Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

May 20, 2020

Neosho PWS
Steve Parnell
15318 Kentucky Road
Neosho, MO 64850

RE: PWS ID# MO5010560, NEOSHO PWS
Lead and Copper Reduced Monitoring

Dear Steve Parnell:

Your water system is on a reduced schedule for lead and copper monitoring. It is time for another round of monitoring. You will receive sample containers and instructions sometime between June 1, and July 31, 2020. Please note that although you have until **September 30, 2020,** to collect your samples, we ask that you collect and return them at your earliest convenience to help balance the workload at the lab. **Samples must be collected by September 30, 2020.**

Remember that samples are to be taken at individual homes or living units and at sites previously tested, when practical. If you must change a site(s) for any reason, fill out the **Change of Sample Site Form** enclosed and return with your samples. Samples taken from infrequently used taps, taps with new faucets, or taps that have not been used for an extended period of time must not be used as results may be artificially high. Samples must be taken as "first draw" samples. We have scheduled you to take **30** samples. If this number is different than the number you took previously, it may be because our inventory shows a population change in number of persons served.

This makes it very important that you keep good records of where samples were taken and fill out all paperwork properly. The documents and forms to help you accomplish this are enclosed.

If you have questions or comments, please give me a call at 573-751-1406 or toll free at 800-361-4827.

Sincerely,

WATER PROTECTION PROGRAM

E. Jeffrey Pinson

E. Jeffrey Pinson
Lead & Copper Monitoring Coordinator
Public Drinking Water Branch

EJP:eh

Enclosures

c: Southwest Regional Office

pop 12157

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
PUBLIC DRINKING WATER BRANCH

CONSUMER CONFIDENCE REPORT DISTRIBUTION CERTIFICATION

FOR OFFICE USE ONLY
ENTERED BY SW
DATE 6/2/2020

PUBLIC WATER SUPPLY NAME	PUBLIC WATER SUPPLY ID NUMBER
City of Neosho	MO 5010560

Population = number of connections x 2.5

Water systems serving 10,000 or more people must use:
Distribution method 1

Water systems serving 500 or more people but less than 10,000 must use:
Distribution method 1 or
Distribution method 2, 3 and 4

Water systems serving less than 500 people must use:
Distribution method 1 or
Distribution methods 2, 3 and 4 or
Distribution methods 3 and 4

FOR PDWB OFFICE USE ONLY

DATE RECEIVED

The following methods were used to distribute the Consumer Confidence Report (CCR) to our customers:

☑ 1. CCR directly delivered using one or more method below (Must submit copy of CCR and notification given to customer)

- ■ Provided direct Web address to customer.
  Provide the direct Web address URL here www.dnr.mo.gov/ccr/MO5010560.pdf
  Example: "The current CCR is available at www.dnr.mo.gov/ccr/MOXXXXXXX.pdf. Call (#) for paper copy"
  Replace XXXXXXX above with PWS ID # for your system and replace (#) with PWS contact phone number.
- ☐ Hand delivered full report.
- ☐ Mail paper copy. Submit copy of CCR and any supporting documentation. (ie. newsletter, postal receipts, etc.)
- ☐ Email. Submit copy of email notification to customers
- ☐ Other. Describe delivery method _____

Date(s) distributed 5/29/20

☐ 2. Published the complete CCR in the local newspaper.
Submit copy of newspaper clipping and affidavit. Date(s) published _____

☑ 3. Inform customers the CCR will not be mailed, but is available upon request.
List method(s) used below (examples – newspaper, water bills, newsletter, etc.). Submit notice given to customers.
Water bills, Paper copy at City Hall, 203 E Main & PW office 200 Nelson Ave, Neosho, MO

Date(s) distributed 05/29/20

☑ 4. Post the complete CCR continuously at the local water office.
☑ Good faith effort in other public buildings within the water system service area. (ie. City Hall, Public Library, etc.)
Date 05/29/20 and locations posted: www.neoshomo.org

CERTIFIED BY:

This community public water system confirms it has distributed its Consumer Confidence Report (CCR) for the 2019 calendar year to its customers and the appropriate notices of availability have been given and that the information contained in its CCR is correct and consistent with the compliance monitoring data previously submitted to the Missouri Department of Natural Resources.

NAME	
Ken Brady	
TITLE	
Local Manager	
EMAIL ADDRESS	
kbrady@alliancewater.com	
PHONE NUMBER WITH AREA CODE	FAX NUMBER WITH AREA CODE
(417) 451-8080	(417) 451-8074

For more information or assistance filling out this form, contact the department's Consumer Confidence Report coordinator at 800-361-4827 or 573-526-3832

Please submit the following items to meet requirements:

☑ Completed certification form
☑ Copy of the distributed/available CCR
☐ Any additional paperwork requested on this form

Email: CCR@dnr.mo.gov **Fax:** 573-751-3110

Mail: Missouri Department of Natural Resources
Public Drinking Water Branch
ATTN: CCR Coordinator
P.O. Box 176
Jefferson City, MO 65102-0176

NEOSHO PWS

Public Water System ID Number: MO5010560

2019 Annual Water Quality Report

(Consumer Confidence Report)

This report is intended to provide you with important information about your drinking water and the efforts made to provide safe drinking water.

Attencion!

Este informe contiene información muy importante. Tradúscalo o prequntele a alguien que lo entienda bien.
[Translated: This report contains very important information. Translate or ask someone who understands this very well.]

What is the source of my water?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and groundwater wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Our water comes from the following source(s):

Source Name	Type
DEWEY & FINNEY	GROUND WATER
SHOAL CREEK	SURFACE WATER
215 WHEELER ST	GROUND WATER

Source Water Assessment

The Department of Natural Resources conducted a source water assessment to determine the susceptibility of our water source to potential contaminants. This process involved the establishment of source water area delineations for each well or surface water intake and then a contaminant inventory was performed within those delineated areas to assess potential threats to each source. Assessment maps and summary information sheets are available on the internet at https://drinkingwater.missouri.edu/. To access the maps for your water system you will need the State-assigned identification code, which is printed at the top of this report. The Source Water Inventory Project maps and information sheets provide a foundation upon which a more comprehensive source water protection plan can be developed.

