



City of Wichita
Northwest Water Treatment Facility
64-Inch Raw Waterline to Finished Waterline Conversion

Dates: January 2022 - April 2025

REV 1 03/08/25

Prepared by: Wichita Water Partners

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General Purpose

A key element of bringing the Wichita Northwest Water Treatment Facility (NWWTF) online is the required conversion of the existing 64-inch raw water pipeline to a finished water service line as a corridor to the Hess Bypass piping, Hess Flow Control Vault and eventually Hess Pump Station. In January 2023, a memorandum was distributed to the City of Wichita (COW) by Wichita Water Partners (WWP) with a high-level outline of the requirements for conversion. Requirements for conversion of the line from raw water to finished water have been reviewed between COW, Garver, Kansas Department of Health and Environment (KDHE) and WWP. The requirements to convert the 64" waterline from raw water distribution to finished water distribution includes five major steps:

1. 64" waterline draining/ cleaning
2. 64" waterline inspection
3. 64" waterline final disinfection. The line will need to meet the requirements of KDHE's minimum design standard and AWWA to meet a finished water line
4. 64" waterline pressure testing
5. Existing residual lines conflict mitigation

Steps taken to date include an initial internal inspection, pressure testing, and a portion of the residual line mitigations. These steps are discussed in greater detail further within the plan.

Remaining steps include cleaning, final inspection, disinfection and testing, and the remaining items for the residual line mitigation plan. This workplan will discuss the items and steps required to accomplish each of these remaining steps. The residual line mitigation plan is being handled under separate cover and will be distributed for review and acceptance separately.

Once the scope is complete within the limits of this workplan, the 64" pipeline will no longer be utilized as a raw water distribution to the existing water treatment facility and will solely be used for finished water use. If deviation from that occurs, several of these steps will need to be completed again prior to use as a finished water line. Below we will review the five steps to complete the conversion. Work plans providing finer details of the completed steps prior to October 1st, 2024 have been prepared and may be provided separately if requested.

Items Completed to Date

This section covers items related to the conversion of the 64" line from raw water to finished water that occurred prior to October 1st, 2024.

Initial Inspection

Summary

Inspection for debris and sediment and condition of existing piping to determine the extent of cleaning, disinfection, and potential repairs that would be necessary to convert this line into a finished water line occurred in January 2022. Third party ASI Marine completed the inspection via submersible rover at two low points in the line at the Mitchel Floodway, see Figure 2, and the Arkansas River, see Figure 3, crossings. The rover utilized Multi-Beam Imaging Sonar, Profiling Sonar, and Video inspection. That inspection included all pipeline in the areas from point of insertion to point of downstream isolation valve, totaling approximately 5,170LF of pipe, see Figure 1. There were areas of potential deformation of pipe noted. No areas of separation, excessive

sediment build-up or degradation concern were witnessed by ASI Marine during the inspection.

Reference Documents

- 64inch Inspection Work Plan Rev 1
- RU21-040 Report - Raw Water Transmission Line
- Arkansas River.mp4
- Mitchell Floodway.mp4

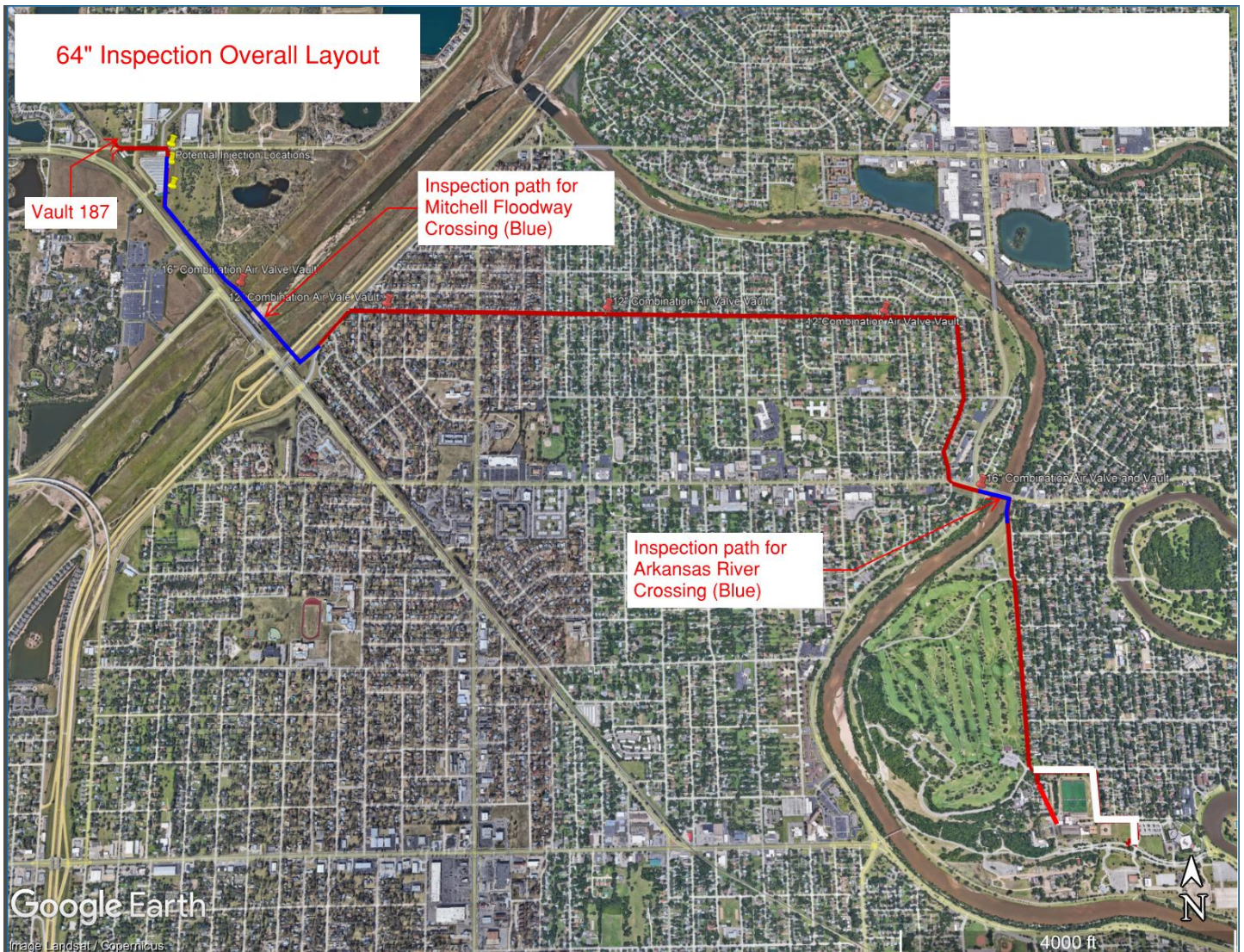


Figure 1- Inspection Areas Overall Layout

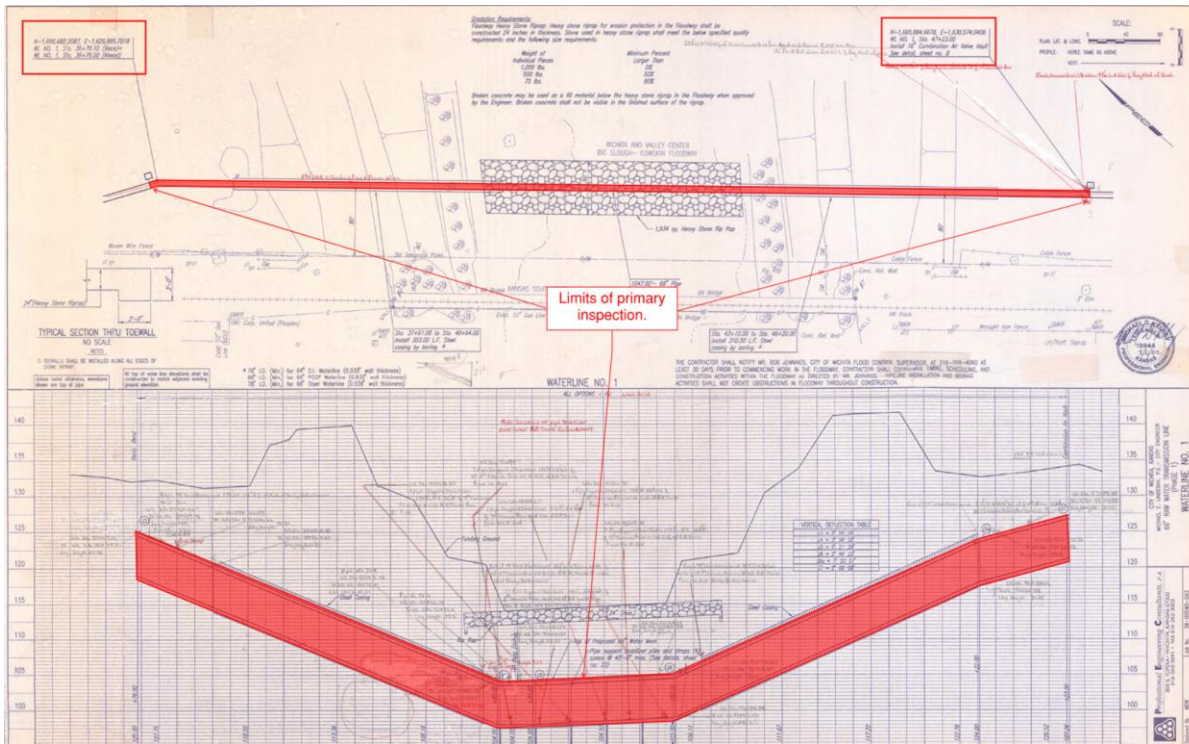


Figure 2- Mitchell Floodway Primary Inspection Points

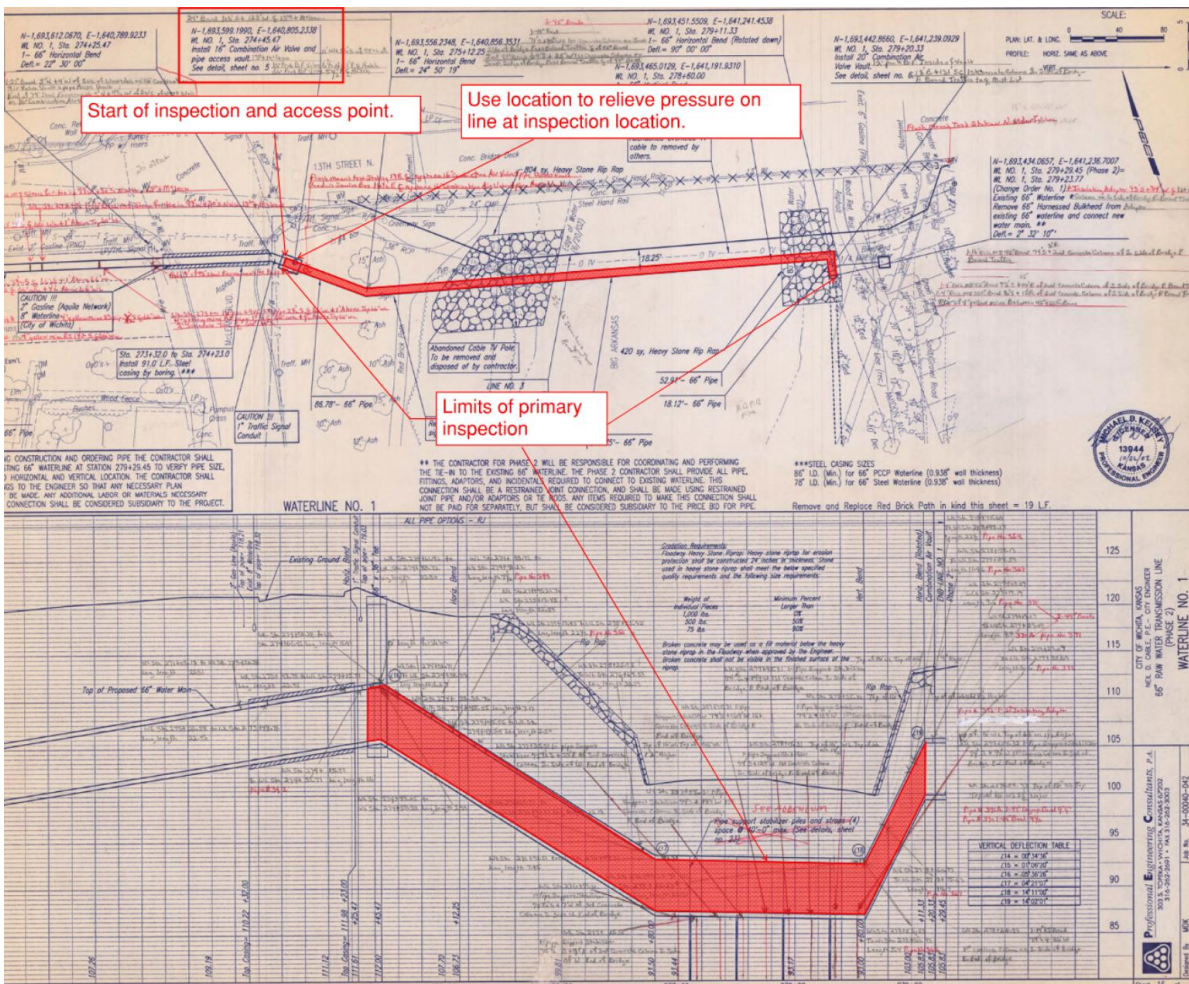


Figure 3- Arkansas River Crossing Primary Inspection Points

Pressure Testing

Summary

Pressure testing of the existing 64" line was also requested to verify the integrity of the pipe. Pressure testing occurred in May 2024 from isolation valves inside existing Vault 187, through the new 66" piping at the headworks of the NWWTF, through the existing 64" RW pipeline, and ended at the isolation valves installed at tie-in location M-03A and M-03B. Minimum required testing limits are from isolation valve at tie-in location N-03 and the isolation valves at tie-in location M-03A and M-03B. Reference attached drawings for limits of pressure test as shown in Figure 4. The test tree was located at the spare flow meter port at the new headworks piping. The general plan for pressure testing of the 64" pipe includes isolating at the following valves:

- Isolation valves at the M-03A and M-03B tie-in location
- Isolation valve at N-02A tie-in location,
- Upstream valves of the IFCV at NWWTF,
- Closing all air relief isolation valves,
- Closing isolation valves at the 187 vault

