Section 5 Attachments

Memorandum

Date: May 26, 2011

To: Myrl Wear

From: Colm Chomicky

Re: Project 1712 Repair Outfall 002 CIPP Liner Repair
Field Activity Project Summary

This memo summarizes field work activities, primarily the environmental sampling and soil management activities associated with the Outfall 002 CIPP Liner Repair. Also included is a photographic log summarizing the project construction activities. The photographic log is also available as a separate PowerPoint file.

1.0 Project Construction Background

Outfall No. 002 is a major storm water collector system carrying rainwater run-off from the south/southeast section of the Banister Federal Complex. The original host pipe line is a 66-inch diameter, reinforced concrete pipe (RCP). In the mid-1970's, two polychlorinated biphenyl (PCB) releases occurred and are documented in the RCRA Facility Investigation report. These releases would have passed through this section of the 66-inch piping prior to discharge in to the Abandon Indian Creek Outfall (AICO) area.

The southern end of this 66-inch pipe originally terminated through a head-wall and discharged into an old oxbow of Indian Creek before the creek was channelized to its current location south of Bannister Road. When the box culvert section of Outfall No. 002 was added to pass under Banister Road, the head-wall structure of the abandoned outfall was left in place. This structure is located at the lower (southern) end of the 66-inch section of pipe.

In 1988, a 60-inch Insituform® cured-in-place pipe (CIPP) liner was installed into the 66-inch pipe of Outfall No. 002 running from what is called the Meter Pit Manhole (Manhole C60R-02) south for about 332 feet to a manhole referred to as the AICO Inlet (Manhole C68R-02). An intermediate Plaza Manhole (C60R-09) is located 72 feet south of the Meter Pit Manhole within the Super Sidewalk Plaza. Another manhole (buried below the parking lot pavement) was confirmed present at approximately 90 feet south of the Plaza Manhole.

Starting in mid-2006, a section of the southern end of the CIPPliner started showing signs of failure. In 2006, Insituform® placed an epoxy sealer over the cracking area as part of another project that was going on at the time.

In 2008, during an inspection of the storm drain, it was noted that a bulge had formed in the bottom of the CIPP liner, from the AICO Inlet north for about 50 feet. Minor infiltration from this cracking was noted during the 2008 inspection. A project was then initiated later that year for a repair, and chemical grout was injected into the bulge area to seal off the infiltration that

was occurring. In addition, grout was injected into the annular space between the CIPP liner and the 66-inch host pipe at the north end of the line at the Meter Pit Manhole.

During a 2009 annual inspection, it was noted that the CIPP bulge had grown to a length of about 100 feet. Later in 2009, an additional grouting project was conducted to again seal off the infiltration into the storm sewer. Following this work, the Environmental Compliance of the Health, Safety, and Environment Department (HS&E) requested that Facility Engineering Services (FES) contact Insituform® personnel and evaluate alternatives that might be available for a permanent fix.

The resulting Outfall 002 repair project included the open cut replacement of the southern most section of the line (approximately 100 feet of open cut replacement) and the slip lining of the northern section (approximately 200 feet of slip line sewer) and the placement of a new Manhole Number 1 at the intersection between the open cut section and the slip lined section. The new 60-inch replacement pipe was a Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe manufactured by HOBAS. As-Built Drawings are included as Attachment 6.

2.0 Environmental:

Environmental related work consisted of following items:

