TRINIDAD AND TOBAGO CONTRACTORS ASSOCIATION

# THE Contractor

TRINIDAD & TOBAGO

QUARTERLY E-MAGAZINE APRIL-JUNE 2024 ISSUE NO.8

## Navigating the Future of Trinidad and Tobago's Construction Industry Amidst an Ageing Workforce

## The Use of the International System of Measurements vs the Imperial System in the Construction Sector

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## Reducing Slips, Trips and Falls

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## President's Message

Glenn Mahabirsingh
TTCA PRESIDENT

# Navigating the Future of Trinidad and Tobago's Construction Industry Amidst an Ageing Workforce

**The Trinidad and Tobago construction industry saw two booms, one in the late 1970s/early 1980s and the other in the 2000s, both of which were powered by the oil and gas industry and would have provided a wealth of expertise for future generations of construction workers. They would have worked on large-scale, difficult projects, honing their technical abilities and knowledge of construction. Many of those professionals are anticipated to retire soon or have already retired. To ensure a smooth transfer of information and the survival of a strong local industry, it is critical to close the knowledge gap with the younger generation.**

While the highly technical and knowledge base ageing workforce in Trinidad and Tobago's construction industry is a source of concern, it can also provide opportunities. As workers in the industry get older, there are potential challenges that may arise. These challenges can include a shortage of skilled workers and a potential decline in productivity. As experienced workers retire from the construction industry, there is a risk of losing valuable knowledge and skills, particularly in areas like traditional construction methods and problem-solving. This loss of expertise can have a significant impact on the industry's ability to maintain quality standards, innovate, and adapt to new challenges. To close the skills gap, the industry must attract more of the younger generation who must have a passion for construction.

## To mitigate this risk and ensure the retention of valuable knowledge and skills, several strategies can be implemented:

### Knowledge transfer programmes:

Establishing formal programmes that facilitate the transfer of knowledge from older, experienced workers to younger employees can be highly beneficial. This can include mentoring, job shadowing, or apprenticeship initiatives, where experienced workers actively pass on their skills and expertise.

### Collaboration and teamwork:

Encouraging collaborative work environments where experienced workers can work alongside younger employees can facilitate knowledge sharing. By fostering intergenerational collaboration and communication, invaluable expertise can be shared and preserved.

### Documentation and digitalization:

Encourage retiring workers to document their knowledge and experiences in manuals, guides, or digital resources. This way, the information can be easily accessed and utilized by future generations. Additionally, embracing digitalization can help store and organize such knowledge more efficiently.

### Training and upskilling:

Provide training programmes and opportunities for both new and existing workers to enhance their skills and familiarize themselves with traditional construction methods. This can help bridge the knowledge gap and ensure that important skills are retained and passed on.

### Industry-government collaborations:

Foster partnerships between the construction industry and government bodies to promote the preservation of traditional construction methods and encourage research and development initiatives that aim to further document and enhance these skills.

**Technology:**
Embracing new technologies in construction, such as Building Information Modeling (BIM), can significantly improve efficiency and reduce the reliance on manual labor. While the adoption of new technologies like BIM does require initial investment in hardware, software, and training, the long-term benefits can outweigh the costs. The Trinidad and Tobago construction industry can leverage these digital tools to enhance productivity, reduce manual labour, improve project outcomes, and stay competitive in a rapidly evolving industry. It's important to note that the successful integration of technologies like BIM requires not only technological advancements but also a cultural shift toward embracing digitalization and fostering collaboration among industry stakeholders.

By implementing these strategies, Trinidad and Tobago's construction industry can mitigate the risk of losing valuable knowledge and skills as experienced workers retire. TTCA is willing to partner with other industry players to further develop and implement strategies to navigate the future of our industry.

# The Use of the International System of Measurements vs the Imperial System in the Construction Sector

by Vaughn I. Lezama
Consulting Engineers Associates 2005 Ltd

## The Metrology Act 18 of 2004 of the Laws of Trinidad and Tobago

Upon proclamation of the Metrology Act 18 of 2004 of the Laws of Trinidad and Tobago, the International System of Units (SI) officially became the primary system of measurement in Trinidad and Tobago and the basis upon which all units of measurement are determined. However, the SI unit of measurement was introduced into our local schools and education system since 1970 when we ceased the teaching of the old Imperial units of weights and measurements of pounds, ounces, feet, inches, yards, miles, etc. and adopted metric units of kilogram and kilometer and the derivatives therefrom. This means that everyone in Trinidad and Tobago who went to school at any level since 1970, i.e. for the last 50 plus years, was taught nothing other than the metric system of measurement, regardless of whichever examination you did, be it Common Entrance, GCE, A-Levels, SEA, CXC, CAPE or University.

There is, therefore, no excuse for unfamiliarity in Trinidad and Tobago with the metric system of measurement which is the legal unit of measurement in the Country. The pet peeve of many Engineers is the persistent use in the local construction industry of imperial units which are scientifically useless. Engineers are unable to use such units in any scientific calculation, especially given the fact that the algorithms of all the analytical software we use are based on the international system of measurements.