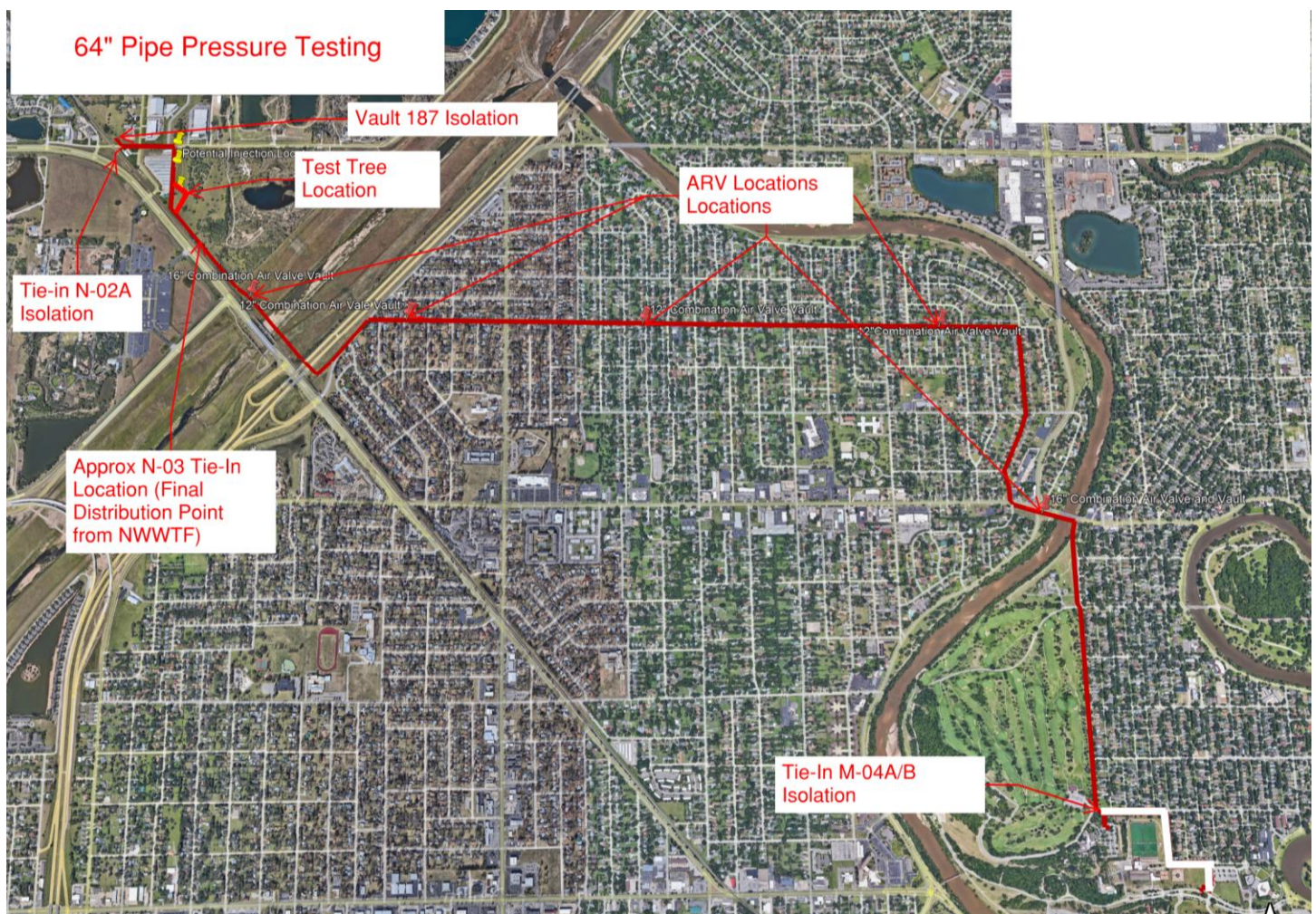


Figure 4- Pressure Testing General Layout

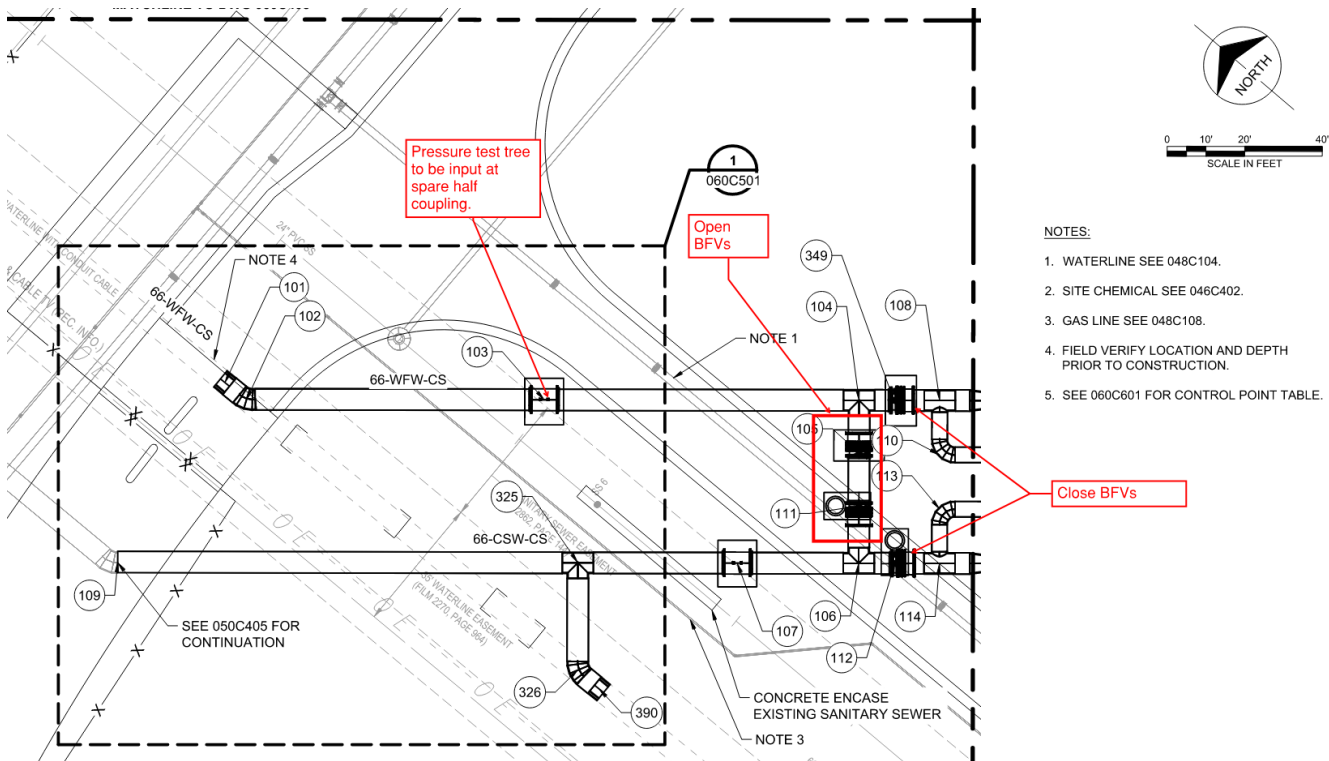


Figure 5- Pressure Test Tree Location

A separate work plan was produced for the pressure test portion of work. Pressure testing of the 64" line was completed and passed on 05/14/2024. Please reference work plan: *64inch Pressure Test Work Plan and test results Leak Test 64 & 66in RW Line_051424*.

Reference Documents

- 64inch Pressure Test Work Plan
- 64 Pressure Testing Overall Layout
- 64 Inch Pressure Test Mark-up Drawings
- Leak Test 64 & 66in RW Line_051424 (Test Results)

Existing Residual Line Conflicts- Completed to Date

Summary

Two existing residual lines, a 16" and a 4" diameter line, currently run in close conflict with the 64" Raw Water/ Future Finished Water line. As part of the conversion, KDHE has requested a mitigation plan to reduce potential future contamination issues with the Finished Waterline. Measures taken by COW include pressure testing and continuous monitoring of the lines. Multiple steps have been taken to complete this requirement.

City of Wichita encased all sanitary sewer crossings of the 64" line along the route of future finished water.

The 16" residual line was pressure tested to confirm no leakage. The line was tested at 180psi along the area shown in Figure 6 and the test passed on 04/17/2024. Please reference work plan: *16 Inch Sludge Line Leak and Pressure Test Work Plan Rev. 2*, and test results *Leak Test 16in Existing Sludge Line_041024*. The test was successful.

The 4" residual line was exposed in multiple locations along with the 64" line and found to only be in conflict along a short run. Potholing was done and a survey shots resulted in surveyed locations exceeding the 10' minimal separation requirement set forth by KDHE. The lines intersected with

each other in one location, and the 4" residual line was encased at this intersection to a minimum 10' horizontal separation from the 64" line. See Figure 7 below. Reference Work Plan: 64 RW Line Locate and 4 in Sludge Line Encasement Work Plan Rev.1

See the following submittals entitled "16 Inch Sludge Line Leak & Pressure Test", "64 Inch RW Locate & 4 Inch Sludge Line Encasement", and "Lime Residual Meter Vault Flow Instruments", respectively received under the Wichita Public Works and Utilities' December 13, 2024 cover letter on December 16, 2024.

Reference Documents

- 16 Inch Sludge Line Leak and Pressure Test Work Plan Rev. 2
- Leak Test 16in Existing Sludge Line_041024
- 64 RW Line Locate and 4 in Sludge Line Encasement Work Plan Rev.1
- 64 RW Line Locate Drawing Set
- 20230727 Pipe Sketch With Line Locate Drawing Set

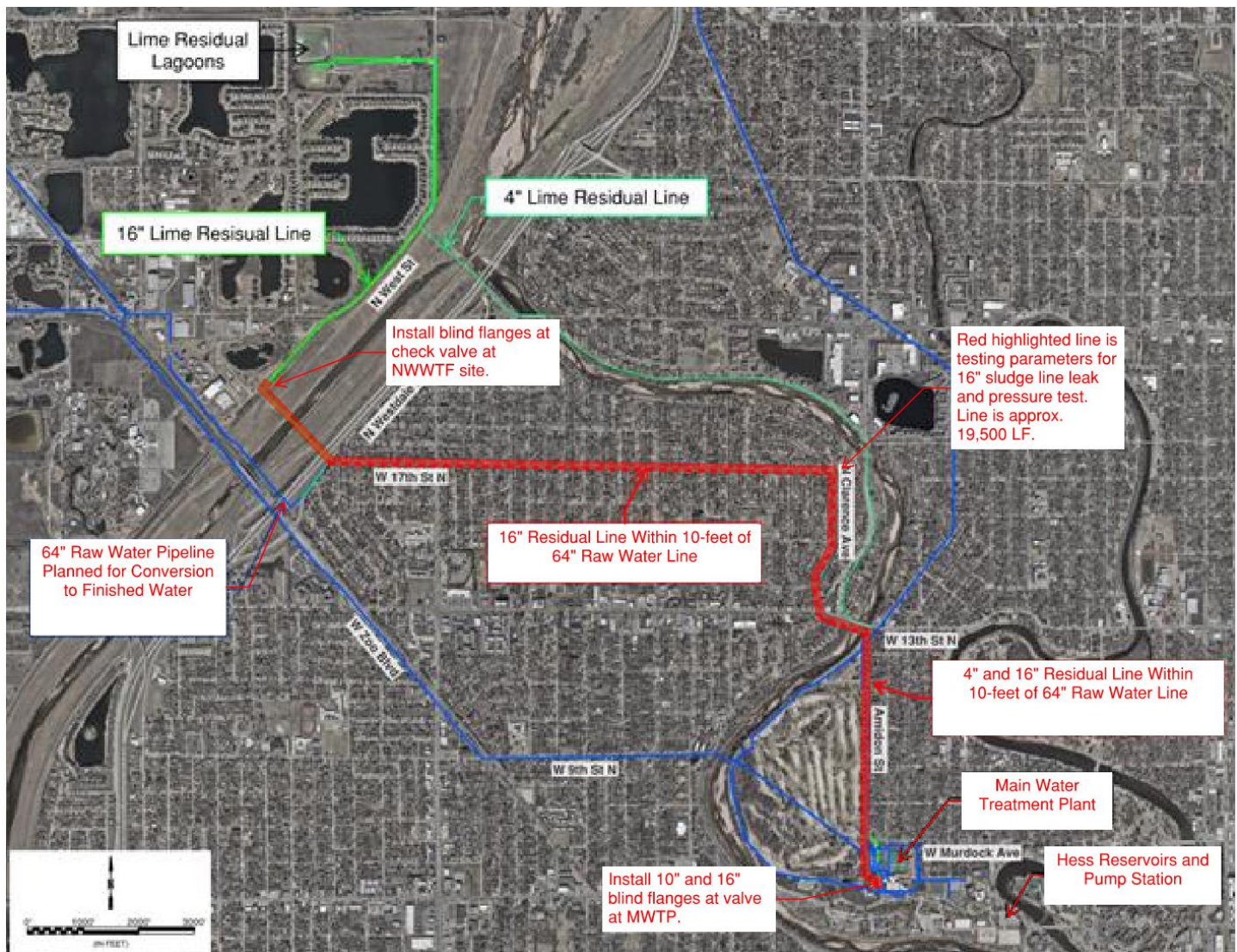
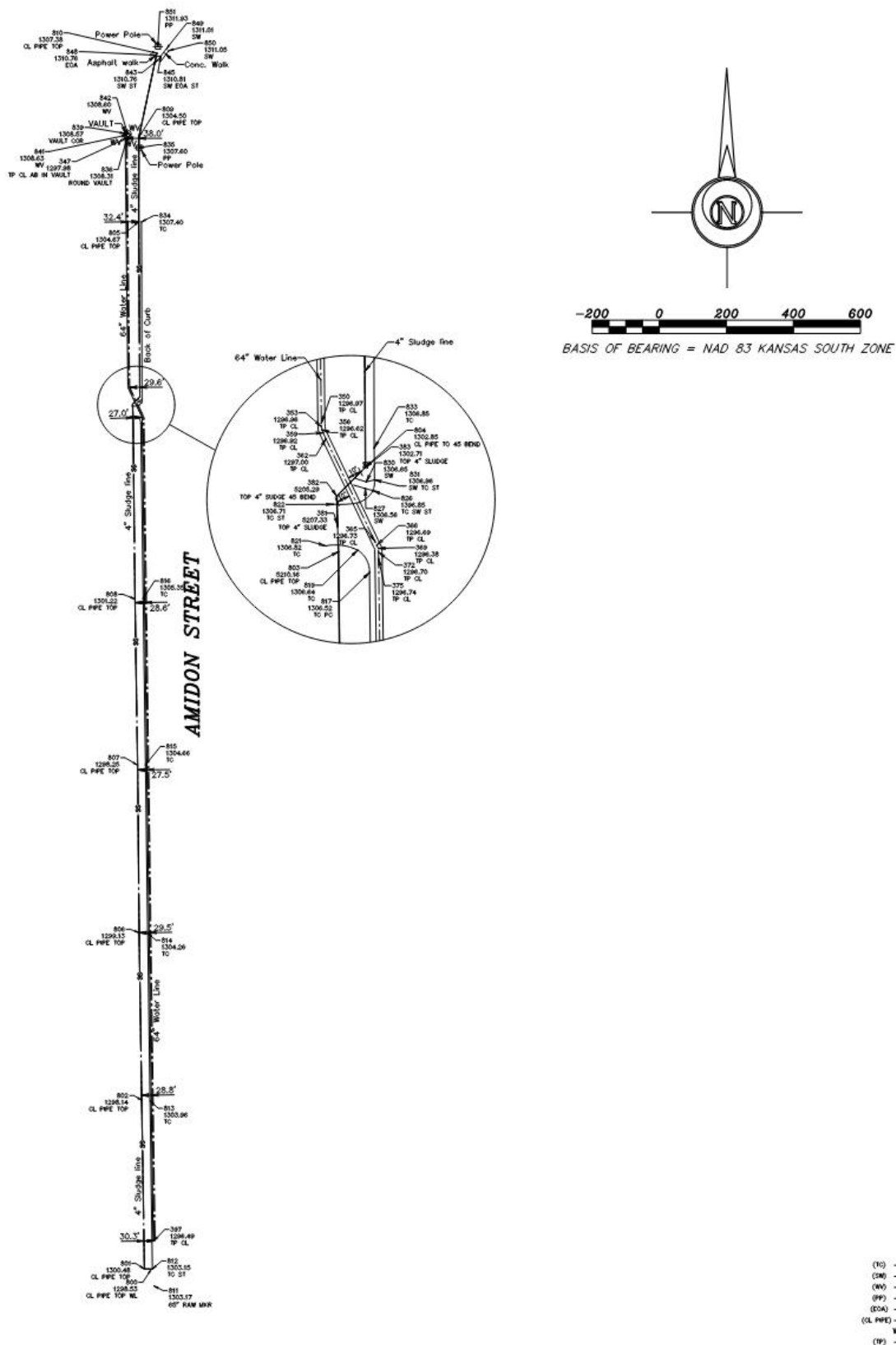


Figure 6- 16" Residual Line Pressure Test Route

SLUDGE PIPE SKETCH



Items to Complete

Summary

Items to complete in order to successfully convert from raw water transmission to finished water transmission include draining and cleaning of the pipe; internal inspection; disinfection and testing; and the remaining residual line mitigation efforts. Below includes these steps in greater detail, including work plans for each step.