- **Soil Sampling per MDNR Correspondence**: The south half of the repair consisted of open cut excavation. Soil samples were collected during the excavation to determine if PCBs were present and if PCBs were at levels exceeding backfill reuse criteria (0.74 mg/kg total PCBs). The MDNR approved sampling program was augmented by additional pre-construction sampling that consisted of coring through the 66-inch RCP to sample soil and groundwater immediately adjacent to the pipe. Sections 3.0 and 4.0 of this Memo provide additional details.
- **Storm Water Diversion**: All upstream storm water was diverted around the section of sewer between the Meter Pit Manhole and the AICO Inlet Manhole. The storm water was pumped around the project section and re-introduced into the Box Culvert section of Outfall No. 002 just south of the AICO Inlet.
- **Excavation Water Treatment System**: The soil and groundwater below the groundwater table (potentiometric surface), or below the top of the existing host 66-inch pipe (whichever higher) was assumed to be potentially contaminated with polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs). Water entering the excavation consisted of surface water seepage past temporary upstream bladder plugs, direct precipitation, and limited groundwater infiltration. Sandbag berms were placed around the open excavation to prevent surface water from entering the excavation; thus minimize the water quantities to treat. Groundwater infiltration entering the excavation was only observed at the deepest part of the excavation immediately north of the AICO box structure where Manhole Number 2 was

installed. All water entering the excavation was pumped to an above-ground treatment system for particulate filtration followed by activated carbon adsorption. The treated water was then discharged to the sanitary sewer. During the project, no PCBs were detected in both the untreated and treated excavation water. None-the-less, treatment was necessary as a conservative precaution in the event that PCBs or VOC contamination could have been encountered. Sampling data is presented in Section 6.0 of this memo

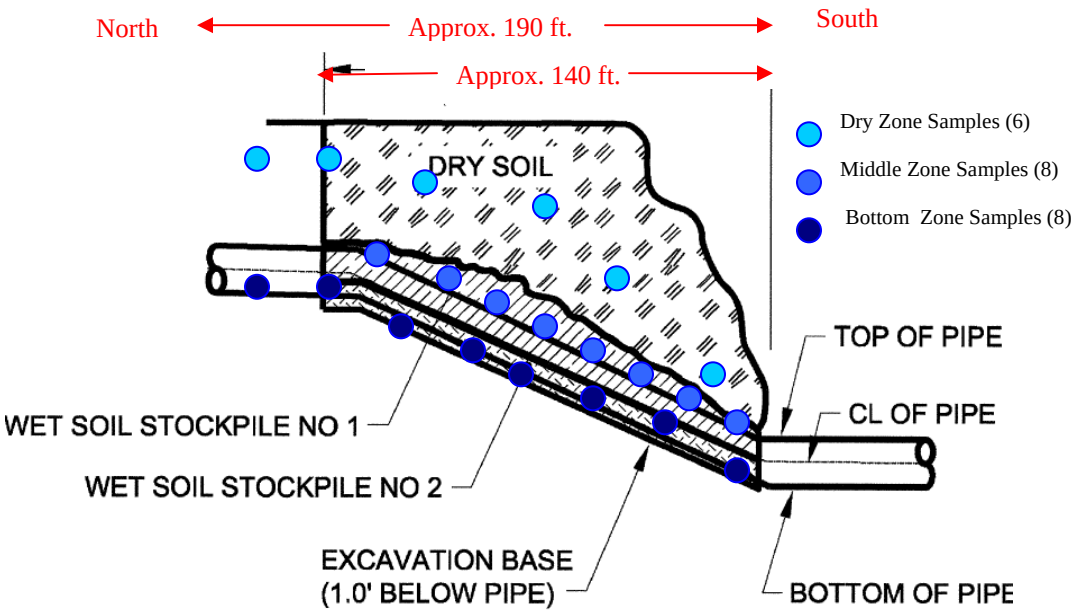
- **Management of Waste and Off-Site Disposal**: Excess site soil was generated as the result of volume displacement associated with importing granular fill bedding for the newly installed 60-inch HOBAS piping, importing road base for the parking lot, and displacement of soil by imported rip-rap used to stabilize the hill restoration. Also due to the geometry of backfilling around manhole structures, imported granular fill was used around Manhole No 1 and 2, which contributed to displacing soil. In addition, there was a shallow layer of concrete and brick rubble coating the hillside. This material was not suitable for meeting backfill compaction specifications; therefore, was exported. Sampling and volume summaries are provided in Section 8.0 of this memo.

3.0 Trench Excavation Soil Sampling Plan

The trench excavation soil sampling plan was based on correspondence between Honeywell FM&T and Missouri Department of Natural Resources (MDNR). This correspondence is included as reference (see Attachment 1). Analytical results are summarized in Section 4.0 of this memo.

