

# Catch Basin Cleaning Program Overview

*Lowell Regional Wastewater Utility*



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## Catch Basin Cleaning Program Overview

### 1. A Brief Overview of Lowell's Collection Systems

Lowell's collection systems refer to the various sewer and drainage systems located within the City's limits. With active sections dating back to the 1800s still in use, Lowell Wastewater's sewer system consists of approximately 220 miles of gravity sewers: ten miles of which are large-diameter (48-inch to 120-inch) interceptor pipes located along the banks of the Merrimack and Concord Rivers, that collect wastewater from the sewer system and convey it to the Duck Island Regional Wastewater Utility. Additionally, Lowell has over 63 miles of drainage pipes within its boundaries, which convey and direct surface runoff (i.e. stormwater) to municipal outfalls along waterbodies and wetlands.

In order to manage its collection systems, Lowell Wastewater's engineering department maintains a comprehensive geographic information systems (GIS) record of the sewer and drainage systems. This effort is supported by the use of Esri's ArcGIS Online applications, including Collector, Survey123, and Workforce. These applications allow field personnel to document collection system capacity, management, operations and maintenance (CMOM) related activities.

Catch basins are an essential component of both the City's sewer and drainage systems. A catch basin is a grated, sub-surface chamber, located at the point where a street gutter discharges into a receiving sewer or drainage system. Catch basins are typically fitted with a deep sump and baffle, which catch and prevent debris (e.g. sand/dirt, oils, bottles, floatables, etc.) from entering and travelling through the collection systems. In simpler terms, catch basins are the primary inlet for surface flows, and debris, to the collection systems.

With a total of 6,514 mapped catch basins in the sewer and drainage collection systems, these structures are essential in preventing unwanted materials and pollutants from being conveyed through sewer and drain lines. Additionally, these catch basins are used to mitigate street flooding, as they provide a means to convey drain the flooding away. As such, the maintenance and upkeep of this infrastructure is a top priority for Lowell's Wastewater department.

### 2. Lowell's Catch Basin Cleaning Program

Over the past four years, Lowell Wastewater has been actively refining its Catch Basin Cleaning Program to incorporate the use of Esri's ArcGIS Online applications create a digital record and better understanding of the City's catch basins throughout the collection system. This data is being used to refine future catch basin cleaning efforts as well. In CY 2022, 1,659 catch basins were cleaned as part of this program. At this rate, Lowell Wastewater expects to clean every catch basin in the City within an estimated five year period.

#### Catch Basin Cleaning Personnel and Prioritization

Lowell Wastewater utilizes both in-house and contracted services to conduct routine catch basin cleaning throughout the City. Wastewater maintenance personnel operate the Utility's Vac-Con truck daily. Contracted services are hired to clean 1,500 catch basins over the course of a fiscal year. Since FY2023, BMC Corp. has held the contract to supplement in-house catch basin cleaning.

Catch basins are cleaned system wide by neighborhood and priority. Certain areas in Lowell are known to experience greater amounts of sediment and debris on the road; catch basins in these areas are prioritized and cleaned more frequently. Additionally, residents may submit a request to have a catch basin cleaned through CivicPlus by following the "Report a Concern" link on the City's website; these catch basin

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requests receive highest priority. By default, all catch basins in need of routine cleaning receive a “Medium” priority designation; catch basins with a need for more frequent cleaning receive a “High” priority designation and catch basins with a reported concern receive a “Critical” priority designation. After a “Critical” priority catch basin has been cleaned, any future cleaning assignments at this catch basin will be addressed as “High” priority. Contracted services handle “Medium” priority catch basin cleaning assignments, but can support the in-house catch basin cleaning crew with “High” and “Critical” cleaning assignments, as necessary.

### Generating Cleaning Assignments with Workforce

ArcGIS Workforce is an online application that is used to create, assign, and manage work-order assignments related to the collection system. In the office, a dispatcher uses the Workforce web app to create assignments and send them to a mobile worker, while also being able to track the location and ongoing progress of the mobile worker. In the field, a mobile worker uses the Workforce app on their mobile device to track and complete their To-Do list of assignments.