Pipe Draining/ Cleaning

Summary

The first step once the conversion of the 64” raw water line has begun includes steps to drain and clean the line. The intention is to complete this process in multiple steps including an initial chlorine shock of the line prior to draining, draining, and pigging the line. The following gives additional detail to each step.

Initial Chlorine Shock and Draining

Injection Set-Up

Dosing at approximately 25 mg/L of chlorine using a 12-12.5% solution of sodium hypochlorite will occur. Dosing will be provided through a Saf-T-Flo HS200 chemical injection quill (or similar) with 30” insertion length as shown in Figure 8.

The injection point will be at the spare half coupling on the West 54” FWHS pipe at the effluent side of the FW Pump Stations at point 192 shown on drawing 060C406 and in Figure 9. The ball valve will allow for the injection quill to be installed while the line is in service. Injection equipment will be installed in coordination with COW availability.

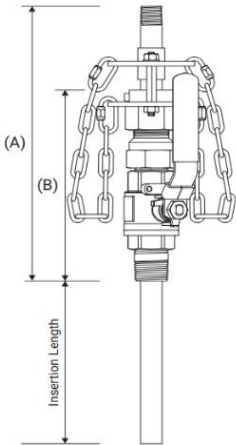
To inject sodium hypochlorite into the line, a tote and pump system will be installed near the injection point. This will be staged near point 192 and used for the duration of injection and conversion of the line. Local delivery of sodium hypochlorite will be necessary during multiple injection periods throughout the conversion.

HS-200

Heavy Service Retractable Injection Quill
2” Valve x 1-1/2” Tube



SPECIFICATIONS	
SAFETY RATING	250 PSI
CHECK VALVE	OPTIONAL
SAF-T-SEAL TIP	N/A
QUICK DISCONNECT	N/A
VALVE/PROCESS CONNECTION SIZE	2"
INLET CONNECTION SIZE	1-1/2"
SOLUTION TUBE SIZE	1-1/2"
SOLUTION TUBE ID	1.610"
SOLUTION TUBE OD	1.900"
(A) OPERATING LENGTH	16.5"
(B) VALVE/GLAND LENGTH	12.25"
EXTRACTION LENGTH	28.75" + INSERTION LENGTH



ORDERING OPTIONS

SERIES	VALVE MATERIAL	SOLUTION TUBE MATERIAL	INSERTION LENGTH	TIP CONFIGURATION	CHECK VALVE SEAL
HS-200					
	S = Stainless Steel	H = Alloy C276 S = 316SS A = Alloy 20 T = Titanium Gr2	2 = 2" 4 = 4" 6 = 6" 8 = 8" 10 = 10" 12 = 12" 18 = 18" 24 = 24"	0 = Standard B = 45° Bevel DH = Diffuser Holes	00 = No Check Valve 05 = Alloy, FKM 06 = Alloy, EPDM

TECH NOTES

- When selecting alloy check valves options, the body material of the check valve is the same as the solution tube material.
- Diffuser hole configurations to be determined by customer. SAF-T-FLO does not provide recommendations regarding diffuser hole layouts.
- The HS-200 series encompasses ordering options previously offered under the EB-150 series.

Figure 8- Injection Quill

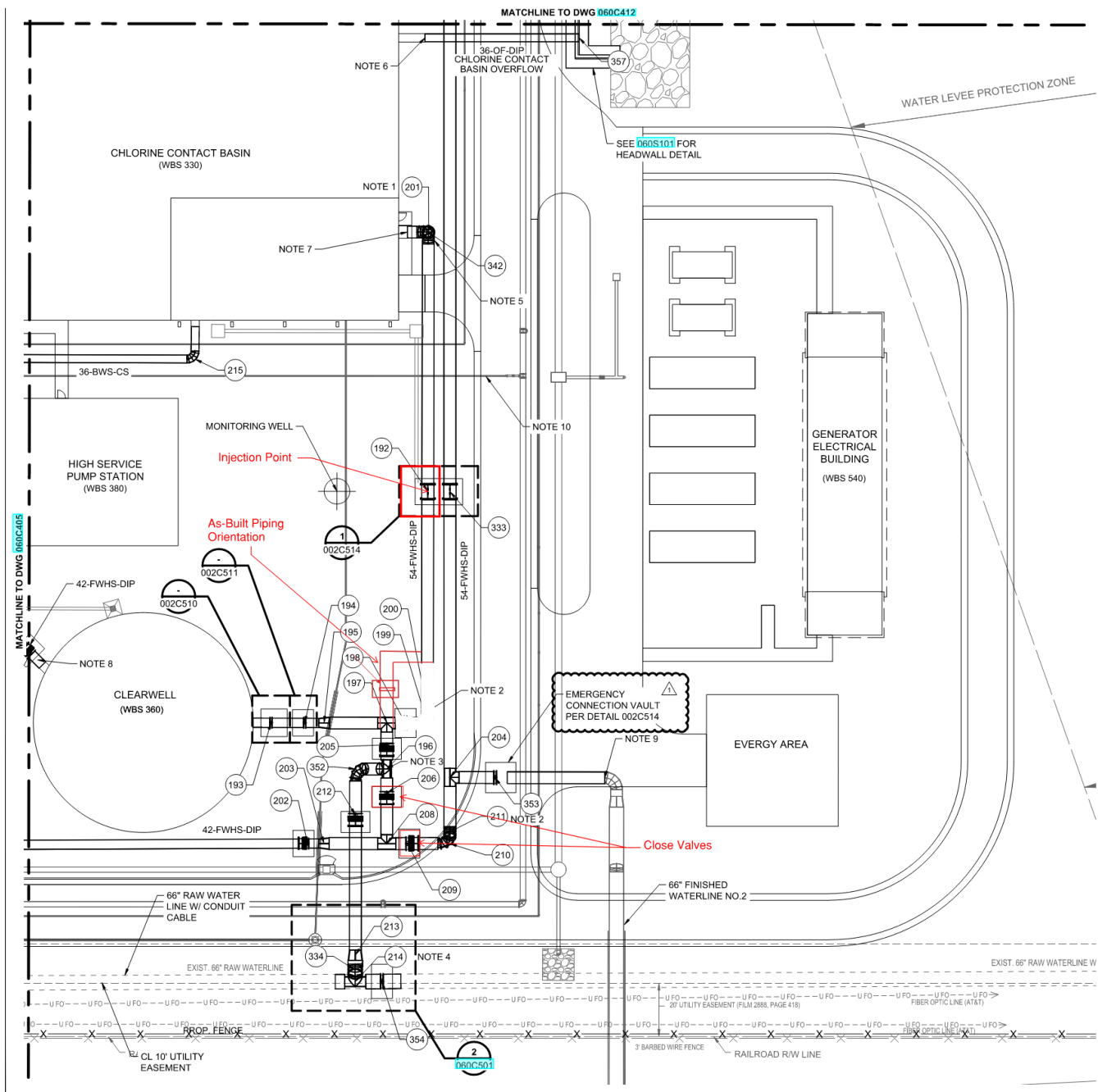


Figure 9- Injection Point

Flush, Drain, and Chlorine Shock

Prior to pigging activities, the 64" line will be drained and flushed of existing water through the Hess Startup Discharge piping as shown on 050G102 and Figure 10. Utilizing a linear footage of 22,000LF and I.D. of 64", the approximate volume of water is 3.68 million gallons. Water from Performance Testing at the NWWTF will be used to displace approximately (1) pipe volume of water through the pipe, or 4 million gallons, minimally. Once the line has drained, the isolation valve will be closed at the Hess Discharge piping, and water will be injected into the line with Sodium Hypochlorite injection from the NWWTF. Flow rate will be between 5-7 MGD using Finish Water Pump 230, 240, or 250 with chlorine injection at a dosing rate of 25mg/L. The pipe volume is approximately 3.68 million gallons, equating to ~860 gallons of chlorine to achieve the desired 25mg/L. Once the line has been filled, the pipe will remain at rest for ~48hours for initial shock. The water will then be discharged at the Hess Discharge, while simultaneously being dechlorinated

per AWWA C655 with local injection of sodium bisulfite at the Hess Discharge piping via injection quill. For reducing 25 mg/L chlorine residual at ~9 MGD via draining, there will be a need of ~665 USGPD of 38% sodium bisulfite, or 28 USGPH. The injection pumps have an operating range of 2.29 to 230 USGPH. The injection quill will be similar to that shown in Figure 8, however will have a diffuser style quill. Prior to discharging, chlorine residual readings will be taken at the 1" drain lines inside the HFCV. Measures will be taken to adhere to NPDES Permit I-AR94-PO96 while discharging is taking place. Once the line has been gravity drained, preparations will begin for the physical cleaning step.

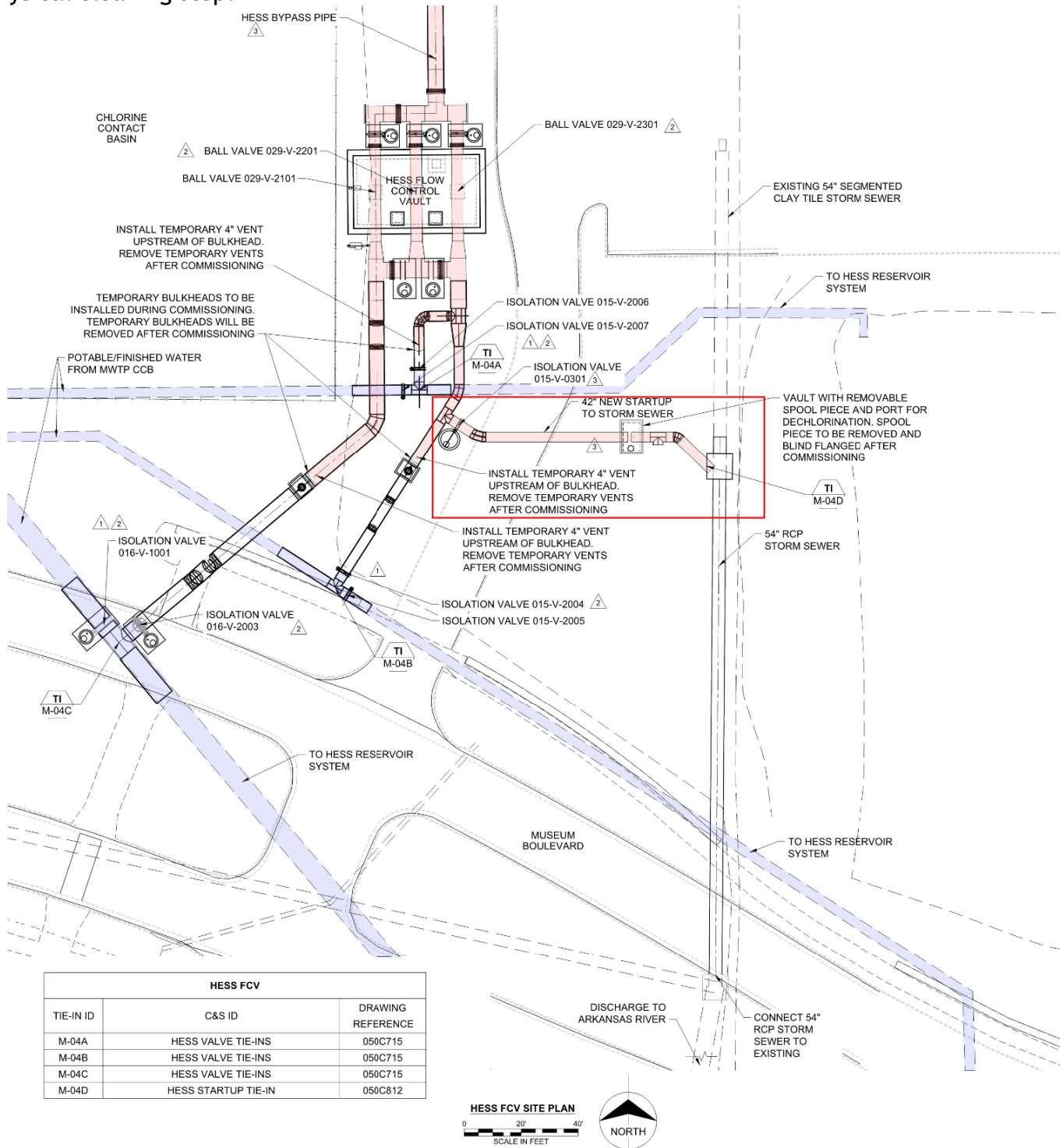


Figure 10- Hess Startup Discharge Configuration

Cleaning/ Pigging

Preparation

To physically clean the line, the line will be cleaned via pigging method utilizing three different pig designs. To allow for pass through of the pigs, the existing Butterfly Valves must be removed and replaced with temporary spools at each valve location. Additionally, a pig launcher and receiver will be installed. During the above *Flush, Drain, and Chlorine Shock* step preparations will begin to prepare the line for pigging. (7) total valves need to be pulled and replaced with spools, and (6) of those valves are within vaults. Locations 1 and 9 will have transition spools to bring the launcher and receiver above grade. Locations 2,3, and 5-8 will have 1'-6" temporary spools installed in place of the valves. Location 4 will have a 66"x36" tee installed with an additional 36" spool on top bringing to grade. Attached spool drawings may be referenced.

Valve stations include numbers 2-8 below and as shown in Figure 11.