Figure 1 below summaries the MNDR approved sampling plan which designates 22 soil samples for PCB analysis.

Figure 1: MDNR Sampling Plan



Based on Figure 1, three soil zones were identified for sampling as follows:

- Soil Lift #1 – Dry Zone Soil (6 samples) – Dry soil samples above the 66-inch storm sewer pipe crown and below ground surface were collected. Samples were collected approximately midway between the top of pipe and the ground surface.

- Soil Lift #2 – Middle and potentially Wet Soil Zone (from the groundwater surface to approximately ½ pipe depth - 8 samples): No Lift 2 samples were collected at the north end of the parking lot where the storm sewer is fairly flat because wet soil was not encountered at this depth; therefore, the 8 samples for potentially wet soil were reserved for the portion of pipe at a steeper angle dipping to the south. Upon actual excavation it was discovered the soil at or above the ½ pipe height was not wet when excavated (with exception of the very southern sample just north of the AICO inlet structure). Therefore, dry soil samples at this same target depth were collected from 7 of the 8 samples at ½ pipe depth to top of pipe zone.

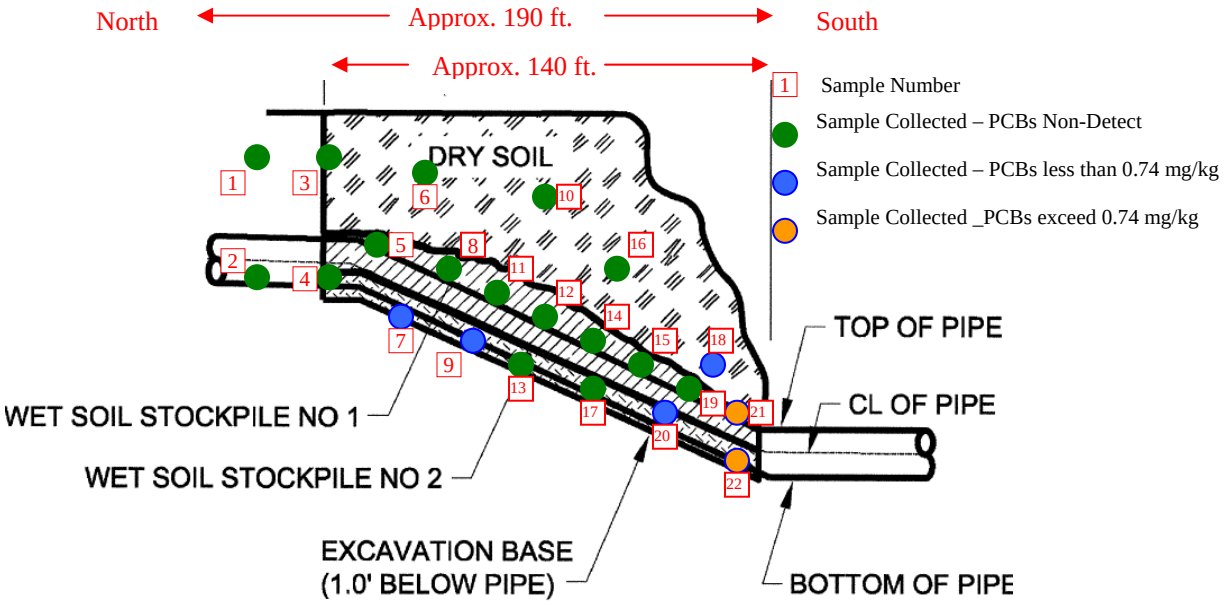
- Soil Lift #3 – Bottom and potentially Wet Soil Zone (from below ½ pipe depth to a depth of approximately 1 foot below pipe, 8 samples (excluding the additional 4 samples already collected by coring). All 8 samples were collected approximately equidistant along the excavation profile. Groundwater was only encountered at the southernmost sample where the removed 66-inch host pipe met a concrete “headwall/wing-wall”

structure just north of the AICO inlet. Also 4 soil samples were previously collected by coring through the 66-inch host pipe wall to obtain soil and water samples from the pipe bedding immediately adjacent to the pipe.

