



6 October 2022
To: Mayor and City Council members
Even though only six days into new FY 23, EPW leadership has developed a solid overview and plan to execute with the bit of existing but largely new resources provided in the approved FY 23 budget. Separate outlines for open ditch and enclosed pipe maintenance described herein to meet our responsibilities. Also have the technology and work order systems to track and record keep. Looking forward to getting after this. Clay

To: Robert Upton, Director Engineering & Public Works
From: Eric Hammond, Assistant Director Engineering & Public Works
CC: Dante Prescod, Right of Way Superintendent
Date: October 6, 2022
Re: Drainage Maintenance & Operation Business Plan Outline

Executive Summary

The intent of this memorandum is to outline the drainage maintenance services provided by the City of Pearland’s Engineering & Public Works Department. As of the crafting of this plan, the City is responsible for 322 miles of enclosed pipe, 145 miles of open ditch, 5,632 storm sewer manholes and 12,237 inlets.

Highlights

- In FY22 staff recommended service level improvement to drainage system maintenance and operation services within the community.
- On September 27, 2022, City Council adopted a budget that provided necessary funding to support the expanded drainage maintenance and operation services.
- Expanded services require seven (7) new full-time drainage staff to support the existing six (6) drainage staff.
- Expanded services allow for inspection, cleaning, and grading of the City’s drainage infrastructure on a ten (10) year rotation. This equates to approximately 14.5 miles of open ditch grading and 31 miles of enclosed inspection & cleaning a year.
- Provide a programmed based approach to drainage system management
- Creation of a drainage infrastructure fund which allows for dedicated maintenance and operation dollars to be separated from other services. Historically streets and drainage were a merged division and service provision team with much overlap and unclear budgets assigned to each service.
- New drainage maintenance equipment was requested, approved, and provided to support expanded services and existing equipment was separated from a previously merged street and drainage structure.