## The Use of Imperial Measurements in Trinidad and Tobago

Notwithstanding the current legal requirement as it pertains to the Metrology Act, our engineers are very often presented with building planning drawings done in imperials units and these units then have to be converted to metric units using a soft conversion in order to efficiently do the necessary structural analyses. What is even more egregious is that where such drawings are dimensioned in metric units, it is obvious that the original designs were prepared using imperial units and a hard conversion used to convert dimensions to metric units. There actually exist drawings which for example, show dimensions such as 152.40mm and 203.26mm and which obviously are hard conversions of 6 inches and 8 inches respectively. Now, as an Engineer you ask yourself, how does one measure 0.40mm or 0.26mm with a measuring tape on a construction site.

It is obvious from the above that those who prepare building planning drawings and architects (yes there are exceptions) are the main proponents of this practice. However, what is indeed disturbing about this, is that it comes largely from a major State Contracting Agency, UdeCoTT. Instead of providing a level of industry leadership, I have seen drawings from UdeCoTT's showing ludicrous dimensions such as 1421mm, 1999mm 1527mm, 2543mm, etc. These dimensions can only come from hard conversions of imperials units. Scientifically 1, 2 or 3 mm in a building with an overall dimension of say 20m or 30m is simply a nuisance dimension. Structural design engineers generally round off these figures to 1420mm, 2000mm, 1530mm, and 2545mm to make them practically useful. That is to say, figures with the last of the four digits either being zero or 5. However, further adjustments then have to be made to ensure dimensional compatibility between the architectural and engineering drawings. This could be avoided if only building planning drawings are prepared using the country's legal system of measurements.

## Industry Leadership in the Use of the SI System

The law of the land is that the unit of weights and measurements is the International System (SI). In this regard therefore, industry leaders such as UdeCoTT and other such state agencies should be exemplary law-abiding state corporations. If, for whatever reason, a drawing must show imperial dimensions, then such drawings should be done using the SI system and then convert from metric to imperial, not the other way around. And for those who did their schooling in the USA during the last 50 years or otherwise have an umbilical connection to the imperial system of measurement, then it is advisable to use soft conversations from imperial to metric rather than hard conversions. For example, using soft conversions, 4 inches will be 100mm, 8 inches will be 200mm and 12inches will be 300mm, etc.

## The Efficacy of the SI System of Measurement

To illustrate the simplicity in grasping an understanding of the SI System, the measurement of volume, capacity, mass and weight is based on the simple fact that in using the SI System, one (1) litre of water weighs 1kg and in the measurement of temperature, water freezes at Zero (0) degree Celsius and boils at 100 degree Celsius. In the latter case everyone is familiar with the temperature difference between ice and boiling water. It is therefore, not difficult to internalize a temperature between Zero and 100 degree Celsius, since there are two well appreciated tactile benchmarks to make a judgement of this measurement. However, looking at a weather forecast, few of us are able to make any such judgement of a temperature given in Fahrenheit unless you have resided in an environment where this unit of measurement is the standard. For example, while we may know that 100 degrees Fahrenheit is equivalent to 37 degrees Celsius, the relationship between the two is non-linear so that finding an equivalency up or down the temperature scale between these two parameters, without an instrument, could be quite a challenge.

It is indeed interesting to note that the US National Weather Service when broadcasting information on hurricane activities gives the wind speed in miles per hours (mph), which is an imperial unit, and the pressure at the eye of the hurricane in millibars, which is a metric unit. There is a practical reason for the latter, since to measure the pressure in say pounds per sq.in (psi), the figure will be a decimal number less than one by a factor of 10 to 100. In other words, imperial measurements are challenged when it comes to small units of measurement such as is required in science and medicine.

## The USA and Metrication

The USA is one of only three countries in the world which are known not to have officially adopted the metric system of measurements. It is reported that during the tenure of President Reagan, 1981-1989, he attempted to have the USA convert to the Metric System of Measurements. However, during that time the USA was by far the leading industrialized country in the world and there was substantial push-back from industry. It was argued then, that the cost of conversion of the vast industrial sector was too substantial and that in any even as the leading industrialized nation there was no need to follow others who in any event needed to purchase American manufactured products. However, as countries around the world continued to developed, the demand for tools and machinery with metric specifications increased. As such, USA manufacturers were eventually forced to retrofit their production lines at even greater expense, than it would have been if done earlier, in order to cater for such international demands.

As a result, USA manufacturers now produce machinery, tools and packaged items in both units. Therefore, countries such as Trinidad and Tobago for which the USA is a major import market are availed of tools, measuring devices and equipment in both units of measurements. This is therefore the reason for our continued familiarity and use of the imperial system of measurements and this is unlikely to change. Even so, post-1994 federal law in the USA mandates that most packaged consumer goods be labeled in both imperial and metric units. In additions, the built-in algorithms of engineering software developed in the USA facilitate the duality of input and output dimensions for engineering calculations. Furthermore, USA Codes and Standards are also now available in both units given the fact that the SI system is widely used in the USA in science, medicine, electronics, the military and international affairs.

## The UK and Metrication

As a point of interest, it is to be noted that the UK, where the British Imperial System has its roots, formally adopted the Metric system in 1967. Even so, certain official exemptions were made to this form of measurement. These exemptions are that distance measurements on roads and motorways are to remain in miles, measurements of milk, beers and ciders to remain in pints and measurements of precious metals to remain in ounces. While packaged goods and just about everything else in the UK are labeled using SI Units, it is the only country in Europe where roads signs show distances along the Roadways and Highways in miles and yards. I have always found this to be quite strange.