	Station	Area	Description	Pipe type	Location	Depth to top
1	N-03	NWWTF- Tie-In-North of Tee	Pig launch - 66"-Install Temp Spool	Steel	Below grade	7'
2	N-03	NWWTF- Tie-In-South of Tee	66" valve- Install 1'-6" Temp Spool	Steel	Vault/ Above Grade	0'
3	54+84.43	235/West Dale	66" valve- Install 1'-6" Temp Spool	Steel	Vault/ Grass	8'
4	108+49.81*	Sheridan/17th	66" valve- Install 66"x36" Temp Tee	Steel	Vault/ Street	5'
5	243+64.00*	Bella Vista/17th	66" valve- Install 1'-6" Temp Spool	Steel	Vault/ Street	8'
6	274+45.47	McLean/13th	66" valve- Install 1'-6" Temp Spool	Steel	Vault/ Grass	10'
7	281+07.99	N. Amidon/River	66" valve- Install 1'-6" Temp Spool	PCCP	Vault/ Grass	8'
8	M-03B	Amidon/Murdock (No vault)	66" valve- Install 1'-6" Temp Spool	Steel	No Vault/ Street	8'
9	HFCV	HFCV Header	Pig retrieval - 66" Install Temp Spool	Steel	Below grade	3'

***Please note- With original piping installed in multiple phases, stations 108+65.99 (Phase 1) equals station 200+00.00 (Phase 2). Reference sheet 7 of 24 on Phase 2 as-builts.**

Preparation will include pulling vault lids at each of these locations and preparing valve hardware for removal. Once the line has been drained, all valves will be actuated to the closed position to allow for disassembly.

Another task after draining is complete is to prepare the areas of the pig launcher and the pig receiver. Details of the launcher and receiver may be seen in Figure 12 and Figure 13. The launcher will be located on the plant north side of the tee at N-03 tie-in where the 54" FWHS line of the NWWTF ties into the existing 64" line. Excavation will occur within a trench box to minimize disturbance on either side of the excavation, which includes the plant road and plant fence. Utility locates are critical in this area due to several known utilities including plant electrical, fiber optic conduit, and underground piping. The Dished Head Blind will be removed from the tee flange, and a spool piece will be used to interconnect the tee to the launcher above grade as shown in Figure 14 and Figure 15.

The pig receiver will be installed on the east flange of the header pipe north of Hess Flow Control Vault. Similarly to the launcher, the Dished Head Blind will be removed, and a spool will be installed attaching to the header flange below grade and to the receiver above grade as shown in Figure 16 and Figure 17. Required traffic control (see attachments) will be setup and excavation will occur during the preparation period and will begin during final draining of the line.

Frac tanks and diesel pumps will be staged at the launcher for the initial launch source during pigging operations. All required valving and piping will be completed at this area during this time. Frac tanks will be filled just prior to pigging operation and temperatures will be monitored if freezing mitigations will be necessary.

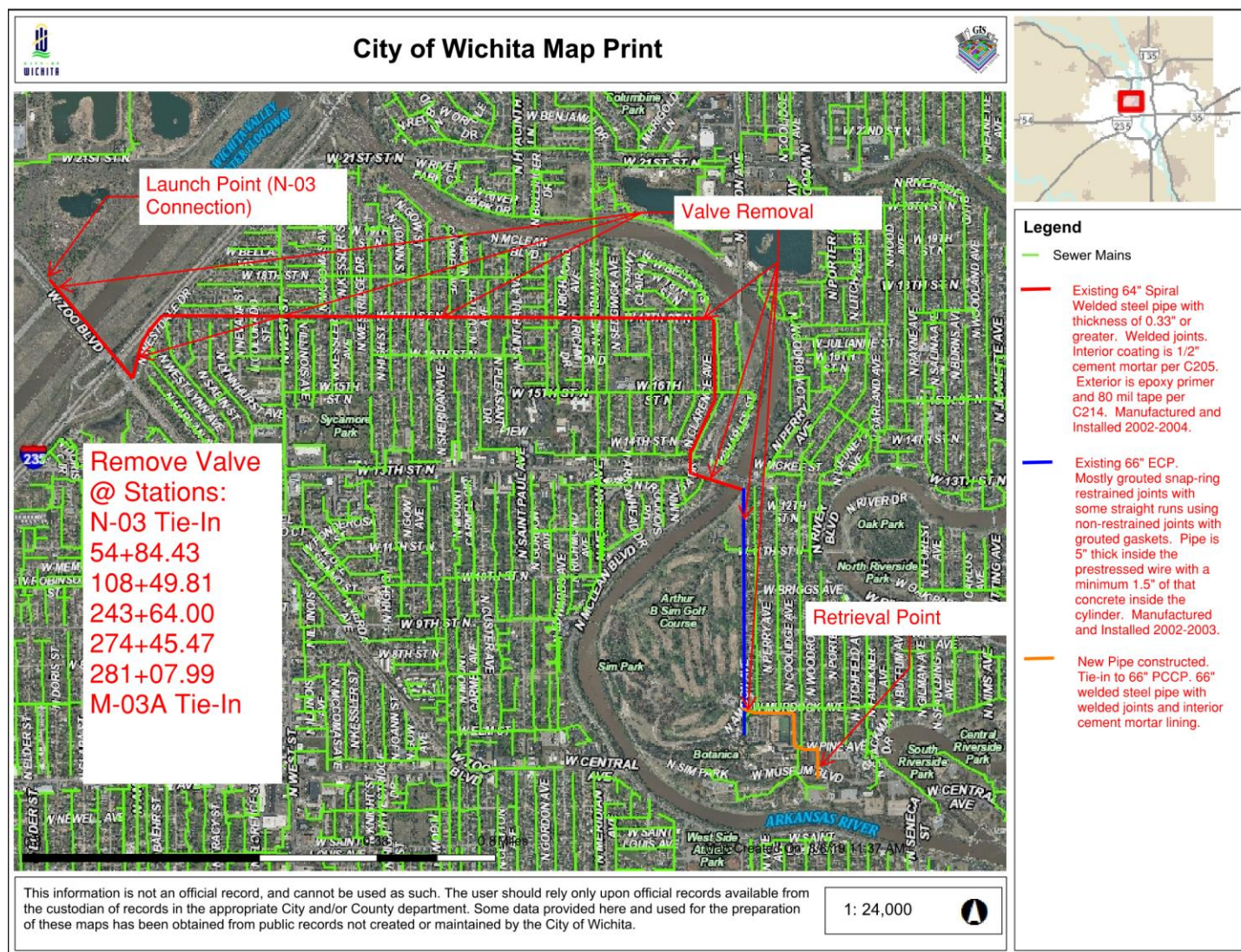
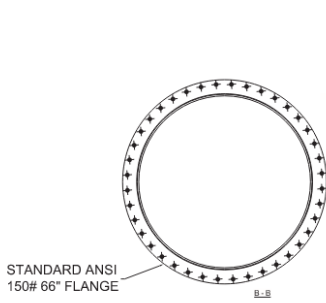
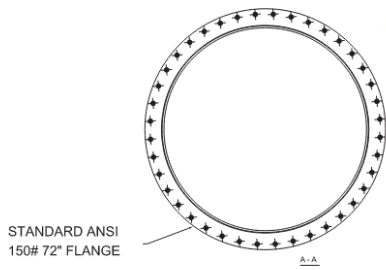
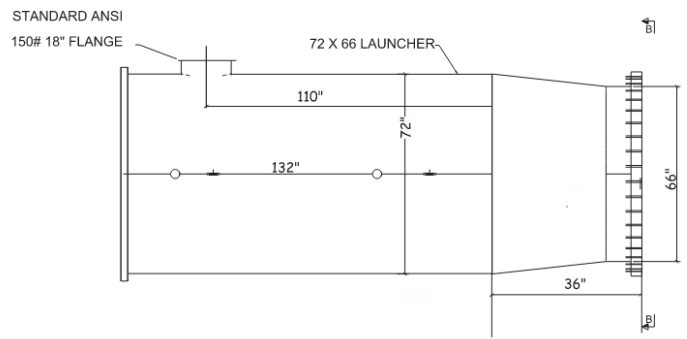


Figure 11- Overall Map- Valve Removal and Pig Launcher/ Receiver



Dimensions show on page 3



Dimensions show on page 4

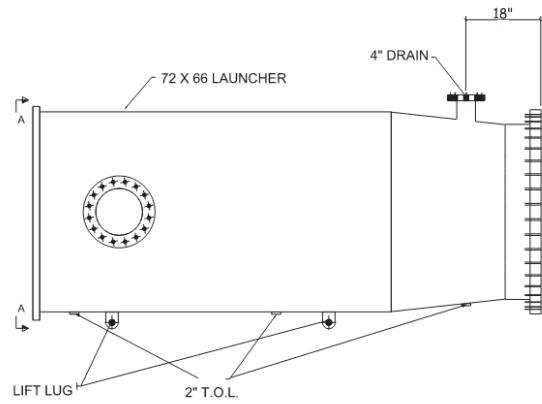


Figure 12- Pig Launcher/ Receiver



Figure 13- Pig Launcher/ Receiver Sample (Smaller Scale)