4.0 Trench Excavation Soil Sampling Results

The sample locations are shown below and results are summarized in Table 1 (attached). The original analytical reports (Pace Analytical Services, Lenexa, KS) are included as Attachment 5.

Figure 2: Excavation Sampling Results



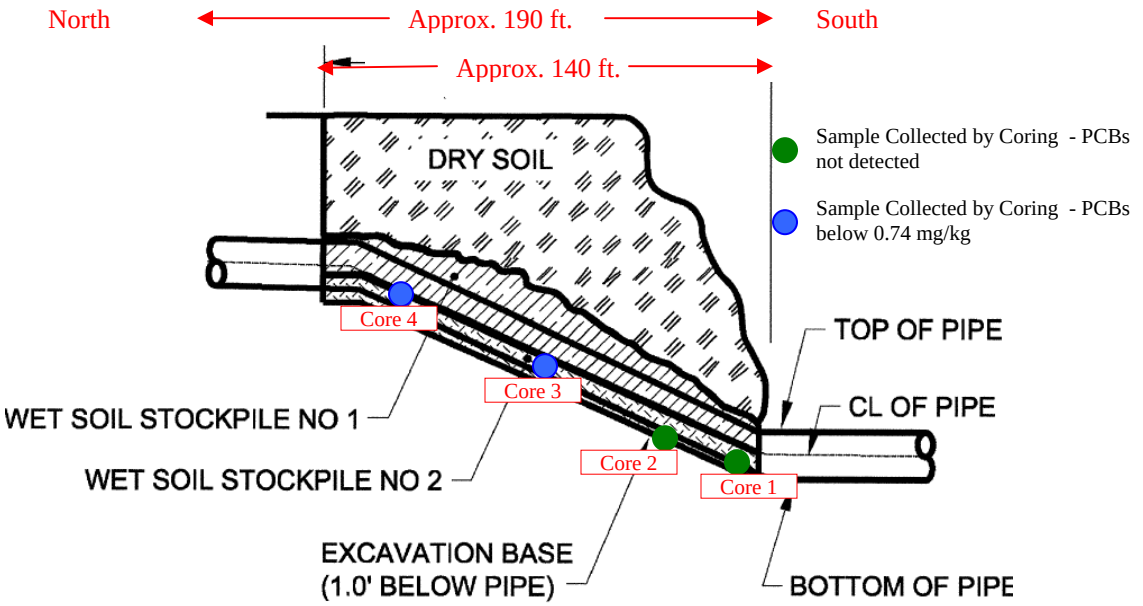
Based on Table 1, several of the soil samples (7, 9, and 20) had detections of Aroclor 1260 which is potentially associated with asphaltic pipe mastic that had been applied as a construction material to the 66-inch host pipe joints. Upstream of the AICO Inlet/Manhole #2 area, there is no indication that PCBs associated with historic releases migrated outside the 66-inch pipe to surrounding soils. Joints occurred every 5 feet along the pipe length. Aroclors 1242/1248 were only detected in samples nearest the AICO inlet (samples 18, 21, and 22) and are consistent with Aroclors types associated with historic releases described in RCRA Facility Investigation report. Samples 21 and 22 were located just south of a former wing wall and concrete apron that were remnants of the former outfall structure to Indian Creek. Therefore, the low PCB levels are possibly the result of the historic releases at the former outfall (as opposed to exfiltration through the 66-inch concrete pipe to adjacent soils).