Why are there contaminants in my water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

Contaminants that may be present in source water include:
A. Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
B. Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming.
C. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
D. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
E. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Natural Resources prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Department of Health regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Is our water system meeting other rules that govern our operations?

The Missouri Department of Natural Resources regulates our water system and requires us to test our water on a regular basis to ensure its safety. Our system has been assigned the identification number MO5010560 for the purposes of tracking our test results. Last year, we tested for a variety of contaminants. The detectable results of these tests are on the following pages of this report. Any violations of state requirements or standards will be further explained later in this report.

How might I become actively involved?

If you would like to observe the decision-making process that affect drinking water quality or if you have any further questions about your drinking water report, please call us at **417-451-8050** to inquire about scheduled meetings or contact persons.

Do I need to take any special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Terms and Abbreviations

Population: 12157. This is the equivalent residential population served including non-bill paying customers.
90th percentile: For Lead and Copper testing. 10% of test results are above this level and 90% are below this level.
AL: Action Level, or the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.
HAA5: Haloacetic Acids (mono-, di- and tri-chloracetic acid, and mono- and di-bromoacetic acid) as a group.
LRAA: Locational Running Annual Average, or the locational average of sample analytical results for samples taken during the previous four calendar quarters.
MCLG: Maximum Contaminant Level Goal, or the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL: Maximum Contaminant Level, or the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
n/a: not applicable.
nd: not detectable at testing limits.
NTU: Nephelometric Turbidity Unit, used to measure cloudiness in drinking water.
ppb: parts per billion or micrograms per liter.
ppm: parts per million or milligrams per liter.
RAA: Running Annual Average, or the average of sample analytical results for samples taken during the previous four calendar quarters.
Range of Results: Shows the lowest and highest levels found during a testing period, if only one sample was taken, then this number equals the Highest Test Result or Highest Value.
SMCL: Secondary Maximum Contaminant Level, or the secondary standards that are non-enforceable guidelines for contaminants and may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply
TT: Treatment Technique, or a required process intended to reduce the level of a contaminant in drinking water.
TTHM: Total Trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) as a group.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

April 17, 2020

NEOSHO PWS

Public Water System ID Number: MO5010560

2019 Annual Water Quality Report

(Consumer Confidence Report)

Contaminants Report

NEOSHO PWS will provide a printed hard copy of the CCR upon request. To request a copy of this report to be mailed, please call us at **417-451-8050**. The CCR can also be found on the internet at www.dnr.mo.gov/ccr/MO5010560.pdf.

The state has reduced monitoring requirements for certain contaminants to less often than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Records with a sample year more than one year old are still considered representative. No data older than 5 years need be included. If more than one sample is collected during the monitoring period, the Range of Sampled Results will show the lowest and highest tested results. The Highest Test Result, Highest LRAA, or Highest Value must be below the maximum contaminant level (MCL) or the contaminant has exceeded the level of health based standards and a violation is issued to the water system.

Regulated Contaminants

Regulated Contaminants	Collection Date	Highest Test Result	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
BARIUM	3/19/2019	0.0602	0.0107 - 0.0602	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
NITRATE-NITRITE	3/19/2019	4.79	0 - 4.79	ppm	10	10 [f]	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Disinfection Byproducts	Sample Point	Monitoring Period	Highest LRAA	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
(HAA5)	DBPDUAL-01	2019	36	23.2 - 69.3	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-02	2019	41	23.3 - 67.9	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-03	2019	38	21.5 - 65	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-04	2019	34	16 - 55.1	ppb	60	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-01	2019	54	31.2 - 58	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-02	2019	49	24.9 - 69	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-03	2019	41	23.5 - 69.6	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-04	2019	50	24.8 - 73.6	ppb	80	0	Byproduct of drinking water disinfection

TOC	Collection Date	Highest Value	Range of Sampled Results	Unit	TT	Typical Source
CARBON, TOTAL	5/6/2019	1.24	0.59 - 1.24	MG/L	0	Naturally present in the environment

Lead and Copper	Date	90th Percentile: 90% of your water utility levels were less than	Range of Sampled Results (low – high)	Unit	AL	Sites Over AL	Typical Source
COPPER	2017 - 2019	0.1413	0.00217 - 0.975	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2017 - 2019	7.1	0 - 25.6	ppb	15	1	Corrosion of household plumbing systems

Radionuclides	Collection Date	Highest Value	Range of Sampled Result(s)	Unit	MCL	MCLG	Typical Source
GROSS ALPHA PARTICLE ACTIVITY	4/4/2018	7.4	7.4	pCi/l	15	0	Erosion of natural deposits

% of samples in compliance with Standard	Months Occurred	Monitoring Violation	Highest Single Measurement	Month Occurred	Sources	In Compliance
100	12	NO	0.08	JUN	SOIL RUNOFF	YES

Violations and Health Effects Information

During the 2019 calendar year, we had the below noted violation(s) of drinking water regulations.

Compliance Period	Analyte	Type
10/1/2019	LEAD & COPPER RULE	FOLLOW-UP OR ROUTINE TAP M/R (LCR)

Additional Required Health Effects Language:

Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

April 17, 2020

NEOSHO PWS

Public Water System ID Number: MO5010560

2019 Annual Water Quality Report

(Consumer Confidence Report)

Special Lead and Copper Notice:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. NEOSHO PWS is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800-426-4791) or at http://water.epa.gov/drink/info/lead/index.cfm.

You can also find sample results for all contaminants from both past and present compliance monitoring online at the Missouri DNR Drinking Water Watch website http://dnr.mo.gov/DWW/indexSearchDNR.jsp. To find Lead and Copper results for your system, type your water system name in the box titled Water System Name and select *Find Water Systems* at the bottom of the page. The new screen will show you the water system name and number, select and click the Water System Number. At the top of the next page, under the *Help* column find, *Other Chemical Results by Analyte*, select and click on it. Scroll down alphabetically to Lead and click the blue Analyte Code (1030). The Lead and Copper locations will be displayed under the heading *Sample Comments*. Scroll to find your location and click on the *Sample No.* for the results. If your house was selected by the water system and you assisted in taking a Lead and Copper sample from your home but cannot find your location in the list, please contact NEOSHO PWS for your results.

