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App shows jarring role of cast-metal covers in Boston

By Eric Moskowitz | GLOBE STAFF DECEMBER 16, 2012

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Workers cut into the pavement on a Boston street to fix a manhole cover. Castings are the cause of more rough rides in the city than potholes.

Pity the poor pothole, maligned by motorists for years. Who ever heard of a casting?

But it turns out that castings — public works jargon for manhole covers, grates, and other cast-metal lids, as well as the rims on which they sit — are responsible for about eight times as many bumps and divots in the road as plain old potholes.

Technology is shining a light on this lesser-known pavement problem. A smartphone application known as Street Bump, developed by an in-house City Hall think tank and tested by 25 municipal employees, records the location of every bump a driver hits.

Of the first 100,000 ride-jarring bumps registered by the app, traditional potholes accounted for a stunningly small percentage. They were vastly outnumbered by misaligned castings, according to the Mayor's Office of New Urban Mechanics, the think tank that developed the app.

If that begs the question — "what are castings?" — it is a sign of the outsized role that potholes play in the public imagination. But across the city, potentially thousands of castings have fallen below the pavement, or popped above, posing obstacles to drivers. Thanks to smartphones, they are now being fixed.

"Boston's residents deserve a smooth ride," Mayor Thomas M. Menino said in a prepared statement that credited Smart Bump for diagnosing a problem and leading officials to create a "solution for what we now know to be the primary cause of bumpy roads in the city."

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The New Urban Mechanics are also behind Citizens Connect, the nearly four-year-old app that allows residents to send the city GPS-tagged photos and descriptions of problems such as graffiti or darkened streetlights.

After the early success of that app, the team began to wonder if smartphones could be used to detect potholes automatically, without waiting for citizens to report them. They developed an app harnessing two smartphone components — the accelerometer, which gauges the direction and acceleration of a phone's movement, and the Global Positioning System receiver — to register the jostling

of a phone placed in a car's cupholder or center console and to mark the location based on GPS satellites. And they set out to refine it to weed out false positives, such as speed bumps.

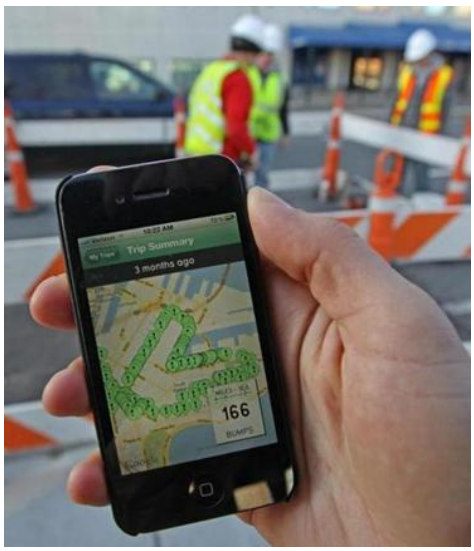
At the time, the talk of Street Bump's promise centered on potholes. City inspectors were starting to suggest that castings were a problem, but utility companies, not the city, own the castings, as well as the 3 feet of pavement around them, said Public Works Commissioner Joanne Massaro.

City crews would sometimes level off the worst ones, applying asphalt around the edges. But no one knew how many castings there were on Boston's streets, much less how many posed a problem, Massaro said.

Earlier this year, city officials asked the utilities to catalog the estimated 50,000 or more castings in Boston, some of them generations old. Soon afterward, data began streaming in from a test of Street Bump by city employees who were asked to activate the app whenever they drove. Follow-up inspection of the tagged trouble spots showed them overwhelmingly to be castings, not potholes.

"Street Bump is a technology that we can use in the city to give us a type of intelligence that perhaps we wouldn't get from the typical channels," said Chris Osgood, cofounder of the New Urban Mechanics.

Massaro said the city "really got serious," once it was armed with Street Bump data. Though misaligned castings rarely chew tires and axles as badly as the worst potholes, they can move several inches and become surrounded by cracks, posing problems for car tires and alignments and potential dangers to bicyclists.



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So the city made a deal with utilities: If they want to work in the offseason, getting access to underground lines on mild weather days

after Nov. 15, they must also fix a certain number of castings a year. About 175 have been repaired so far.

City workers using smartphones have begun identifying problem castings in the roads, and one utility, NStar, has crews working on the problem.

Menino is famously interested in the condition of the streets. “This is something the mayor takes very seriously,” Massaro said. “The utility companies really work at his pleasure out there, and it’s very important that they take responsibility.”

The city has also put out a call for designers to create castings to better withstand Boston traffic and New England winters, opening a $10,000 competition in partnership with the Living Labs Global Award.

Of the thousands of castings already in the ground, NStar owns roughly half and has been responsive to the call to fix them, Massaro said.

Making castings flush is about more than applying a skim coat of asphalt, which could quickly peel off, said Frank Cannone, an NStar inspector.

Instead, a section of road must be cut away around the manhole and then refilled, a multihour job involving a backhoe, saw cutter, jackhammer, and paver. Those were the tools employed Thursday morning to fix a misaligned manhole on Summer Street near the Seaport District, the work briefly revealing age-old cobblestones.

Though that manhole and its surrounding pavement had represented only a minor divot on the northbound side of Summer Street, a rectangular grate on the southbound side — owned by the Boston Water and Sewer Commission, a utility corporation legally distinct from City Hall. sat amid a lunar crater: another problem casting, overlooked for years, identified by iPhone.

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