



### DRAINAGE INVESTIGATION

The West Koke Mill Association (HOA) expressed concern about drainage issues within various common areas throughout the West Koke Mill Subdivision (Additions One through Three). These common areas were designed to function as storm water drainage detention systems to convey surface water runoff to the city storm sewer system. During heavy rain events, detention basins are designed to hold water for short periods and release the water off property at a rate that won't overtake the downstream storm sewer systems. The HOA believes that there could be factors that are preventing these detention areas from functioning as designed, citing high water levels and dewatering periods lasting days following large rain events. Additionally, during low flow or dry periods, many of the paved swales throughout the detention areas hold shallow pools of water which provide conditions for algae growth and habitat for potential disease carrying mosquitoes.

The West Koke Mill HOA tasked Martin Engineering Company to investigate drainage issues and provide recommendations for solutions based on their findings. MEC also reached out to the City of Springfield with hopes they could provide "AS-BUILT" subdivision plans to verify the drainage system was constructed according to plan. Unfortunately, the City was unable to locate these documents and could only provide the generic preliminary plan. MEC generated surface contours using USGS Lidar data to compare the general drainage pattern of the subdivision with the preliminary plan. MEC also utilized GPS equipment to gather elevation data along key flow paths to verify these features were constructed with adequate slopes to promote positive drainage. The information provided below summarizes issues and provides recommendations for solutions at each respective location. **Refer to the attached Drainage Exhibits as they correlate aerial mapping and photo's ID locations to information herein.**

**Problem Area 1A:**

**Owner: HOA**

**Subdivision: West Koke Mill 1<sup>st</sup> Addition**

The issue here relates to a clogged black 12" diameter corrugated plastic pipe (CPP) located within a 35' wide common area in the rear lots between Blueberry Lane and Clara Mae Court. At the time of investigation, the area inlet at the upstream end of the pipe section was full of water and the CPP was completely submerged, which suggest the pipe has an obstruction(s) preventing flow. During heavy rainfalls it is likely that the upstream drainage structure will surcharge, and pools of water will accumulate within this area. It is also likely that the homes adjacent to this area have gutter drains and/or sump pumps connected into this pipe, which will likely result in backups resulting in potential interior and exterior water damage.

**Recommendations:**

1. Hire a licensed plumbing contractor to jet the pipe clear of debris such as leaves or trash. If an impassable obstruction is encountered, the plumbing contractor can utilize a sewer camera to investigate the location and type of obstruction (ex. tree roots). The camera video will also show the location of any residential gutter or sump drains that may be connected. If successful, this method would be the least impactful and most cost-effective solution.
  - a. Estimated cost of plumbing service for jetting and camera 265 linear feet ~**\$2,000-\$3,000.**
2. Excavating, and replacing the portion(s) of the obstructed pipe would be the next solution if jetting is unsuccessful. This solution would be more impactful and could damage trees and landscaping located within the 35' corridor. Get an engineer's opinion on the extent of necessary repair and hire a licensed plumbing contractor address the issue.
  - a. Estimated cost of removing obstruction and replacing damaged sections of pipe ~**\$2,000-**

**\$10,000.** Does not include tree removal if necessary.

3. Complete replacement of system. This would be most impactful and costly solution. Hire a licensed Engineer to draft a plan and assist in project administration/bidding.
  - a. Estimated cost for replacement of drainage structure and 265' of storm sewer. ~**\$20,000-\$40,000.**

### **1A Photos**

Photo 12:



Upstream drainage structure with CPP submerged in water.

Photo 11:



Downstream outlet of clogged 12" CPP. Pipe outlets to Problem Area 1B.

**Problem Area 1B:**

**Owner: HOA**

**Subdivision: West Koke Mill 1<sup>st</sup> Addition**

This area holds pools of water for long periods of time making mowing and general maintenance difficult. Ideally, this water should flow from outlet pipe in Photo 11, at a consistent grade to the Koke Mill Rd ditch. It appears that over time, vegetation, and tree growth have altered the intended flow path trapping water in multiple locations throughout this detention area. Elevation data was gathered using GPS equipment to verify grades and explore solutions. The data found that there is approximately 1' of grade difference (~0.35% slope) between the outlet pipe and the roadway ditch. This grade difference suggests that minor grading along the intended flow path could solve this drainage issue.

**Recommendations:**

1. Hire a skilled operator capable of excavating at a precise grade along the flow path from the outlet pipe to the ditch. Excess soil from the high areas can be used to fill low areas to eliminate pooling water and promote positive drainage throughout the area. The swale alignment can be constructed to avoid damage or removing existing trees. Yearly maintenance of swale would be necessary to sustain positive drainage. Engineering construction guidance recommended.
  - a. Estimated cost of grading and constructing a vegetated swale ~\$3,000-\$8,000.
  - b. Estimated cost of grading and constructing a paved swale ~\$15,000-\$25,000. (Engineer recommends paved swales on slopes less than 1%).

**1B Photos**

Photo 10:



Pooled water unable to drain to roadway ditch.

Photo 9:



Soil from high areas can be used to fill various low areas.

**Problem Area 2A:**

**Owner: Joplin Apts**

**Subdivision: West Koke Mill 3rd Addition**

This concrete drainage swale is located within a 20' wide utility easement spanning north-south along the west property line of Joplin Apartments. This swale collects stormwater from both the apartment complex and Checkerberry Lane. The northern 1/3 of the swale conveys water to the north @ ~0.3% slope toward HOA owned property and the southern 2/3 conveys water south @ ~0.2% slope towards Devils Walkingstick Drive. Much of this swale is cluttered with leaves, mud, and other debris which prevent flow and provide unpleasant scenery for nearby residents.