## Conclusion

There is no doubt that the preeminent global use of the SI System of measurement is a fait accompli. It would therefore be a disservice to future generations to be burdened with documentations containing archaic dimensions in the same way our generation were burden with land area measurements of a bygone era given in acres, roods and perches of which only a trained land surveyor could have made any sense.

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Vaughn Lezama 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.

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# Exploring the Quintessential of Construction Team Dynamics: Crafting a Pathway to Achievement

by Mikey Thackoor
NH International Caribbean Ltd

I often reiterate a fundamental truth: projects are constructed by people. Despite the integral role of technology, machinery, materials, planning, and methodologies, these elements cannot orchestrate a project's completion independently. It necessitates a synergistic effort among individuals who may not necessarily share affinities but must harbor mutual respect and acknowledge the unique contributions of every team member. My leadership journey has allowed me to helm teams of diverse nationalities, ethnicities, and cultural backgrounds, united by our identity as construction workers—a distinct and proud fraternity. Through my experiences, I've discerned and wish to elaborate on the critical elements of team dynamics: the five stages of development and the five dysfunctions of a team, understanding that dysfunctions can arise at any point across the developmental stages. The journey of a team through a construction project, especially in the Caribbean's vibrant setting, is analogous to guiding a crew through the intricate phases of constructing a complex edifice.

**1. Laying the Foundation (Forming) -** At the outset, akin to assembling a diverse crew under the warm Caribbean sky, we gather our team—each member arriving with their own set of skills and expectations, but uncertain of their place in the grand blueprint

- **Identifying:** This stage is characterized by high enthusiasm but low productivity as the team is just getting to know the project and each other. You might notice hesitation in taking initiative, a lot of questions about basic operations, and an overall lack of direction without guidance.
- **Resolutions:** Establish clear objectives, roles, and responsibilities from the start. Conduct team-building activities that encourage bonding and provide a comprehensive project overview, ensuring everyone understands the mission. As the leader, maintain an open-door policy to address concerns and foster a culture of transparency and inclusivity.

**2. Bracing the Storm (Storming) -** As the project progresses, the idyllic Caribbean setting is occasionally marred by inevitable squalls. Personalities clash over design interpretations and resource allocations, mirroring the unpredictable weather.

- **Identifying:** Conflicts and challenges to authority and project standards become evident. There might be frustration over processes, disagreement on project directions, or competition among team members. This phase is crucial and unavoidable for the team's growth.
- **Resolutions:** Encourage open communication and constructive feedback. Facilitate conflict resolution sessions where issues can be discussed openly and solutions negotiated. Empower team leaders to mediate disputes within their groups, ensuring that everyone feels heard and valued. It's vital to reinforce the project's goals and how each team member contributes to its success.

**3. Erecting the Structure (Norming) -** With the worst of the storms behind us, our crew begins to move in harmony, much like the rhythm of the waves against the shore. A shared understanding and mutual respect for each other's craftsmanship emerge.

- **Identifying:** The team starts working more cohesively, establishing routines and standards. Look for signs like increased collaboration, mutual respect among team members, and a more positive team atmosphere. Conflicts don't disappear but are managed more effectively.
- **Resolutions:** Capitalize on this harmony by setting up more collaborative projects and encouraging team decision-making to reinforce the sense of unity. Recognize and celebrate milestones and achievements to boost morale. Keep refining processes and roles to ensure they align with the team's evolving dynamics and remain approachable for guidance and support.

**4. Completing the Edifice (Performing) -** As we reach the pinnacle of our project, our team functions like a well-oiled machine. Each member plays their part flawlessly, with minimal oversight, driven by a shared vision of the finished structure gleaming under the Caribbean sun

- **Identifying:** The team reaches peak efficiency, working independently yet collaboratively towards project goals. You'll see high levels of autonomy, creativity, and problem-solving. The focus is squarely on productivity and innovation, with minimal direct oversight required.
- **Resolutions:** Support the team by providing the resources they need to excel and by removing any obstacles that impede their progress. Continue to challenge the team with high-level objectives to keep them engaged. Ensure that successes are acknowledged and that constructive feedback is provided to facilitate continuous improvement.

**5. Handing Over the Keys (Adjourning) -** As our project reaches its conclusion, a bittersweet sentiment envelops the team. There's pride in the monumental structure we've erected together, yet a melancholy knowing this shared journey is ending

- **Identifying:** Upon project completion, there's a mix of satisfaction and depression as the team disbands. Signs include completing final tasks, reflecting on the project, and expressing reluctance to disengage from the team dynamic.
- **Resolutions:** Organize a project debrief to celebrate successes, discuss lessons learned, and acknowledge each team member's contributions. Offer support for transitioning to new projects or roles and consider organizing reunions or keeping communication channels open for future collaborations. Recognizing the emotional aspect of this phase is crucial; it provides an avenue for team members to express their feelings about the project and its conclusion. It's a time for goodbyes, but also for looking forward to new horizons, armed with the lessons and camaraderie forged in the crucible of this Caribbean adventure.