Soil exceeding 0.74 mg/kg: Soil samples 21 and 22 were collected from the zone where a replacement manhole was constructed. This area consisted of a 24-ft long by 14-ft wide trench box. All the soil from this area was stockpiled in a dedicated area on a double layer of 30-mil liner, then disposed as special waste at the Deffenbaugh facility. The 24-ft by 14-ft wide trench box yielded 314.3 tons of soil with minor amounts of concrete debris associated with a buried concrete apron associated with the former Indian creek outfall structure. Additional information on stockpile management and disposal quantities is provided in Sections 7.0 and 8.0 of this memo. Sample 22 was a biased sample in that soil selected was based on visual criteria deemed most likely to preferentially contain PCBs. The particular soil horizon was a small pocket of organic rich soil that appeared to be a marshy, decayed vegetation-rich material associated with the former Indian Creek stream bed/bank system. The organic-rich material would be expected to have preferentially adsorbed PCBs. This organic rich material and all adjacent soils were excavated in order to accommodate construction of the new manhole and concrete bulk head within the 24-ft long x 14-ft wide trench box.

5.0 Pre-Construction Sampling of Trench Soils adjacent to the 66-Inch Pipe

Prior to start of excavation, samples were collected from soil located immediately adjacent to the 66-inch pipe at the ½ pipe diameter height (3 and 9 o'clock positions) and below (6 o'clock position). These samples were collected June 3 to 4, 2010. Table 1 Summarizes. Samples were collected by core penetration of the host pipe and collecting soil immediately adjacent to the pipe as part of the design. Figure 3 (below) also summarizes the PCB results for the cored locations. Aroclor 1260 was the only Aroclor detected and is potentially associated with construction materials such as mastic material that has been applied to the 66-inch host pipe joints. During the 66-inch pipe removal, a sample of mastic material associated with the host pipe was collected and analyzed with a result of 3.49 mg/kg PCBs (Aroclor 1260), indicating a potential source.

Figure 3: Core sample locations through the 66-inch host pipe.



6.0 Groundwater/Excavation Water Analyses

Water pumped from the excavation to the treatment system was analyzed once per week when the treatment system was operating. Water was transferred from the lowest part of the excavation to storage tanks (Baker Tanks) that were in-turn plumbed to the water treatment system. Samples were not collected for the weeks when water was accumulating in the storage tanks (when the treatment system was inactive) until sufficient water had accumulated for treatment. Both untreated and treated water samples were collected for each sample episode. Table 2 summarizes the excavation water sample results.

No PCBs were detected in the untreated or treated excavation water samples. Water samples were also previously collected from pre-construction core locations through the 66-inch host pipe (Table 2). No PCBs in the Aroclor 1242/1248 family were detected. There was a very low detection of PCB Aroclor 1260 that may be associated with pipe mastic material. Again this indicates that no significant impact to the soils (via exfiltration) adjacent to the 66-inch host pipe occurred as the result of historic releases.

AICO Road Bed Sampling

A gravel road was constructed from the parking lot to the AICO inlet area to facilitate construction traffic and serve as long-term future access to the AICO area for maintenance and inspection purposes. As part of construction, shallow soils were removed to accommodate

granular road base material. This soil was sampled prior to excavation for disposal characterization. Table 1 summarizes the soil sampling results and Attachment 2 is a map of the sampling results. Soil was loaded into roll-offs and disposed as special waste at the Johnson County Landfill. Table 4 documents the removal date of February 8 to 10, 2011 with a total of 111 tons removed. All shallow soil was below TSCA levels and met the 0.74 mg/kg reuse standard. The soil was planned for disposal as the shallow soil was not suitable for backfilling due to vegetative matter and roots (as well as displacement by the imported road base material).

7.0 Soil Stockpiling:
Soil excavated from the open excavation was temporarily stockpiled until sample analytical results were obtained. If PCBs were non-detect or below 0.74 mg/kg total PCBs (i.e., sum of all Aroclors), the soil was used as backfill (although some excess soil was present and disposed as special waste).

The stockpile configuration changed depending on the project stages because this was an active project with backfilling progressing at the north end of the excavation as excavation proceeded at the south end of the open cut pipe installation area. Attachment 3 documents the soil stockpiles and associated excavation samples through the project stages. Note that soil exceeding 0.74 mg/kg PCBs (Trench samples 21 and 22) where stored on a dedicated stockpile prior to loading into roll-offs for disposal as a special waste. Table 4 documents the removal of the Sample 21/22 soil from the site on March 24 to March 28, 2011 (316.3 tons).