**Recommendations:**

1. Yearly maintenance to remove built up debris. This work could be hired out or included in a voluntary subdivision maintenance initiative.
  - a. Estimated cost of debris removal ~\$0-\$1,500.

**2A Photos**

Photo 21:



Leaf buildup at the northern portion of the drainage swale.

Photo 30:



Leaf & mud buildup at the southern portion of the drainage swale.

**Problem Area 2B:**

**Owner: Joplin Apts**

**Subdivision: Lot 4, West Koke Mill 2nd Addition**

This portion of the drainage detention system collects storm water from an approximate 10 acre watershed. This entire watershed reports to a 12" corrugated plastic pipe (CPP) located within Lot 4 of the Joplin Apartments which is designated for stormwater detention. This pipe often gets clogged with contributing leaves and debris from this watershed area. During large rain events, water is unable to pass resulting in water to backup and pond within the upstream HOA owned detention area. According to the HOA, 2'-3' feet of water can accumulate threatening homes adjacent to this common area. Once with water rises to a level that overtakes the concrete headwall for the CPP, water will flow overland to a 12" concrete pipe located on the west side of Smyth Drive. During the field investigation, this 12" concrete pipe was completely buried and clogged with leaves. At times when either of these 12" pipes area clogged, the detention system will cause unintended ponding upstream.

**Recommendations:**

1. Yearly maintenance to remove leaves and jet out clogged pipes. This work could be hired out or included in a voluntary subdivision maintenance initiative.
  - a. Estimated cost of debris removal ~\$0-\$1,500.
2. Coordinate with City Public Works Department for maintenance of 12" concrete pipe @ Smyth Dr. Even though this pipe is technically part of the city sewer system, they would like to see efforts made from the owners upstream to minimize leaves and debris reporting to their system (per phone conversation with Public Works Engineer on 12-22-2022). Installing a grate on the end of the pipe (photo #1) to catch leaves and debris to prevent interior blockage would be a suggestion.

**2B Photos**

Photo 1:



12" concrete pipe @ Smyth Dr clogged with leaves causing water backup and long-term ponding.

Photo 3:



12" CPP with concrete headwall. Pipe recently cleared of debris according to HOA.

**Drainage Area #3**

**Owner: HOA**

**Subdivision: West Koke Mill 1<sup>st</sup> Addition**

This drainage area encompasses the common areas adjacent to the rear lots on Elderberry Ln, Raspberry Ct, and Blueberry Lanes. Concrete swales along the perimeters of this lots convey storm water to a 24" diameter concrete pipe from the west side of Elderberry Lane and outlets into the S Koke Mill Rd ditch. During field survey, GPS data was gathered along the concrete swales to verify slopes were adequate to promote positive drainage. Aside from leaf buildup within the concrete swales, no other issues were apparent at the time of survey.

**Recommendations:**

1. Yearly maintenance to remove built up debris. This work could be hired out or included in a voluntary subdivision maintenance initiative.
  - a. Estimated cost of debris removal ~\$0-\$1,500.

**Area 3 Photos**

Photo 36:



Leaf buildup within concrete swales throughout drainage area #3.

Photo 46:



Drainage area #3 reports to 24" concrete pipe @ Elderberry Lane. Leaf buildup apparent.

### **Notables:**

- The S. Koke Mill Rd Right of Way is 120' in the section of roadway adjacent to West Koke Mill Subdivision Additions 1-5. MEC was able to establish the centerline of S. Koke Mill Rd using boundary survey data acquired from the future Greenbriar Rd intersection project of ours from 2020. When the Right of Way line is projected onto 2011 IDOT imagery, it appears that the public Right of Way encompasses the west roadside ditch (see Drainage Area #1 exhibit). This suggests that the Koke Mill Rd ditch is not on HOA owned property.
- MEC discussed clogged pipe issue in Problem Area 2B @ Smyth Rd with a City of Springfield Public Works engineer. The representative added that they are aware of a storm manhole problem approximately 200' downstream that is likely contributing the drainage issues on HOA and Joplin Apartment property. Public Works intends to address this issue in the 2023 construction season.
- Public Works is unaware of the destination of the stormwater system located on the north side of Devils Walkingstick Drive. Their maps indicate a storm manhole with no destination located on private property in the northeast quadrant of Checkerberry Lane not is not visible on the surface. Public works to investigate manhole and destination of storm sewer.

### **General Recommendations:**

- HOA to investigate (with covenants) who is responsible for maintenance of roadside ditch on Koke Mill Right of Way & downstream culverts.
- HOA and/or attorney to investigate subdivision covenants for maintenance assessments as they relate to drainage detention/retention areas & utility easements. Maintenance assessments would be a necessary tool to help fund more costly projects related to issues withing these drainage areas. See subdivision covenants attached to report.
- HOA and/or attorney to write rules for leaf disposal. Impose fines for disposing leaves in detention areas.
- HOA to come up with a yearly subdivision maintenance plan for leaf removal & disposal.
- HOA to coordinate with Public Works Department regarding clearing of clogged pipes on city property.

### **END DRAINAGE INVESTIGATION**