



Landscape Architects, Land Planning Consultants, Engineers & Surveyors

Final Report on:

Dogwood Drive
CCTV Inspection of Existing 48" & 72" Storm Drain
Between Country Lane and Pipe Outfall

Prepared For:

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EXECUTIVE SUMMARY

In accordance with Change Order No. I to the contract for PGM Project No. VCI 09-0111, Vista Design, Inc. (VDI) has coordinated a Closed Circuit Television (CCTV) inspection of the existing 48" and 72" storm drain network along Dogwood Drive. To perform this task, VDI retained the services of Video Pipe Services, Inc., of Beltsville, MD, who is fully equipped with the CCTV technology and expertise necessary to undertake the inspection. A summary of the results of the Video Pipe Services, Inc. inspection of April 5, 2010 may be found in Appendix D.

Based on a review of the CCTV inspection videos produced by Video Pipe Services, all of the pipe segments contain varying amounts of sediment and debris, which should be cleared to improve the conveyance capacity of the pipes. In addition, the following major issues were illuminated:

- The 72" pipe has been compromised at a location approximately 20' below manhole 2. The cause of the breach has not yet been determined due to the massive amount of sediment accumulated within the pipe at this location, but it appears that the entire east side wall of the pipe has failed, thus allowing soil to enter. If the eastern wall of the pipe has indeed failed, the entire pipe section will be unstable and subject to failure. At a minimum, the sediment at this location is blocking over 60% of the pipe's conveyance capacity.
- The 72" pipe has been compromised at a location approximately 308' below manhole 2. Based on the video images, it appears the pipe has collapsed from above and may have also separated from the adjacent pipe section, given the large amount of seepage shown entering the pipe from the top at this area (although the video images do not clearly indicate if the pipe sections are actually separated or just collapsed). The degree of pipe collapse is significant enough to jeopardize the structural stability of the pipe, thus making it subject to failure. At a minimum, the collapsed pipe is blocking over 50% of the pipe's conveyance capacity.
- The outfall of the 72" CMP contains heavy debris, which is limiting the conveyance capacity of the entire system. However, once this debris is removed, the pipe velocities will likely be sufficient to significantly erode the adjacent stream valley.

Based on a review of the inspection data, the majority of the pipe sections appears to require mild to moderate maintenance activities, but are otherwise in satisfactory condition. However, the damaged sections of the 72" CMP pipe should be replaced immediately to prevent impending pipe failure, which could potentially result in property damage or personal injury.

While the damaged sections of the 72" CMP should be replaced as soon as possible to prevent imminent pipe failure, the remaining sections of the pipe also show deficiencies, which could compromise its long-term safe functioning. Given the large area draining through this pipe and the potential for significant property damage as a consequence of pipe failure during a large storm event, we strongly recommend that the pipe either be completely replaced, or that Cured-in-Place-Pipe (CIPP) technologies be used to line the existing pipe.

In either case, VDI suggests that an energy dissipater be designed for the outfall of the 72" pipe to reduce outfall velocities prior to discharge into the adjacent stream valley, thereby mitigating stream valley erosion.



BACKGROUND:

In accordance with the Vista Design, Inc. (VDI) letter proposal dated January 21, 2010, which later became Change Order No. 1 to the contract for PGM Project No. VCI 09-0111, Vista Design, Inc. has coordinated a Closed Circuit Television (CCTV) inspection of the existing 48" and 72" storm drain pipes along Dogwood Drive in the County Club South portion of the Pinefield Subdivision near Waldorf, MD (See Map in Appendix A). The existing Dogwood Drive storm drain network drains an area of approximately 151 acres, most of which is developed in ¼ to ½ acre lots (See Map in Appendix B). Also located within the drainage shed is the Mellwood facility and its associated parking and travel areas.

According to PGM staff, the Dogwood Drive storm drain network has been the subject of many discussions over the past several years and County staff has attempted to CCTV the pipe at least once in recent years. A visual inspection of the area indicates several localized depressed areas, possibly indicating that the pipe has been compromised and is now allowing surrounding soil to infiltrate the pipe as well as allowing soil to infiltrate two inlets, which appear to drain toward the larger pipes. However, without visible manholes along the alignment of the smaller pipes, it is unclear from visual inspection alone how the smaller pipes connect with the overall pipe network.

INSPECTION METHOD & DETAILS:

Following execution of Change Order No. 1, VDI contracted for CCTV inspection services with Video Pipe Services, Inc. (VPS), of Beltsville, Maryland, who is equipped with the specialized camera and rover system necessary to obtain a thorough, detailed evaluation of the pipe network. The VPS inspection was timed to coincide with a dry period during an unusually wet spring, with the final inspection occurring on April 5, 2010.

In total, VPS inspected over 1,060 linear feet of pipe, including approximately 460 feet of 48" pipe and 600 feet of 72" pipe. The video record of the VPS inspection is captured on two DVD's entitled: (Disc 1) *Video Pipe Services, Disk 1, Vista Design, Inc., CCTV Storm Drain Pipe in Waldorf, MD, April 5, 2010.* and (Disc 2) *Video Pipe Services, Disk 2, Vista Design, MH2 – Holly Avenue, April 5, 2010.* Disc 1 and Disc 2 were forwarded to VDI on April 12th and April 20th, respectively.