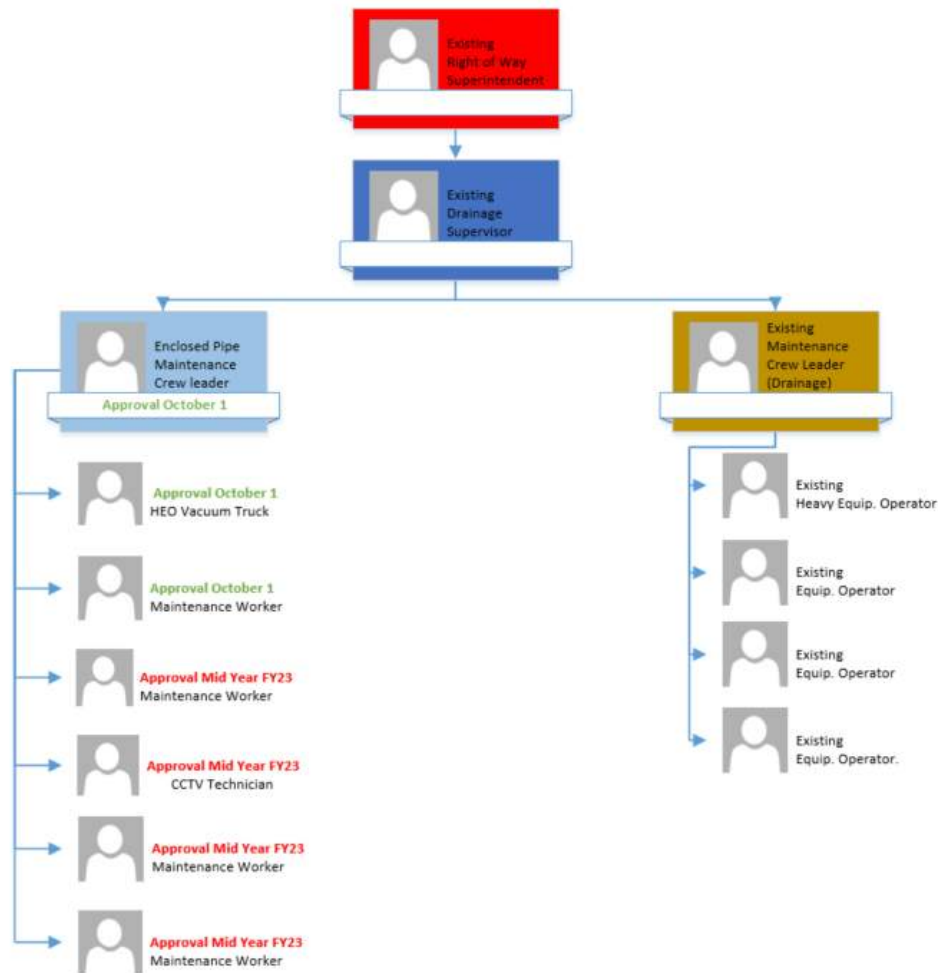
Detail

It is the intent of the Engineering & Public Works Department to initiate an expanded drainage maintenance service for the residents, business, and property owners of Pearland. This expanded service will provide for the following each year:

- 1) A goal of 14.5 miles of open drainage ditch to be graded in accordance with original flow elevations. (Flow elevation is determined based on the elevation of the culvert inlet/outlet. Unless it is necessary to be modified which would be determined upon consultation of Engineering)
- 2) A goal of 31 miles of enclosed storm sewer to be inspected and cleaned as needed, including all associated drainage assets which support those systems. These items include inlets, manholes, outfalls, etc.

Staffing

To achieve this expanded service level in FY23, it was necessary to increase staffing levels by seven (7) new team members. These drainage professionals will operate in a similar hierarchy as proven successful in other divisions. That hierarchy includes overarching management by the Right of Way Superintendent, one Supervisor, two Crew Leaders and ultimately ten (10) frontline team members comprised of position titles such as Heavy Equipment Operator (HEO), Equipment Operator (EO), Closed Circuit Television Tech (CCTV Tech) and Utility Maintenance Works (UMW). The following illustrates the organizational structure of this team and reporting responsibilities. It should be noted that the Superintendent is a direct report to the Assistant Director of Engineering & Public Works, who is a direct report to the Director of Engineering & Public Works.



Three of the new positions necessary to support this team are funded in the FY23 budget for a full fiscal year, while four remaining positions are funded for partial year beginning April 1, 2023. All three new positions approved in the FY23 budget process and funded for a full fiscal year have been posted and are “on the street” for filling. These postings include the Crew Leader, HEO and UMW. It is anticipated that these positions will be offered no later than October 31, 2022, pending qualified candidate pool with onboarding complete and members fit for duty on or before

November 15, 2022. The remaining four positions that were approved with partial year funding will be posted and “on the street” February 1, 2023, with an anticipated start date of April 1, 2023, pending qualified candidate pool.

Existing staff assigned to the division prior to the FY23 budget will remain tasked with providing open ditch maintenance services. These services include the use of the existing gradalls and dump trucks to clean open ditches and restore grade for proper water movement. All new staff approved in the FY23 budget will be dedicated to provision of enclosed pipe inspection and enclosed pipe cleaning services.

Equipment

To provide necessary maintenance services on an annual basis, the City must leverage many existing pieces of equipment and acquire new units to support service provisions. The units funded in the FY23 budget included a new CCTV van, F-150 Regular Cab and F-250 Crew Cab. The required funding and purchase dates associated with these respective pieces of equipment are as follows:

Vehicle Type	Budget	Funding Available	Anticipated Delivery Date	Assignment
Ford F-150	\$25,700.00	1-Oct-22	Estimated 8 – 10 Months from delivery of PO to Vendor	Enclosed Pipe Maintenance Crew Leader
*Camera Truck (Sprinter Van)	\$260,000.00	1-Oct-23	Estimated 1 – 6 months from delivery of PO to Vendor if vehicle is on the lot - no rentals available	CCTV Tech & UMW
Ford F-250	\$44,700.00	1-Oct-23	Estimated 8 – 10 Months from delivery of PO to Vendor	UMW & UMW

*This is a specialized piece of equipment and delivery time will vary if the vehicle is located on the lot at time of order or if we must purchase and wait for a vehicle build. It is anticipated that due to the specialized nature of this vehicle it will be presented to Council in a dedicated agenda request and not packaged in the larger group vehicle purchase traditional of standard fleet vehicle purchases.