Optional Monitoring (not required by EPA)

Optional Contaminants

Monitoring is not required for optional contaminants.

Secondary Contaminants	Collection Date	Your Water System Highest Sampled Result	Range of Sampled Result(s) (low - high)	Unit	SMCL
ALKALINITY, CACO3 STABILITY	3/19/2019	168	153 - 168	MG/L	
ALKALINITY, TOTAL	8/12/2019	160	120 - 160	MG/L	
CALCIUM	3/19/2019	53.7	36.5 - 53.7	MG/L	
CHLORIDE	3/19/2019	13.9	0 - 13.9	MG/L	250
HARDNESS, CARBONATE	3/19/2019	168	148 - 168	MG/L	
MAGNESIUM	3/19/2019	18.6	3.38 - 18.6	MG/L	
MANGANESE	3/19/2019	0.00162	0 - 0.00162	MG/L	0.05
NICKEL	3/19/2019	0.00158	0.00115 - 0.00158	MG/L	0.1
PH	3/19/2019	7.8	7.62 - 7.8	PH	8.5
POTASSIUM	3/19/2019	2.27	0 - 2.27		
SODIUM	3/19/2019	6.66	3.08 - 6.66	MG/L	
SULFATE	3/19/2019	11.8	5.42 - 11.8	MG/L	250
TDS	3/19/2019	196	167 - 196	MG/L	500
ZINC	3/19/2019	0.00589	0.0011 - 0.00589	MG/L	5

Secondary standards are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply.

City of Neosho
203 E. Main Neosho, MO
417-451-8060
For online bill pay, go to
www.neoshomo.org

Account Statement

ACCOUNT INFORMATION

ACCOUNT:	**010923-000**
SERVICE ADDRESS:	1910 Pineville Road
SERVICE PERIOD:	5/1/2020 to 5/31/2020 (31 days)
BILLING DATE:	5/27/2020
DUE DATE:	**6/15/2020**

JEFFREY K. WILLIS
1910 Pinevlle Rd.
Neosho, MO 64850

METER READING

	Previous Reading		Current Reading		
Serial No	Date	Reading	Date	Reading	Cons
90251595	4/6/2020	502	5/6/2020	559	57

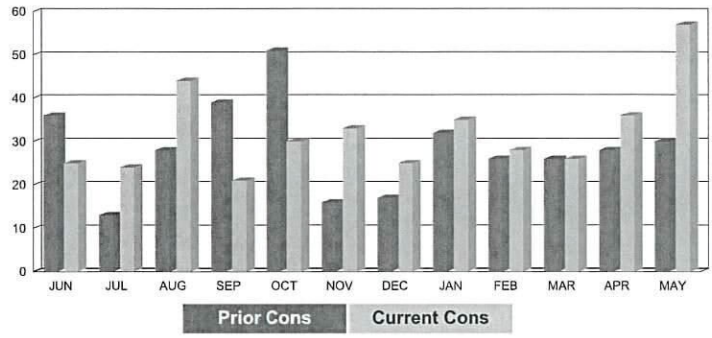
SPECIAL MESSAGE

For 2020 Quality Water Report go to www.dnr.mo.gov/ccr/MO5010560.pdf. This bill is due on June 15th. If paid after that date, a 12% penalty will be applied to both the water and sewer portions of the bill. Beginning June 1st credit card fees will no longer be waived for online payments.

CURRENT CHARGES

Water	33.50
Primacy Fee	0.23
Meter Fee	1.49
Trash Pickup	10.04
Tax	0.71
TOTAL CURRENT CHARGES	**45.97**

USAGE HISTORY



BILL SUMMARY

PREVIOUS BALANCE	37.06
PAYMENTS RECEIVED	-37.06
ADJUSTMENTS	0.00
ADDITIONAL BILLING	0.00
CURRENT CHARGES	45.97
TOTAL AMOUNT DUE	**45.97**

Payment Coupon

AMOUNT DUE

TOTAL AMOUNT DUE BY **6/15/2020** **45.97**

ACCOUNT INFORMATION

PLEASE RETURN THIS PORTION ALONG WITH YOUR PAYMENT
PLEASE MAKE CHECK PAYABLE TO:
CITY OF NEOSHO

ACCOUNT:	**010923-000**
SERVICE ADDRESS:	1910 Pineville Road
SERVICE PERIOD:	5/1/2020 to 5/31/2020 (31 days)
BILLING DATE:	5/27/2020
DUE DATE:	**6/15/2020**

JEFFREY K. WILLIS
1910 Pinevlle Rd.
Neosho, MO 64850

AMOUNT ENCLOSED

REMIT PAYMENT TO:

CITY OF NEOSHO WATER DEPT.
203 E. MAIN
NEOSHO, MO 64850

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

SEP 2 1 2020

Ken Brady
Neosho PWS
203 East Main
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000059-20

Dear Ken Brady:

The Missouri Department of Natural Resources' Public Drinking Water Branch, Infrastructure Permits and Engineering Section received a response from Allgeier, Martin, and Associates to our comments concerning your Long Term 2 Enhanced Surface Water Treatment Rule Plan for Neosho PWS, of Newton County, Missouri. In order to approve the additional treatment credit as proposed the following information is needed:

1. Six months of turbidity data for the combined filter effluent (CFE) option. CFE turbidity must be measured at 4-hour intervals (or more frequently) and 95 percent of the measurements from each month must be less than or equal to 0.15 nephelometric turbidity unit (NTU). The data should be provided in an Excel spreadsheet.

2. Six months of turbidity data for the individual filter effluent (IFE) option. IFE turbidity must be measured every 15 minutes (excluding the 15 minute period following return to service from a filter backwash) and 95 percent of the measurements from each month must be less than or equal to 0.15 NTU. The data should be provided in an Excel spreadsheet.