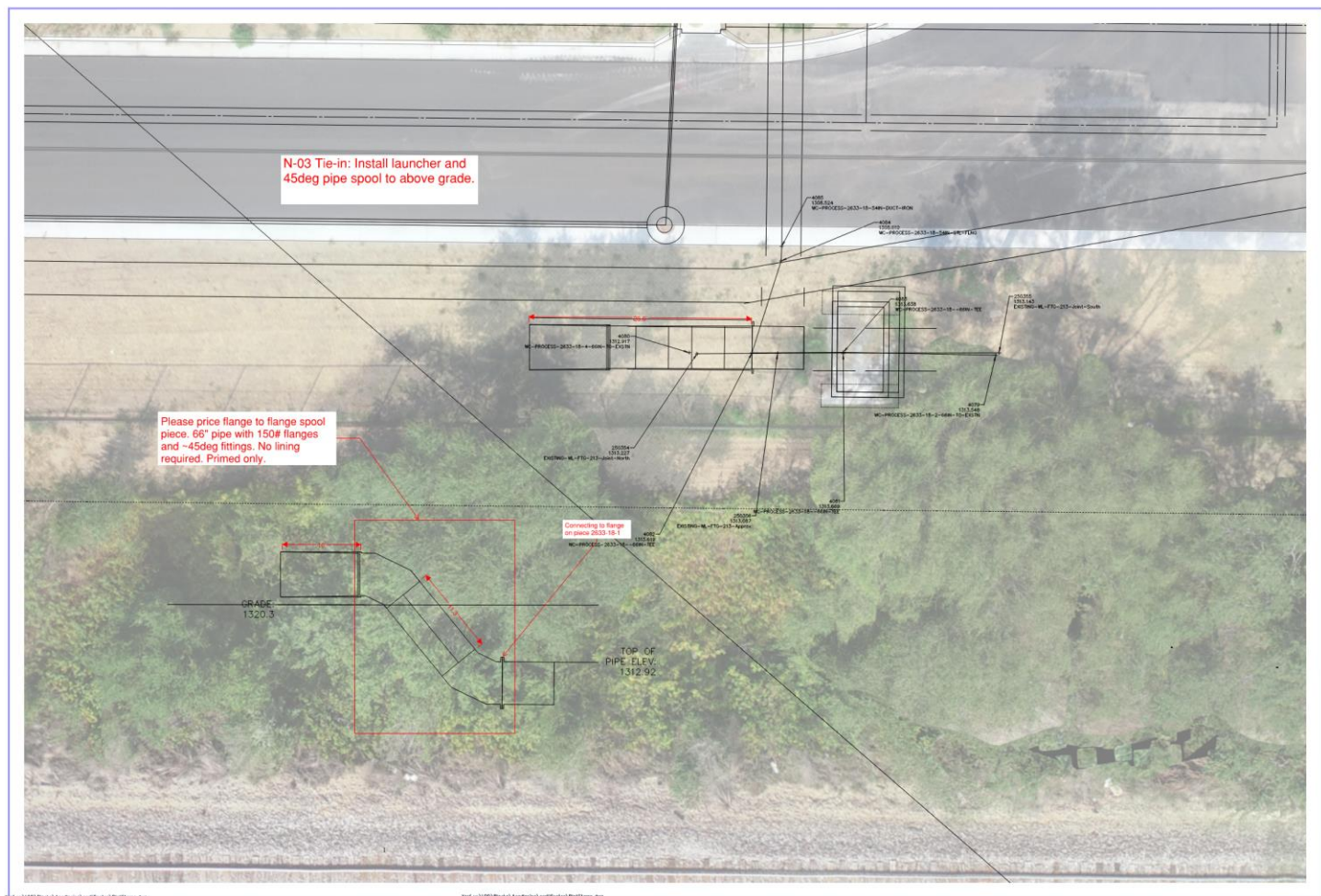


Figure 14- Pig Launcher Layout

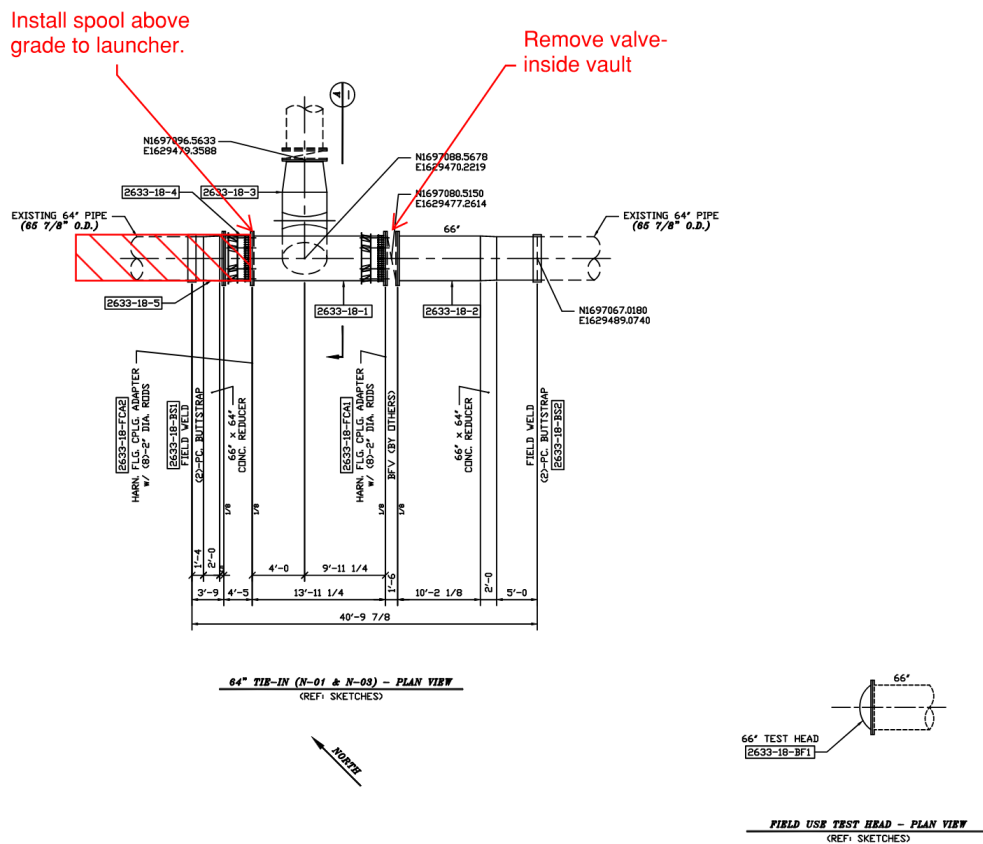


Figure 15- Pig Launcher Layout/ Permanent Dished Head Blind

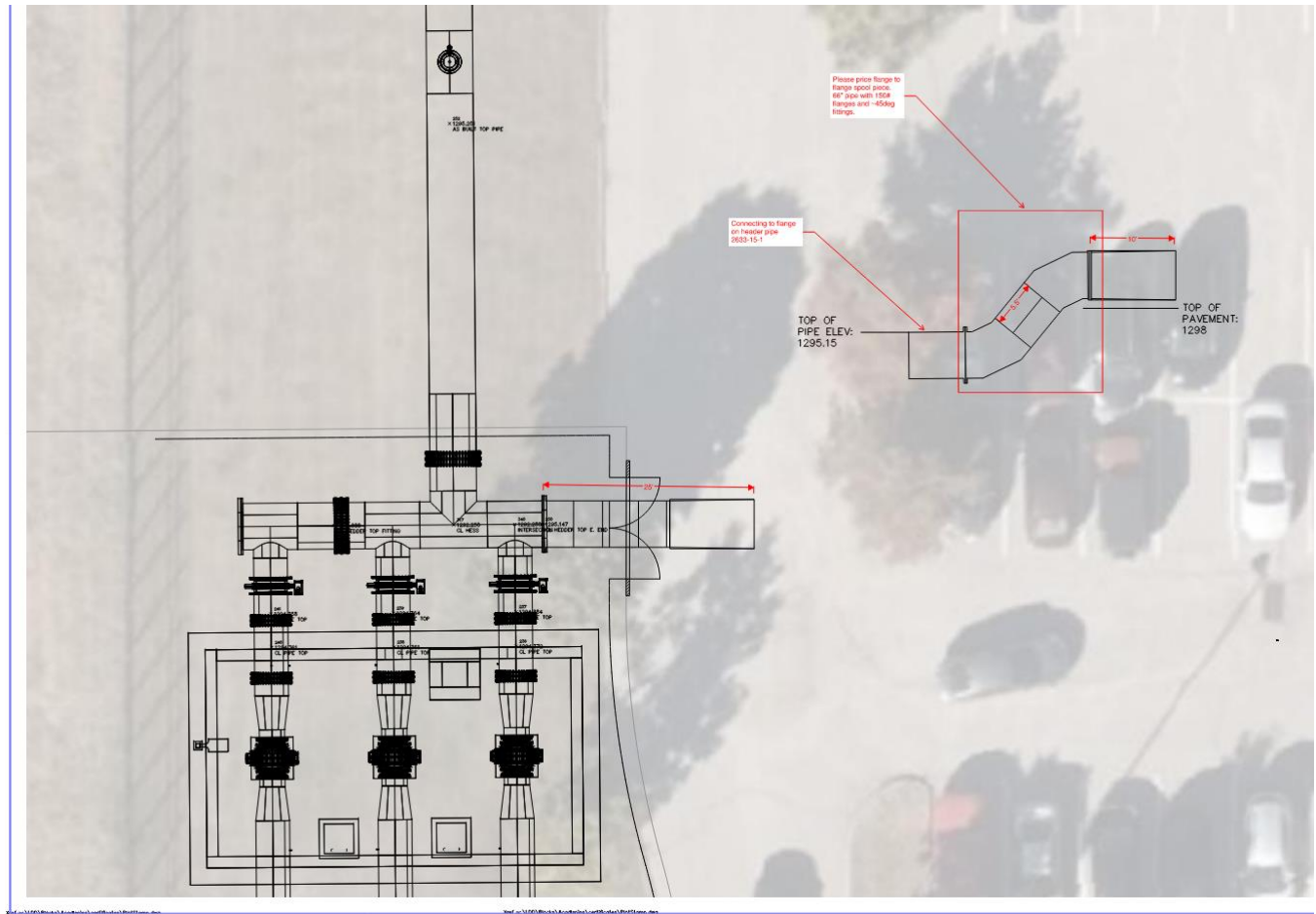


Figure 16- Pig Receiver Layout

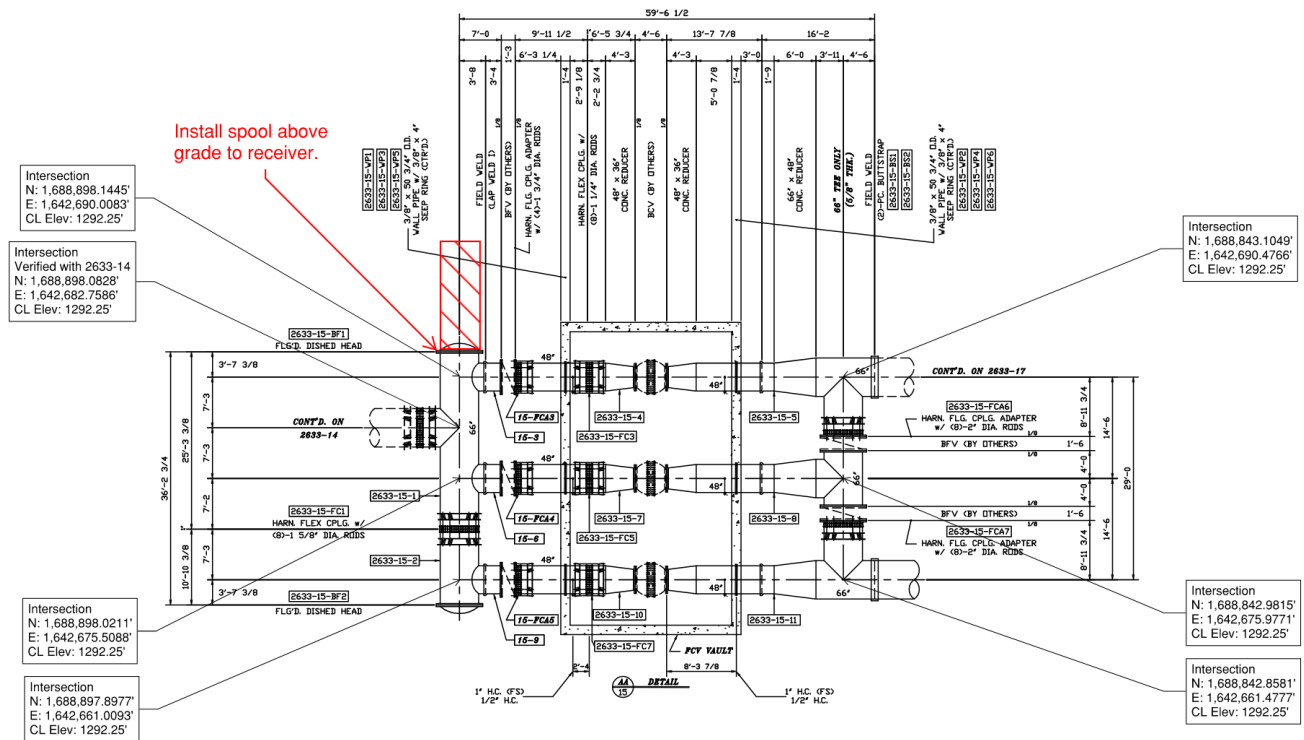


Figure 17- Pig Receiver Layout/ Permanent Dished Head Blind

Pigging

After the preparations are complete, pigging will begin. American Pipeline Solutions will lead all pigging activities and give direction through the process. A total of (6) 66" diameter foam pigs are being produced for the pigging: (3) LB Light Density Swab type; (1) MB Medium Density Bare Foam type; and (2) MC Medium Density Criss-Cross Foam type (See examples in Figure 18). Data Sheets on all three pig styles can be found in ght Piggin Supporting Documents attachment. It is expected that (5) total pigs will be used for the operation, with (1) remaining as a spare. Each pig run is expected to take ~2 days to complete the full process. The sequence of pigging is as follows:

1. LB Light-Density Bare Swab: Length 99" Diameter 66"
2. LB Light-Density Bare Swab: Length 99" Diameter 66"
3. MB Medium Density Bare Pig: Length 96" Diameter 66"
4. MC Medium-Density Criss-Cross Foam Pig: Length 96" Diameter 66"
5. MC Medium-Density Criss-Cross Foam Pig: Length 96" Diameter 66"
6. LB Light-Density Bare Swab: Length 99" Diameter 68" (If necessary)

LB Light-Density Bare Swab: Length 99" Diameter 66" (Length 99" Diameter 68"



MB Medium Density Bare Pig: Length 96" Diameter 66"



MC Medium-Density Criss-Cross Foam Pig: Length 96" Diameter 66"



Figure 18- Foam Pig Sample Photos

The pigs will be loaded in the launcher at the NWWTF N-03 Connection. Ancillary diesel pumps with minimum 2000GPM capacity will be used to apply pressure behind the pig in the launcher to seat/start the pig in the line downstream of the 54"/64" tie-in. Once the pig has been started sufficiently, pumping will stop with the ancillary pumps. Pumping will then begin with the NWWTF

FW pumps, producing 5-7MGD flow to push the pig through the line. Flow may fluctuate as necessary to achieve the desired pig velocity as directed by APS.

Monitoring Stations will be located in no less than three locations along the line, allowing the pig to be monitored while in transit. Flow rates and travel time will be monitored to further anticipate the pig's movement and upcoming approach at each monitor locations. This monitoring will also allow for known sections of piping if the pig becomes lodged at any point.

If necessary, flushing will occur between pigging runs. Potential flushing will be up to 30MGD for a period allowing one turnover of pipe volume. Total quantity of flushes will be determined by observations made by APS after each pig run.

During pigging operation, valves will be configured around Hess Flow Control Vault as shown in Figure 19.

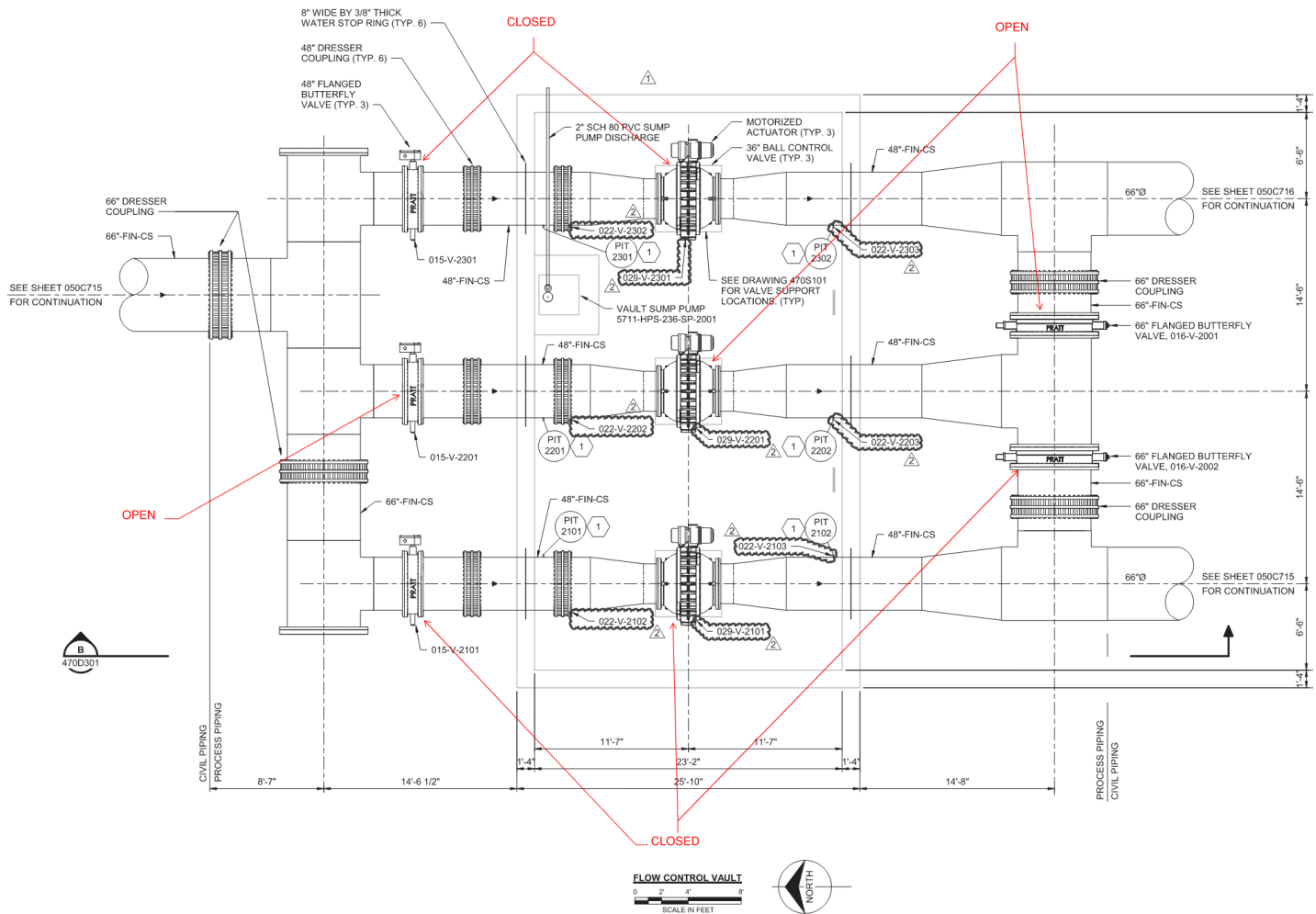


Figure 19- Valve Configuration

Once the pig has traveled the length of the pipe to the desired location of APS, valve 015-V-2201 will be closed and the remaining water will be pushed through the port in the pig receiver and discharged to the local storm drain. The pig will then follow the flow and enter the pig receiver at the end of the line. Valve 015-V-2201 will then be reopened and the line will complete draining

through the Hess discharge line. After draining, the receiver will be opened and the pig will be retrieved and discarded in staged dumpsters. This process will repeat similarly for all (5) pig runs. It is anticipated the second pig run will produce the majority of residual from cleaning the line. Once the pigging operation is complete, the inspection phase will begin. If the inspection finds additional cleaning is required, the final Swab will be run through the line.

Discharge- Permit Variance

Discharging will be through the Hess Discharge line shown in Figure 10, minus the small amount through the receiver at the end of the pig run. Both discharges are anticipated to enter the stormwater drains local to the receiver and ultimately discharge to the Arkansas River. NPDES Permit I-AR94-PO96 has been received for discharging at this location and does not have a required Total Suspended Solids (TSS) limit at this discharge location, only requires monitoring. Due to short duration of anticipated solids entering the river and the material in the line is from primarily groundwater transmission, a permit variance request was worked through with KDHE and was established and in place prior to pigging. Reference Letter Wichita Waterline Pigging Authorization from KDHE Director, Bureau of Water. The variance letter replaced the requirements of the permit just during the pigging and flushing operations. Other work will be monitored, recorded and reported as required within the permit. Any modifications to the existing outfall structure will require prior approval by City of Wichita Stormwater group. None are anticipated as flow of discharge is similar to design flow of stormwater.

