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CONTRACTORS ASSOCIATION

# THE Contractor

TRINIDAD & TOBAGO

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## INSIDE THE FIDIC 'RAINBOW':

### Choosing The Right Contract For Your Project

## THE HIDDEN PHYSICS OF GROUND ENGAGEMENT TOOLS:

### How Tooth And Edge Geometry Drives Productivity And Fuel Efficiency In Heavy Earthmoving Machines

### BUILDING SAFER SKYLINES:

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### CLEARING THE GROUND:

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### BUILDING TRUST:

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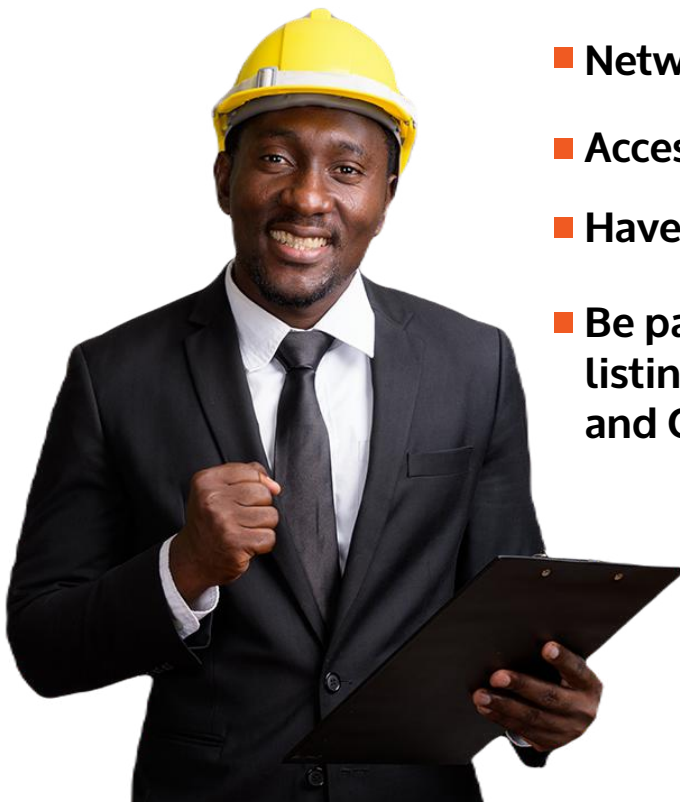
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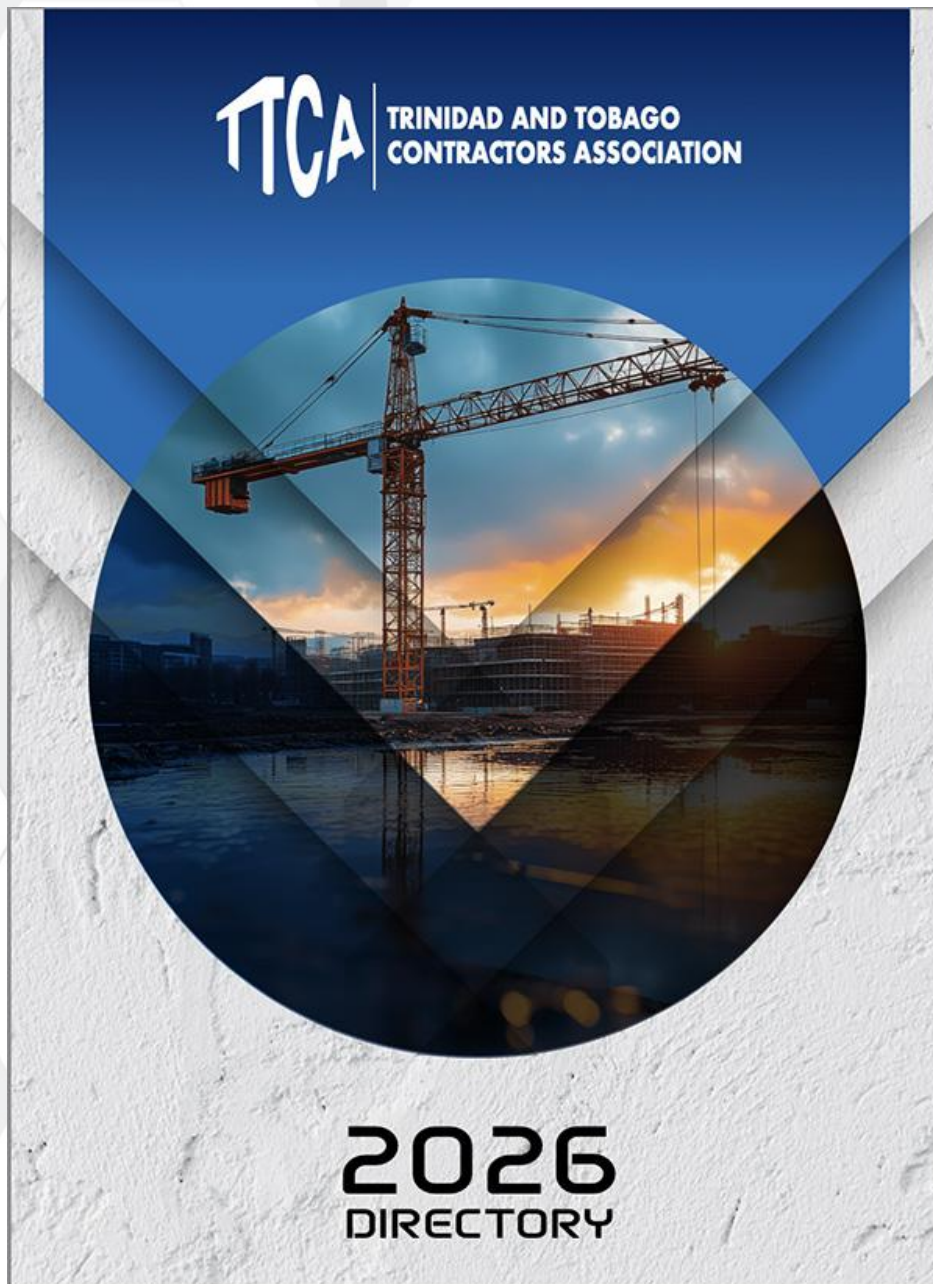
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# PRESIDENT'S MESSAGE



**Rajiv Coosal**  
TTCA President

The contractors of Trinidad and Tobago can reflect on years marked by progress, resilience, and shared purpose. Together, we have navigated challenges, embraced opportunities, and strengthened the foundation of our Industry through collaboration and dedication.

Our industry plays a crucial role in infrastructural development for our Nation and is one of the strongest pillars of our economy. We are classified as essential, particularly during recessions or financial crises, pandemics, geopolitical ebbs and flows.

Construction and infrastructure works - road works connects our communities, bridges, general maintenance, repairs, retrofitting of existing buildings, affordable housing, to name a few, are mainstays for Nation building. This ensures stability, security, and economic development.

Infrastructure development is used as economic stimulus; fosters trust between citizens; has a strong multiplier effect and creates wide ripple effects, as it sustains several industries. While the demand slows at times, it never fully disappears.

When there are disruptions, countless stakeholders and livelihoods are affected. Supply chains; transport and logistics, engineering, and support services. The construction sector's resilience in challenging times comes from a mix of structural demand, adaptability, and policy support - but it is not automatic.

Project types are cyclical as dynamics change with the ebbs and flows of the industry in a continuum of infrastructure and public works; private real estate; renovation and refurbishments; cost and efficiency innovations. Over the decades, foundations for expansion have been well positioned by stakeholders in our sector.

Whilst we adapt under pressure, those conditions are not sustainable, in the long term. Construction is vulnerable to rising material and energy costs; labour shortages and skills gaps; delayed payments and cash-flow anxieties. The industry is not immune to crises and in difficult times, often forced to shift from growth-driven targets to stability-driven measures.

Public works projects provide stability when private investment slows. The sector provides employment to a large number of workers. Central governments throughout the

World frequently use it as a counter-cyclical tool during downturns. Efficiency is a survival skill and sustainability as a resilience driver. Our sector supports countless families and drives activity across multiple sectors.

There is a constant push for smarter operations, lean construction methods, better supply-chain planning, energy-efficiency upgrades, green construction - energy-efficient buildings reduce lifecycle costs. Climate-resilient infrastructure attracts long-term investment.

There is greater demand for quality infrastructure, sustainable building practices, and inclusive development that benefits all communities - urban and rural alike. Meeting these expectations requires a cohesive effort.

The impetus is for us to play an even greater role for the survival of the industry. Together, we will continue to deliver infrastructure that is resilient, sustainable, and praiseworthy for generations to come. We have seen visions turn into action, plans into progress and designs internationally recognized. We must recognize and reinforce good practice.

We are committed to creating a fair, transparent, and predictable environment in which contractors can operate and grow. We will strive to improve procurement processes, spotlight payment timelines, strengthen safety and regulatory frameworks. Critically important, we will demand local contractors are given meaningful opportunities to compete and lead.

Partnership built on trust, transparency, and mutual respect between Government and the contracting community is fundamental. Support for local capacity building is the assurance of national development and structural advantages must not have a place in the determination of outcomes. Success must depend on merit rather than unfair, built-in advantage.