While historical data can be useful, we'd like the above requested data to be collected over the next months to show how the plant is operating currently. We ask that you notify us within seven (7) calendar days from your receipt of this letter, as to when you will start collecting the data. The data should be collected over a continuous six month period and provided to the Department one month after the end of the data collection period. Any modifications needed to your SCADA system to ensure the data is collected and stored at the above described intervals should be made before you start collecting the six months of data.

Please keep in mind the deadline to achieve the additional level of log removal is January 31, 2022. If Neosho PWS is unable to meet the above described stringent turbidity levels for either CFE or IFE, you will need to select a different toolbox option for compliance from EPA's LT2 Enhanced Surface Water Treatment Rule Toolbox. The guidance manual can be found at the following link: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1009JLI.txt

Should you have any questions, please feel free to contact Megan Torrence at 573-522-1801, or by email at megan.torrence@dnr.mo.gov, or contact me at 573-751-1127 or by email at maher.jaafari@dnr.mo.gov. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

c: Allgeier, Martin and Associates, Inc.
Southwest Regional Office
Monitoring Section, PDWB

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

November 24, 2020

Neosho PWS, MO5010560
David Kennedy
203 East Main, City Hall
Neosho, MO 64850

Subject: Notification of Invalidation of Haloacetic Acids (HAA) Results

Dear David Kennedy:

This letter is to notify you that the Missouri Department of Natural Resources has identified biased-high Haloacetic Acids (HAA) results for drinking water samples analyzed at our Environmental Services Program laboratory. The Department has investigated the cause of these high results and has implemented measures to correct the problem and to avoid future data errors (see below for more information).

Because of this finding, the Department has reviewed HAA analytical results from the third quarter of 2019 to the second quarter of 2020 (July 2019 to June 2020). By identifying samples in which the HAA result was greater than the TTHM result, and comparing those data to historical results for your system since 2018, the Department was able to determine that some HAA results reported for your system are not valid for one or more quarters. The Department determines compliance with the HAA Maximum Contaminant Level (MCL) based on a locational running annual average (LRAA) of four quarters of data. The Department will invalidate the result(s) for these quarter(s), and will no longer use the data to determine the LRAA compliance for your system.

The enclosed Table 1 shows the original HAA result(s) and quarter(s) the Department invalidated. Table 2 shows the original HAA results and LRAA calculations before invalidation. Table 3 shows your system's HAA results after invalidation and the corresponding four quarters of updated LRAA calculations. These recalculations did not affect your compliance with the HAA MCL.

Background, Investigation and Corrective Action
In response to a pattern of higher-than-normal HAA analytical results, the Department's initiated a comprehensive review of all laboratory processes and procedures involved in the HAA sampling, extraction and analytical processes. The investigation identified two issues during the extraction phase of EPA Method 552.2.

1) The EPA Method requires an extraction of the original sample to be heated for a period of time at a specific temperature. The Department found that one of the two water baths used to heat the samples was as much as 15 degrees Celsius above the required temperature. The Department found the other water bath to have a slightly elevated temperature also.

2) The Department found that a tool used to crimp the cap onto sample vials was not properly sealing the vials, allowing the extract solvent to escape.

The combination of the elevated temperature and/or escaping solvent caused the HAA concentration to increase in the sample vial, resulting in higher HAA results not indicative of the quality of water dispensed to the public by the system.

The Department has implemented corrective actions, including the purchase of a new block heater and crimping tool to ensure the correct temperature and proper sealing of all sample vials during the extraction phase of the Method 552.2 analysis.

The Department has also increased the HAA sample vial size from 40 milliliters (ml) to 60 ml and updated the sample collection instructions. This corrective action will help sampling personnel avoid overfilling of vials, that could lead to the flushing of the dechlorinating agent from the sample, thereby allowing HAAs to continue to form in the vial during the holding period prior to analysis.

As an additional corrective measure, the Department will be performing split sampling during the fourth quarter of 2020 and will be using a contract laboratory for compliance sampling. This will help us to ensure that we have addressed any concerns with bias in our analytical process prior to performing compliance analysis for HAAs at our laboratory in the future.

Conclusion
Please understand that your confidence in our laboratory is extremely important to us and we take very seriously our mission to provide quality analytical data to our public water systems. We appreciate your patience as the Department completes actions to resolve this issue. If you should have any questions about this matter, please contact Mr. Todd Eichholz of my staff at the Water Protection Program, P.O. Box 176, Jefferson City, MO 65101, by phone at 573-751-4090, or email at Todd.Eichholz@dnr.mo.gov.

Sincerely,

WATER PROTECTION PROGRAM

David J. Lamb, Chief
Public Drinking Water Branch

Enclosures

c: Steve Parnell
Southwest Regional Office

Table 1 - HAA Sample Results and Invalidation Determination

Water System and Location Information					Original HAA Sample Results (mg/L)				Quarter(s) Identified for Invalidation			
PWSID	PWS Name	Analyte	Location ID	Location	3Q2019	4Q2019	1Q2020	2Q2020	3Q2019	4Q2019	1Q2020	2Q2020
MO5010560	NEOSHO	HAA5	DBPDUAL-01	AIRPORT - TERRY JOHNSON DR	0.0305	0.0498	0.0291	0.0793				Y
MO5010560	NEOSHO	HAA5	DBPDUAL-02	MFA OIL CO - 13953 PENN LN	0.0346	0.0394	0.0251	0.0884				Y
MO5010560	NEOSHO	HAA5	DBPDUAL-03	PUBLIC WORKS - 715 N COLLEGE ST	0.0265	0.0374	0.0234	0.0672				Y
MO5010560	NEOSHO	HAA5	DBPDUAL-04	CROWDER WWTP - 675 RADIO RD	0.0302	0.0347	0.0211	0.0593				Y

