

One for the road

State-of-the-art truck weighstations are keeping dangerously overloaded trucks off the Qatar highway network, in doing so promoting road safety and reducing pavement deterioration. As a consequence, overweight violations have been greatly reduced

by Husam Musharbash, Traffic Tech Group (Middle East/Gulf)

The Middle Eastern state of Qatar is in the midst of an extraordinary economic boom. The massive construction developments within Doha, Qatar's capital city, and the surrounding regions – as well as a general increase in population – have resulted in a subsequent rise in the volume of commercial truck traffic and other vehicles on the road. This has reportedly increased at a rate in the region of 10% every year.

Although such investment is good news, it has led to some worrying side effects. Similar to many other developing countries, crashes in Qatar have increased with the larger vehicle presence, which has caused great concern for authorities. In response, therefore, numerous ITS projects are being implemented, including the deployment of signals at roundabouts, workzone ITS, and a freeway management system – each contributing to the country's efforts in putting safer transportation infrastructure in place. In addition, tighter control on truck weight limits was deemed necessary, after an axle load survey in 2007 revealed that over 83% of those heavy vehicles weighed on the Salwa Highway (an international road connecting Qatar to the Saudi border) were exceeding legal weight limits. In 2008, the Salwa Road Project Management Team (SRPMT) took the decision to start truck weight enforcement and contracted Traffic Tech for the weighing operations, initially implemented using portable scales.



FROM PORTABLE TO PERMANENT

The first month of truck weight enforcement on the Salwa Highway reduced overweight violators to 30%. Appreciating the results, the SRPMT moved forward with long-term implementation and contracted Traffic Tech to build six truck weighstations as part of a larger project to design and build the Salwa Highway's Freeway Management System.

The weighstations were completed in 2009. Each has four main stages. At the

station approach, there are mainline sensors covering all four lanes in one direction of the freeway, which are used as a permanent traffic data collection station – an ITS component that forms part of the highway's road asset management system. The other parts cover the weight enforcement aspect. Trucks will initially pass through the ramp screening scale, at which potential overweight violations are identified. In addition, this section is also equipped with an Over-height Vehicle Detection System (OVDS) that warns of overheight violations. Next up is the multi-platform static scale, where overweight violations are verified with static weighing. Lastly, a bypass lane captures information concerning trucks that avoided the weighstation altogether.

WEIGH IN MOTION

The mainline, ramp screening and bypass lanes are equipped with advanced weigh-in-motion (WIM) systems supplied by Canada's International Road Dynamics (IRD). Through Quartz sensors and/or piezoelectric sensors mounted in the road, data such as axle weights, gross vehicle weight, speed, spacing between adjacent axles, vehicle



← Data collected through WIM systems can be used for both real-time and offline functions, integrated through appropriate information systems

length, and vehicle class, is all captured while the trucks are actually moving.

All trucks should enter the weighstation if it is open. An electronic ('Open/Closed') sign located before the ramp screening scale will indicate if trucks should report or not. The ramp screening scale is a single lane equipped with Quartz WIM sensors, inductive loop sensors, overheight sensor and a megapixel camera. A snapshot of each truck will be taken after passing the sensors and each picture will be assigned to its corresponding truck record. Specific data collected in the ramp screening includes axle weights, gross vehicle weight, truck speed, spacing between adjacent axles, total truck length, truck class, date and time, vehicle record number, overweight status, overheight status, and finally a truck image. The data obtained from the ramp screening is sent to the operator's workstation for live monitoring and will also be saved for future use for report generation.

Based on a truck's measurement and the data captured, they are automatically classified and compared to a compliance table. If a truck exceeds any of the thresholds for its class, traffic signals will automatically direct it to report to the static scale, otherwise it will be directed to leave the station without any further delay.

If some suspected trucks choose not to report to the static scale for weight verification after being directed to do so, they'll be detected and will appear in the operator's software as a 'running violator'.

A multi-platform static scale follows the ramp screening scale. Through static weighing, it verifies overweight violation of those identified in the ramp screening. A traffic signal located after the static scale then automatically directs confirmed violators to the parking lot for issuance of a violation ticket. Those that have no violation will be permitted to exit the station. If, however, a truck driver opts to exit after being directed to the parking lot, a snapshot will be taken by a camera located at the exit lane so this truck will also appear in the operator's workstation as a running violator.

Bypass lanes detect trucks that ignored the 'Open' sign of the weighstation – a stage



← Showing the damage – severe rutting – that overloaded trucks can cause to roads

RESULTS AND MOVING FORWARD

So what's been the result of all of this added truck enforcement? First of all, there has been an amazing decline in violators – from over 83% in 2007, it dropped to just 5% in September 2009. Reaping the benefits of this safer transport operation on the Salwa Highway are the daily motorists. With trucks conforming to limits, truck-related accidents have been greatly reduced. Drivers, on the other hand, also have less to worry about.

Weight enforcement visibility is limiting overweight violations, and hence is reducing road deterioration and road maintenance cost – a fact supported by the fourth power rule on the relation between percentage overweight versus percentage reduction in road pavement life.

With the underlying benefits of truck weight enforcement proved, 16 more truck weighstations are under contract with Traffic Tech – awarded by the Public Works Authority – to be implemented throughout Qatar, five of which are currently under construction on North Road. A separate contract, meanwhile, was carried out for one truck weighstation on the Dukhan Highway. In the end, there will be 23 truck weighstations that will constitute a national truck weight enforcement system covering Qatar's entire road system. ■

that consists of piezoelectric WIM and inductive loop sensors installed in all four lanes of the main highway, as well as high-speed image-capturing cameras. Truck details including its photograph will be stored in the system to be recalled at any other time for further enforcement purposes.



↑ Sensors embedded in the road capture information on vehicle gross weight, speed and axle classification

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