Catch basin cleaning assignments are initially created in bulk using a Python script, such that an assignment is generated for every mapped catch basin in the City’s GIS record. These cleaning assignments default to receive “Medium” priority designation but can be manually changed to “High” or “Critical” priority where necessary. Additional catch basin cleaning assignments can be manually created whenever requested. The created assignments populate a map with an overlay of the sewer and drainage systems; this provides the mobile worker with better context for the catch basin with respect to its general location in Lowell and within the collection systems.

The dispatcher assigns catch basin cleaning assignments, by neighborhood and priority, to the corresponding mobile worker: in-house or contracted services. Mobile workers are only able to view and access assignments that are assigned to them. Once on location, the mobile worker will select the assignment; this brings up a side panel, as shown in Figure 1 in the Appendix. From this panel, the mobile worker will press the “Start” button, informing the dispatcher that the catch basin is currently being cleaned. Once finished, the mobile worker will then press the “Finish” button, completing the cleaning assignment, and removing it from the To-Do list.

### Recording Information with Survey123

Survey123 is a companion application that is used to record and collect data related to an individual feature asset. A catch basin cleaning survey has been developed and is accessible to mobile workers by following the “Survey at Assignment” link found at the bottom of the aforementioned side panel (Figure 1). Mobile workers are expected to complete a corresponding survey for every catch basin cleaning assignment. A copy of this survey is included as Figure 2 in the Appendix.

Assessment questions in the catch basin cleaning survey include the following:

- Pre-cleaning and post-cleaning sediment depth measurements;
- A structural assessment, with photo;
- The total number of piped inlet and outlet connections found in the catch basin;
- Whether or not a curb inlet (also known as a throat/throttle) to the catch basin is present;
- A field for general comments or other relevant information.

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### 3. Shaping Future CMOM Related Work

The information being collected as part of Lowell's Catch Basin Cleaning Program is being used to help plan and execute future collection system maintenance activities in two main areas: structural repairs and MS4 General Permit compliance.

#### Structural Repairs

As previously noted, catch basins are being structurally assessed by cleaning personnel as part of the overall catch basin cleaning process, with results being recorded via Survey123. Through this process, catch basins with structural defects, including broken grates, recessed/sagging frames, missing bricks, intrusions and cracks are being categorically inventoried, and can be prioritized for repair as necessary.

#### MS4 General Permit Compliance

Per section 2.3.7.a.iii.2 of the 2020 Municipal Separate Storm Sewer Systems (MS4) Permit, permittees are required to, "establish a schedule with a goal that the frequency of routine cleaning will ensure that no [municipal drainage] catch basin at anytime will be more than 50 percent full". By having pre-cleaning and post-cleaning sediment depth measurements being taken as part of the catch basin cleaning process, an estimate of the total amount of solids/sediment removed from the catch basin can be made. Once the catch basin is cleaned a second time, and another set of pre-cleaning and post-cleaning sediment depth measurements are taken, an estimated rate of fill can be made for the catch basin. This rate can then be used to predict when the catch basin will be at 50 percent full and in need future cleanings.