Three total 12-Inch C.S. Dual 23-Cartridge Filter Trailers (138 total cartridges) will be used with fabric filters to capture the majority of the solids leading in front of and directly behind the pig. The pig will be monitored and when it transitions into the last ~1500LF of pipe, water flow will be transferred from the discharge pipe through the filter pots to allow for additional filtering. 200 micron filter bags will be used to start, and filter sizing may be changed pending outcome of initial runs. See figure below for sample system.



Inspection

Summary

The inspection will follow the cleaning process. Prior to the inspection, all valves will be closed at HFCV and the waterline will be filled from the NWWTF again via the FWPS. It has been determined to complete a video inspection internal of the line from the N-03 tie-in connection to the M-03 A/B connection of the new bypass line. The inspection method will be similar as previously described within the *Initial Inspection* section of this workplan and within workplan *64inch Inspection Work Plan Rev 1*, dated January 2022. ASI Marine will lead the inspection via submersible rover. The rover will be placed to access the line through four areas: the pig launcher, 36" ARV tees at stations 274+45.47 and 281+07.99, and a temporary tee installed at 108+49.81 pending the chosen rover's ability and available length of umbilical cable.

Inspection Plan/ Schedule

Tentative inspection schedule is as follows:

Day 1-2: ASI mobilizes crew to Wichita

Day 3: Inspection Entry Point #1- Set up equipment and launch inspection from N-03 Connection Launch Point inspecting downstream to the eastbound turn on W 17th St N. If able, the vehicle will continue east as far as possible.

Day 4: Inspection Entry Point #2 and 3- Set up equipment and enter temporary tee at 108+49.81 valve to facilitate inspection along the west to east section. First stretch is intended to reach station 62+04.59 upstream. Second stretch to minimally inspect to station 244+24.05, further if rover allows.

Day 5: Inspection Entry Point #4- Set up equipment and launch inspection from 281+07.99 and inspect downstream aiming to finish phase 2 and attempt to enter the Hess Bypass.

Day 6: Inspection Entry Point #5- Set up equipment and launch inspection from 274+45.47 and inspect downstream through the siphon under the Arkansas River until the next valve; inspect upstream if possible, based on water level.

Day 7- 8: ASI crew demobilizes.

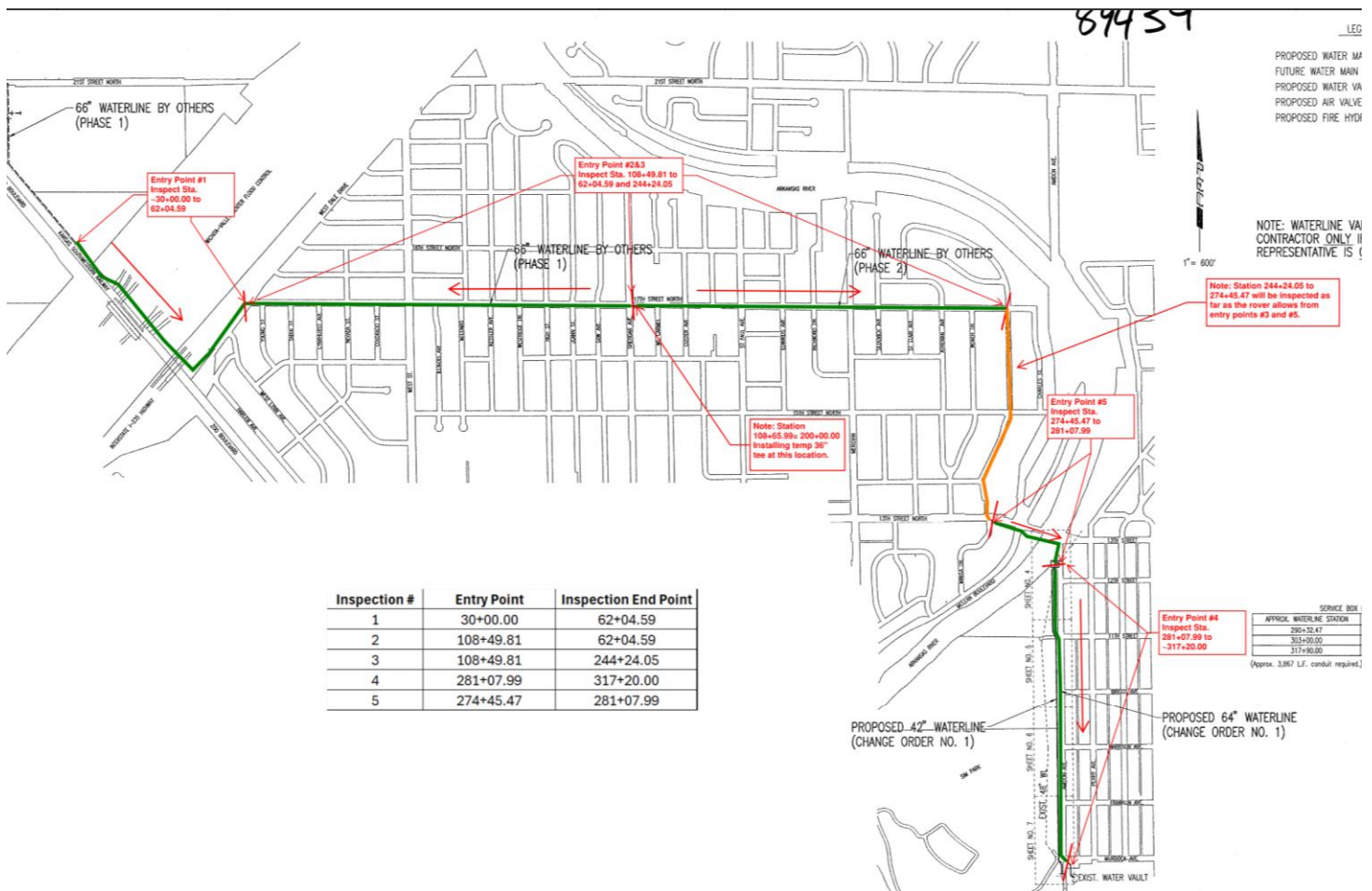


Figure 20- Inspection map and sequencing

Rover Details

ROV Inspection Details and Methodology (See attached ASI Marine Rover Specifications)

For the inspection, ASI will use a Seabotix vLBV300 ROV due to its size and capabilities. Four vectored thrusters provide forward, lateral, and reverse travel. The Seabotix vLBV300 has two vertical thrusters to enable the operator to move vertically through the water column. The vehicle is equipped with four variable intensity 1080-lumen LED lights and an additional two, 3800-lumen LED lights to illuminate the area of inspection for the high-resolution color camera.

The ASI custom vLBV system supports umbilical cable lengths of 590 feet, 2,600 feet, and 8,400 feet. These umbilicals house both signal and power conductors (fiber optic and copper, respectively), along with a Kevlar strength member and abrasion-resistant protective jacket. Umbilicals are neutrally buoyant in fresh water to reduce drag and to allow for longer penetration distances. For this inspection, ASI will be using the 8,400 foot tether.

An ROV pilot controls the vehicle movement, lighting, and camera position from the surface with the use of a hand-held control console. The video signal is routed to the surface through a fiber optic cable in the umbilical. All video can be reviewed in real-time, and the video signal is also recorded in real-time onto a video-recording computer. Audio commentary is added to document points of interest and anomalies as they are seen during the inspection.

ASI's vLBV ROV supports multiple sensors that can be selected specific to the task at hand. For this inspection, the ROV will be outfitted with video camera, a real-time imaging sonar, and a profiling sonar. The sonars will be available to the ROV pilot if required for navigation purposes and will augment the visual (video) inspection.

Since one computer is being used for multiple sensors that are logging the data, all of the time stamps for records and events are synchronous. During playback and post-processing, this ensures that the correct instance in time (equivalent to the same location) is being accessed and cross-referenced.

lance
Crawler Systems

Optional USBL
Tracking System



Optional
Grabber

Optional Multi-Beam
Imaging Sonar System

Figure 21- vLBV Rover

For inspection operations, a crew of three ASI personnel will stage the topside equipment within an enclosed trailer positioned adjacent to the access point. The ROV will be deployed through the pig launcher.

Review and Acceptance, Deliverables

To maintain schedule, during the inspection a City of Wichita representative will need to be available to witness the video footage within the trailer. At this time, the representative will work with ASI Marine to inspect the cleanliness of the line and determine if the cleanliness from the pigging is acceptable to continue to the disinfection process. Once this is determined, the line will be reestablished.

The raw inspection video will be reviewed and edited. Specific edits to video will include adding appropriate titling to identify the inspection project and asset reference name, and extraneous video and audio content will be removed. An electronic copy of the edited inspection videos will be provided as deliverables to Wichita Water Partners via Procore submittal.

The written report and inspection video will require approximately six business days to complete. With limited downtime and other reporting commitments, these project deliverables would be submitted to Wichita Water Partners within 30 days after completing the data collection.

Restoring the Line

Summary

Once the inspection has been deemed acceptable, the line will be reestablished prior to disinfection and testing. Prior to replacement, all butterfly valves will be cleaned via pressure washer or similar, and sprayed with a mild chlorine solution. All temporary spools will then be removed, and the existing butterfly valves will be replaced. New gaskets and hardware will be installed at the valves at this time and hardware will be torqued per gasket manufacturer torque

tables. The pig launcher and receiver and associated spools will be removed, and the dished head blind flanges will be replaced with new gaskets and hardware at the associated tees. Hardware will be torqued per gasket manufacturer's torque tables. Once the line is refilled, flanged connections will be checked via in-service leak test at the blinds and the valves. This will be checked again when the line is being flushed at exposed locations. All exposed piping shall be backfilled via project approved backfilling methods at minimum to spring line. Once these items are completed, the disinfection and testing step may begin.

Non- critical items required for restoring the line include valve vault lid replacement, road restoration, sod/seeding restoration, material and equipment demobilization. These items may be completed without affecting other critical aspects of the waterline conversion.

Disinfection and Testing

Summary

Once the line has been restored, disinfection and testing will be completed following AWWA C651 and KDHE Policies, General, Considerations and Design Requirements for Public Water Supply Systems in Kansas Appendix D standards and requirements. An initial disinfection step will be taken to disinfect and flush and residual from the restoration activities of the line. After this step, the final disinfection step will be taken, following AWWA C651.

Injection Set-Up

The injection set-up will be the same as described in the *Initial Chlorine Shock and Draining step*.

Disinfection

Once the line has drained, the isolation valve will be closed at the Hess Discharge piping, and water will be injected into the line with Sodium Hypochlorite injection from the NWWTF. Flow rate will be between ~5-7 MGD with chlorine injection at a dosing rate of 25mg/L. The pipe volume is approximately 3.68 million gallons, equating to ~860 gallons of chlorine to achieve the desired 25mg/L. Once the line has been filled, the pipe will remain at rest for ~48hours for initial shock. The water will then be discharged at the Hess Discharge, while simultaneously being dechlorinated per AWWA C655 with local injection of sodium bisulfite at the Hess Discharge piping via injection quill. The injection quill will be similar to that shown in Figure 8, however will have a diffuser style quill. Measures will be taken to adhere to NPDES Permit I-AR94-PO96 while discharging is taking place. The line will be flushed for a completed (3) pipe volumes, or ~11 million gallons. After this is completed, the line will be gravity drained and prepared for final disinfection. See "Disinfection Support Documents" in the submittals received under the Wichita Public Works and Utilities' December 13, 2024 cover letter on December 16, 2024.

Final disinfection steps will follow AWWA C651 Sec 4.4 and reflect steps previously described above.

Sampling

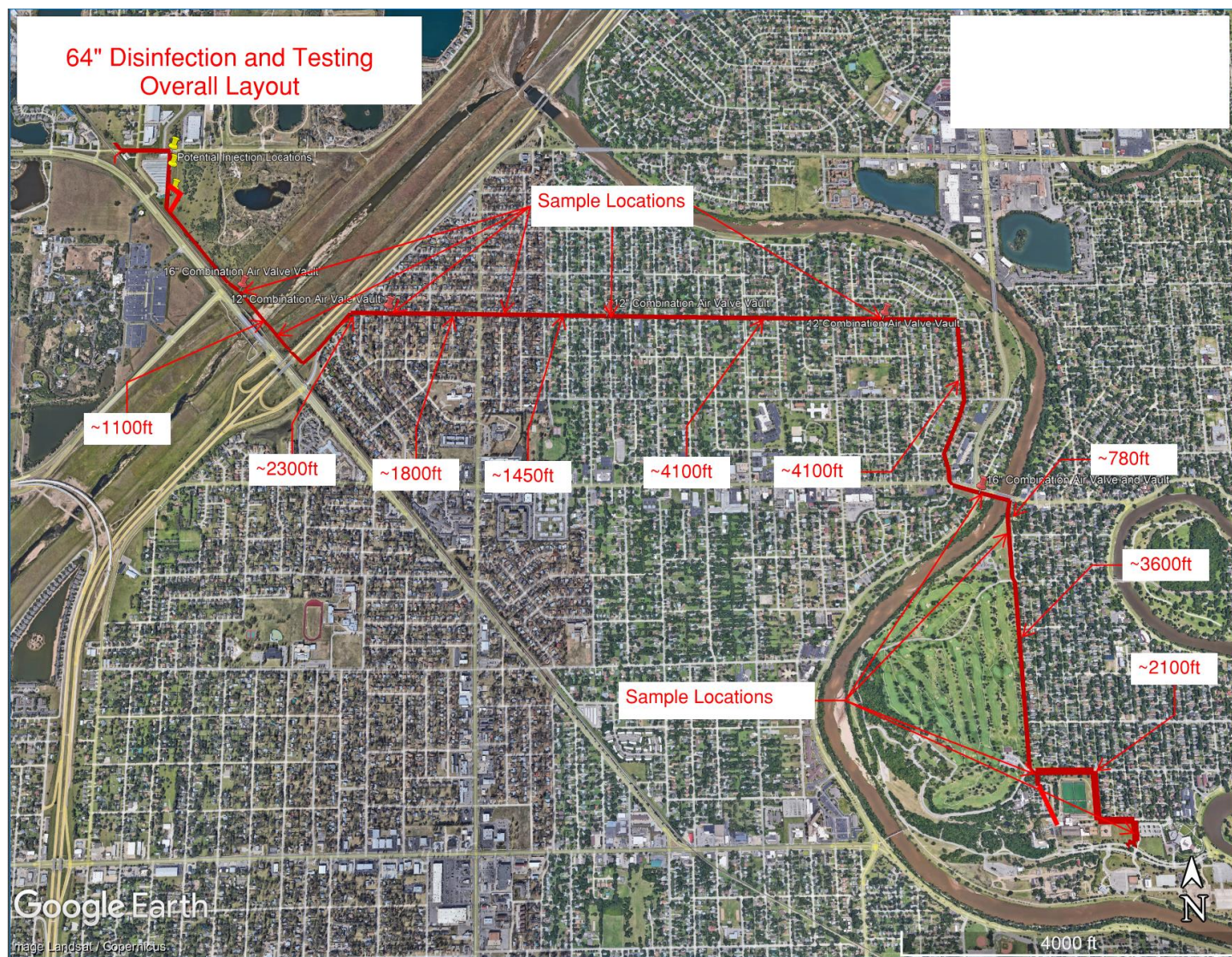
A total of ten locations will be sampled for Bacteriological Testing per AWWA C651 Sec. 5.1.3. Please note, the quantity and spacing of sampling points exceed the spacing referenced in sec. 5.1.1.2 (every 1200ft) due to available sampling points and the overall linear footage of line being

tested. Additionally test using, Standard Method 9223B (24th edition), to show absence of total coliform bacteria. Test using Standard Method 9215E, to show the heterotrophic plate count most probable number and test chlorine concentration. Sampling points are shown in Figure 22 and described below.