I would like to highlight, this administration recognizes and values the expertise, innovation, and practical knowledge our contractors bring to the table. Policies are strongest when

they are informed by those who work on the ground.

As leaders in this industry, we must continue to raise the bar and take the lid of our perceived capacity. Embrace innovation, digitization and technology, invest in training and skills development, uphold the highest ethical standard. Safety on every site is the rule and not an exception. Public trust is built through consistency, accountability, and quality — and that trust is one of our most valuable national assets.

Our people matter. Behind every project are engineers, specialists, technicians, foremen, labourers, support staff, and workers who give their time, strength, and skill — often in difficult conditions. Their safety, dignity, and well-being are paramount.

The commitment of our members, partners and staff is commendable, and I am deeply grateful for the time, expertise, and energy you contribute. Your engagement, professionalism, and belief in the responsibilities of the Industry continue to drive our success and inspire meaningful impact.

Looking ahead, we remain focused on growth, innovation, and service. With clear vision and a strong sense of community, we are well positioned to build on our achievements and meet the demands of all clients, with confidence and optimism.

I thank the Contractors Association for its leadership and continued collaboration. I look forward to collaborating with you as we build not just projects, but a stronger, more resilient, and more prosperous Trinidad and Tobago.

*May our commitment continue to grow from strength to strength. Thank you for your continued trust and support.*

# INSIDE THE FIDIC “RAINBOW”

## CHOOSING THE RIGHT CONTRACT FOR YOUR PROJECT

ARTICLE BY: ESM CONTENT TEAM

FIDIC SERIES: PART ONE

Walk into any major tender briefing for an infrastructure job in Trinidad and Tobago today and chances are, those familiar words leap off the documents: “FIDIC Red Book,” “FIDIC Yellow Book,” or “FIDIC Silver Book”. For contractors, engineers, and consultants, these names signal not just international standards, but a level of contractual discipline that can make or break a project’s bottom line. Understanding what lies inside the so-called FIDIC “Rainbow Suite”—and what it means for risk, responsibility, and payment—is no longer just the realm of lawyers or multinational contractors. It’s increasingly essential knowledge for construction professionals throughout the Caribbean.

### WHAT IS FIDIC—AND WHY DOES IT MATTER?

The International Federation of Consulting Engineers, known globally by its French acronym FIDIC, has set the benchmark for construction contract forms for decades. Founded in 1913 as a professional association for consulting engineers, FIDIC is now best known for its suite of standard conditions of contract used on complex projects around the world. These contracts matter because they provide a clear, structured framework for assigning roles, payment, time, and—crucially—risk between the parties.



When international funding or overseas designers are involved, FIDIC forms are very often the starting point. Their structure, written in straightforward English and tested repeatedly in arbitrations and courts, offers a familiar language for employers, contractors and engineers. This is why the World Bank, Inter-American Development Bank, Caribbean Development Bank and other multilateral lenders have adopted FIDIC contracts in their standard bidding documents for works they help finance—including projects right here in the Caribbean.

### **DECODING THE “RAINBOW SUITE”—RED, YELLOW, SILVER**

So what is the “FIDIC Rainbow Suite” everyone talks about? The term usually refers to three flagship contracts, each published with a distinctively coloured cover:

#### **RED BOOK – CONDITIONS OF CONTRACT FOR CONSTRUCTION**

Typically used where the employer provides the design and the contractor builds to that design.

#### **YELLOW BOOK – CONDITIONS OF CONTRACT FOR PLANT AND DESIGN-BUILD**

Used where the contractor is responsible for both design and construction.

#### **SILVER BOOK – CONDITIONS OF CONTRACT FOR EPC/TURNKEY PROJECTS**

Aimed at EPC/turnkey arrangements where the contractor takes on extensive risk and hands over a complete, operating facility.

There are other forms—Green (Short Form), the Blue-Green Dredgers Contract for dredging and reclamation works, the Gold Book for long-term design-build-operate projects, and more—but in day-to-day Caribbean building

and infrastructure practice, the spotlight usually falls on the big three.

The widely used 1999 editions of Red, Yellow and Silver were followed in 2017 by updated second editions, which maintained each book's essential purpose while adding more detailed provisions on contract administration, claims and dispute avoidance. The underlying philosophy of who does what—and who carries which risks—remains the backbone of the Rainbow Suite.

### **HOW DID FIDIC CONTRACTS BECOME A GLOBAL STANDARD?**

FIDIC contracts did not become influential by accident. Multilateral development banks needed a neutral, tested basis for delivering multi-million-dollar projects across many jurisdictions. FIDIC's standard forms offered exactly that: a familiar structure, a reasonably balanced allocation of risk, and procedures that could be understood and applied by teams from different countries and legal systems.

As those MDB-funded projects multiplied, national governments and private developers around the world increasingly adopted FIDIC's logic—sometimes using the books directly, sometimes adapting them with their own Particular Conditions. For Caribbean contractors, this trend means that understanding the Rainbow Suite is now part of the basic toolkit for serious participation in regional and international work.

### **CHOOSING THE RIGHT FIDIC BOOK—THE BIG STRATEGIC CHOICE**

Before parties start worrying about the fine print (liquidated damages, extensions of time, or insurance), the first and most important decision is simply: which FIDIC book fits this project? That strategic choice shapes everything that

follows—from design responsibility and risk allocation to payment structure and the day-to-day mechanics of contract administration.

### **THE RED BOOK: FOR EMPLOYER-DESIGNED CONSTRUCTION**

The Red Book is the natural choice where the employer (or their consulting engineers) provides the detailed design and the contractor is engaged to construct in accordance with that design. Think of a government building, a public road improvement, or typical civil and structural works. The Red Book assumes that the design risk sits primarily with the employer, while the contractor's core role is to execute the works to the specified standards.

Payment is usually based on measured quantities—bills of quantities, measurement on site, and payment for the work actually done. That “re-measurement” character is one of Red's defining features. While risk is not dumped entirely on one party, the employer carries responsibility for design quality and completeness; the contractor carries the risk of executing efficiently to that design.

Another key feature under the Red Book is the presence of an independent Engineer, appointed by the employer, who administers the contract—issuing instructions, certifying payments, and making determinations on time and money. For many contractors, understanding the Engineer's role is just as important as understanding the employer's.

### **THE YELLOW BOOK: DESIGN-BUILD AND PLANT CONTRACTS**

When the contractor is expected to both design and build the works, the Yellow Book comes into play. This is common for water and wastewater treatment plants, complex building systems,



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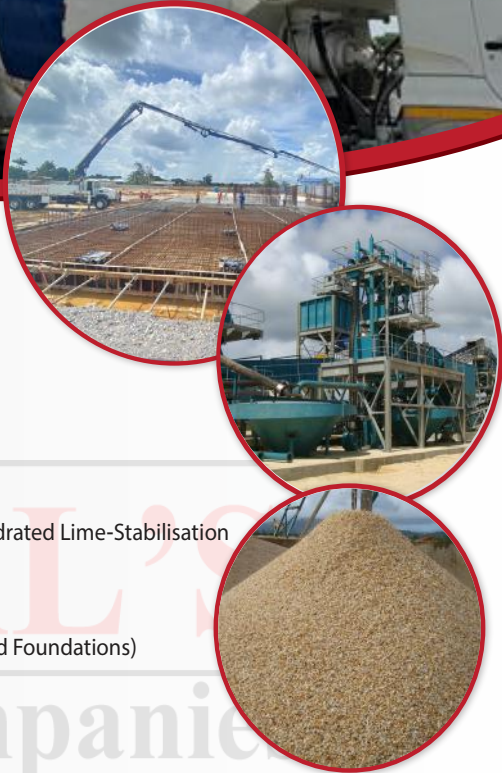
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specialist facilities or “design and build” packages where the employer wants a single point of responsibility from concept to completion.

Under the Yellow Book, the contractor takes on design responsibility and is typically paid on a lump sum basis. The employer defines performance requirements and key outputs rather than detailed drawings for every element. The contractor then manages design, procurement and construction, coordinating specialist designers and suppliers.

The risk profile shifts: the contractor now carries design risk and the responsibility for meeting performance criteria. At the same time, there is more room for innovation and value engineering, because the party that builds is also the party that designs.

## **THE SILVER BOOK: EPC/TURNKEY MEGA-PROJECTS**

At the high-risk, high-commitment end of the spectrum is the Silver Book, designed for EPC/turnkey projects such as power plants, industrial facilities, major processing plants or complex infrastructure nodes. Here, the employer’s primary concern is usually certainty of time and cost, and the contractor is expected to deliver a complete, functioning facility on a fixed-price, fixed-time basis.

Under the Silver Book, the contractor assumes a very wide range of risks—design, coordination, many site and interface risks, and the integration of all components into an operating whole. Prices tend to be higher because contractors factor in this greater risk, and the contractor’s exposure to unforeseen events is significantly greater than under Red or Yellow, subject to carefully defined exceptions.

Silver also differs in its administrative flavour: it often involves more direct employer control and relatively less emphasis on an independent Engineer acting as a buffer. For

contractors, this means that what is signed at the outset is critical; there is less room to rely on a neutral contract administrator to “smooth out” the rough edges later.