Table 2 - LRAA Compliance Determination Before Invalidation of Results

Water System and Location Information					Original HAA Sample Results (mg/L)				Original LRAA Compliance Calculation			
PWSID	PWS Name	Analyte	Location ID	Location	3Q2019	4Q2019	1Q2020	2Q2020	3Q2019	4Q2019	1Q2020	2Q2020
MO5010560	NEOSHO	HAA5	DBPDUAL-01	AIRPORT - TERRY JOHNSON DR	0.0305	0.0498	0.0291	0.0793	0.029	0.036	0.037	0.047
MO5010560	NEOSHO	HAA5	DBPDUAL-02	MFA OIL CO - 13953 PENN LN	0.0346	0.0394	0.0251	0.0884	0.038	0.041	0.042	0.047
MO5010560	NEOSHO	HAA5	DBPDUAL-03	PUBLIC WORKS - 715 N COLLEGE ST	0.0265	0.0374	0.0234	0.0672	0.033	0.038	0.038	0.039
MO5010560	NEOSHO	HAA5	DBPDUAL-04	CROWDER WWTP - 675 RADIO RD	0.0302	0.0347	0.0211	0.0593	0.03	0.034	0.035	0.036

Table 3 - LRAA Compliance Determination After Invalidation of Results

Water System and Location Information					Updated HAA Sample Results (mg/L)				Updated LRAA Compliance Calculation			
PWSID	PWS Name	Analyte	Location ID	Location	3Q2019	4Q2019	1Q2020	2Q2020	3Q2019	4Q2019	1Q2020	2Q2020
MO5010560	NEOSHO	HAA5	DBPDUAL-01	AIRPORT - TERRY JOHNSON DR	0.0305	0.0498	0.0291		0.029	0.036	0.037	0.036
MO5010560	NEOSHO	HAA5	DBPDUAL-02	MFA OIL CO - 13953 PENN LN	0.0346	0.0394	0.0251		0.038	0.041	0.042	0.033
MO5010560	NEOSHO	HAA5	DBPDUAL-03	PUBLIC WORKS - 715 N COLLEGE ST	0.0265	0.0374	0.0234		0.033	0.038	0.038	0.029
MO5010560	NEOSHO	HAA5	DBPDUAL-04	CROWDER WWTP - 675 RADIO RD	0.0302	0.0347	0.0211		0.03	0.034	0.035	0.029

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
PUBLIC DRINKING WATER BRANCH/FINANCIAL ASSISTANCE CENTER
CONSTRUCTION PERMIT APPLICATION

FOR OFFICE USE ONLY	
REVIEW NO.	5000042-21
DATE RECEIVED	3/30/2021

No fee is required for a construction permit.
If you have any questions, call 1-800-361-4827 or 573-751-5924 (PDWB) or 573-751-1192 (FAC)
Submit one copy of the application and two copies (one hard copy and one electronic copy) of required documentation to: Permits and Engineering Section or Financial Assistance Center (For DWSRF projects), P.O. Box 176, Jefferson City, Missouri 65102-0176 **Or email to: pdwb.engineeringwaterpermits@dnr.mo.gov**

Per 640.115 - Construction, extension or alteration of a public water system shall be in accordance with the rules and regulations of the Safe Drinking Water Commission. Requirements for submission, review and approval of engineering reports, plans and specifications for public water supply planning and construction must be in accordance with 10 CSR 60-3.010, 10 CSR 60-10.010, and 10 CSR 60-13 (For DWSRF projects).

Is this project being funded by DWSRF? ☐ Yes ☑ No

NAME OF PROJECT

MASTER WATER METER INSTALLATION

PUBLIC WATER SYSTEM INFORMATION

NAME OF PUBLIC WATER SYSTEM	CONTACT PERSON	TITLE	PUBLIC WATER SYSTEM ID NO
CITY OF NEOSHO, MO	NATE SILER	PUBLIC WORKS DIRECTOR	MO5010560

ADDRESS	CITY	STATE	ZIP CODE
203 E. MAIN ST.	NEOSHO	MO	64850

TELEPHONE NUMBER	E-MAIL ADDRESS
417-451-8071	NSILER@NEOSHOMO.ORG

CONSULTANT ENGINEER INFORMATION

CONSULTING FIRM	CONSULTANT ENGINEER NAME
ALLGEIER, MARTIN and ASSOCIATES, INC.	THOMAS HANCOCK, PE

ADDRESS	CITY	STATE	ZIP CODE
7231 EAST 24TH STREET	JOPLIN	MO	64804

TELEPHONE NUMBER	E-MAIL ADDRESS
417-680-7200	TOM.HANCOCK@AMCE.COM

DEVELOPER OF PROJECT INFORMATION

If the developer of project is different from the public water system, a signed acceptance letter from the public water system must be provided stating that upon completion of construction, the water system will own, operate and maintain the water system facilities.

DEVELOPER OF PROJECT NAME	TITLE

ADDRESS	CITY	STATE	ZIP CODE

TELEPHONE NUMBER	E-MAIL ADDRESS

PROJECT LOCATION

COUNTY	1\4, OF	1\4, OF	SECTION	TOWNSHIP	RANGE	LATITUDE	LONGITUDE
NEWTON - SEE ATTACH "A"							

SCOPE OF THE PROPOSED PROJECT (DESCRIBE THE PROJECT COMPLETELY. ATTACH ADDITIONAL SHEETS OF PAPER IF NECESSARY.)

MASTER METER INSTALLATIONS AT NINE EXISTING PRESSURE REDUCING STATION LOCATIONS INCLUDING PRECAST CONCRETE VAULTS, ISOLATION VALVES, PIPING, AND RELATED APPURTENANCES

PROPOSED WATER SUPPLY SOURCE

New community and non-transient non-community water systems commencing operation after October 1, 1999 or systems applying for DWSRF financing shall show as part of their application that the public water system will meet the minimum technical, managerial, and financial (TMF) capacity requirements. A TMF checklist is available upon request from the department.