Sample locations:

1. Zoo Blvd and North of Floodway/ Station 36+70.00
2. Zoo Blvd and South of Floodway/ Station 47+23.00
3. 17th and Sabin St. / Station 67+75.00
4. 17th and Illinois Ave. / Station 86+00.00
5. 17th and Joann St. / Station 100+65.00
6. 17th and St. Clair St. / Station 233+00.00
7. 13th and McLean Blvd 274+45.47
8. 12th and Amidon 279+20.33
9. Hess Bypass Piping ARV at Amidon and Murdock
10. HFCV Flow Meter Spare Port

Please note- With original piping installed in multiple phases, stations 108+65.99 (Phase 1) equals station 200+00.00 (Phase 2). Reference sheet 7 of 24 on Phase 2 as-builts.



It is intended to continuously allow flow of water above ground through the sample port while testing is taking place. Once 3-5mg/L residual is identified at each location utilizing chlorine residual test strips locally, testing and sampling will begin.

To conduct sampling, a tee and ball valve will be placed downstream of the existing 2" ball valve on the upstream side of the ARV between the combination valve and the ARV. From the 2"x2" tee, a 2" bronze ball valve will be installed. A 2"x1/2" schedule 80 PVC reducer will be added then a section of 1/2" Schedule 80 PVC will be routed above grade to be available as a test point. A secondary 1/2" PVC ball valve will be installed above grade to be easily accessible during the testing process. See Figure 23 and Figure 24 for proposed configuration. Note, orientation may change upon installation as lines will be filed routed as necessary.

The 2" ball valve will be intended to be left in place and will be plugged upon completion of the conversion.

General Arrangement of ARV Modifications

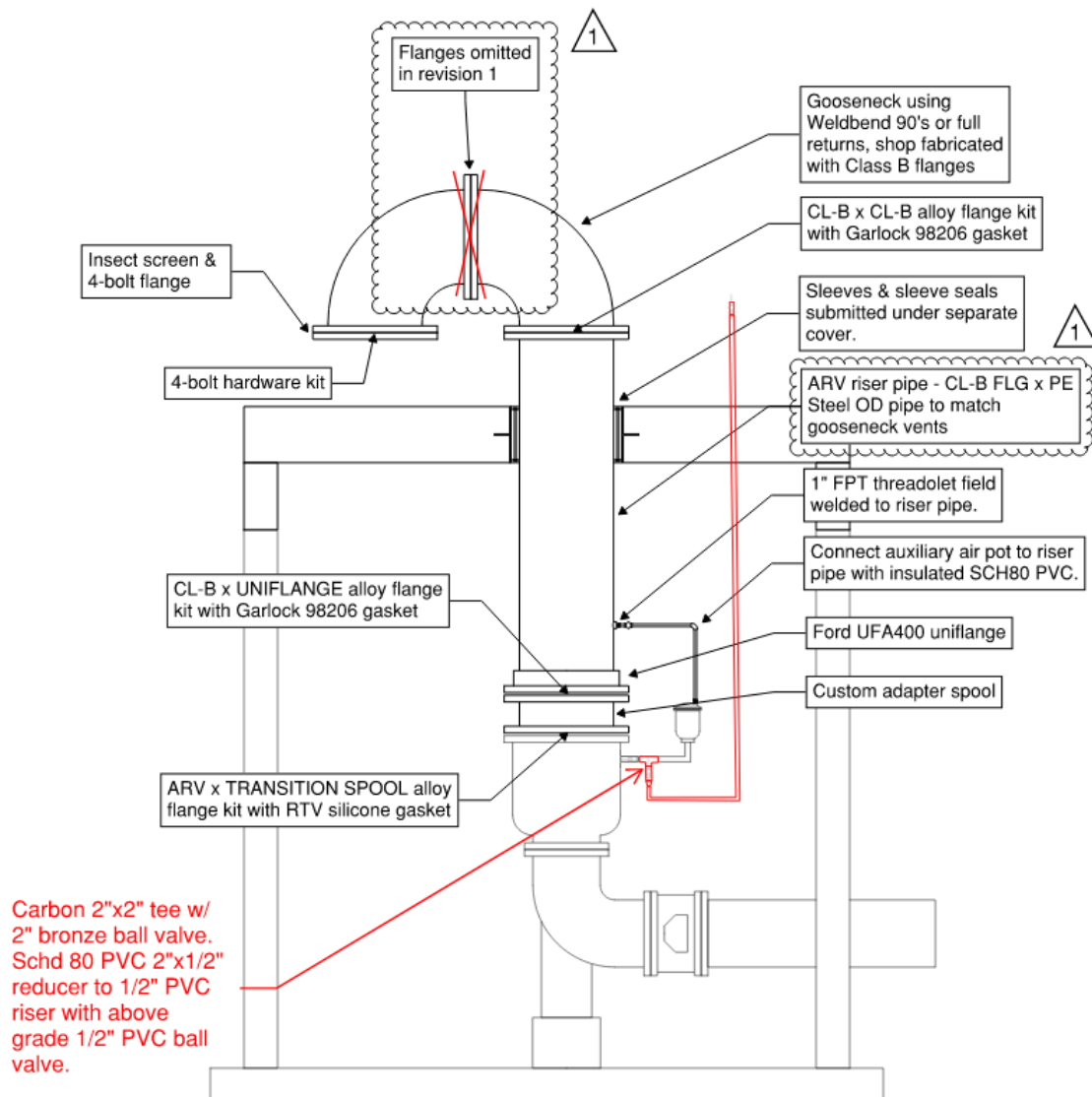


Figure 23- Sample Point Example

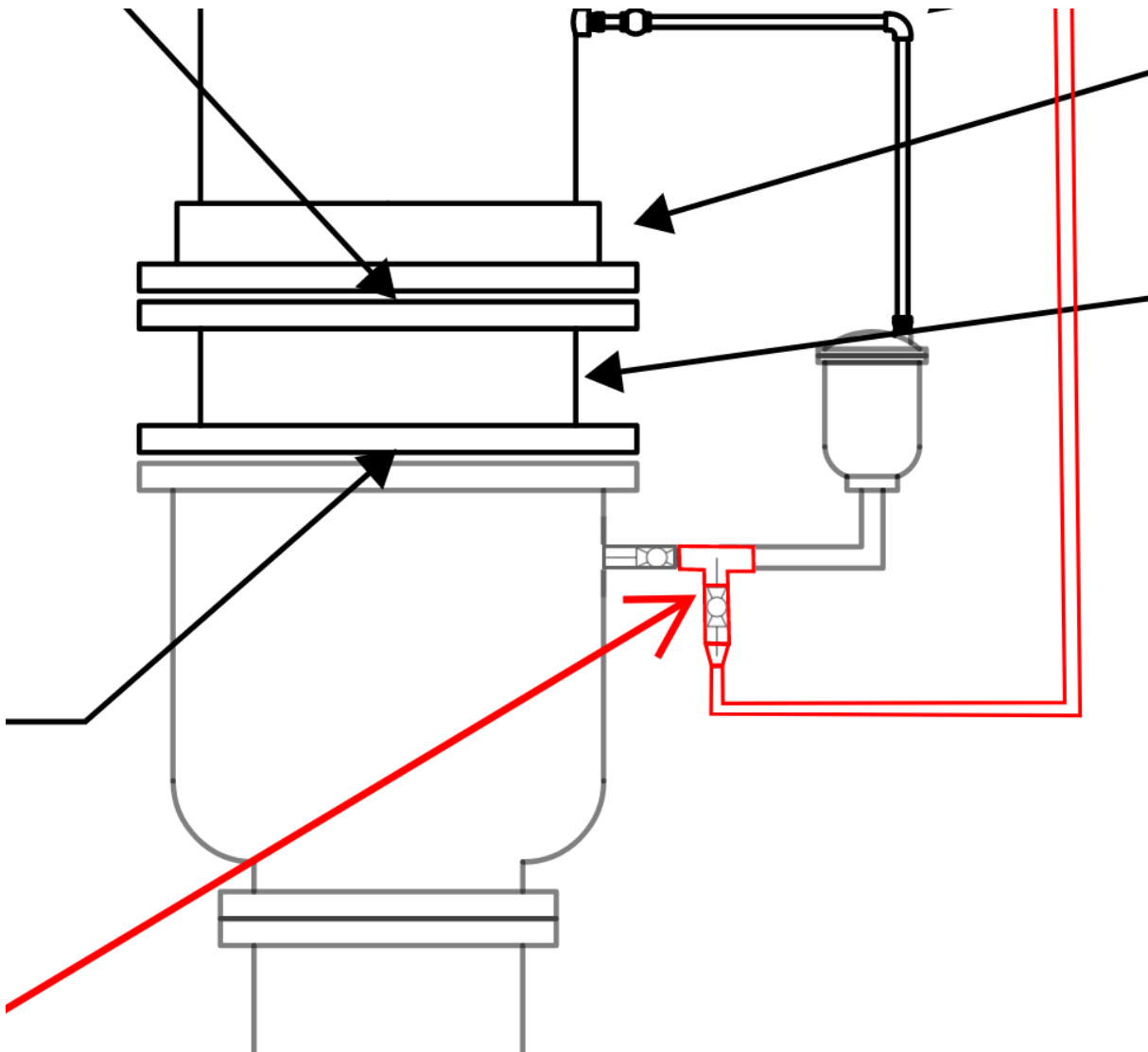


Figure 24- Sample Point Example- Valving Detail (Valve orientation and pipe routing to be field routed during installation)

Results and Record Keeping

Bacteriological Test(s)- Confirm the bacteriological quality in the pipeline within 84 hrs. of putting pipeline into service per AWWA C651 Sec. 5.1.4 and 5.1.5. Collect 3 sets of samples at each sample point along the pipeline after 24 hours of stagnant water. Test using EPA-815-R-05-002, Method 1623, to show absence of *Cryptosporidium*. Test using, Standard Method 9223B, to show absence of total coliform bacteria. Test using Standard Method 9215E, to show the heterotrophic plate count most probable number. Test chlorine concentration.

Filing of all records will be conducted between COW and KDHE. WWP will assist in sampling as required.

Once records are deemed acceptable, the line will need to be brought down briefly to remove the

chlorine injection quill. All sample testing locations will have the 2" ball valves closed, plugged, and left in place. PVC sample lines will be removed.

Hess Flow Control Vault Effluent Bulkhead Removal and Disinfection

Summary

During construction of the new bypass line, it was determined to install bulkheads between the pipe that would require cleaning and disinfection for this workplan and the existing finished waterlines on the effluent of the existing MWTP. Once the work has been completed on the North side of the Hess Flow Control Vault, there will need to be work completed to remove the bulkheads, repair the pipe lining, flush these lines, and disinfect and test to prepare for finished water transmission. The workplan to complete this portion of work has been generally included on drawing 050G102 Rev 7 dated Nov. 11th, 2023 as part of the Hess Startup Discharge Piping review. That sequencing and workplan will be completed following a successful disinfection process of the remaining portion of finished waterline and will be the final step to prepare for distribution into the exiting finished water system for the City of Wichita. The procedures outlined on drawing 050G102 for cleaning and disinfection are to be performed after the draining, pigging, flushing, disinfection, and inspection of the 64" waterline are complete. Only finished water will be allowed in the 64-inch finished waterline, the Hess Bypass, and the Hess Control Vault after the bulk heads are removed.

Existing Residual Line Conflicts- To be Completed

Summary

As previously discussed in this workplan, two existing residual lines, a 16" and a 4" diameter line, currently run in close conflict with the 64" Raw Water/ Future Finished Water line. A portion of work had previously been completed to mitigate the issues with these conflicts. Final metering of the 16" Residual line will be required at the MWTP and at the NWWTF to monitor potential leakage once the 64" is converted. Design, Contingency Plan, and Technical Memo is being provided under separate cover and plan to provide to KDHE for review. Further review and acceptance of the remaining work of the residual lines will be handled under that review process.

Final Acceptance and Release for Distribution

Summary

To achieve release for City of Wichita to use the 64" pipeline as a conveying pipe for finished water, several steps will need to be verified as complete. The City of Wichita Water Distribution representatives will have final say on the completion of work and provide reporting to KDHE for approval. See table below and the attachment for a summary of those steps.

Acceptance Criteria			
Item	Description	Passing Criteria	Responsible Party for Approval
1	64" Transmission line pressure testing is complete and has passed.	Hold 54PSI +/- 5PSI for 2 hours	COW
2	64" Transmission line is clean of all residual/ organic matter.	No visible foreign material	COW
2a	Confirm foreign material has been removed. Visually view the interior of the pipeline.		COW
	Locations Viewed:		
	Sta 30+00 – 62+00 (West of Floodway – 17th & Westdale)	No visible foreign material	COW
	Sta 62+00-108+49 (17th & Westdale – 17th & Sheridan)	No visible foreign material	COW
	Sta 108+49 – 244+24 (17th & Sheridan – 17th & Clarence)	No visible foreign material	COW
	Sta 274+45 – 281+80 (13th & Minisa (W of River) – 12th & Amidon (E of River))	No visible foreign material	COW
	Sta 281+80 – 317+20 (12th & Amidon (E of River) Murdock & Amidon)	No visible foreign material	COW
	Locations Not Viewed:		
	Sta 244+24 – 274+45 (17th & Clarence – 13th & Minisa)	N/A	COW
	New Sta 10+00 – 32+00 (Murdock & Amidon – Flow Control Vault)	N/A	COW
2b	While flowing at 6.9 f/s for 3 hrs., continuously monitor with a Turbidity Meter at the flow meter vault. Alternate measurement: Collect 13 sets of samples 15 minutes apart from each of 10 sample points along the pipeline. <i>See 2c for utilized test criteria</i>	All test results < 0.1 NTU <i>See 2c for utilized test criteria</i>	<i>See 2c for utilized test criteria</i>
2c	The drain does not have the capacity of the pipeline. Performing this test at scouring velocity requires increasing the capacity of the drain. Therefore, utility management has decided to revise the acceptance test and pass criteria to the capacity of the drain as following: While flowing at 2.1 f/s for 12 hrs., continuously monitor with a Turbidity Meter at the flow meter vault. **Alternate measurement if Tubidity Meter is ot available: Collect 49 sets of samples 15 minutes apart from each of 10 sample points along the pipeline.	All test results < 4.0 NTU and 50th percentile < 0.3 NTU	COW
3	64" Transmission line has been disinfected.		COW
3a	Confirm there is no chlorine demand in the pipeline within 84 hrs. of putting the pipeline into service. Collect a set of samples at each sample point along the pipeline. One sample from each of 10 sample points at the beginning, and a second sample after 24 hours. Test Total CL2 concentration.	< 0.25 mg/L decay in 24 hours.	COW
3b	Bacteriological Test(s)- Confirm the bacteriological quality in the pipeline within 84 hrs. of putting pipeline into service per AWWA C651. Collect 3 sets of samples at each sample point along the pipeline after 24 hours of stagnant water. Test using EPA-815-R-05-002, Method 1623, to show absence of Cryptosporidium. Test using, Standard Method 9223B, to show absence of total coliform bacteria. Test using Standard Method 9215E, to show the heterotrophic plate count most probable number. Test chlorine concentration.	Total Coliform Bacteria Pass = Absent Cryptosporidium = Absent Heterotrophic Plate Count < 100 CFU/mL Total Chlorine > 2.0 mg/L, < 4.01 mg/L	COW
4	All temporary measures have been removed and points of separation to discharge lines is complete.		COW
5	Point of entry points are prepared for sampling.		COW
6	Residual line monitoring is in place and prepared for use.		COW
7	Residual line conitgency plan is reviewed and accepted.		COW

Note: See attachments for full size version of Acceptance Criteria. See “Final Acceptance Criteria” in the submittals received under the Wichita Public Works and Utilities’ December 13, 2024 cover letter on December 16, 2024.