## **PRACTICAL DECISION-MAKING—CHOOSING YOUR COLOUR**

So how does a Caribbean contractor or employer actually decide which FIDIC contract to pick? A few practical questions go a long way:

### **WHO IS DOING THE DESIGN?**

If the employer holds the pen on design, the Red Book is usually the natural starting point. If the contractor is expected to design and build, you are in Yellow or Silver territory.

### **HOW MUCH RISK IS THE EMPLOYER TRYING TO PASS DOWN?**

The more fixed-price, fixed-time certainty the employer demands, the more the balance nudges towards Silver—and the more the contractor must price and manage that risk.

### **HOW COMPLEX IS THE PROJECT?**

A fairly standard office building or road improvement may sit comfortably in Red, especially with strong employer design support. A water treatment plant with sophisticated process engineering will often push the discussion towards Yellow. A new power station or port facility financed on tight international terms may well come wrapped in Silver.

### **IS A MULTILATERAL DEVELOPMENT BANK INVOLVED?**

Many MDBs use harmonised FIDIC-based documents—often built on the Red or Yellow Books—as their standard. On bank-financed works, the tender documents may not be a pure FIDIC form, but FIDIC will be sitting just below the surface.

## **GUIDING EXAMPLES**

A Ministry tender for a coastal road improvement, complete with detailed engineer’s

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drawings and specifications, will typically be based on the Red Book model—even if Particular Conditions adapt certain clauses.

A local developer who wants a modern, energy-efficient apartment complex designed and built under a single contract might turn to the Yellow Book logic, engaging a contractor to take responsibility for both design and construction against defined performance criteria.

When a financier backs a major new power plant and insists on a single point of responsibility for design, procurement, construction and performance tests, the Silver Book—or a Silver-based form—is likely to be at the centre of the discussion.

### **LOOKING AHEAD—GETTING RISK RIGHT FROM THE START**

The “Rainbow Suite” isn’t just decorative branding in a tender document. Choosing the right FIDIC form at the very beginning decides who manages which risks, how money flows, how time and variations are handled, and how disagreements are escalated and resolved. For contractors and employers in Trinidad and Tobago, getting that first choice right is often the difference between a workable project and one that spends its life fighting itself.

**PART 2 OF THIS SERIES WILL DIVE DEEPER INTO HOW RISK IS ACTUALLY ALLOCATED ACROSS THE RED, YELLOW AND SILVER BOOKS—AND WHY THAT RISK MAP SHOULD GUIDE PRICING, NEGOTIATION STRATEGY AND PROJECT MANAGEMENT FROM DAY ONE.**





In the construction and mining sectors across Trinidad and Tobago, the true performance determinant of excavators, dozers, graders, and loaders is rarely understood by operators and fleet managers: the ground engagement tools (GET)—the teeth, blades, edges, and cutting surfaces that directly contact the earth. These components represent the crucial interface between machine and material, yet their geometric design, metallurgical properties, and wear patterns exert profound effects on fuel consumption, equipment longevity, cycle times, operator comfort, and total cost of ownership. Understanding the physics embedded in tooth angle, edge curvature, material composition, and wear dynamics unlocks a hidden layer of operational efficiency that separates high-performing fleets from those hemorrhaging fuel and maintenance costs.

# THE PHYSICS OF GROUND ENGAGEMENT TOOLS:

## How Edge Geometry Drives Performance and Fuel Efficiency in Working Machines



## THE MECHANICS OF CUTTING RESISTANCE AND FUEL CONSUMPTION

At the most fundamental level, the interaction between a tooth or blade and soil, rock, or compacted material involves a contest between applied force and material resistance. This resistance is not constant—it scales directly with the geometry of the cutting surface and how that surface is presented to the material being excavated.

Research on cutting mechanics demonstrates a critical principle: cutting force decreases dramatically with increased rake angle (the angle at which the cutting surface slopes backward from the point of contact). In material science studies on cutting processes, higher rake angles reduce the energy required to sever or displace material, directly translating to lower fuel consumption for the same excavation task. For bucket teeth and blade edges, this principle manifests as the difference between a sharp, well-angled tooth and a blunt, rounded one.

When a bucket tooth or blade edge becomes worn, its geometry degrades from a precisely engineered point or edge into a rounded, flattened surface. This seemingly small change has outsized consequences. The worn edge no longer cuts the material cleanly; instead, it compresses and drags it, creating substantially higher resistance to penetration. Operators and engineers at jobsites have long observed that machinery with worn teeth requires more passes to move the same volume of material,

but the underlying cause is this increased cutting resistance. The engine must deliver more horsepower to achieve the same penetration depth, burning more fuel in the process. Field data confirms that running equipment with dull or rounded excavator cutting edges significantly impacts productivity, with worn edges requiring more force to penetrate materials, which increases fuel usage, slows down cycle times, and puts added strain on the hydraulic system.

The relationship between tooth angle and penetration resistance is not linear. Studies on roadheader cutting heads—equipment that shares fundamental physics with bucket tooth systems—reveal that cutting resistance decreases gradually with increasing cutting angle. In hard abrasive materials, optimal performance often emerges when the cutting angle exceeds 50 degrees. Below the critical threshold for a given material, resistance rises sharply—a phenomenon well-understood in tribology but often overlooked in GET design selection.

The practical implication for fleet managers in Trinidad and Tobago is immediate: selecting the correct tooth profile for the specific material type (sand, clay, coral limestone, compacted gravel) directly dictates fuel burn per cubic meter moved.

## CONTACT SURFACE AREA AND HYDRAULIC SYSTEM STRESS

A second and equally important mechanism connects GET geometry to machine stress: the contact area between the tooth/blade



and material. Larger contact surfaces create higher stress on the entire system because more material interfaces with the tooth simultaneously, increasing total resistance.

The contact surface can be increased by three mechanisms: the specific GET selected, allowing GET to exceed 100% wear (the point at which the geometry has degraded beyond its engineered specifications), or the angle at which the GET is presented to the material. For loaders and graders, this translates directly into operator technique—a loader bucket held at too shallow an angle to the material will create excessive bucket-to-ground contact, increasing drag and fuel consumption. The larger the contact surface, the more stress is introduced to the hydraulic, structural, and drive systems. This increased resistance requires the machine to work harder, resulting in more horsepower demand, higher fuel burn, increased time to

move material, and inefficient overall contact.

Critically, this stress is not just mechanical; it is transmitted through hydraulic cylinders, pins, bushings, and welds to components never designed for that load level. Worn or damaged teeth strain the excavator arm and hydraulic system because the machine must apply greater forces to achieve the same digging task. Over time, this cumulative overload accelerates wear in secondary components. Pins connecting teeth to adapters experience grinding wear, abrasive wear, and bonded wear as the system fights against increased cutting resistance. Bushings in the stick and boom deteriorate faster. Welds at the base of buckets experience greater stress concentration. What begins as worn teeth becomes a cascading failure pattern that ultimately drives down equipment availability and inflates maintenance budgets.



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The design of modern GET systems addresses this through careful geometry optimization. For example, premium GET feature designs with 30% more wear material but 25% less cross-sectional area, allowing the tooth to self-sharpen as it wears while maintaining penetration capability. This geometry distributes forces more evenly and reduces peak stress concentrations that would otherwise damage pins and bushings.

## WEAR MECHANISMS AND MATERIAL SCIENCE FOUNDATIONS

The physics of wear on GET is not uniform; it follows distinct mechanical processes, each driven by different environmental and design factors. Understanding these mechanisms reveals why seemingly small changes in material selection and tooth design produce outsized improvements in wear life and total cost of ownership.

Abrasive wear represents the dominant failure mode in excavators and loaders, accounting for more than 70% of observed wear in bucket teeth. This occurs when particles of sand, gravel, or rock slide across the tooth surface under pressure, gradually eroding the base material. The rate of abrasive wear depends on particle hardness, loading force, sliding distance, and the hardness of the tooth material itself—all factors an operator and machine designer can influence.

Two-body abrasive wear occurs as the bucket cuts into soil and rock; the material directly contacts the tooth, creating a wear surface. As the bucket deepens and soil piles up, three-body abrasive wear takes over—fine material rolls along the tooth surface into the bucket, with gravity pulling it down and creating a grinding action. Finally, fretting wear emerges from vibration and cyclic stress as the system bounces during excavation and loading cycles, causing micro-movements at contact points that gradually degrade the metal.

Beyond abrasion, impact wear and adhesive wear present secondary failure modes. Impact wear results when the bucket teeth strike hidden hard surfaces—rocks, embedded foundations, concrete—transferring kinetic energy as a shock load that can chip, crack, or fracture the tooth. Adhesive wear occurs when two surfaces come into contact and experience relative motion under such high pressure that

microscopic welding and tearing of material occur at the contact points, leading to surface damage and eventual failure.