- In addition to the equipment to be added into inventory, the Drainage Team is responsible for several existing and necessary pieces of equipment to provide assigned drainage maintenance services. This service assigned equipment includes:

Unit #	Vehicle / Equipment Type
TH157	Dump Truck
TH148	Dump Truck
TH139	Cherry Picker
M200	Gradall
M129	Small Gradall
TH180	Vactor Truck

M134	Arrow Board
R135	Trailer
P326	F150 Single Cab
TL178	Crew Truck F350 4 door
TL198	Crew Truck F450 4 door
P342	F250 Single Cab Transfer Tank
P468	F250 Extended Cab

Future equipment to be considered as additional resources & future purchases:

- Root cutter nozzle
- Push camera with mobility and pan, tilt, zoom

Program Based Approach

This section is intended to provide clarity on service areas and service level methodologies. The program-based approach to drainage system management will ensure that all drainage assets will be inspected, graded, or cleaned on a ten (10) year rotation. A map has been created to outline the 10-year maintenance program and illustrate the route in which staff will advance throughout the community. Both enclosed pipe maintenance and open ditch storm sewer maintenance will occur concurrently within each predetermined year's zone. However, due to the varying age of open ditch infrastructure and enclosed storm sewer infrastructure, dedicated crews may not be working within the same section of the predetermined zone at the same time. To put this into perspective, for this first year, staff are focusing maintenance in "year 1" (zone A) as illustrated in the map below. Based on age of infrastructure, the enclosed pipe maintenance crew may begin service provision in Section A5 due to the amount of time this enclosed system has been in the ground, while the open ditch maintenance crew may begin in section A3 due to the amount of time that has passed since the open ditches were installed in this area when compared to other locations in the zone.

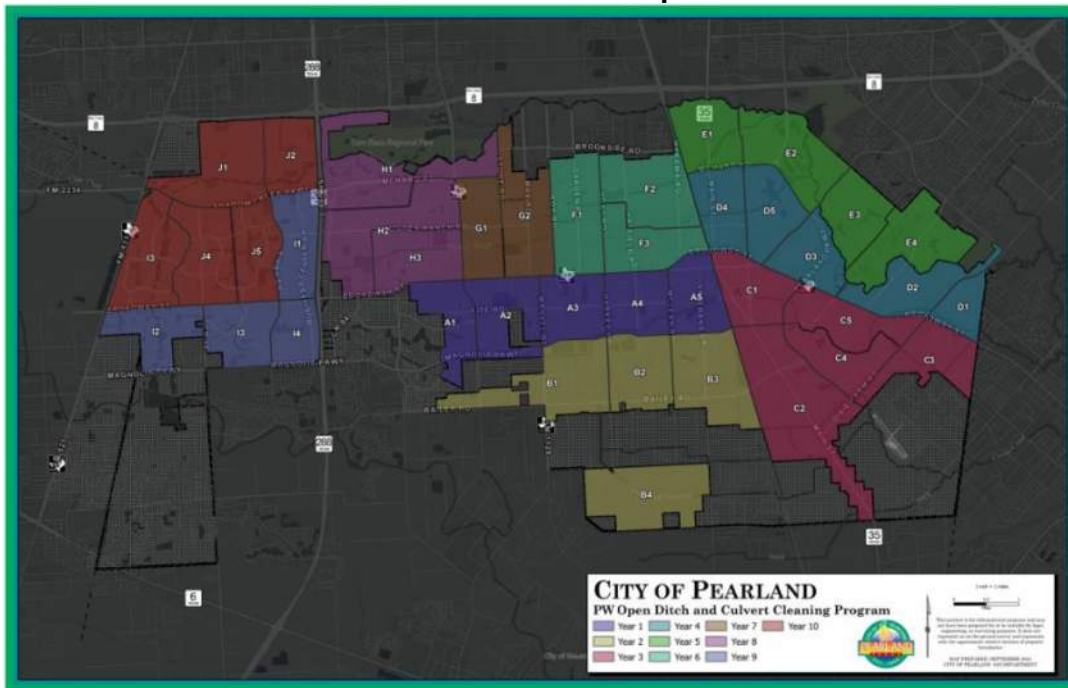
It is the Division Supervisor who is responsible for making these determinations on scheduled start points and advancement routes within the designated zone based on age and condition of the infrastructure. The Supervisor will determine and assign this route to the dedicated Crew Leader, who will then ensure the appropriate services are rendered.