8.0 Waste Management Sampling.
At the discretion of Honeywell Waste Management, additional samples beyond the MNDR approved soil sampling program were collected. These additional samples were for waste profiling purposes, although the planned MNDR soil samples were also useful for waste profiling purposes.

The first set of waste profile samples was collected October 28, 2010. Sampling was conducted by core drilling through the 66-inch host pipe and CIPP liner to collect samples to determine if the removed 66-inch piping and CIPP liner contained PCBs and if the materials could be disposed as a special waste. Analysis also included the TCLP procedure for metals, volatiles, and semi-volatiles. The CIPP liner material contained low levels of PCBs (max 1.53 mg/kg, Aroclor 1248). The 66-inch host pipe was non-detect for Aroclor 1248; however, 0.393 mg/kg of Aroclor 1260 was detected, consistent with mastic material applied at construction joints. During excavation of 66-inch host pipe, additional concrete samples were collected from roll-offs but found to be non-detect for PCBs. An additional CIPP liner sample was also collected from a roll-off with a detection of 0.716 mg/kg Aroclor 1242. PCBs are not a component of the CIPP manufacturing process and the CIPP was installed after the documented releases. One

possibility is that the CIPP has a slight affinity to absorb PCBs from the environment and has been exposed to groundwater infiltration since 1988. In essence, the CIPP material may act as a passive sampling media by adsorbing trace amounts of PCBs over a very long time period.

A second set of samples was collected to profile brick and concrete rubble that was removed from the hillside. This rubble was found to contain low levels of Aroclor 1260. This construction debris is believed to pre-date the 1979 date when PCBs were no longer manufactured and inventories being phased-out. Prior to this date PCBs were a component of many types of construction materials including, paints, adhesives, concrete curing compounds, caulks, mastics, and similar materials. Manufacturing processes at the KCP did not involve the use of the Aroclor 1260; therefore, the detections appear consistent with historic building materials.

9.0 Photo Log Summary
Attachment 4 is a photo log documenting the key components of the Outfall 002 Repair. These photos are also available as a PowerPoint file

10.0 Analytical Reports
Copies of the original Pace Analytical Services reports are included as Attachment 5. Tables 1 to 3 are analytical result summaries and include a column with the Pace laboratory episode number. This episode number is used as the cross-reference between the tabular summary and the analytical reports. Attachment 5 analytical results are separated by individual fly sheets for each lab episode in numerical order for ease of reference.

11.0 As-Built Drawings
Attachment 6 is the set of As-Built Drawings for the project. The Drawings show the location of the newly installed HOBAS pipe and key features such as the new manholes and other pertinent features.

Tables:
- Table 1 Excavated Material Analytical Results
- Table 2 Excavation Water Analytical Results
- Table 3 Waste Management Sampling
- Table 4 Waste Disposal Sums

Attachments:
- Attachment 1: MNDR Correspondence

Kansas City Plant
National Security Asset

Memorandum

To: File 1010C5A – Storm Sewer

From: M. E. Stites, D/SE1, OC48

Date: May 27, 2011

Re: **OUTFALL 002 INSPECTION**

An interior inspection of the Outfall 002 system main trunk line was conducted on May 13, 2011, Joe Baker, Elaine Brewer, and myself. Refer to Figure 1 for locations identified in this narrative. Steve Ramm, D/SE1 served as confined space attendant.

As a result of completion of the 002 reroute system, base flow rates (i.e., non-rain event flows) in the 002 system downstream of the dog leg have been eliminated. The main purpose of this inspection was to review the recently completed work to repair the section of line between the AICO inlet and the meter pit manholes (Figure 1). Due to the above noted construction, cleaning of the main trunk line is not needed at this time.