The material composition of GET directly influences which wear mechanism dominates. Traditional bucket teeth are manufactured from alloy steel—base steel alloyed with elements like manganese, chromium, and molybdenum to enhance specific properties. Manganese improves toughness (resistance to fracture), while chromium increases wear resistance. However, there is a fundamental trade-off: extremely hard materials can become brittle and prone to chipping or breaking if they lack sufficient toughness to absorb shock loads. This explains why excavators operating in quarries with extreme impact loads may perform better with slightly softer, tougher teeth rather than maximum-hardness designs, while those working in abrasive sand may benefit from higher-hardness materials.

While Titanium Carbide (Ti Carbide) offers superior hardness, stiffness, and weight reduction compared to standard alloy steels, it is typically used as a reinforcement or coating rather than a bulk material due to its

brittleness. Theoretical analysis suggests that TiC-reinforced composites could offer higher stiffness and reduced weight compared to stainless or AISI-1045 steel. Such weight reduction would carry secondary benefits: a lighter tooth allows the bucket to be held at more precise angles, reducing non-productive ground contact and improving fuel efficiency.

### **SELF-SHARPENING GEOMETRY AND CONTROLLED WEAR**

Nature has engineered an elegant solution to the wear problem: self-sharpening structures that maintain cutting edges through controlled degradation. Sea urchin teeth, which endure millions of chewing cycles against rocks and shells, employ a microstructure where the outer “stone” layer undergoes selective material chipping that preserves sharpness rather than dulling the edge, while internal growth compensates for material loss over the animal’s lifetime. Modern GET designers have begun applying these principles.

**Premium GET designs incorporate self-sharpening geometry—typically achieved through carefully engineered microstructure gradients where harder outer layers fracture in a controlled manner to maintain sharpness as the tooth wears. A self-sharpening tooth explicitly targets high-abrasion environments such as quarries, where standard teeth would dull rapidly and require frequent replacement.**





The advantage is profound: a self-sharpening tooth maintains penetration efficiency across a longer wear period, reducing the number of replacement cycles and, critically, sustaining fuel efficiency longer into the tooth's service life.

For motor grader blades, tungsten carbide inserts achieve a similar effect. Tungsten carbide tiles, brazed or bonded to a steel backing, are arranged so that as the blade wears, the trapezoid-shaped carbide tiles create a continuously refreshed cutting edge that stays sharp as the steel backing wears down. This design extends blade life to 10 times that of conventional steel blades in suitable applications, while maintaining the low fuel consumption associated with a sharp edge.

## ANGLE, SPEED, AND THE OPERATOR'S ROLE

The geometric angle at which a GET contacts material is not fixed by the machine design alone; operator technique introduces a critical variable. For excavators, the optimal digging sequence involves entering the bucket face squarely, positioning the teeth at approximately 40 degrees downward, then raising the boom and curling the bucket through the material. This technique maximizes tooth contact

with material and minimizes non-productive bucket contact with the ground—every inch the bucket body touches the earth represents wasted energy and accelerated wear on surfaces never designed to be work tools.

**More contact equals more wear and more resistance; minimizing non-productive contact is the principle that separates efficient operations from wasteful ones.**

**Operators who internalize this principle and consistently apply it report 20-30% improvements in cycle times and fuel consumption compared to those using drag-heavy techniques. This benefit compounds daily: over a year, the difference in fuel expenditure alone justifies intensive operator training programs.**

For graders, the cutting angle presents a comparable optimization problem. Maintaining

a fixed angle (typically 90 degrees to the road for maximum penetration) ensures constant edge thickness and predictable wear patterns. Constantly pitching the blade forward and backward accelerates wear by rounding off the cutting edge, reducing penetration and forcing more passes to achieve the same grading quality. Conversely, operating at speeds below 6 miles per hour (8 kph) with properly angled edges permits smooth grading without inducing vibration-induced edge damage or slivering. Premium grader systems achieve a 55-70 degree cutting angle that penetrates material like a razor blade rather than dragging dirt, enabling single-pass grading that would otherwise require two or three passes with conventional blades—a 35% efficiency improvement with dramatically reduced operator fatigue.

## **OPERATOR FATIGUE AS A PERFORMANCE METRIC**

Operator fatigue merits explicit recognition as a hard, measurable impact on productivity and cost. When GET are worn or poorly matched to material conditions, the machine becomes difficult to operate—it resists movement, bounces unpredictably, vibrates excessively, and requires high hydraulic pressures to achieve basic tasks. Operators fighting a machine develop fatigue rapidly, leading to slower cycle times, reduced focus, and higher accident risk.

Conversely, equipment outfitted with sharp, properly engineered GET performs smoothly. The bucket penetrates cleanly rather than chattering. The grader blade cuts crisply rather than dragging and bouncing. The loader scoop fills efficiently rather than requiring multiple passes. Operators report dramatically lower fatigue levels and greater control. Well-maintained GET directly lead to improved cutting, digging, and grading performance with increased output

and reduced operator fatigue. This is not merely ergonomic comfort; it translates to measurable productivity gains and fewer safety incidents.

## **TOTAL COST OF OWNERSHIP: THE ACCUMULATION OF SMALL EFFICIENCIES**

The microeconomic case for premium GET design and careful maintenance discipline emerges when total cost of ownership (TCO) is properly calculated. TCO encompasses purchase price, fuel costs, maintenance costs, repair costs, insurance, and resale value—but the relationship between these components is non-linear. A small improvement in fuel efficiency, repeated across thousands of operating hours, compounds into substantial savings.

**For a typical 5-ton excavator operating 1,000 hours annually, fuel consumption at current Trinidad and Tobago diesel prices (4.41 TTD) translates to roughly 45,000–53,000 TTD in annual fuel costs. An improvement of 10–15% TTD in annual fuel costs. An improvement of 4,500–7,500 TTD in direct annual savings—money that flows to the bottom line without requiring capital investment. Over a 10 year equipment life this compounds to 45,000–75,000 TTD in fuel savings alone for just one small machine.**

Simultaneously, optimized GET reduce wear on secondary components. By minimizing shock

loads on pins, bushings, and welds through improved cutting geometry, the interval until major repair cycles extends. Pin wear progresses in three stages: grinding wear (initial), abrasive wear (middle), and bonded wear (failure). When cutting forces are properly distributed, the progression through these stages slows. A fleet operating optimized equipment may extend intervals between major hydraulic renovations by 20-40%, saving tens of thousands of dollars over equipment life.

Wear part costs themselves reflect significant economies. A typical high-quality tooth replacement cost in T&T ranges from 400–1,200 TTD per tooth depending on material and design. Replacing teeth across a 10-machine fleet can cost 100,000–280,000 TTD annually. However, when premium GET designs extend tooth life by 30%, the replacement frequency declines, reducing annual costs by tens of thousands of dollars while simultaneously reducing labor costs associated with downtime. The higher upfront cost of premium teeth (often 20-30% more expensive) is typically recouped in 12-18 months when combined with fuel savings.

## APPLICATION-SPECIFIC GET SELECTION IN TRINIDAD AND TOBAGO

For a Trinidad and Tobago construction company operating a mixed fleet of 5 excavators, 3 dozers, and 4 graders, the annual operational impact of GET optimization is substantial. Assuming an annual operation of 1,200 hours per machine:



### ANNUAL BASELINE OPERATING COSTS (ESTIMATED TTD):

- **ANNUAL FUEL COSTS: ~\$400,000 TTD**
- **ANNUAL WEAR PARTS COSTS: ~\$180,000 TTD**
- **ANNUAL MAINTENANCE COSTS: ~\$250,000 TTD**
- **TOTAL ANNUAL OPERATING COST: ~\$830,000 TTD**

### WITH 15% FUEL EFFICIENCY, 25% PART LIFE EXTENSION, AND 20% MAINTENANCE REDUCTION:

- **ANNUAL FUEL COSTS (OPTIMIZED): ~\$340,000 TTD (SAVINGS: \$60,000)**
- **ANNUAL WEAR PARTS (OPTIMIZED): ~\$135,000 TTD (SAVINGS: \$45,000)**
- **ANNUAL MAINTENANCE (OPTIMIZED): ~\$200,000 TTD (SAVINGS: \$50,000)**
- **TOTAL ANNUAL SAVINGS: ~\$155,000 TTD**



These savings compound over the 8-10 year expected life of heavy equipment, delivering 1.2M–1.5M TTD in cumulative operational savings—often matching the upfront capital cost of a new machine.

The construction and quarrying environment in Trinidad and Tobago presents specific material conditions that demand tailored GET selection. The region's geology features coral limestone, weathered volcanic soils, and alluvial deposits of sand and gravel. Road construction projects encounter compacted clay and laterite. Quarrying operations face hard, abrasive stone.

For excavators working in coral limestone and rock quarries, rock bucket teeth with reinforced tips and sharper profiles enhance penetration and break through tough materials. For general construction in mixed soil conditions, traditional chisel-shaped teeth like T5 designs offer a balance of penetration and wear resistance. For wheel loaders moving aggregates, flared bucket teeth optimize for material volume rather than precision. For dozers and graders, a 45-degree beveled edge penetrates harder materials more effectively than a straight edge, while serrated edges are ideal for the packed gravel and compacted clay bases common in local roadworks.

## MAINTENANCE DISCIPLINE AND WEAR PATTERN ANALYSIS

Proper management of GET demands systematic maintenance: monitoring wear patterns,

rotating components, and replacing them at the optimal time—not too early (wasting material) and not too late (damaging the machine).