Schedule

Planned dates and durations:

A full schedule will be produced and distributed prior to start of work. The following dates are for planning purposes.

Description	Anticipated Start Date	Anticipated End Date	Duration (Calendar Days)
COW/ KDHE Work Plan Review	10/18/2024	11/1/2024	14
Material Procurement	10/18/2024	1/6/2025	80
Receive Materials	1/6/2025	1/17/2025	11
Shock Line and Drain	1/6/2025	1/9/2025	3
Road Removal and Vault Preparation	1/6/2025	1/9/2025	3
Valve Removal and Install Temporary Spools	1/9/2025	1/26/2025	17
Install Pig Launcher and Receiver	1/14/2025	1/26/2025	12
Prepare Pumps, Tanks, and Receiving Tanks	1/20/2025	1/26/2025	6
Complete Pigging Operation (~2 day duration per pig)	1/27/2025	2/9/2025	13
Video Inspection	2/10/2025	2/14/2025	4
Video Cleanliness Approval	2/11/2025	2/14/2025	3
Restore 64” Waterline	2/14/2025	2/28/2025	14
Initial Chlorine Shock and Drain	3/1/2025	3/5/2025	4
Chlorine Disinfection/ BAC-T/ Crypto Testing	3/5/2025	3/10/2025	5
Remove Bulkheads/ Clean & Disinfect New Piping Downstream of HFCV	3/10/2025	3/24/2025	14
Final Approval for Service	3/24/2025	3/31/2025	7

FW Line Operational April 1, 2025	4/1/2025	4/1/2025	0
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Approximate Manpower

Preparations

WWP: (1) total crew with 3-5 workers and a Superintendent.

Wildcat: (1) total crew with 3-5 workers for initial preparations

(3) total crews with 3-5 workers for valve removal, spool replacement, launcher and receiver prep

Cleaning

WWP: (1) total crew with 3-5 workers for setup of launching pumps and a Superintendent

Wildcat: (1) total crew to assist in pigging operation

APS: (1) total crew to assist with piggin operation

Inspection

WWP: Superintendent, additional help on standby if needed

Wildcat: (1) total crew to assist in blind flange removal, and rover installation

ASI: (1) total crew for rover operation

Restoration

WWP: (1) total crew with 3-5 workers and a Superintendent.

Wildcat: (3) total crews with 3-5 workers for valve installation

Disinfection and Testing

WWP: Superintendent, additional help on standby if needed

Wildcat: (1) total crew to assist in disinfection and sampling

Chlorserv: (1) total crew for disinfection and monitoring

HFCV Effluent Bulk Heads and Disinfection

WWP: Superintendent, additional help on standby if needed

Wildcat: (2) total crews to complete bulkhead removal

Chlorserv: (1) total crew for disinfection and monitoring

Equipment

Pigging/ Cleaning

(3+) Excavators

(2) Telehandlers

(4) Light plants

(2) Loaders

(2) Dump trucks during excavations

(1) Crane- Picking/Settling Vault Lids

(1) Misc Equipment as necessary

Inspection

(1) Excavator per launch location to remove blind flanges.

Materials

All permanent material to be AIS and NSF 61 compliant per standards and regulations.
Temporary materials Material provided by WWP.

Pigging/ Cleaning

- (1) Pig Launcher
- (1) Pig Receiver
- (6) Various Pigs
- (1) Intermediate Transition Spool at Launcher
- (1) Intermediate Transition Spool at Receiver
- (2) 18" Butterfly Valves w/ Bolt & Gasket Kit
- (2) 4" Butterfly Valves w/ Bolt & Gasket Kit
- (6) 66"x1'-6" Temporary Valve Spools
- (1) 66"x36" Temporary Tee
- (1) 36" Extension Spool
- (1) 36" Dished Blind Flange
- (18) 66" SBR Gaskets (12- Temp spools, 1- Temp Tee, 4- Launcher/ Receiver Spools, 1- Spare)
- (17) 66" Garlock 98206 Gaskets (14- Valve Replacements, 2- Permanent Blind Flanges, 1- Spare)
- (16) 66" Bolt Kits
- (2) 36" SBR Gaskets
- (2) 36" Bolt Kits
- (4) 66" Bolt Kits- Spare
- (3) Frac Tanks @ Launcher
- (2) 6"-8" Diesel Pumps @ Launcher
- (1) Lot of interconnecting pipe and valves at Frac tanks and pumps @ Launcher
- (3) Frac Tanks or (2) Modu Tanks at Received Area
- (3) 12" C.S Dual 23- Cartridge Filter Pots w/ trailer
- (1) 8" Diesel Pump at Receiver
- (1) 4" Diesel Pump at Receiver
- (1) Lot of interconnecting pipe and valves at Frac tanks and pumps @ Receiver
- (6) 2'x4' Concrete Blocks to install at Arkansas River discharge point

Inspection

- (2) 36" Garlock 98206 Gaskets
- (2) 36" Bolt Kits

Disinfection/ Testing

- (~200LF) 1/2" PVC
- (12) 2"x1/2" PVC Reducer
- (12) 1/2" PVC Ball Valves
- (12) 1/2" PVC Plugs
- (48) 1/2" PVC 90s
- (4) PVC Primer/Solvent
- (12) 2"x2" Carbon Threaded Tees
- (12) 2" Bronze Ball Valves
- (12) 2" Carbon plugs

- (1) 330gal Sodium Hypochlorite Injection Skid Assembly
- (1) Sodium Hypochlorite Injection Quill
- (1) 5000gal Sodium Bisulfite Dechlorination System
- (1) Sodium Bisulfite Injection Quill
- (150) Chlorine Residual Test Kits
- (50) BAC-T Sample Kits
- (50) Crypto Sample Kits
- ~(3300) Gallons of Sodium Hypochlorite- 10 Totes
- ~(8,000) Gallons of Sodium Bisulfite- First Fill- 4000 gallons.

Safety

A WWP safety professional will be onsite and available to assist during the scope. WWP's Safety Manager's contact info is below. All lead individuals will also have the COW Water Treatment Plant's Control Room number to contact in any emergency situations.

WWP Safety Manager: Dennis Kalp (314-778-0813)

MWTP Control Room: 316-268-4968

All tasks will be completed in accordance with the WWP Site Specific Safety Manual. Please reference Confined Space and Lockout Tagout procedures within the manual. Main areas to consider include:

- Confined Space Entry
- Energy Isolation; Lockout/ Tagout (LOTO)
- Pedestrian and vehicle traffic
- Chemical exposure

LOTO:

- WWP will work with COW to close all necessary valves, establish proper LOTO, and utilize control locks with satellite boxes for remaining crew members. All WWP employees and subcontractors shall comply with plant's written lock-out/tag-out guideline or standard where it exceeds the safety standards as written above.
- Control LOTO will be placed with COW at each valve location. A WWP designated representative will place locks at the valve locations. Satellite boxes will then be placed at each work area for use by all other members involved in the project scope. WWP's keys will be placed in the satellite boxes prior to other lock placement.
- Each member will have an individual lock and key.
- All members will be required to remove their locks from the satellite boxes at the end of each shift in case of emergency.
- All LOTO placed will require a sign-in sheet with lock numbers.
- WWP's locks will remain in place locally at each valve until the work scope is complete. Locks will be removed concurrently with COW locks.

Additional Safety Notes:

- PHDs and specific workplans have been developed specific to the work scope and will be reviewed by all crews.
- All site-specific PPE is required and additional PPE required for specific tasks as called out in the PHD.
- Air movers will be utilized as necessary if vault is not previously equipped.
- For non-permit spaces, atmospheric testing will be completed at the beginning of each shift and when any conditions change. WWP will perform the testing with their calibrated air monitors.
- All valve vaults will be treated as non-permit required confined spaces.

Safety Documentation Included/ In WWP Safety Records:

- 64" Conversion PHDs
- C-7 Safe Work Permit (LOTO and Confined Space Permit)
- LOTO Documentation (G-02, G-03, and G-05)
- Certificate of Training for LOTO and Confined Space (C-9)
- Confined Space Log (C-27)
- Gas Monitor Calibration Log (G-08 and G-09)- Located at WWP Safety Office
- Sodium Hypochlorite SDS
- Sodium Bisulfite SDS

Members of the Inspection Team, Contact Information, and Roles**City of Wichita (Owner)**

COW MWTP Contact: Logan Walker (316-371-0249)

COW MWTP Contact: Robert Bigley (316-201-7049)

COW Site Contact: Brandon Woods (316-680-9482)

COW NWWTF Contact: Jeff Crockett (620-376-1104)

COW NWWTF Contact: Adam McGlory (316-461-7151)

MWTP Control Room: (316-268-4968)

WWP (Design Builder)

Project Manager: Grant Malone (314-452-0504)

WWP Superintendent: Eric Rotert (785-224-8560)

WWP Safety Coordinator: Dennis Kalp (314-778-0813)

Wildcat Construction (Labor and Equipment Support)

Project Manager: Taylor Robillard (316-648-9067)

Superintendent: Jason Unruh (316-680-2379)

American Pipeline Solutions (Pigging)

Project Manager: Johnny Benson (201-892-0854)

Superintendent: Mitch Howe (973-885-1637)

ASI Marine (Video Inspection)

Project Manager: David Bearss (231-632-2029)

Site Supervisor/ ROV Tech: Nick Wittering (289-929-4833)

ChlorServ (Disinfection)

Project Manager: Elliot Gebbia (512-845-6519)

Risk Assessment

Risk: Pigging Equipment breakdown/ malfunction. Level: Low

Mitigation:

1. A secondary chlorine injection skid and pumps are available for use. Operation would be halted for a brief period of time to get the replacement skid installed and in use.
2. Chlorine injection quill would require trouble shooting. An additional quill can be pulled from Hess Discharge as a backup quill.

Risk: Pig becomes lodged in piping. Level: Low

Mitigation:

1. The first pig run is with a 'swab', which is a less dense pig to confirm the pig will be able to navigate all deflections and the flow path for the remaining pigs.
2. The pigs will be monitored via a monitoring system at multiple locations during the run. This allows the team to know the approximate speed the pig had been traveling and understand approximately where in the line the pig may be lodged.
3. If pig is lodged at tee at Amidon and Murdock intersection, the tee will be exposed from valve removal. Means will take place to dismantle the pipe, retrieve the pig, and reassemble the pipe.
4. Flow will be increased by the increasing flow of the FW pumps at the NWWTF.
5. The submersible rover for the video inspection will have the opportunity be fitted with an arm to assist with pig retrieval. Access would be assessed depending on pig location.
6. Pipe will be drained, and investigation will take place to find the pig. If the video inspection team is onsite, video rover may be utilized in lieu of draining the line. If the pig is not dislodged, the pipe will be drained, excavation will need to occur, and the pipe will be dismantled to remove the pig.

Risk: Chlorine Injection Equipment breakdown/ malfunction. Level: Low

Mitigation:

1. A secondary chlorine injection skid and pumps are available for use. Operation would be halted for a brief period of time to get the replacement skid installed and in use.
2. Chlorine injection quill would require trouble shooting. An additional quill can be pulled from Hess

Discharge as a backup quill.

3. Chlorine injection is also set-up directly into the Finished Water Wet Wells for other plant start-up activities. Sodium Hypochlorite may be dosed directly into the wet wells prior to sending down the 64" waterline.

Risk: Line does not pass initial BAC-T or Crypto tests. Level: Low

Mitigation:

1. Testing and additional disinfection will follow AWWA C651 Sec. 5.1.6.

Risk: Pigging does not clean the pipe after initial runs. Level: Low

Mitigation:

1. APS will be monitoring cleanliness during each run. Expectation is after run #2 or #3, bulk of material has been removed.
2. An inspection may take place of a sample section of pipe after pig run #2 or #3.
3. Pigging stations will be left in place until after the visual inspection is completed.
4. One spare "swab" style pig will be available for an additional pig run.
5. Additional flushing for extended durations is possible with startup water from NWWTF.
6. Additional disinfection rounds may take place if necessary.
7. Internal debris retrieval may be possible pending location.

Attachments/ References

Final Acceptance Criteria

1. Final Acceptance Criteria Table

Pigging Support Documents

1. General Overview Drawings
2. Valve Locations
3. Temp Valve Spools
4. Pig Launcher Location
5. Pig Receiver Location
6. HFCV Valves During Pigging
7. Traffic Control

Inspection Support Documents

1. Inspection Stations
2. vLBV ROV Rover Information

Disinfection/Sampling Support Documents

1. Disinfection Support Documents

HFCV Effluent Bulkhead Removal and Disinfection Support Documents

1. 050G102 Rev 7 Dated 02/16/24

Previous Work Plans

1. 64 Inch Raw Waterline Inspection Rev1 Dated January 2022
2. 16 Inch Sludge Line Leak and Pressure Test Rev 2 Dated April 2024
3. 64 Inch RW Line Locate and 4" Sludge Line Encasement Rev 1 Dated May 2024
4. 64 Inch Raw Waterline Conversion Piping Pressure Test Rev 1 Dated May 2024

Referenced Existing/ As-Built Drawings

1. 20030606_448_89439_64in Raw Water Transmission Phase 1
2. 20040723_448_89439_64in Raw Water Transmission Phase 2
3. 20030519_448_89439_42inAnd64in Raw Water Amidon_13thToMurdock
4. Hess Bypass Drawings

Referenced Documents

1. AWWA C651 Disinfecting_Water_Mains
2. AWWA C655 Field Dechlorination
3. EPA Method 1623.1: Cryptosporidium and Giardia in Water by Filtration/IMS/FA
4. EPA Method 9223B ENZYME SUBSTRATE COLIFORM TEST
5. EPA Method 9215E HETEROTROPHIC PLATE COUNT
6. KDHE Minimum_Design_Standards_Complete
7. Letter- Wichita Waterline Pigging Authorization