The enclosed storm sewer and open ditch maintenance teams will remain in the programmed zone until all assigned drainage infrastructure within each section has been inspected, cleaned or grade re-established. Once the entire zone is complete, the team(s) may advance to the next program zone, starting with the most aged infrastructure and working systematically throughout. It should be noted that the service providers, once completed with their dedicated zone may advance at their own speed, should they reach successful completion in advance of the sister service.

It should be noted that this program will remain a work in progress through the first completed cycle (10 years). For example, year one will not result in full staffing levels or procurement of all assigned vehicles until later in the fiscal year, which will delay startup & production. Additionally, because we do not have all infrastructure currently mapped, after the first pass through the City we will have a better inventory of infrastructure. This inventory and data collection will allow "right

sizing” of zones as they will likely change to equalize the work year after year for both the open and enclosed crews.

Zone & Section Map



While it is intended to focus on a programmed based approach to drainage maintenance, we are sensitive that citizens will continue to request drainage related work orders for areas not within the programmed zone. At this time, the drainage team is crafting a [Drainage Maintenance Policy](#), similar in nature to the Sidewalk Policy, that will provide priority levels and appropriate response timelines to those reactive work order submissions. Moreover, the open ditch maintenance team will be responsible for managing those community needs, construction activities and work orders, allowing the enclosed pipe inspection & maintenance team to remain focused on the programmed approach.

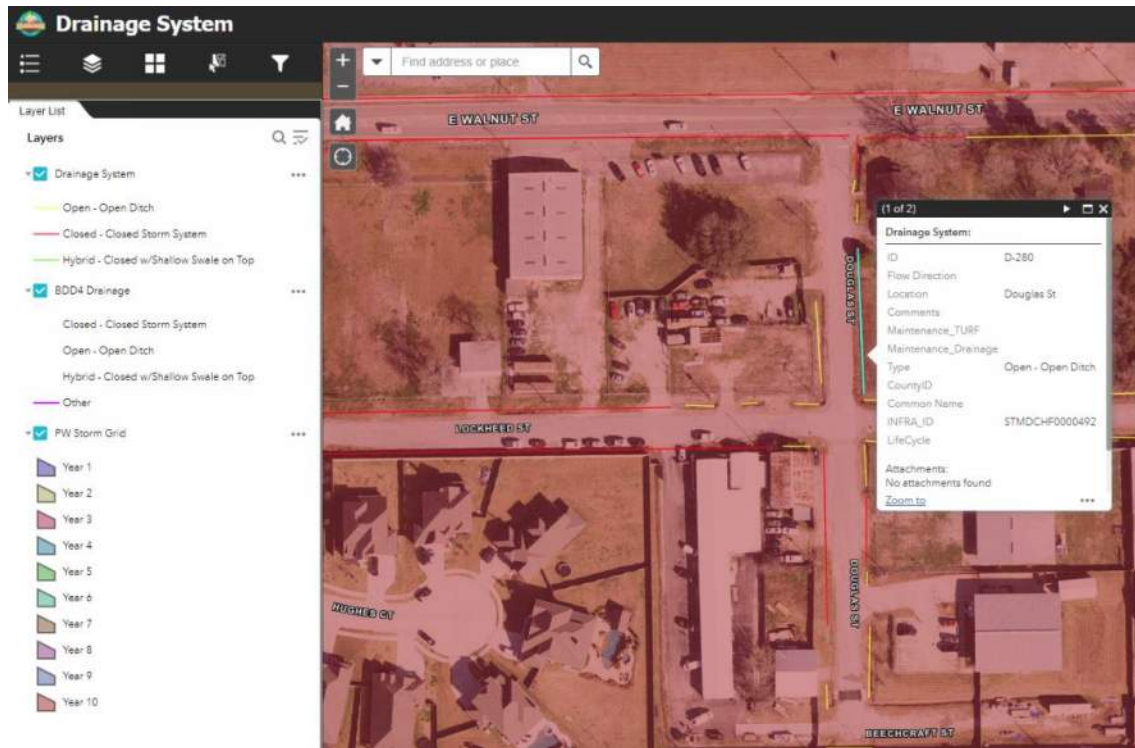
Drainage Asset Management

The GIS Department has created a [Drainage System Maintenance Dashboard](#) to record, maintain and manage each drainage asset, cctv video, deficiency, impact or rendered services associated with each individual drainage asset. Although the inventory process is ongoing, each drainage asset has/will receive an inventory identification number based on three drainage system types. As of this writing there are over 6,118 individual drainage assets with only a portion of the City inventoried at this time.