Wear patterns are diagnostic tools. Uneven wear on one side of a bucket indicates lateral loading from consistently angled digging—a habit corrected through operator retraining. For grader blades, rotating them ensures even wear, extending blade life to 200% of conventional designs.

## CONCLUSION: PHYSICS AS COMPETITIVE ADVANTAGE

The physics embedded in ground engagement tools—cutting resistance, contact area mechanics, wear progression, shock load distribution, and operator-machine interaction—represents a hidden but profound determinant of equipment performance and operational cost. For construction and mining companies operating in Trinidad and Tobago, where fuel costs are a significant overhead and equipment utilization is intense, the systematic application of GET optimization principles offers a direct path to competitive advantage.

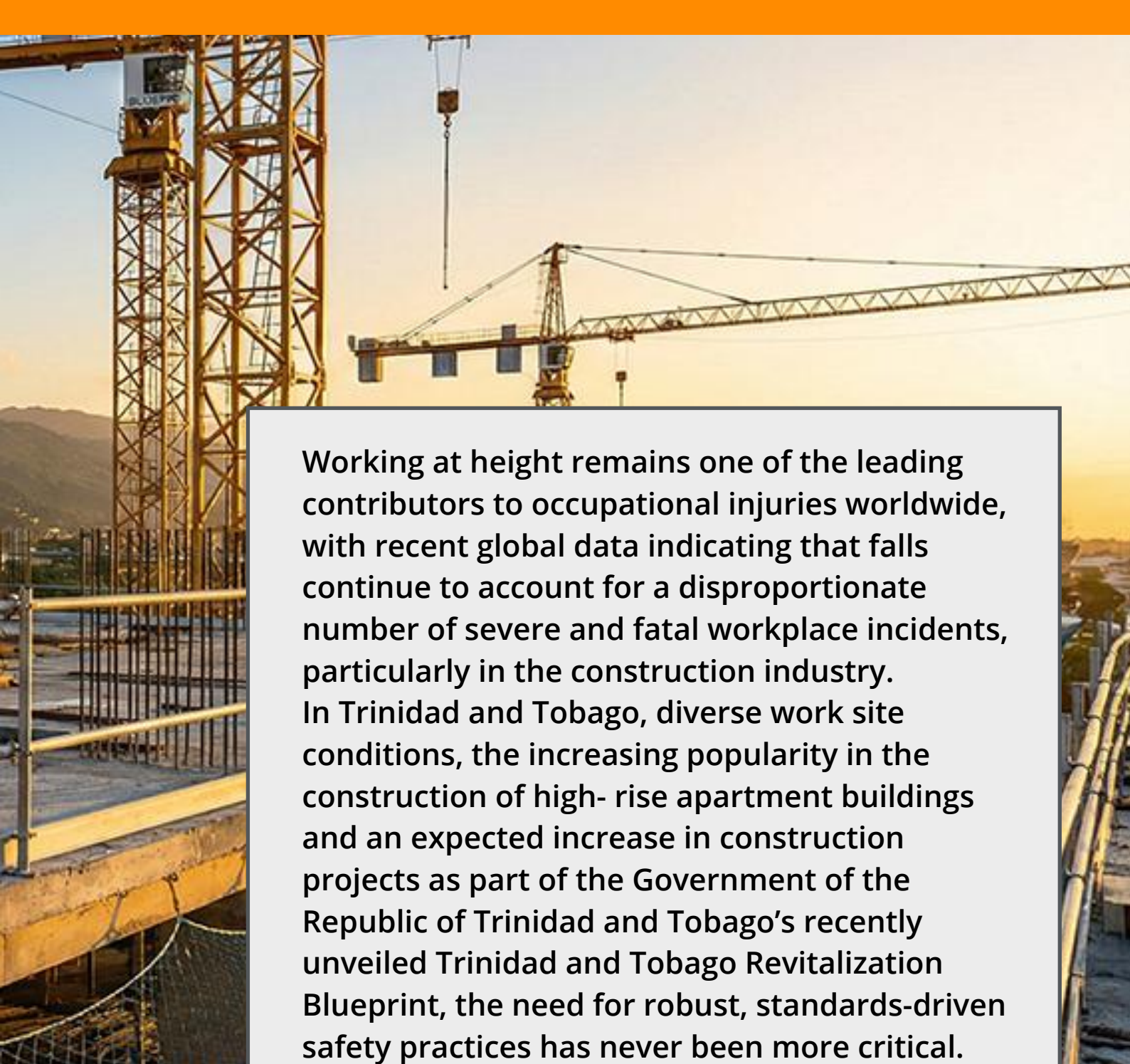
The evidence is clear: selecting GET matched to specific material conditions and training operators in proper technique deliver 15-25% fuel improvements and 25-40% extensions in part life. The investment required is modest—operator training and premium GET selection cost a fraction of the hundreds of thousands of dollars in savings they generate. For a fleet manager, the answer is embedded in the physics: every degree of tooth angle and every millimeter of wear progression compounds into a measurable, substantial competitive advantage.

*The cost estimates in this article are approximate retail ranges that vary by supplier, brand, alloy, and machine size.*



# **BUILDING SAFER SKYLINES: THE CRITICAL ROLE OF STANDARDS IN WORK-AT-HEIGHT SAFETY**

**ARTICLE BY: ANDIA PERSAD-MAHARAJ/TTBS**



Working at height remains one of the leading contributors to occupational injuries worldwide, with recent global data indicating that falls continue to account for a disproportionate number of severe and fatal workplace incidents, particularly in the construction industry. In Trinidad and Tobago, diverse work site conditions, the increasing popularity in the construction of high-rise apartment buildings and an expected increase in construction projects as part of the Government of the Republic of Trinidad and Tobago's recently unveiled Trinidad and Tobago Revitalization Blueprint, the need for robust, standards-driven safety practices has never been more critical. This article examines emerging international trends in work-at-height accidents, explores the practical guidance outlined in TTS 623:2011, Requirements for working at heights, and highlights the often-underestimated physical, psychological, and financial repercussions of such incidents. Together, these insights underscore the essential role of safety standards in reducing risk and strengthening organizational resilience.

## GLOBAL TRENDS IN WORK FROM HEIGHT INJURIES

Ms Kelly Nicoll, the then President of the Institution of Occupational Safety and Health (IOSH) prioritized working at height as a theme for her 2024/2025 presidential term. Ms Nicoll recounted “Working at height is one of the biggest causes of death and significant injury across the world. Some of the worst incidents I have ever dealt with during my career have involved falls from heights, and the impact of those incidents has followed me ever since.”

Ms Nicoll’s sentiments are echoed in global trends and statistics on work at heights incidents, as highlighted in Table 1:



Table 1: Global Work at Height Statistics and trends

Country	Work at Height Statistics
Abu Dhabi	Falls from heights and falling objects are the leading cause of fatal injuries on worksites in this country <sup>1</sup>
Australia	Fall injuries are estimated to have cost the Australian health care system 4.7 billion dollars for the period 2020-2021 <sup>1</sup>
United Kingdom	The total cost of workplace falls in the United Kingdom for the period 2022/2023 was estimated to be over £847 million. This includes costs to the employer, individual, government tax losses and benefit payments <sup>1</sup>
United States of America	The construction industry in the USA experiences over 300 fatal and 20,000 non-fatal fall related injuries per year <sup>1</sup>

[Source: Institution of Occupational Safety and Health. (n.d.). Working at height: Don’t fall silent. <https://iosh.com/about/campaigns/working-at-height>]



Table 2: Working at height accident statistics in Trinidad and Tobago over the period 2022-2025

In Trinidad and Tobago, over three year period 2022-2025, our country experienced 88 accidents related to working at heights. Details on the type and nature of these 88 accidents are provided in Table 2.

*[Source: The Occupational Health and Safety Agency, Trinidad and Tobago, Working from heights data 2022-2025 (2025)]*

Work at Height Accidents by Severity (2022 - 2025)				
	Critical	Fatal	Non-Critical	Total
<b>Count of Severity</b>	22	3	63	88

Work at Height Accidents by Year					
	2022	2023	2024	2025	Total
<b>Number of accidents per year</b>	19	17	27	25	88

Work at Height Accidents by Year and Severity				
	2022	2023	2024	2025
<b>Critical</b>	6	3	7	6
<b>Fatal</b>	0	1	0	2
<b>Non-Critical</b>	13	13	20	17
<b>Total</b>	19	17	27	25

## UNDERSTANDING THE TRUE IMPACT OF WORK FROM HEIGHT INJURIES

Falls from heights can have a multi-layered impact on injured persons, affecting their physical, psychological, and financial well-being:

### PHYSICAL

Workers falling from heights or workers injured by objects falling from heights may sustain physical injuries, such as fractures, spinal cord injuries and head trauma. In some cases, severe orthopaedic and spinal injuries can lead to chronic pain and long term pain conditions.

### PSYCHOLOGICAL

Injured workers and even workers who were nearly injured may experience anxiety, difficulty sleeping and flashback trauma. Chronic pain and a long recovery process can also negatively impact the mental health of affected workers and their families.

