HT 13: TREAT CORROSIVE CONCRETE WASTEWATER

New York City Building Code
Proposal developed by the Construction Practices Committee

Summary

Issue:
Concrete trucks, buckets and washout pump trucks are typically rinsed at construction sites, and the runoff is then directed to a stormwater drain. This water is corrosive and should not be discharged onto public streets or into rivers.¹

Recommendation:
Require wastewater from concrete mixer trucks to be either treated on site or returned to the manufacturing plant for treatment.

Proposed Legislation, Rule, or Study

Amendments to the New York City Building Code:

1. Amend Section 3302.1 to include the following defined terms:

   **CONCRETE BUCKET.** A receptacle of one half cubic yard or greater capacity used to convey concrete.

   **CONCRETE WASHOUT WATER.** Wastewater from the rinsing of equipment used to mix, transport, convey, and/or place concrete manufactured by a permitted batch or mixing plant. Examples include concrete buckets, the concrete hose lines and pumps of concrete pump trucks, and the chute of concrete mixer trucks. This definition does not include equipment involved in the preparation, conveyance, or application of concrete mixed on site from bagged ready-mix.

   **NORMAL SEWAGE.** See Section 24-523(a)(10) of the Administrative Code.

   **SEWER SYSTEM.** See Section 24-523(a)(2) of the Administrative Code.

2. Add a new Section 3303.17 as follows:

   **3303.17 Concrete washout water.** Concrete washout water from mixer trucks shall be collected and either:

   1. allowed to evaporate;
   2. returned to the concrete batch plant for treatment;
   3. treated onsite to the standard of normal sewage prior to release into the sewer system; or
   4. treated onsite prior to release into the sewer system according to a treatment protocol established by the commissioner.

Supporting Information

Issue – Expanded
Concrete contains Portland cement, and typically also antifreeze and fly ash or slag. The residue from these materials gives concrete washout water a pH above 12, which is comparable to Drano® Clog Removers. Concrete washout water also contains metals and metalloids, at least four of which are toxic². Concrete washout water flowing down the street gutter can harm the public by direct contact or ingestion. Undiluted, the water would also be lethal to aquatic life. NYC’s sewer system commonly outflows into local rivers.

Although NYC law prohibits the discharge of substances with a pH above 12 and that contain toxic materials to the City sewer system, the rule is not enforced for concrete washout water. Construction projects are permitted to release the water to the ground, street, and City sewer once it is filtered of sediment through the use of filter fabric and straw bales. This proposal requires projects to employ low cost and practical measures that are currently available to eliminate the...
release of the primary source of untreated washout water, which results from rinsing the barrel and chute of mixer trucks.

For a 1.2 million square foot project, this strategy was estimated to prevent the release of approximately 163,500 gallons of untreated concrete washout water to neighboring city streets and the City sewer system. This equates to five times the amount of water in a 25 yard-long, three lane-wide and four foot-deep swimming pool.

**Environmental & Health Benefits**

Concrete contains Portland cement, as well as often antifreeze and fly ash or slag. The residue from these materials gives concrete washout water a pH above 12, which is comparable to Drano® Clog Removers.

In addition to a high pH, concrete washout water also contains the following metals, of which the first four—arsenic, chromium, lead, and zinc—are defined as toxic by the NYC building code and federal Clean Water Act:

- Arsenic
- Chromium
- Lead
- Zinc
- Aluminum
- Barium
- Calcium
- Iron
- Magnesium
- Manganese
- Potassium
- Selenium
- Sodium
- Vanadium

Concrete washout water also contains sulfur trioxide, which can react with water to form sulfuric acid.

A recent test of the concrete washout water from a local project confirmed the above information.

In addition to the dangers related to direct contact with the water, waste discharged into the City's combined sewer system emptied into the local rivers during Combined Sewer Overflow (CSO) events. These events occur about 50 times per year, on average, and up to 70 times per year at some outfall locations.

This proposal was found to have a low positive health impact per building and to impact a small number of buildings. It was thus given a health score of 1.

This proposal was found to have a low, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

**Cost & Savings**

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to lower capital costs if implemented.

**Precedents**

1. California, Washington, Minnesota, and land areas where the EPA is the permitting authority prohibit construction sites greater than 1 acre from releasing concrete washout water to the ground, sewer system, or local water body without prior treatment.

2. Section a(1) of Rules of the City of New York (RCNY) Title 15, Chapter §19-03, Materials and Substances Excluded from Public Sewers, currently prohibits construction materials from being discharged, allowed to run, leak, or escape into any public sewer. The rule also prohibits substances having the following characteristics from being discharged into the public sewer:

   (9) Wastewater having a pH lower than 5.0 or higher than 12.0 or having any other corrosive property likely to cause damage to structures or equipment of the sewerage system or create a hazard to personnel;

   (10) Toxic substances in such quantities, which the person knows or has reason to know, may when discharged from a single source or in combination with other sources:

   (ii) limit the City's options for operating its sewerage system or disposing of the sewage sludge, grit or scum generated at water pollution control plants;
(iii) be detrimental to the health of human beings, animals, or aquatic life;

Under this existing NYC law, concrete washout water should not be permitted to enter the City’s sewer system.