The following information must be provided for new or modifications to water supply sources:
***Must be affixed with professional engineer's seal**

Well	Surface water intake	Interconnection with PWS
☐ Engineering Report* or Review No. _____	☐ Engineering Report* or Review No. _____	☐ Engineering Report* or Review No. _____
☐ Detailed Plans*	☐ Detailed Plans*	☐ Detailed Plans*
☐ Technical Specifications*	☐ Technical Specifications*	☐ Technical Specifications*
☐ Well Site Survey from Regional Office		☐ Name of Public Water Supplier _____
☐ Estimated Casing Depth letter from Water Resources Center		☐ Water Purchase Agreement (Permanent Interconnections only)

PROPOSED STORAGE

The following information must be provided for new or modifications to storage tanks:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*

Dimensions _____ ft
Capacity _____ gal
Ground Elevation _____ ft
Overflow Elevation _____ ft

PROPOSED WATERLINE

The following information must be provided for new or modifications to waterlines:
***Must be affixed with professional engineer's seal**

☑ Detailed Plans*
☑ Technical Specifications*or Standard Specifications* Review No. _____ or Supervised Program Specifications* Review No._____
☐ Hydraulic Analysis* (For Complete Distribution Systems or at the Department's discretion)

Line Size at Point of Connection SEE ATTACH "A" inch
Available Flow at Point of Connection SEE ATTACH "A" gpm
Residual Pressure at Point of Connection SEE ATTACH "A" psi
Fire Demand (if applicable) _____ gpm
Residual Pressure at End of Proposed Waterline _____ psi

Any potential contamination near the proposed site? ☐ Yes ☑ No
If Yes, must be shown on the Detailed Plans

PROPOSED PUMPING

The following information must be provided for new or modifications to pumping stations:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*
☐ Pump Curve

Number of Pumps _____
Capacity / pump _____ gpm
Total Dynamic Head _____ ft

PROPOSED TREATMENT PROVIDED

The following information must be provided for new or modifications to treatment:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*
☐ Product or Equipment Literature (if applicable)
☐ Design Basis for size/capacity of units or chemical dosages*
☐ Description of testing equipment

PROPOSED WASTE DISPOSAL FACILITIES FOR WATER TREATMENT

The following information must be provided for new or modifications to waste disposal facilities:
***Must be affixed with professional engineer's seal**

☐ Detailed Plans*
☐ Technical Specifications*
☐ Design Basis for size/capacity of units*

Number of Units _____
Capacity / Unit _____ gal
Final Disposal of sludge _____

CERTIFICATION

I certify that I have personally examined and am familiar with the information in this application and believe that the information submitted is accurate and complete. I am aware that making a false statement or misrepresentation in this application is grounds for denying or revoking the construction permit. I may also be guilty of a misdemeanor and upon conviction, may be punished by fine or imprisonment.

SIGNATURE OF RESPONSIBLE OFFICIAL	DATE
	03/29/2021
TYPE OR PRINT NAME OF RESPONSIBLE OFFICAL	TITLE
NATE SILER	PUBLIC WORKS DIRECTOR

ATTACHMENT “A”

MNDR CONSTRUCTION PERMIT

PROJECT:

MASTER WATER METER INSTALLATION

NEOSHO, MO

PROJECT LOCATION:

A NE ¼ OF SE ¼ OF SECTION 24, T25N, R32W, LAT N 36.869079 (d), LONG W 94.376823 (d)

B NW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.869900 (d) , LONG W 94.373235 (d)

C SW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.867597 (d) , LONG W 94.370014 (d)

D SW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.865524 (d) , LONG W 94.368700 (d)

E NE ¼ OF NW ¼ OF SECTION 30, T25N, R31W, LAT N 36.864695 (d), LONG W 94.367454 (d)

F OMITTED FROM PROJECT

G SE ¼ OF NE ¼ OF SECTION 30, T25N, R31W, LAT N 36.858047 (d), LONG W 94.355973 (d)

H SW ¼ OF SE ¼ OF SECTION 13, T25N, R32W, LAT N 36.880021 (d), LONG W 94.380699 (d)

I NE ¼ OF NE ¼ OF SECTION 24, T25N, R32W, LAT N 36.879277 (d), LONG W 94.377557 (d)

J OMITTED FROM PROJECT

K SE ¼ OF SE ¼ OF SECTION 13, T25N, R32W, LAT N 36.881625 (d) , LONG W 94.374847 (d)

LINE SIZE, AVAILABLE FLOW, AND PRESSURE AT CONNECTION

A 8” 2267 GPM @ 68 PSI RESIDUAL

B 6” 1430 GPM @ 25 PSI RESIDUAL

C 8” 2114 GPM @ 54 PSI RESIDUAL

D 8” 2096 GPM @ 42 PSI RESIDUAL

E 12” 2062 GPM @ 40 PSI RESIDUAL

F OMITTED FROM PROJECT

G 8” 3391 GPM @ 54 PSI RESIDUAL

H 6” 3069 GPM @ 58 PSI RESIDUAL

I 8” 2091 GPM @ 68 PSI RESIDUAL

J OMITTED FROM PROJECT

K 8” 2404 GPM @ 81 PSI RESIDUAL

CONTRACT DOCUMENTS, SPECIFICATIONS, AND DRAWINGS FOR MASTER WATER METER INSTALLATION NEOSHO, MISSOURI

EST 1839 NEOSHO MISSOURI

April 6, 2021

Prepared by

ALLGEIER, MARTIN and ASSOCIATES, INC.
Consulting Engineers • Hydrologists • Surveyors
Joplin, MO • Kansas City, MO • Rolla, MO • Springfield, MO
Missouri Certificate of Authority No. 000427

TABLE OF CONTENTS

DIVISION 3 – CONCRETE

DIVISION 13 – SPECIAL CONSTRUCTION

INDEX TO CONSTRUCTION DRAWINGS

With regard to this Project, and Pursuant to RSMO 327.411, Allgeier, Martin and Associates and the Professional whose personal seal and signature appears below assume responsibility only for the drawings, specifications, and other documents bearing the personal seal of the undersigned Professional, and hereby disclaim any responsibility for all other drawings, specifications, or other documents which do not contain the personal seal of the undersigned Professional.

04-06-2021

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes basic identification of the Work and other related activities.