### FINANCIAL

There are significant costs associated with workplace injury for both employees and employers. Such costs include, medical costs, lost wages and legal fees.

## PROMOTING SAFER WORKPLACES WITH STANDARDS

Occupational health and safety standards play a crucial role in protecting workers by providing a clear framework for identifying, managing, and mitigating risks in the workplace. Standards, developed through a multi-stakeholder consensus based approach, establish requirements for safe practices, equipment use, training, and emergency preparedness, thereby helping organizations create safer environments and improve their occupational health and safety performance.

TTS 623:2011, Requirements for work at height is a voluntary National Standard, which provides a foundation of requirements, practices and

responsibilities for the safe and proper conduct of work at height. The standard is available for use by both local and foreign contractors operating in Trinidad and Tobago.

Key topics covered in this standard include:

- Duties and responsibilities
- Competence
- Avoidance of risks at height
- Selection of work equipment for work at height
- Requirements for work at height
- Equipment for work at height
- Falling objects
- Requirements for fall protection systems
- Anchorage systems
- Rescue procedures
- Audit
- Record-keeping

## EXAMPLES OF WORK FROM HEIGHT SAFETY CONSIDERATIONS PROVIDED IN TTS 623:2011

This section highlights selected safety considerations from TTS 623:2011; however, these examples do not constitute a complete work-at-height safety design. Users should consult TTS 623:2011 in its entirety for full and comprehensive requirements.

### 1.0 SCOPE

TTS 623:2011 establishes health and safety requirements with respect to work at height where there is the risk of a fall from a height of 1.8 metres (6 feet) or more above a lower level. The standard addresses collective fall prevention, working platforms and fall protection. It also covers alternative recognized means of rope and work positioning which can be used by paid instructors or leaders of climbing activities.



## 2.0 DUTIES AND RESPONSIBILITIES

Examples of the duties and responsibilities for various bodies specified in TTS 623:2011 are provided in Table 3.

Table 3: Examples of duties and responsibilities of employers and employees provided in TTS 623:2011

	<b>EMPLOYER</b>	<b>EMPLOYEE</b>
<b>DUTIES AND RESPONSIBILITIES</b>	<ul style="list-style-type: none"> <li>• Provide safe plant and equipment</li> <li>• Provide welfare facilities (e.g. first aid)</li> <li>• Provide training to recognize the hazards associated with the type of work and to understand the procedures to control or minimize those hazards</li> </ul>	<ul style="list-style-type: none"> <li>• Comply with employer’s health and safety instructions</li> <li>• Comply with occupational health and safety policies</li> <li>• Avoid endangering health and safety by alcohol use or drug consumption</li> </ul>

### 3.0 AVOIDANCE OF RISK AT HEIGHTS

TTS 623:2011, requires employers to conduct risk assessments for each work at height job and to ensure that work is not carried out at a height where it is reasonably practicable to carry out the work safely otherwise than at height. In cases, where work from height is unavoidable, the standard also provides guidance on mitigating risks of falling. TTS 623:2011 requires a fall protection hierarchy to be considered when designing fall protection solutions, using the following methods in decreasing order of preference:

- a) elimination or substitution;
- b) passive fall protection;
- c) fall restraint;
- d) fall arrest; and
- e) administrative controls.

NOTE Control measures are not mutually exclusive; there may be occasions or situations when more than one control measure are necessary to reduce the risk of a falls.

### 4.0 REQUIREMENTS FOR WORK AT HEIGHT

TTS 623:2011 provides guidance on the establishment of controlled access zones for leading

edge work and similar operations. For example, controlled access zones used where overhand bricklaying and related work are taking place, shall be defined by a control line erected not less than 3 metres (10 feet) or not more than 4.6 metres (15 feet) from the working edge. Additional control lines shall be erected at each end to enclose the controlled access zone. Only employees, wearing personal fall arrest system, engaged in overhand bricklaying or related work shall be permitted in the controlled access zones.

### 5.0 AUDIT

Organizations implementing TTS 623:2011 shall have a documented audit program to periodically evaluate the performance of its Work at Height safety program, regulatory compliance and the effectiveness of its training and inspection programmes. Elements of the audit programme shall include key performance indicators and targets, these shall be established, communicated and understood by all employees.

Despite advancements in safety management, work at height remains a complex and



persistent hazard, and its impact is often felt long after an incident occurs. Beyond the immediate trauma, injured workers and their employers may face prolonged recovery periods, psychological effects, and significant operational and financial costs. Standards such as TTS 623:2011, Requirements for work from heights, offer organizations a framework for hazard assessment, equipment selection, competency, and safe operating procedures. When these guidelines are consistently applied, companies not only safeguard their employees but also strengthen the reliability and continuity of their operations. Ultimately, integrating TTS 623:2011 into daily practice fosters a strategic advantage of safer, more efficient and reliable operations.

## ABOUT TTBS

The Trinidad & Tobago Bureau of Standards (TTBS) is a body corporate governed by the authority of the Standards Act No. 18 of 1997. TTBS operates under the aegis of the Ministry of Trade, Investment and Tourism. The primary role of TTBS is to develop, promote and enforce standards in order to improve the quality and performance of goods produced or used in the Republic of Trinidad and Tobago. To ensure industrial efficiency and development; promote public and industrial welfare, health and safety; and protect the environment. TTBS' standards development mandate excludes foods, devices, drugs and cosmetics, which fall under the purview of the Ministry of Health.

To learn more about TTS 623:2011, Requirements for work at height visit our website, using the link below:

<https://gottbs.com/product/tts-6232011-requirements-for-work-at-height/>



Andia Persad-Maharaj studied mechanical engineering at the University of the West Indies, St Augustine Campus before proceeding to work in the fast-paced oil industry as a designer for well-head equipment. Passionate about quality and standards her move to the Trinidad and Tobago Bureau of Standards was a natural fit. With over a decade of experience in national and international standards development, Andia manages the National Standards Portfolios for occupational health and safety, risk management, and energy efficiency. Her recent standardization projects at the TTBS include The Trinidad and Tobago Energy Efficiency Building Code and TTS/ISO 31000:2024, Risk management - Guidelines. Andia is the inaugural recipient of the ISO Next Generation Award and ISO Fellowship Programme for her contributions to international standardization. She has served as a guest lecturer on standards and sustainability at the United Nations and University of Geneva, Switzerland.



# CLEARING THE GROUND: What the OPR's 2023–24 Annual Report Reveals About Construction Procurement in Trinidad & Tobago

Procurement and contract awards affecting the construction sector — findings, implications, and practical recommendations.

**ARTICLE BY: VAUGHN I. LEZAMA**

The Office of the Procurement Regulation's (OPR) first Annual Report to Parliament (April 26, 2023 – April 25, 2024) is a milestone for public procurement transparency in Trinidad & Tobago. The report — and contemporaneous public commentary — highlights structural problems that directly affect the construction sector: a substantial value of contract awards that were not subject to fully competitive processes, relatively low advancement of registered suppliers to pre-qualification, uneven compliance by public bodies with the new procurement regime, and ongoing reforms such as the 2024 Simplified Procurement Regulations. These elements together influence market access, competition, price discovery and

ultimately the quality and timeliness of public construction works.

## **WHAT THE ANNUAL REPORT SAYS — HEADLINES THAT MATTER TO CONSTRUCTION**

### **FIRST-YEAR BASELINE AND STATUTORY ROLE.**

The Annual Report establishes the OPR's mandate to monitor compliance with the Public Procurement and Disposal of Public Property Act (as amended) and to publish procurement performance data — purposefully creating a baseline for future comparisons. This matters to construction because public works depend heavily on consistent, monitored procurement processes.



### **LARGE SHARE OF NON-FULLY-COMPETITIVE AWARDS.**

Media coverage of the report highlighted that roughly TT\$5 billion worth of contract awards in the reporting period were not made by fully competitive procurement methods — a red flag for the construction sector where open competition helps ensure value and technical competence. (OPR data and press coverage discuss the figures and the concern they generated.)

### **SUPPLIER/CONTRACTOR REGISTRATION VS. PRE-QUALIFICATION GAP.**

The report and related coverage note that while the registry of suppliers/contractors is large (reported registry numbers in the order

of about 10,794), only a small proportion had advanced to pre-qualification (reported ~1,494), reducing the pool of pre-qualified construction contractors available for higher-value works. That gap constrains real competition for many construction contracts.

### **COMPLIANCE AND CAPACITY VARIABILITY ACROSS PUBLIC BODIES.**

The OPR flagged variable levels of compliance with the Act and supporting instruments among procuring entities. Inconsistent procurement planning, incomplete Annual Schedules of Planned Procurement Activities, and uneven record-keeping were reported — all of which can delay or distort construction contract awards.

## **REGULATORY PROGRESS — SIMPLIFIED PROCUREMENT FRAMEWORK.**

The Government published the Simplified Procurement Regulations (Legal Notice No. 65 of 2024) during the reporting year. These are intended to make low-value procurements more efficient and to clarify procedures for smaller purchases and quotations — an important tool if applied correctly to recurring small-scale construction works and ancillary services.