**A successful construction project is much like a symphony—each individual's contribution is essential, yet it is the harmony of teamwork that creates a masterpiece. In the vibrant dance of construction, make no mistake, it's the shared spirit and collective endeavor of people that lay the true foundation for enduring success.**

**Confronting the quintet of dysfunctions—building trust, embracing conflict, fostering commitment, ensuring accountability, and focusing on results—is pivotal for a team's effectiveness and triumph. By adopting strategies that nurture trust, stimulate constructive debate, set clear goals, uphold accountability, and maintain a unified vision towards project objectives, you lay the groundwork for success. The project's outcome largely depends on a leader's ability to adeptly navigate and remedy these challenges.**

**1. Lack of Trust –** Trust among crew members, is a crucial foundation for any team aiming to build effectively. Without trust, workers are hesitant to share concerns or admit mistakes, leading to weak communication and teamwork.

- **How to Identify:** Team members are reluctant to share ideas, admit mistakes, or provide help to others. There's a noticeable lack of openness and vulnerability.
- **Resolution Strategies:** Foster an environment where vulnerability is encouraged and respected. Conduct team-building activities promote personal connections and understanding. Encourage leaders to model transparency and humility by admitting their mistakes and weaknesses.

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**2. Fear of Conflict -** occurs when crew members shy away from open discussions and critical feedback, resulting in unresolved issues and a lack of consensus on project decisions.

- **How to Identify:** Discussions within the team avoid sensitive topics, resulting in passive-aggressive behavior and indirect communication. Ideas are not fully debated, and meetings are often superficially agreeable.
- **Resolution Strategies:** Normalize healthy conflict as a part of the team's process. Encourage open discussions and constructive criticism by setting ground rules for engagement that ensure respect and listening. Role-playing exercises can also prepare team members for conflict situations, making them more comfortable with disagreement.

**3. Lack of Commitment -** emerges from unclear project goals or decisions, causing confusion and misaligned priorities on the job site.

- **How to Identify:** Ambiguity in project goals and plans is evident. Decisions are frequently revisited, and there's a general sense of confusion about project direction among the team.
- **Resolution Strategies:** Involve the team in the decision-making process to ensure buy-in. Clarify project goals, roles, and responsibilities regularly. Use visual aids like charts or timelines to keep everyone aligned. decisions are made, reiterate the commitments to ensure clarity and alignment.

**4. Avoidance of Accountability -** refers to the team's reluctance to address poor performance or behavior, compromising the project's quality and timelines.

- **How to Identify:** Poor performance or counterproductive behavior goes unaddressed. Team members may express frustration privately but avoid confronting the issue openly.
- **Resolution Strategies:** Establish clear performance standards and regular feedback mechanisms. Encourage peer-to-peer accountability by creating a culture where constructive feedback is valued. Leadership should lead by example, holding themselves and others accountable openly and fairly.

**5. Inattention to Results -** where individuals prioritize personal achievements or recognition over the project's success.

- **How to Identify:** Team members focus more on individual accolades or responsibilities than on the collective success of the project. There's a lack of shared enthusiasm for project milestones or outcomes.
- **Resolution Strategies:** Reinforce the importance of shared goals over individual achievements. Celebrate team successes and recognize contributions that advance the project's objectives. Use regular project reviews to keep everyone focused on the end goals and the team's progress toward them.

The Caribbean, with its colorful culture and dynamic landscapes, serves as a backdrop to the unfolding narrative of a construction project. This setting offers a vivid illustration of the team's journey through the five developmental stages. Each phase presents its unique challenges and opportunities for growth, from laying the foundational team spirit under the Caribbean sun to navigating inevitable storms of conflict, building a harmonious structure of mutual respect, achieving peak performance as a unified entity, and finally, transitioning with a sense of accomplishment and bittersweet farewell.

However, navigating these stages is not without its pitfalls. The five dysfunctions loom as potential barriers to team success. Addressing these dysfunctions head-on, with strategies aimed at fostering trust, embracing healthy conflict, clarifying project objectives, promoting accountability, and focusing collectively on project goals, is paramount. It requires a leadership approach that is both empathetic and decisive, encouraging transparency, open communication, and a commitment to shared success.

In the realm of construction, it is an undeniable truth that the essence of project completion lies not in the mere assembly of materials and technologies but in the collective endeavor of people. It is the human element, with its diverse array of skills, perspectives, and experiences, that transforms blueprints into tangible realities. Our shared identity as construction workers binds us, manifesting a unique fraternity characterized by resilience and dedication. Drawing from this rich tapestry of experiences, I've delved into the essential components of team dynamics, focusing on the five stages of development and the critical five dysfunctions that can emerge, underscoring the importance of addressing these challenges to foster a cohesive and efficient team environment.

As a construction worker, I stand with pride, following in the footsteps of those who came before me, while casting a guiding light for the generations that will follow. A successful construction project is much like a masterpiece—each individual's contribution is essential, yet it is the harmony of teamwork that creates a masterpiece. In the vibrant dance of construction, it is not the bricks and mortar that build, but the shared spirit and collective endeavor of people that lay the true foundation for enduring success.