B. Related Requirements:

1. Document 00500 - Agreement Form
2. Document 00700 - General Conditions
3. Document 00800 - Supplemental Conditions

1.02 PROJECT DESCRIPTION

A. Project location is Neosho, Newton County, Missouri, as shown on the drawings.

B. Access to the work site(s) is available via public roads and streets.

C. The project consists of construction of water master meter installations, including but not limited to, precast concrete meter vaults, electromagnetic flow meters with radio transceiver modules, related piping, and miscellaneous work required for completion of the project. All work indicated on the drawings and specifications is to be performed unless deleted by Owner's change order.

D. Inclusive in the work is close coordination with all appropriate jurisdictional agencies and responsibility for construction standards, traffic control, and safety requirements of these agencies.

1.03 TYPE OF CONTRACT

A. All general construction work and related items required to complete this project will be included in a single general construction contract.

B. Provide and pay, except as otherwise specifically stated in the Contract Documents, for all materials, labor, tools, equipment, connections, transportation, superintendence, temporary construction of every nature, all other services, facilities, and cost of every nature whatsoever necessary to execute and complete the entire Work being done under the Contract Documents and deliver it complete in every respect.

1.04 WORK BY OTHERS

A. No Work by others is contemplated, although the Owner reserves the right to do Work within the project site.

1.05 CONTRACTOR'S USE OF SITE

A. Confine operations at the site to the Owner's property and construction easements indicated on the drawings.

B. Keep existing driveways and entrances serving private property clear and available to the

property owner at all times.

C. Do not unreasonably encumber the site with materials or equipment.

1.06 SCHEDULING OF WORK AND WORK SEQUENCE

A. Schedule all work, including location of utilities, to coordinate with appropriate jurisdictional agencies.

B. Construction sequence shall be determined by the Contractor subject to the Owner's need to continue operations of existing facilities.

C. Where Work is on or adjacent to existing facilities, exercise caution and schedule operations to ensure that functions of present facilities will not be endangered. Shutdown of Owner's operating facilities to perform the Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

1.07 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

1.08 COPIES OF DOCUMENTS

A. Contractor will be provided, at no cost, a maximum of four (4) sets of full-size Contract Drawings, Specifications, and any Addenda thereto, for execution of the Work.

B. Additional copies of the above document will be supplied at printing and delivery cost upon request.

1.09 REGULATORY REQUIREMENTS

A. Obtain all necessary permits and comply with all codes of construction or permit requirements of all authorities having jurisdiction.

B. Pay for any bond, fees, other charges, design, work or materials associated with obtaining the necessary permits, including all City of Neosho permits.

C. Any traffic control plans required by regulatory agencies as part of their permit shall be prepared and carried out, at the contractor's expense, in accordance with the M.U.T.C.D., latest version. Barricades, signs, and signals shall be maintained. The signs shall indicate actual conditions that exist on the road ahead.

1.10 REFERENCES AND STANDARDS

A. The latest edition of the following specifications cover certain specified materials and methods to be utilized. Abbreviations as used in the specifications shall mean the following:

1. AWWA: American Water Works Association
2. AGA: American Gas Association

3. ASTM: American Society for Testing and Materials
4. AASHTO: American Association of State Highway & Transportation Officials
5. ANSI: American National Standards Institute
6. APS: American Petroleum Institute
7. ASA: American Standards Association
8. DOT: Federal Department of Transportation
9. AWS: American Welding Society
10. AREA: American Railway Engineering Association
11. ACI: American Concrete Institute
12. BOCA: Building Officials and Code Administrators

1.11 ENVIRONMENTAL

A. In the event of spillage or discharge of oil to the environment, the Contractor shall comply with the provisions of Title 40 Code of Federal Regulations: Part 110 – Discharge of Oil: Part 112 – Oil Pollution Prevention; Part 300 – National Oil and Hazardous Substances Pollution Contingency Plans; and all applicable State, County, and municipal regulations.

B. The Contractor and Owner, in their respective obligations under the terms of the Contract, shall conform to the provisions of the Clean Air Act (41 U.S.C. 7506©).

1.12 SAFETY

A. Precautions shall be exercised at all times by the Contractor for the protection of persons, employees, and property. The safety provisions of applicable laws, local building and construction codes (OSHA and manufacturer's safety requirements) shall be observed. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01010

SECTION 01040
COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers the following requirements:

1. Project Coordination.
2. Site Administration.
3. Field Engineering.
4. Project Meetings.

B. Related Requirements:

1. DOCUMENT 00700 - General Conditions
2. DOCUMENT 00800 - Supplemental Conditions
3. SECTION 01010 - Summary of Work

1.02 PROJECT COORDINATION

A. Coordinate scheduling, submittals and work of the various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provision for accommodating items installed later.
B. Verify characteristics of elements of interrelated operating equipment are compatible. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate work with other contractors performing work under these Documents.
D. Coordinate work with any subcontractors to assure that one subcontractor's work does not delay another's work.
E. Coordinate work with major equipment and material suppliers to assure timely procurement and delivery of equipment and materials to the site.

1.03 SITE ADMINISTRATION

A. Contractor shall be responsible for all areas of the site used by it and by all subcontractors in the performance of the work.
B. Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others.
C. Contractor has the right to exclude from the site all persons who have no purpose related to the Work or its inspection, and may require persons on the site, except Owner's employees, to observe the same regulations as Contractor requires of its employees.

1.04 FIELD ENGINEERING

A. Survey control and reference points which, in the Engineer's opinion, are necessary to enable the Contractor to perform the Work are indicated on the drawings. The Contractor shall locate and protect survey control and reference points and be responsible for laying out the Work.

Elevations shown on the drawings and referred to in the specifications are based on the benchmarks shown.

B. The Contractor shall perform all construction staking and surveying he may find necessary or convenient to enable him to construct each element of the Work in the correct position to correspond to the information shown on the drawings. Modifications to avoid unknown or mislocated facilities are to be expected.

C. The Contractor shall be responsible for the preservation of all benchmarks and control monuments, property corners, and public land corners within, or adjacent to, the project limits. If any of these markers are disturbed or destroyed, the cost of replacing them will charged to the Contractor.