RECENTLY COMPLETED REPAIR WORK

The interval of pipe extends from AICO upstream to the meter pit location immediately south of the southeast corner of the main manufacturing building. The 60 inch diameter pipe located immediately upstream of AICO was In-Situ Form lined in 1988 from AICO to the meter pit. Approximately six feet upstream of AICO damage to the liner system was observed during the June 2009 inspection. The bottom radius of the liner had heaved upward approximately six inches and had cracked allowing minor infiltration of groundwater. This damage extended for a length of approximately 15-20 feet. As a result, repairs were made to the liner in the fall of 2009. Grout was injected into the area of damage to seal and support the line. The December 2009 inspection reviewed the work performed as a part of this repair. No leaks were observed. However, the injection of grout to repair the liner had caused the base of the liner to heave further producing a feature almost 18 inches high. A hydrophilic grout is used to implement these repairs and it appears that the grout injected during the fall of 2009 continued to expand causing the pipe to protrude further inward. The additional heaving noted in the December inspection had caused the liner to crack along its long axis. However, no leaks were observed as the large mass of grout under the liner sealed the area and prohibited infiltration.

The KCP assessed the condition of the host pipe and existing liner system by core drilling the pipe interval between AICO and the meter pit at four locations. This core sapling determined that three out of the four locations assessed were in good condition. One core drill location identified the

concrete pipe as having limited cohesion. Therefore, the recommended repair was to install new pipe in lower interval of this section of pipe (~150 feet) and install a slip liner in the remaining portion of the line (~150 feet). During the coring operation soil and groundwater samples were collected from beneath the host pipe. The above information (liner and host pipe condition and chemical analyses) was used to support development of a scope of repairs for the damaged interval of pipe.

Given the age of the liner (installed 1988) and the damage to this section the liner system at this location, the KCP elected to initiate repairs to the damaged section of pipe liner. Repair work was initiated during December 2010 and completed April 2011.

OUTFALL 002 REROUTE SYSTEM

The Outfall 002 base flow reroute system has been in full time operation since March 8, 2005. The system is effectively capturing and rerouting all base flows upstream of this point to the groundwater treatment system. The dog leg manhole where the reroute system is located is configured to act as a sediment trap with the bottom of the manhole approximately 3.5 ft below the outlet. Base flow (i.e., non-rain event flows comprised of air conditioning condensate) entering the dog leg manhole was estimated at 2 gpm. Base flow of up to 12 gpm is diverted by the 002 reroute system to the Groundwater Treatment System.