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Mr. Mikey Thackoor is an experienced professional in the construction industry with a track record of over 25 years working across the globe. Presently, he holds the position of Head of Operations (Eastern Caribbean) at NH International Caribbean Ltd. In this role, Mr. Thackoor provides expert leadership in project development, design, implementation, and execution to ensure optimal results are achieved.

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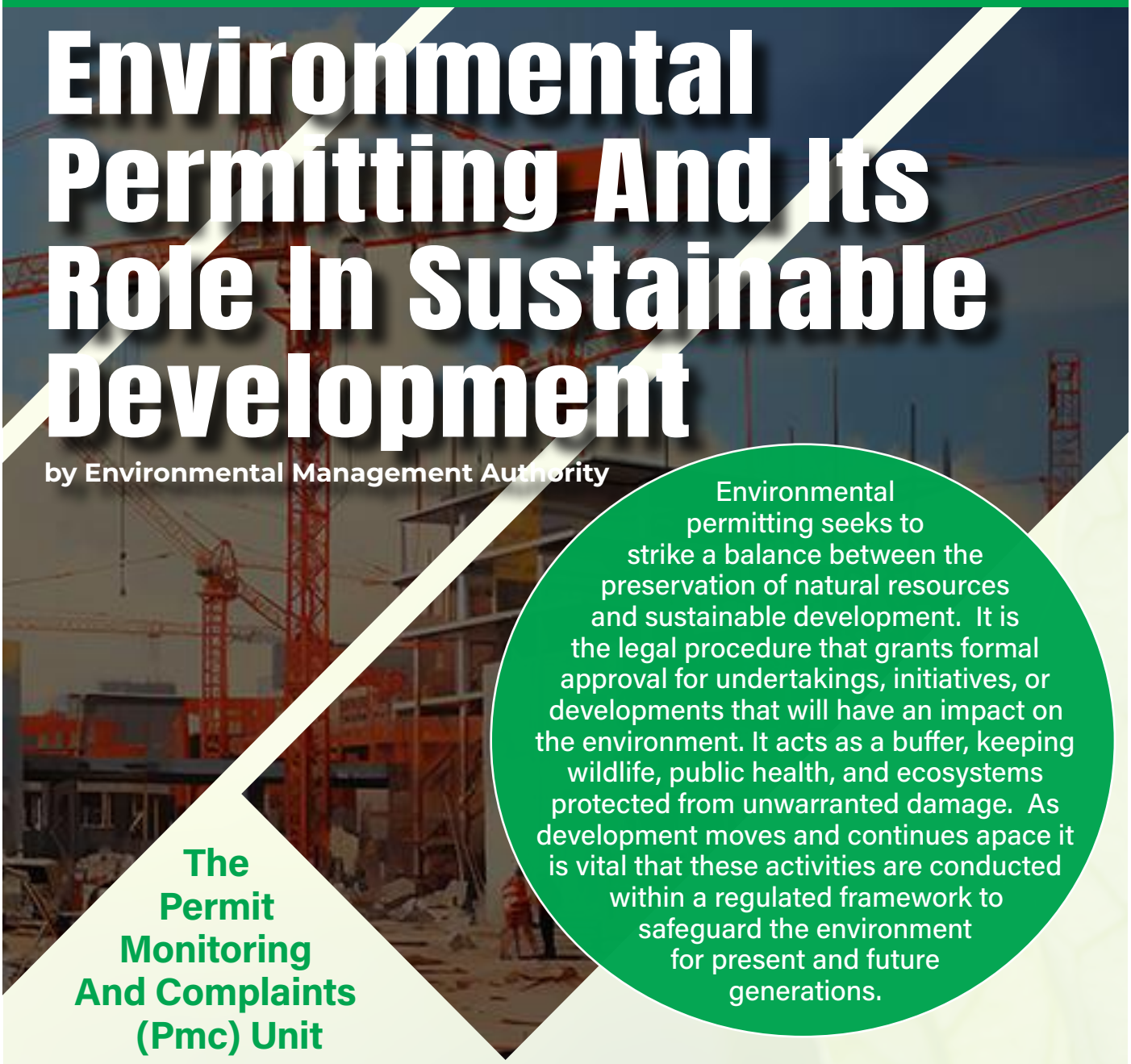
# Environmental Permitting And Its Role In Sustainable Development

by Environmental Management Authority



Environmental permitting seeks to strike a balance between the preservation of natural resources and sustainable development. It is the legal procedure that grants formal approval for undertakings, initiatives, or developments that will have an impact on the environment. It acts as a buffer, keeping wildlife, public health, and ecosystems protected from unwarranted damage. As development moves and continues apace it is vital that these activities are conducted within a regulated framework to safeguard the environment for present and future generations.

## The Permit Monitoring And Complaints (Pmc) Unit

**What We Do:** According to Section 16 (1) of the Environmental Management Act Chapter 35:05 (EM Act), one of the main functions of the Environmental Management Authority (EMA) is to "Monitor compliance with the standards, criteria and programmes relating to the environment." To fulfil this objective, the Permit Monitoring and Complaints (PMC) Unit of the EMA was formed and charged with the responsibility of monitoring certificates and permits issued by the Authority, as well as to ensure compliance with the terms and conditions as mandated in the EM Act Chapter 35:05. Apart from ensuring compliance, the PMC Unit is also responsible for the investigation of complaints associated with issued certificates and permits. At present, the main certificates/permits monitored by the PMC unit are Certificates of Environmental Clearance (CECs), Water Pollution Permits (WPPs) and Consent Agreements (CAs). During the monitoring process, the PMC Unit:

- Provides guidance to the permit holder.
- Reviews and approves post-permit documents.
- Conducts site inspections and CEC audits.
- Communicates breaches and facilitates enforcement.