## **DETAILED OBSERVATIONS AND HOW THEY IMPACT THE CONSTRUCTION SECTOR MARKET CONCENTRATION AND BARRIER EFFECTS**

When large sums are awarded outside of full competition, there is risk of market concentration (the same firms repeatedly winning awards), higher prices, and the entrenchment of incumbent firms. For construction, that can reduce opportunities for new or smaller contractors to scale up, and erode incentives for contractors to innovate or improve quality. The low rate of pre-qualification advancement magnifies this effect: procuring entities may be awarding projects from a narrow, pre-approved pool rather than an open, technically competitive market.

## **TECHNICAL COMPETENCE AND EVALUATION RIGOUR**

Construction contracts carry complex technical, geotechnical and environmental risks. The report's emphasis on inconsistent compliance suggests procuring entities may differ in their technical evaluation capabilities. Weaknesses here raise the risk of awarding contracts to firms that are price-competitive but technically under-prepared — a common precursor to defects, claims and delays in construction delivery.

## **PLANNING AND PROCUREMENT PIPELINE TRANSPARENCY**

Annual schedules and procurement plans are intended to give the market notice and allow contractors to prepare bids and allocate capacity. Gaps or delays in the Annual Schedule of Planned Procurement Activities (ASPP) reduce transparency and can compress competition into last-minute procurements or non-competitive routes — damaging construction sector planning and resource mobilisation.

## **REGULATORY REFORMS: PROMISE AND RISK**

The Simplified Procurement Regulations are useful for efficiency but, without strong safeguards, can be misapplied to justify non-competitive selection of larger works. Clear thresholds, monitoring, and public reporting are essential to prevent misuse in construction procurements.

## **CONCLUSIONS — THE CONSTRUCTION SECTOR'S PROCUREMENT DIAGNOSIS**

1. Transparency is improving but not yet complete. The OPR's reporting is a major step forward — it creates a public record and a basis for accountability — yet the findings show material governance and capacity gaps remain.
2. Competition is weaker than it should be for construction. The combination of large non-competitive awards and a small pool of pre-qualified contractors suggests the construction market is operating with incomplete contestability, which risks higher costs and lower quality.
3. Capacity constraints at procuring entities and in the supplier base are key drivers. Poor procurement planning, uneven application of technical evaluation criteria, and a supplier base where many are registered but few are pre-qualified, all point to capacity problems on both sides of the market.

4. Regulatory instruments need active enforcement and guidance. New regulations (e.g., simplified procurement) are constructive — but they require clear thresholds, training, and monitoring to avoid unintended negative consequences in the construction sector.

## **PRACTICAL RECOMMENDATIONS (PRIORITISED AND ACTIONABLE)**

1. Strengthen pre-qualification pathways for construction contractors

Action: OPR, in collaboration with relevant line ministries and relevant stakeholders (e.g., APETT, JCCCI and TTCA), should develop clear, tiered pre-qualification templates for construction that include demonstration of company experience, past performance (with verifiable references), financial capacity, equipment, and key personnel qualifications (including registered engineers for technical lead roles).

Rationale: Expands meaningful competition while safeguarding technical capacity.

2. Make professional certification a material element of technical evaluation for large works

Action: For major civil works above a defined threshold, require lead design and supervising personnel to hold recognised professional certification (e.g., registered/licensed engineers), and make this a scored criterion in technical evaluation.

Rationale: Improves design oversight, reduces defects/claims, links professional accountability to public works outcomes. (This is complementary to, not a replacement for, company-level capacity checks.)

3. Protect the integrity of simplified procurement

Action: Set explicit monetary thresholds and categorical exclusions for the use of simplified procurement in the construction sector (e.g., clarify which maintenance or minor works may qualify), publish all simplified procurements centrally, and require periodic audits of their use.

Rationale: Prevents mission creep where significant construction works are procured via less-rigorous methods.

4. Improve procurement planning and market signalling

Action: Require timely publication of Annual Schedules of Planned Procurement Activities (ASPPs) with sufficient lead time for construction markets, and mandate that changes to ASPPs be publicly explained. Tie compliance to performance metrics in the OPR's oversight framework.

Rationale: Better pipeline visibility allows firms to mobilise resources and bid competitively.

5. Build technical procurement capacity inside procuring entities

Action: Invest in targeted training for technical evaluation panels (how to assess construction methodologies, geotechnical proposals, environmental mitigation and price risk), and provide standardised evaluation templates and scoring rubrics. Consider a shared technical evaluation pool of experts for smaller entities.

Rationale: Reduces inconsistent evaluations and increases fairness in contractor selection.

6. Expand supplier development and small contractor upskilling

Action: Public-private programmes to support smaller contractors in achieving pre-qualification (mentoring, financial management training, consortium/teaming guidance). Facilitate access to bridging finance and guarantees for contractors transitioning to larger works.

Rationale: Increases the depth of the construction supply base and long-term competition.

7. Strengthen transparency and follow-up reporting

Action: OPR should continue and deepen public reporting on contract awards by value, procurement method, winning supplier, and measures of competition (e.g., number of bidders). For construction projects, require publication of start/completion dates and performance

outcomes (defects, claims).

Rationale: Data-driven oversight deters misuse and informs policy.

8. Introduce e-procurement and stronger contract management practices

Action: Accelerate adoption of e-procurement for construction tenders with mandatory disclosure of tender documents and add standard clauses for performance bonds, liquidated damages and contract management reporting.

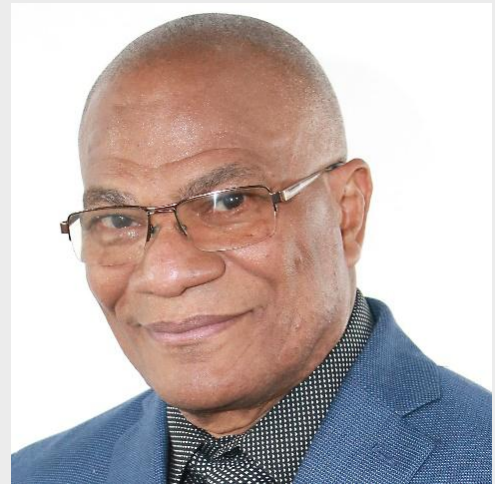
Rationale: Digital procurement improves auditability; stronger contract terms reduce delivery risk.

## CLOSING NOTE

The OPR's 2023–24 Annual Report is an essential first snapshot of how the new procurement regime is functioning. For the construction sector — where projects are capital-intensive, technical, and visible — the path forward requires combining regulatory enforcement with practical capacity building across procuring entities and suppliers. Taken together, the OPR's transparency, clearer pre-qualification rules, professional accountability (including engineers' roles), and better procurement planning can foster competitive markets, improve value for money, and lead to safer, more durable public infrastructure.

### Sources

Primary report and supporting documents for this review include: the OPR Annual Report to Parliament (FY 2023–24), the OPR website reports page, contemporaneous reporting in Newsday and Guardian Newspapers summarising key findings, and the Government's publication of the Simplified Procurement Regulations (Legal Notice No. 65 of 2024).



Vaughn Lezama, BSc., R. Eng. MASCE, FAPETT, is a Civil Engineer with over 44 years of engineering practice. He is the Chairman and Principal Engineer at Consulting Engineers Associates 2005 Ltd. Eng. Lezama is registered with the Board of Engineering of Trinidad and Tobago and is a Fellow and Past President of the Association of Professional Engineers of Trinidad and Tobago. He is also a Member of the American Society of Civil Engineers. Eng. Lezama has extensive experience in Engineering Designs, Technical Studies, Construction Supervision, and Contract Administration. He is highly trained in the use of the FIDIC suite of Contracts. Currently, Eng. Lezama serves as the Registrar of the Board of Engineering of Trinidad and Tobago (BOETT) and is responsible for maintaining the Register of Engineers in accordance with the Engineering Profession Act No. 34 of 1985.



[www.ceal2005.com](http://www.ceal2005.com)



# BUILDING TRUST:

## How Residential Paint Contractors Can Raise Their Game as Home-Improvement Professionals

Beyond “we paint walls,” residential painting in Trinidad & Tobago is a professional service with real stakes: homes, health, and reputations. Homeowners aren’t just buying pigment; they’re buying planning, protection, and peace of mind. This feature lays out how residential paint contractors can level up—operationally, legally, and commercially.



## TREAT THE WORK LIKE A SERVICE BUSINESS, NOT A COMMODITY

Start with scoping discipline. Accurate estimates are not “guesstimates.” Measure net paintable areas (subtracting windows/doors), specify the number of coats per surface, note whether a primer is required, and list all preparation steps (washing, mildew treatment, sanding, patching, caulking). Then isolate access (ladders, small scaffolds), protection (masking, coverings), finishes (by room/zone), and cleanup/haul-away so nothing hides in “miscellaneous.”

Use the manufacturer’s Technical Data Sheets (TDS) as your compass. Coverage rates, substrate prep, re-coat windows, and dry-film thickness live there—build your estimate around those, not rules of thumb. Include a contingency for texture or colour-change scenarios that routinely add an extra coat.