- Enclosed Storm Sewer – enclosed storm sewer comprised of a network of underground pipes receiving stormwater through inlets and ultimately discharging into receiving detention facilities or streams.

- Open Drainage – open drainage system like a roadside ditch or connection drainage typically excavated into soil but at times paved with concrete that receives water from adjacent properties or transports to receiving streams & detention facilities. This open system is inclusive of all associated culverts and outfalls
- Hybrid Drainage – drainage system which typically includes a shallow swale with inlets throughout that allow water into an enclosed storm sewer immediately below the shallow swale. These are often found in landscaped medians or shoulders and include both open ditch and underground piping.

Asset Identification



In addition to an inventory repository, this dashboard can be manipulated by drainage representatives to track the advancement of work throughout each programmed zone by toggling the status options for each drainage system. In real time, managers can receive a snapshot of what work has been completed, what remains and then quantify each. Though the buildout is still in process, the updates can be made by Cityworks as work orders are closed and the dashboard is fed. Lastly, this dashboard will be used to store all collected CCTV video and drainage impacts such as damaged culvert, impacted flow lines or obstruction in the drainage system. Symbology has been created and data points can be attached for storage of records and images associated with drainage obstructions found in the field. Collectively all impact data will be reviewed by Engineering and used to develop drainage improvement plans or capital improvement projects (CIP).

Deficiency & Video Upload



For presentation or discussion purposes, staff will produce images such as the following to illustrate impacts to either the open or enclosed infrastructure geographically and aid in storying telling or solution identification.



Operation & Maintenance Open Ditch Management:

Open ditch management is defined as the process in which open drainage systems are inspected and cleaned to remove sediment and debris in both the open section of ditch as well as the culverts and outfalls that connect open segments to one another or receiving facilities. Within the dedicated program zone and as determined by section based on aged infrastructure, City staff will inspect each segment of open ditch and connecting culverts.

The intent of this inspection is to visually identify any debris or obstruction that cause drainage impediments and should be removed from the open drainage system. Then conduct elevation surveys to verify design elevation and flowline. Once this elevation and flowline is determined, utilizing the gradall, clean the open drainage system to remove accumulated sediment and soil from the drainage way. Once each segment of open ditch is cleaned and flow line restored, division leadership updates the status of each asset via closed work order in Cityworks and updating of GIS dashboard. In addition to the open ditch sections, staff will via push camera, inspect each culvert, outfall, or related infrastructure for verification of impact or deficiencies. Restoration of sod within a cleaned open ditch system is not a service currently provided by the City.

In the event a City of Pearland CIP has been completed on a drainage asset within two years of staff reaching the zone, staff are not required to conduct ditching services beyond visual and push camera inspections unless results of that inspection indicate that additional work must be completed at that location and is not covered under warranty. Aside from the exception, it is the intent of this plan that all open drainage systems within the entire programmed zone will be inspected and cleaned to ensure appropriate flow line. This success will be measured based on the completion of all cleaning & re-establishment of grades in all ditches within a program zone annually, tracked via completion toggle on the drainage maintenance dashboard and closing of Cityworks work order. As part of traditional drainage services, staff will continue to monitor and evaluate systems post improvements and during periods of rainfall to ensure proper operation or identify any additional modifications that may be necessary.

Open ditch maintenance services will begin on October 1, 2022, as staff and equipment to provide this service are existing. Team will begin within program year 1 zone A, section 5. This is due to the age of open drainage system within the Old Town Site. Staff will advance systematically throughout the remainder of zone A based on age and logical management of water movement. For detail information on the provision of drainage services please refer to the [Drainage Maintenance Policy](#)

Impacted flowline



Re-established flowline



It is worth noting that contracted ditch cleaning services have been bid to supplement City capabilities and a contract recommendation will be presented to City Council at the first meeting in November.