Non-hazardous solid waste collected, sorted into recyclable and non-recyclable components and stored onsite in durable and sturdy plastic or metal containers of adequate capacity with secure covers, until ready for disposal.


## What Does The Monitoring Process Entail?
### The Permit

Conduct of site visits – Site visits are conducted in order to verify that the scope of the project is consistent with the application and to also ensure compliance with the terms and conditions of the issued permit.

Review and approval of reports and plans - Examples of reports and plans reviewed by the EMA include (but are not limited to) Quality Assurance Project Plans (QAPPs), Quarry Rehabilitation Plans (QRPs), Waste Management Plans, Ecological Risk Assessments (ERAs) & Discharge Monitoring Data Reports (DMDRs).

Regular updates on the status of works – Apart from the conduct of site visits, PMC officers will liaise regularly with the permit holder via telephone/email/ meetings in order to remain updated on the status of works. The permit holder may also be required to submit updated photos, receipts, drawings and/or plans to the PMC officer in order to facilitate this.

Figure 1: The Permit Monitoring Process

Safety signs and hazard notices placed at public entrance to construction site.


## Non-Compliance With Conditions Of An Issued Permit
## What Is Voluntary Compliance?

In cases where a breach of an environmental requirement is detected, the **Voluntary Compliance Approach** is initially taken.

Once a breach is detected, the permit holder is informed of the breach via written correspondence by the PMC Officer. Details of the particulars of the breach and the timeframe to rectify will be stipulated by the EMA. Initially, through the Voluntary Compliance Approach, the permit holder is given the opportunity to rectify the breaches in a timely manner that is facilitative and cooperative.

Should the permit holder fail to rectify the respective non-compliance in a timely manner, a warning letter will be issued by the EMA. This warning letter will identify the environmental breach and specify a new deadline date for rectification. Failure to comply with this deadline date in the warning letter or failure to respond to the EMA in a timely manner will result in enforcement action.

## Enforcement Action

Bearing in mind that the permits issued by the EMA are legally binding documents, breach of any condition of an issued permit can result in enforcement action by the EMA. In cases where voluntary compliance action fails to achieve the desired outcome, enforcement action is taken by the EMA which can result in penalties/fines.

## Complaint Investigation

A major role of the PMC Unit is to investigate complaints received by the Authority associated with issued permits. Complaints oftentimes act as an indicator of how effective the mitigation measures within a permit are.
**Example Of Complaint:** Complaints of dust emanating from project works associated with the construction of a Housing Development.
**Nature Of Complaint:** Generation of excessive dust from the project site especially during periods of dry conditions.

Construction works, when improperly monitored, can adversely impact upon the surrounding community and natural environment. Potential impacts include dust emissions, noise and waste generation. These potential impacts and examples of mitigation measures are explored in Table 1 below.


Figure 2: Ongoing construction works at housing development site.

Table 1: Potential impacts and mitigation measures associated with construction works

| IMPACT | SOURCE | PROPOSED MITIGATION |
|---|---|---|
| Air | Generation of dust from the following activities:<br>- Transport vehicles moving fill and aggregate to and from project site.<br>- Loading/offloading of aggregate material.<br>- Clearing of vast areas simultaneously resulting in exposed soil.<br>- Location of stockpiles.<br>- Uncovered stockpiled aggregates. | - Ensure vehicles are properly covered during transport of aggregate and raw materials.<br>- Installation of dust screens.<br>- Location of stockpiles downwind of built development or receptors.<br>- Use of non-toxic dust-suppressant chemicals.<br>- Protection of exposed soil and/or raw material via use of geotextiles. |
| Noise | Generated from activities such as:<br>- Delivery of aggregates on site.<br>- Use of construction equipment on site e.g. excavators, backhoes.<br>- Piling works. | - Scheduling of construction activities between the hours of 7:00am – 7:00pm.<br>- Regular inspection and maintenance of tools, machinery and equipment.<br>- Notification to community regarding periods of expected increased noise levels. |
| Waste | - Improper disposal of waste, e.g. burning on site.<br>- Accidental releases from spills and leaks of fuel and chemicals.<br>- Domestic waste generated from workers on site.<br>- Excavated material.<br>- Washing from premix concrete trucks. | - No burning on site. Any material that cannot be re-used should be removed from the site for disposal in an environmentally acceptable manner.<br>- Domestic waste is sorted and placed in secured containers for disposal.<br>- Designated bunded areas for the storage of chemicals/fuels and refueling of vehicles. |
| Traffic Management | - Storage of equipment and/or aggregate along the public roadway.<br>- Increased movement of heavy vehicles within the project area thus resulting in increased traffic congestion in the vicinity | - All equipment and aggregate storage to be limited to project site.<br>- Development of a Traffic Management Plan.<br>- Posting of clearly labelled warning signs and hazard notices. |

## Examples Of Mitigation Measures Implemented On Site In Order To Reduce Environmental Impacts Identified In Table 1

Installation of dust screens and hoarding along site perimeter

Regular application of water to reduce dust emissions.