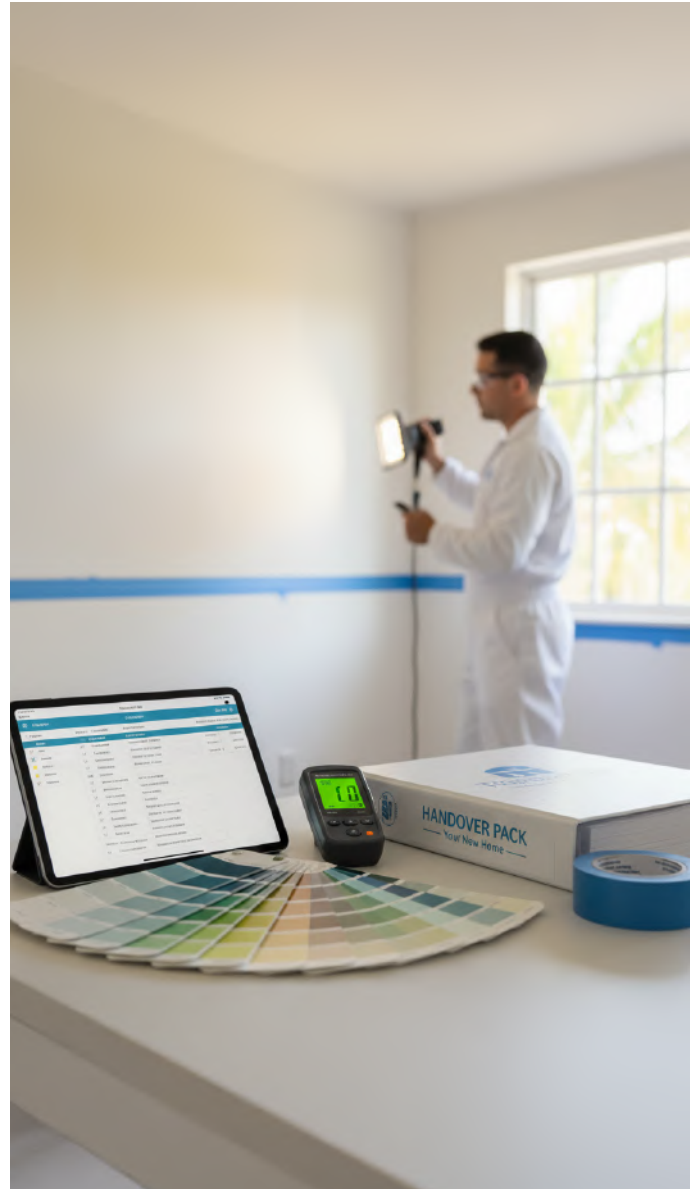
Write the contract like it will be tested. Spell out:

- Scope of Work and Assumptions (e.g., “surfaces are dry, sound, and free of contamination at the start”).
- Exclusions (e.g., structural repairs, water ingress fixes, mould remediation).
- Change-order process (who approves, how it’s priced).
- Schedule and site access requirements.
- Payment milestones tied to clearly defined deliverables.
- Workmanship warranty with plain-language limitations (normal wear, moisture intrusion, unaddressed leaks, etc.).

This clarity protects you and the client, and it differentiates a professional from a painter “just passing through.”

## QUALITY CONTROL THAT SURVIVES OUR CLIMATE

Prep beats paint. In a tropical, maritime environment, salt, UV, and humidity punish shortcuts.



Institute a repeatable prep sequence: wash, treat mildew, neutralize contaminants, sand/feather, dust-off, prime where specified, then finish. Moisture meters aren’t gimmicks; they prevent coating failure on damp substrates.

Sample boards and on-wall patches catch colour and sheen surprises before a full room goes sideways. For touch-ups and phased work, keep a labelled “control panel” (same substrate, primer, and finish sequence) so you can return months later and match.

Primer strategy matters. Stain-blocking where needed, bonding primers for glossy or previously oil-based surfaces, and masonry primers for fresh render. The goal is adhesion

and uniformity—two quiet heroes that make finishes look expensive and stay that way.

Document as you go. Take date-stamped photos of substrate conditions, repairs, masking, first coat, second coat, and final result. A simple photo log turns subjective debates into objective records and strengthens your warranty posture.

## SAFETY AND COMPLIANCE AREN'T OPTIONAL

### PLAN THE JOB, THEN WORK THE PLAN.

The Occupational Safety and Health (OSH) Act in Trinidad & Tobago imposes general duties on employers and self-employed persons, including protecting workers and the public, and it explicitly calls for risk assessment. Treat every project as work at height, chemicals in use, and the public nearby—and do a written risk assessment with controls to match.

## WORK AT HEIGHT—LADDER AND SCAFFOLD DISCIPLINE.

Choose the right access method for the task and duration; inspect ladders and platforms before use; maintain three points of contact; secure footing; and don't overreach. Train your crew—competence beats bravado, and a fall will erase a year's profit.

## PPE AND VENTILATION.

Follow the Safety Data Sheet (SDS) for each coating. Respiratory protection, eye protection, gloves, and coveralls are not “nice to have.” Manage ventilation—especially with solvent-borne products—and control ignition sources where applicable. These aren't theoretical risks; they're daily realities. (The OSH Act sets the duty of care; your risk assessment operationalizes it for each site.)



## COMMUNICATION THAT BUILDS TRUST (AND REPEAT WORK)

### PRE-JOB BRIEF.

A one-page “What to expect” sets the tone: how you’ll protect floors and furnishings, daily start/finish times, noise/dust controls, and who the homeowner contacts for changes.

### DAILY MICRO-UPDATES.

A quick end-of-day message—“Rooms 1–3 first coat done, masking stays up overnight, second coat tomorrow 9:00”—reduces anxiety and call-backs.

### PUNCHLIST CULTURE.

Invite the homeowner to a lit-room inspection with blue tape before demobilization. Fix what’s flagged, capture photos, then remove tape together. It’s professional, transparent, and fast.

### HANDOVER PACK.

Provide colour names/codes, product labels or PDFs of TDS, leftover paint (sealed and dated), and care instructions (curing times, cleaning, when to schedule maintenance). This small ritual makes your work live longer and your brand look bigger.

## BRAND, REPUTATION, AND THE TTCA ADVANTAGE

Your brand is built in quiet moments: clean edges, tidy job sites, uniforms, labelled touch-up tins, and punctual crews. Online, keep a current portfolio (before/after, close-ups of edges and trim), and collect concise testimonials tied to specific outcomes (“no odour issues,” “on schedule,” “careful with our newborn’s room”).

Lean on association credibility. TTCA membership places you in a professional ecosystem—training, exposure on TTCA’s website that keep you plugged into market activity.

Referencing association membership in proposals signals a standard of practice and a channel for continuous improvement.

## DIGITAL TOOLS THAT MAKE YOU LOOK—AND RUN—LIKE A PRO

### ESTIMATING & PROPOSALS:

Use templated scopes with selectable prep/finish options and embedded assumptions, then generate branded PDFs for sign-off.

### SCHEDULING:

A shared calendar link reduces “When are you coming?” messages. For multi-room jobs, schedule by zone so homeowners can keep part of the house functional.

### JOB FILES IN THE CLOUD:

Store measurements, colour schedules, TDS/



SDS, and progress photos per address. The day you need them, they'll be there.

#### **PORTFOLIO & REVIEWS:**

Make it easy for clients to see similar rooms/homes and to leave feedback. Short links or QR codes on your handover pack help.

#### **BASIC CRM:**

Track leads, estimates sent, follow-ups due, and maintenance reminders. Future you will thank present you.

## **SCALE WITHOUT BREAKING YOUR QUALITY**

### **STANDARD OPERATING PROCEDURES (SOPS).**

Write short, visual SOPs for surface prep, masking standards, daily site setup/cleanup, and final inspection. When everyone paints

"your way," you can add crews without diluting the finish.

### **TRAIN FOR METHOD, NOT JUST MUSCLE.**

Teach the why behind each step: e.g., wash and treat mildew before sanding; prime slick alkyd trim before acrylic; respect re-coat windows. When crews understand the sequence logic, they make fewer mistakes under pressure.

### **CREW LEADS AND CROSS-CHECKS.**

Promote leads who can read scopes, manage punchlists, and talk to clients. Then institutionalize cross-checks: lead inspects another crew's work weekly. Fresh eyes catch small misses before they become reputational damage.

### **CHOOSE YOUR NICHE, THEN OWN IT.**

"Occupied-home repaints with odour-sensitive clients." "Historic timber with high-detail trim." "Exterior coastal homes within X miles of the sea." Niching speeds up estimates, deepens expertise, and makes your marketing memorable.

## **THE BOTTOM LINE**

The market is moving toward professionalized, accountable painting services—especially in a climate that exposes shortcuts and in a regulatory environment that expects documented safety and informed product choices. Contractors who run disciplined scopes and estimates, enforce safety, communicate clearly, and present as members of a standards-driven community will outlast low-bid operators.

Trinidad & Tobago homeowners are ready to pay for proof: preparation photos, methodical sequencing, clean edges, and predictable handovers. If more residential paint contractors adopt this "service-first" posture, the industry's reputation rises with every room. That's good for clients, good for homes.



**Join** **The Membership**  
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