INSPECTION RESULTS:

The Dogwood Drive storm sewer network contains two 48-inch Corrugated Metal Pipe (CMP) sections, one 48-inch Reinforced Concrete Pipe (RCP) section, and one 72-inch CMP section. Debris was present in all pipe sections, but most appeared to be in relatively good condition. However, multiple, significant defects were observed in the 72" CMP that are of sufficient magnitude to compel VDI to recommend immediate implementation of corrective measures in order to mitigate the potential for property damage and/or personal injury.

Following the sequence of inspection depicted by the VDS videos, beginning at manhole 1 and proceeding in a southerly direction, most of the 48" CMP appears to be in fairly good condition. Minor corrosion was observed at several pipe junctions and minor debris was noted in several locations. A buried manhole was identified at the 378' mark, along with an inflowing CMP section from the east (Appendix C, Photo 1).

Beginning at the inflow point of the 48" RCP and proceeding in a northerly direction, the inspection revealed the RCP pipe to be in good physical condition. The bottom of the pipe appears to contain light to moderate sedimentation, and given the fact that the base flow in the pipe deepened as it approached the buried manhole (at which point the pipe material transitions to CMP) it is possible that the pipe is not properly aligned as it enters the buried manhole. However, the base flow made thorough reconnaissance of conditions impossible and results inconclusive (Appendix C, Photo 2).

Beginning at manhole 2 and proceeding in a northerly direction, the 72" CMP at first appears to be unobstructed. However, 20' downstream, a large pile of sediment along the eastern wall of the pipe indicates that the pipe has been compromised. Based on the inspection video, the pipe appears to be over 60-percent obstructed, however the accumulated debris and sediment make it impossible to determine the full extent of the pipe breach. Nevertheless, the massive amounts of sedimentation in the pipe and the location of such sedimentation along the pipe's eastern wall indicate the breach to be of sufficient size to jeopardize the structural capacity of the pipe (Appendix C, Photo 3). Inasmuch as, this section of pipe is situated beneath an existing driveway, immediate corrective measures are recommended to ensure that additional soils do not wash into the pipe further undermining the driveway, which could collapse, potentially resulting in property damage and/or personal injury.

Continuing downstream in the 72" CMP, multiple areas of pipe joint separation were identified, which are currently allowing sediment and debris to enter the pipe network and undermine the surrounding areas. Heavy debris was also identified in this section of the pipe, as well as large sections of corroded pipe bottom.

At a point approximately 308' downstream of manhole 2, the 72" pipe appears to have collapsed from above (Appendix C, Photo 5). The inspection video does not provide sufficient detail to determine if the collapse occurred at a joint (i.e. – pipe separation) or mid-pipe (i.e. - pipe deflection), but since infiltration was visible from above the pipe, one can reasonably conclude that it is at least partially breached. Whereas, this section of pipe is located directly beneath an existing driveway and appears to be unstable, immediate corrective measures are recommended to ensure that additional soils do not wash into the pipe and further undermine the driveway, which could collapse, resulting in property damage and/or personal injury.

Continuing downstream, the inspection reveals additional pipe joint separations and areas of pipe corrosion and heavy debris in the 72" CMP. The outfall of the pipe also contains heavy debris, which is severely impacting the conveyance capacity of the pipe.

An inspection of the 48" CMP between manhole 2 and manhole I reveals areas of corrosion and debris.

For a Summary of all pipe deficiencies identified by the investigation, please see Appendix D.

CONCLUSION AND RECOMMENDATIONS:

Based on a review of the VPS videos, the 48” CMP and 48” RCP sections of the Dogwood Drive pipe network appear to be in relatively good condition and can be expected to perform properly following removal of accumulated debris and sedimentation. It is recommended, however, that the buried manhole be uncovered and a proper top and lid installed to ensure usability of this access point. These corrective measures are not critical in nature, but given the fact that the sediment and debris are limiting the conveyance capacity of the pipes, maintenance should be undertaken as soon as possible to restore the original pipe capacity and avoid flooding of upstream areas during large storm events.

The 72” CMP, however, is in need of immediate attention. The two large breach areas are located immediately beneath private driveways, which appear to be used on a daily basis. Considering the size of both breaches, should no corrective actions be implemented, sink holes, additional pipe sedimentation and ultimately full network failure are probable. At a minimum, the two breach areas should be immediately repaired through the removal and replacement of the affected pipe sections. However, this will not address the many pipe joint separations or heavily corroded areas that are present along the length of the pipe, which will only worsen with time. The only methods to fully correct the pipe deficiencies are either through removal and replacement of the entire 72” pipe section, or through the selective removal and replacement of the breached sections and linings of the entire pipe length with Cured-in-Place-Pipe (CIPP) technologies.

APPENDIX A
DOGWOOD DRIVE STORM DRAIN
EXISTING CONDITIONS MAP

APPENDIX B
DRAINAGE AREA MAP

APPENDIX C

PHOTOS



Photo 1 – 48” CMP – Buried Manhole



Photo 2 – 48” RCP



Photo 3 – 72” CMP – Breach 20’ Downstream of MH 2



Photo 4 – 72” CMP – Corrosion of Pipe Bottom (typical)



Photo 5 – 72” CMP – Pipe Breach 308’ Downstream of MH 2



Photo 6 – 72” CMP – Pipe Outfall

APPENDIX D
SUMMARY OF CCTV INSPECTION