Stockpiles located within designated areas and protected by geo-textiles

Geotextiles protecting exposed slope

Washbay established for vehicles entering and exiting construction site

References
Legal, Compliance and Enforcement / Permit Monitoring and Complaints. 2023. Monitoring of Certificate of Environmental Certificates. SOP, Port-Of-Spain: Environmental Management Authority.
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**ARTICLE BY**

EMA environmental management authority

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# ADVANTAGES OF USING CEMEX TCL SUPERIOR CONCRETE ROADS

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- Evaluation of existing pavements
- Pavement designs with different technical solutions
- Develop final plan set
- Life-cycle analysis of costs and environmental impacts
- Life-cycle assessment of environmental impacts

**EXECUTION – Commercial teams leads with Strategic involved**

- Materials (concrete, cement, additives, aggregates)
- Construction: pavements, `structure layers, curbs, sidewalks, others
- Maintenance & Rehabilitation
- Project supervision, technical training and support
- Finishing Tool Rentals

**COMMERCIAL & OPERATIONAL SYNERGIES – Strategic Partnerships**

- Identify public and private resources opportunities
- Develop engineers estimates
- Implementation of Sales Supply Contracts (Service Center)
- Implementation of Operational (Technical) Synergies

## PROJECTS COMPLETED

- Pt. Lisas Business Park – *Phase II*
- East Lakes Gated Community
- IPI - Soleil Gated Community
- Japan Motors Warehouse Complexes
- Low Cost Supermarket Complex
- Tucker Warehouse – *Chagaramas*
- Southern Sales Car Park – *Point Lisas*
- Secondary Access Road – *Tortuga*
- Southern Sales – *Morvant*
- Residential Road – *Montrose, Chaguanas*
- Wendy's Carpark – *Diego Martin*
- Audi Car Park – *Richmond Street, Port of Spain*

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We have been providing FREE technical services in Trinidad for the past 6 years.

## CEMENT

| | | |
|---|---|---|
| PREMIUM PLUS | TYPE IP | Blended with Pozzolan |

## AGGREGATES

| TYPE | NAME |
|---|---|
| Large size Limestone (Crushed) (Melajo & Mayo) | • 20 mm or 3/4" Limestone<br>• 1-2" -25-50mm Limestone<br>• 2-4" 50-100mm Limestone |
| Small size Limestone (Crushed) (Bermudez & Melajo) | 10mm (-) or 3/8" Limestone |

## ADMIXTURES

| TYPE | NAME |
|---|---|
| High range superplasticizer | ISOFLOW 7660 |
| Retarder & Water Reducer | ISOPLAST 2024 |
| Retarder | ISORETARD 2201 |
| Plasticizer and Retarder (Medium range) | ISOFLEX 7835 |
| Waterproofing | ISOFUGE 9350 |
| Air Entraining Agent | ISOSPHERE 5042 |
| Corrosion Inhibitor | ISOINHIBIT 5400CF |

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# Reducing Slips, Trips and Falls

**by Lisa Ramoutar**
**Certified Walkway Safety Auditor**

Problem - Every year the TT OSH Authority records hundreds of workplace accidents. They have recognized that many accidents in the workplace occur because of Slips, Trips and Falls. Even at our home we have incidents with Slips, Trips and Falls. What if there were ways to reduce these accidents? This article seeks to inform the reader of some of the hazards associated with slips, trips and falls and proposes some measures to mitigate these risks.

## What is a Slip?

A Slip is a sliding motion due to loss of traction on a walkway surface (floor, stair, tread, pavement).

## Causes of Slips

Anything that reduces the traction between the shoe/foot and the walking surface such as:

- Water – Rain, condensation, leaks, water containing elements e.g. Fountains, dispensers, pools etc.
- Oils and Greases – garages, kitchens, bakeries, manufacturing etc.
- Powders – kitchens, bakeries, manufacturing etc.
- Other contaminants – coatings, polishes etc. Note a contaminant in this context includes anything that isn't supposed to be on the floor surface such as mud, debris etc.
- Worn or deteriorated surfaces
- Improperly constructed surfaces
- People – Shoes/clothing, speed, activity, inattention, or condition
- Inappropriate floor surface or surface finish for the activity

## What is a Trip?

A trip is an interruption of one's gait because of an obstruction or / and irregularity in or on a surface.

Causes of Trips

- Poor housekeeping
- Poor placement of auxiliary items e.g. electrical wires
- Changes in floor level – A change of height as small as ½" can cause a trip
- Irregular tread height on stairs
- People - Clothing, activity, inattention, fatigue

## What is a Fall?

A fall is an undesirable descent due to the force of gravity, usually from a standing posture or during ambulation, to a lower level, usually the ground or floor. A fall usually happens if we slip and our heel does not come to a stop after contact with floor (say beyond 10-15 cm) or we trip and are unable to recover our balance.