CONCLUSION

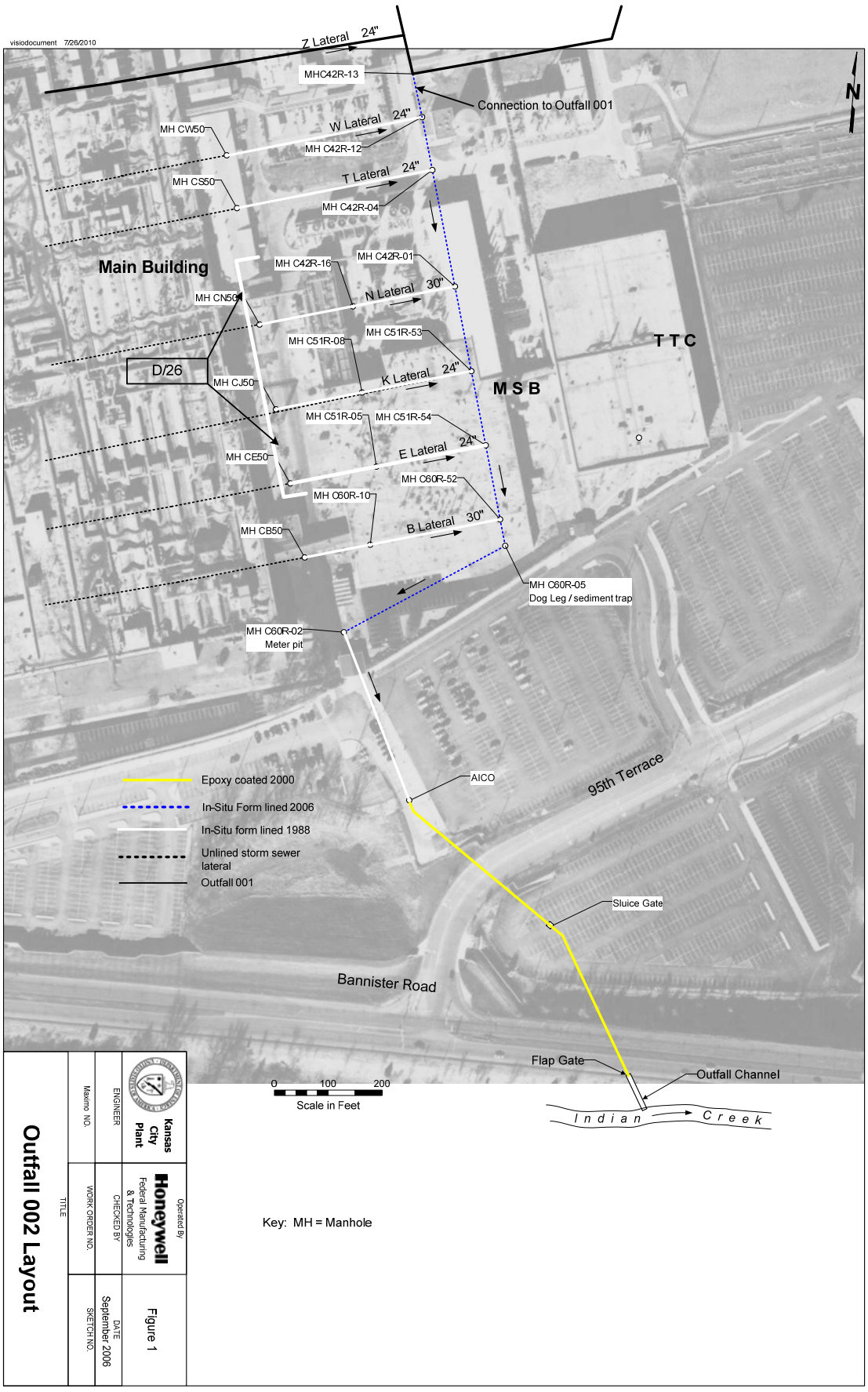
The interior condition of the outfall piping is in excellent condition with no signs of infiltration or excessive sediment accumulation. The Outfall 002 reroute system continues to effectively reroute all base flow within the system resulting in no discharge during periods of no precipitation.

If you have any questions or require additional information, please contact me at extension 7192.

Mike Stites
Senior Engineer Environmental Compliance

Attachment

cc: D. M. Caughey, NNSA, 1D49
J. L. Baker, D/SE1, OC48
M. R. Wear, D/FE1, 1B31


visiodocument 7/26/2010
Z Lateral 24"
MHC42R-13
Connection to Outfall 001
N
W Lateral 24"
MH CW50
MH C42R-12
T Lateral 24"
MH CS50
MH C42R-04
Main Building
MH C42R-16
MH C42R-01
N Lateral 30"
MH CN50
MH C51R-53
MH C51R-08
TTC
D/26
K Lateral 24"
MH CJ50
MSB
MH C51R-05
MH C51R-54
E Lateral 24"
MH CE50
MH C60R-52
MH C60R-10
B Lateral 30"
MH CB50
MH C60R-05
Dog Leg / sediment trap
MH C60R-02
Meter pit
Epoxy coated 2000
In-Situ Form lined 2006
In-Situ form lined 1988
Unlined storm sewer lateral
Outfall 001
AICO
95th Terrace
Sluice Gate
Bannister Road
Flap Gate
Outfall Channel
0 100 200
Scale in Feet
Indian Creek
Key: MH = Manhole
Outfall 002 Layout
TITLE
Kansas City Plant
ENGINEER
Honeywell
Federal Manufacturing & Technologies
Operated By
Memo NO.
WORK ORDER NO.
CHECKED BY
SKETCH NO.
DATE
September 2006
Figure 1

Section of new storm sewer piping being installed during Outfall 002 repair work.