3. Section 16-119 of the Administrative Code of the City of New York states:

It shall be unlawful for any person, his or her agent, employee, or any person under his or her control to suffer or permit any dirt, sand, gravel, clay, loam, stone, rocks, rubble, building rubbish, sawdust, shavings or trade or household waste, refuse, ashes, manure, garbage, rubbish or debris of any sort or any other organic or non-organic material or thing or other offensive matter being transported in a dump truck or other vehicle to be dumped, deposited or otherwise disposed of in or upon any street, lot, park, public place or other area whether publicly or privately owned.

Under this existing NYC law, concrete washout water should not be permitted to be dumped on City streets.

**LEED**

All new construction and major renovation projects pursuing LEED certification are required to comply with the requirements of the EPA Construction General Permit (CGP). Compliance is mandated by Sustainable Sites Prerequisite 1. Thus all LEED projects in the City should already be following the requirements proposed herein (though none currently are doing so).

**Implementation & Market Availability**

A project with a large site area will be able to use watertight concrete washout bins, in which the water can be left until it evaporates. Permanent bins with a nonstick surface are best for this application, because the concrete can be slid out and recycled. The alternative is to use plywood boxes lined with a plastic sheet. Once the concrete cures in this type of box, the whole box has to be disposed of and the concrete cannot be recycled. Plywood boxes cost about $400 to make.

An alternative is to capture the water and return it with the truck to the concrete plant for treatment. Concrete plants have water treatment facilities by law because they generate a significant amount of washout water rinsing trucks and equipment themselves. An off-the-shelf solution for capturing the water and returning it to the plant costs about $1,400 per truck to purchase and two hours to install. This solution consists of a pail that hooks onto the bottom of the concrete truck chute while the chute is being rinsed down. The pail empties into a 30-gallon tank installed on the truck. Back at the plant, the tank is emptied while the truck is rinsed down more thoroughly, as is currently the practice. For a large project (e.g. 1.2 million SF) about 10 trucks would need to be fitted out with the system to service the job effectively. Using the system could add 10-15 minutes to the washout process, but it also offers cost savings through the following:

- Reducing the need to chop concrete out of sewers, which costs about $480 per session. Current practice can result in sewers needing cleaning as often as once a week on a large project.
- Reducing the need for washout boxes (lined with filter fabric) on site. Current practice typically requires large jobs to fabricate 2 plywood washout boxes a week. The cost of this practice is about $4,120 per month.
- Reducing potential for fines related to sewer blockages: Fines range from $350 - $10,000.
- Reducing potential for personal injury related to concrete washout water.

Concrete Slurry Solutions (www.concreteslurrysolutions.com) has developed a product as described above for capturing rinse water off the chute and returning it to the concrete plant for treatment with the truck. It is called the Concrete Washout Watchdog. It has been installed on the fleets of the following concrete manufacturers:

| Strata Corp                  | West Fargo ND  |
| Central Iowa RM             | Ankeny IA      |
| Crosslakes RM               | Crosslakes MN  |
| Cemstone                    | St. Paul MN    |
| Superior Supplies           | Santa Rosa CA  |
| Nevada Ready Mix            | Las Vegas NV   |
| Sacramento Concrete         | Sacramento CA  |
| Over & Over Ready Mix       | Sun Valley CA  |
| Associated Ready Mix        | Los Angeles CA |
| A&A Supply                  | Sacramento     |
| Cadman                      | Redmond WA     |
| Carl’s Ready Mix            | Windsor CA     |
| Catalina Pacific, Geiger Ready Mix | Kansas City MO |
| Matthew’s Ready Mix         | Yuba City CA   |
| Livingston Concrete         | N. Highlands CA|
| Rinker Materials            | Fairfield CA   |
| Rinker Materials            | Everett WA     |
Concrete Washout Systems™ offers permanent concrete washout boxes with a nonstick surface. The company has numerous containers at various sites throughout New Jersey and New York State. Recently completed jobs in NYC include Pier 53 (Trevcon), Pier 98 (D’Onofrio), The Willis Avenue Bridge (Kiewit), The Throgs Neck Bridge (American Bridge), East 80th Street (Ryan Associates), and several projects for Cross Country Construction, Atlantic Sub-Sea, DKN Concrete, and Gotham Construction. Current projects include Astoria Power Plant (Jingoli), World Trade Center (Rogers & Sons, Collavino Construction), and The Harlem River Tunnel (Kiewit).

Other off-the-shelf solutions are also available to satisfy the requirements of this proposal.

ENDNOTES:


5. Assumes that the cost includes four sheets of plywood at $75/box and one hour of carpenter time at $100/hour.

6. Assumes one sewer cleaning involves two laborers working for four hours at $60/hour with benefits

7. Assumes two boxes are fabricated each week at a cost of $75/box of plywood and one hour of carpenter time at $100/hr, and then two boxes are broken down at a cost of four hours of laborer time at $60/hour.