## Why is it a problem?

A clean, dry surface may be safe, but that very same surface when wet or contaminated can be slippery and dangerous. Slips and Trips not resulting in falls can result in: cuts and bruises, muscle strains, forceful contact with other adjacent people or surfaces and even dislocations. Slips and Trips resulting in falls can be catastrophic resulting in the injuries mentioned previously and a host of others including trauma to the spine and head and fatality. These injuries can significantly reduce the quality of life of an individual. The good news is that these injuries can be avoided.

## Mitigation measures for Operational Facilities

Maintenance is key to reducing Slips, Trips and Falls – in the workplace, and at home.

- Practice good housekeeping – Ensure walkways and stairs are kept free from obstacles.
- Ensure adequate lighting.
- Use walk-off mats at entrances to capture dirt, water and other contaminants.
- Clean up all spills immediately & use appropriate signage.
- Adequately clean walking surfaces to remove contamination.
- Use signage at areas where there are higher risks - stairs, ramps, changes in elevations, wet floors etc.
- Employees should avoid carrying bulky loads that block their view of the floor.
- Ensure handrails and guiderails are available at stairs and ramps.
- Ensure suitable footwear is used.
- In cases where walkways are exposed to the rain – Cover or consider improving traction. Clean often to prevent moss or another contaminant build up.

## Prevention measures for New Facilities

On the front end, the key is proper and suitable Design and Construction to cater for the intended use of the facility. Consider everything under the Mitigation measures for Operational Facilities. Additionally, the following are proposed:

- Design and construct to consider:
  - the environment and foot traffic
  - the processes and flow of people in and through the space
  - the likely contaminants, available controls and cleaning procedures
- Proper Material Selection – Does the tile, vinyl meet your need? Will it provide the resistance you need for a floor with a lower probability of slips and falls? It is useful to check the material specification for a hard flooring surface finish such as tiles. This will be presented as the Coefficient of Friction of the product.

## Recommendations

- Assess your high-risk areas. If you have known slippery surfaces or reports of slips / trips / falls, then consider implementing the mitigation measures.
- Unsafe floors should be reported to the relevant personnel to prevent incidents and accidents.
- Plan for renovations or new constructions – There is no such thing as a perfectly safe floor. There are only floors with higher or lower risks of slips, trips and falls.
- If you continue to have issues with slippery floors even after implementing the measures, it may be useful to check whether the floor is providing the required friction.

**Author**
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**Caribbean Industrial Research Institute (CARIRI)**

Lisa Ramoutar is a TTCA Board Director and the Laboratory Manager at Caribbean Industrial Research Institute (CARIRI). Mrs. Ramoutar is a Civil Engineer with over 10 years experience in investigating materials in construction. She supervises an experienced and knowledgeable team at CARIRI. Their goal is to improve quality in construction.

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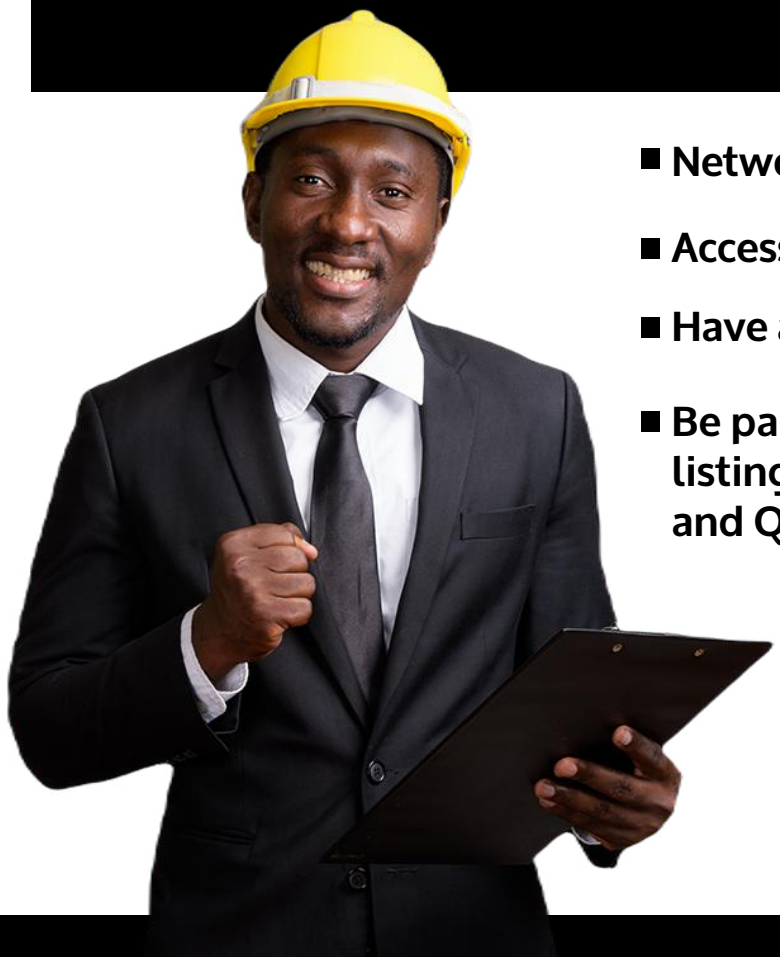

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