# Catch Basin Cleaning Program Overview

## Appendix

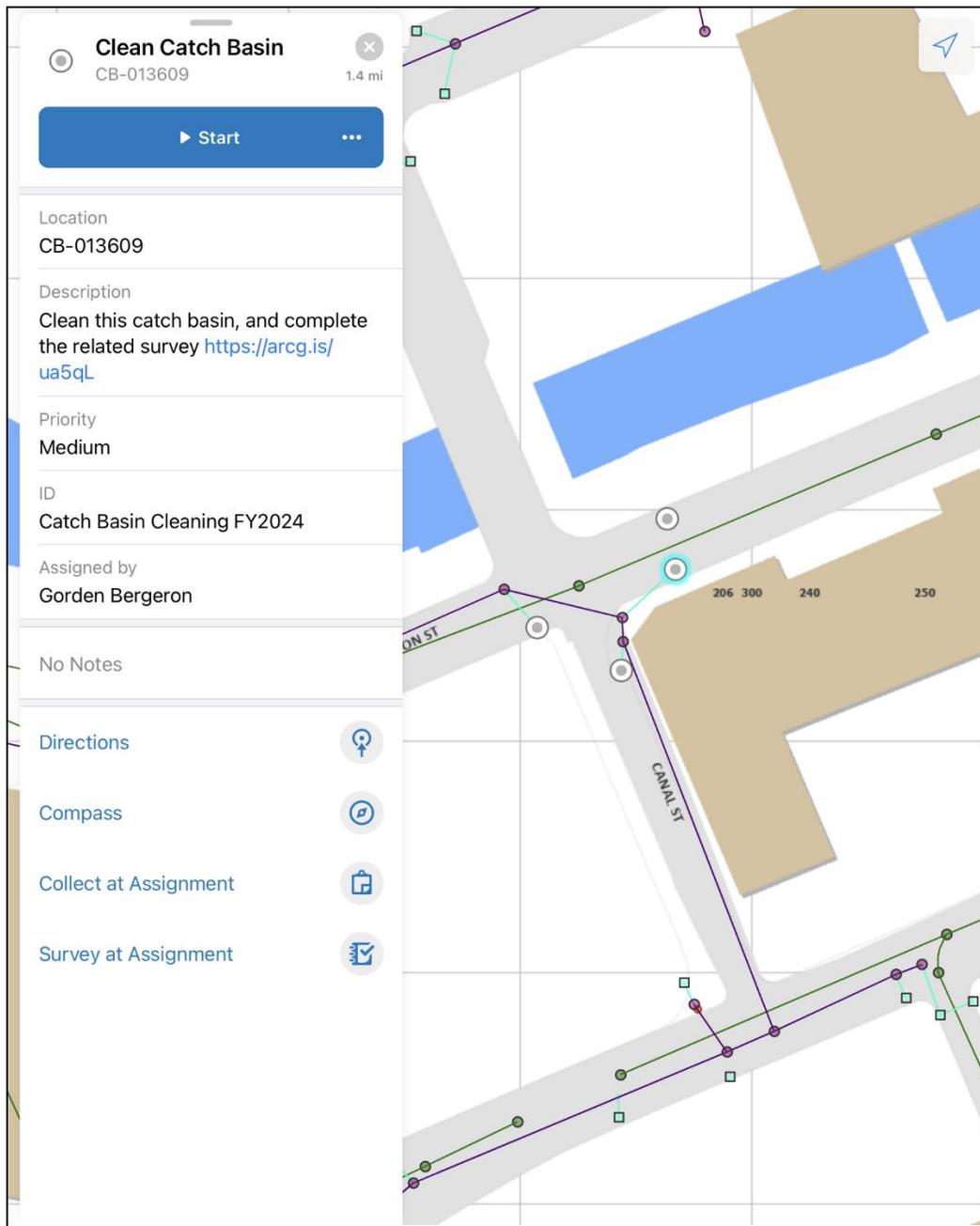


Figure 1. Catch Basin Cleaning Workforce Mobile Worker View

## Catch Basin Cleaning Program Overview

Contractor Catch Basin Cleaning Survey

Crew Members \*

BMC

Other

Mapped or Unmapped \*

Does a record of this catch basin already exist on the map (mapped), or is it missing (unmapped):

Mapped

Unmapped

Facility-ID

Internal use - **do not edit**

CB-013609

Access Issues \*

Accessed - No Issues

Vehicle Blocking Access

Could Not Locate

Could Not Open

Other

**▼ Catch Basin Cleaning**

Sediment Depth Pre-Cleaning (from rim) \*

Measure down to the debris level from rim **before** basin is cleaned (in inches).

Sediment Depth Post-Cleaning (from rim) \*

Measure down to the debris level from rim **after** basin is cleaned (in inches).

Condition \*

Overall condition of the catch basin

Good

Fair

Poor

Number of Connections \*

Total number of piped inlet and outlet connections in/from catch basin

1

2

3+

Curb Inlet \*

Does this catch basin have a curb inlet (a.k.a throat/throttle)

Yes

No

Comments

Record any comments or relevant information here:

✓

Figure 2. Catch Basin Cleaning Survey