Operation & Maintenance Enclosed Storm Sewer Management:

Enclosed storm sewer management is defined as the process in which enclosed storm sewers are inspected and cleaned to remove sediment and debris from the inlets, through each segment of underground pipe to the receiving stream or facility. Within the dedicated program zone and as determined by section based on aged infrastructure, City staff will inspect each segment of storm sewer and associated components.

The intent of this inspection is to visually identify any debris or obstruction that cause drainage impediments and should be removed from the system as well as any deficiencies in the piping or infrastructure itself that should be repaired/replaced. Because this infrastructure is typically found underground, staff will employ cctv equipment to visually inspect and record the condition of underground infrastructure. Should it be necessary due to drainage impediments, staff will deploy the vactor truck to clean the enclosed pipe system in conjunction with cctv entry and allow for improved video inspection/access.

Upon review of the cctv footage, staff will determine if pipe cleaning is necessary or remove any obstructions via vactor truck that may be located. All cctv footage shall be attached to an asset and saved via work order in Cityworks and inclusion on the drainage dashboard. Additionally, all anomalies or deficiencies shall be indicated by appropriate symbology to denote the specific location of issue. Once each segment of enclosed system is inspected and cleaned as necessary, division leadership updates the status of each asset via closed work order in Cityworks and updating of GIS dashboard. All drainage obstructions and deficiencies shall be compiled and shared with the Drainage Engineering Team for review and consideration of future CIP projects. It is also worth noting that a manhole inspection process has already been created in Cityworks and is used successfully for Distribution & Collection staff. This existing resource will be modified

slightly to allow for overlap with storm sewer manholes. In general, it is intended to prep cctv vehicle in the morning, shoot footage proactively for the first half of the day then return to the office at the second half of the day for detailed film review and download. However, while the team is in the field collecting data, they are marking hot spots on the video itself for later review at designated timestamps, additionally the team will mark above grade the potential location of impacts for group review as necessary. During rain events and because it is ineffective to cctv while enclosed system is flooded, this crew will support as needed the open ditch team and address traditional rain event calls.

In the event a City of Pearland CIP project has been completed on a drainage asset within two years of staff reaching the zone, staff are not required to conduct inspection and cleaning services at that improvement. Aside from the exception, it is the intent of this plan that all enclosed storm sewer systems within the programmed zone will be inspected and cleaned to ensure appropriate operation. This success will be measured based on the completion of all inspection & cleaning of all enclosed storm sewer components within a program zone annually and tracked via completion toggle on the drainage maintenance dashboard. As part of traditional drainage services, staff will continue to monitor and evaluate systems post improvements and during periods of rainfall to ensure proper operation or identify any modifications that may be necessary.

Portions of Enclosed storm sewer maintenance will begin on November 15, 2022 assuming onboarding of staff is completed as planned and based upon qualified candidate pool. This team comprised of those funded for a full year will begin cleaning the enclosed storm sewer system inlets, manholes and culverts with the vactor truck that is currently in the teams possession. Cleaning of these assets are to support inspections and training on equipment operation and will remain the initial focus due to fear of losing jet nozzles in a storm sewer prior to verifying the absence of hazards with a cctv equipment. Beginning on or before May 15, 2023, upon successful onboarding of mid-year team members we will begin the inspection services of enclosed storm sewer maintenance. These newest team members will be focused on conducting inspections to our manholes and inlets until the cctv truck is received and team is trained on use. It is worth noting the team is working to procure a portable inspection camera with pan, tilt zoom and mobility features prior to receipt of the cctv truck for smaller projects and shorter inspection runs. For detail information on the provision of drainage services please refer to the Drainage Maintenance Policy.

Estimated Timeline



In summary it is the intent of EPW to expand drainage maintenance services within the community beginning fiscal year 2023. We will first onboard the appropriate personnel and acquire all necessary equipment to fulfill this task. Then systematically begin the cleaning and inspection process within Zone A. Staff intend to communicate two updates on the drainage program in FY23, with the first planned for publishing on or before May 30, 2023, serving as a status report and the second to be published in on or before September 30, 2023, inclusive of a complete snapshot of progress throughout the year and anticipated program/resource expansion planned in FY24.

Bond Projects