1.05 PROJECT MEETINGS

A. Preconstruction Conference:

1. Owner/Engineer will administer a meeting within 15 days after execution of the Agreement, to review items stated in the agenda and to establish a working understanding between the parties as to their relationships. The conference shall be attended by:

   a. Contractor and its Superintendent.
   b. Representatives of principal Subcontractors, suppliers and manufacturers as appropriate.
   c. Engineer.
   d. Owner and its Resident Project Representative.
   e. Representatives of authorities having jurisdiction over the project as appropriate.

2. Agenda:

   a. Project schedule.
   b. Project coordination.
   c. Procedures and processing of Contractor's Submittals, Change Orders and Applications for Payments.
   d. Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
   e. Construction facilities and controls.
   f. Critical work sequencing.
   g. Procedures for maintaining Record Documents.
   h. Procedures for testing.
   i. Temporary utilities if applicable.
   j. Safety and first aid.

3. Owner/Engineer will arrange for keeping the minutes and distribute copies to all persons in attendance.

B. Progress Meetings:

1. Contractor shall schedule and administer meetings at times requested by Owner/Engineer, not to exceed once per month. Meetings shall be attended by:

   a. Contractor and its Superintendent

b. Representatives of all Subcontractors active on the site.
c. Engineer.
d. Owner and its Resident Project Representative.
e. Others as requested by Contractor, Engineer or Owner.

2. Agenda:

a. Review previous meeting minutes.
b. Review of work progress since previous meeting.
c. Field observations, problems, and conflicts
d. Identification of problems which impede planned progress.
e. Review status of Contractor's submittals.
f. Review of off-site fabrication and delivery schedules.
g. Maintenance of progress schedule.
h. Corrective measures and procedures to regain projected schedule.
i. Revisions to progress schedule.
j. Planned progress during succeeding work period.
k. Effect of proposed changes on progress schedule and completion date.
l. Other business relating to the Work.

3. Owner/Engineer will arrange for keeping of minutes and distribute copies to all persons in attendance and those affected by decisions made.

PART 2 - PRODUCTS: NOT APPLICABLE.

PART 3 - EXECUTION: NOT APPLICABLE.

END OF SECTION 01040

SECTION 01090
DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes definitions of terms and symbols used in the Contract Documents, explanation of specification format and content, and establishes edition dates for standards referenced elsewhere in the specifications.

B. Related Requirements:

1. Document 00700 - General Conditions

1.02 DEFINITIONS

A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents, including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in the Contract Documents are defined generally in this section. Definitions and explanations of this section are not necessarily complete or exclusive but are general for the Work to the extent not stated more explicitly in another provision of the Contract Documents.

1. "General Requirements" are the provisions or requirements of the DIVISION 1 - Sections, and which apply to the entire work of the Contract.

2. The term "indicated" is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.

3. Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and permitted", mean "directed by Engineer", "requested by Engineer", etc. However, no such implied meaning will be interpreted to extend Engineer's responsibility into Contractor's area of construction supervision.

4. Where used in conjunction with Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of the term "approved" will be held to limitations of Engineer's responsibilities and duties as specified in the General Conditions and Supplemental General Conditions. In no case will "approval" by Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

5. "Project Site" is the area available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings and may or may not be identical with description of land upon which project is to be built.

6. When applied to equipment and materials, the words "furnish", "install" and "provide" shall mean the following:

a. The word “furnish” shall mean to supply, pay for, and deliver to project site, ready for assembly, installation, etc., as applicable in each instance.
b. The word “install” shall mean to assemble, erect, place into position, incorporate into the Work, adjust, clean and make fit for intended use, as applicable in each instance.
c. The word “provide” shall mean to furnish and install, complete and ready for intended use, as applicable in each instance.

7. “Installer” shall mean the entity (person or firm) engaged by Contractor or its subcontractor (at any lower tier) for performance of a particular unit of work at project site, including installation, erection, application, and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

8. “Testing Laboratory” shall mean an independent entity engaged to perform specific inspections or tests of the Work, either at the project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

B. Basic contract terms used in the Contract Documents are defined in the GENERAL CONDITIONS.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATIONS

A. Specification Format: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute’s 16-Division format and Master format numbering system. Some portions may not fully comply, and no particular significance will be attached to such compliance or non-compliance.

1. Divisions and Sections: For convenience, basic unit of specification text is a “section”, each unit of which is numbered and named. These are organized into related families of sections, and various families of sections are organized into “divisions”, which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.

2. Section Numbering: Used to facilitate cross-references in Contract Documents. Sections are organized in numerical sequence; however, numbering sequence is not complete, and listing of sections in Index at beginning of Contract Documents must be consulted to determine numbers and names of specification sections in Contract Documents.

3. Page Numbering: Numbered independently for each section. Section number is shown with page number at bottom of each page, to facilitate location of text.

4. Parts: Each section of specifications generally has been subdivided into three basic “parts” for uniformity and convenience (Part 1 - General, Part 2 - Products and Part 3 - Execution). These titles do not limit the meaning of text within. Some sections may not contain all three parts when not applicable.

B. Specification Content: These specifications use certain general characteristics of content and conventions in the use of language which are explained as follows:

1. Imperative Language: These specifications are written in imperative and abbreviated form. Unless specifically stated otherwise, this imperative language is directed at the

Contractor. Incomplete sentences shall be completed by inserting “shall”, “the Contractor shall”, “shall be”, and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings.

2. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

3. Abbreviations: The language of these specifications and other Contract Documents is of the abbreviated type in certain instances and implies words and meanings which will be appropriately interpreted. Specific abbreviations are frequently used for trade association names and titles of general standards.

C. Assignment of Specialists: In certain instances, specification text requires that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as “expert” for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of contract requirements remains with the Contractor.

D. Trades: Except as otherwise indicated, the use of titles such as “carpentry” in specification text implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as “carpenter”), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

1.04 DRAWING SYMBOLS

A. Except as otherwise indicated, graphics symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Refer instances of uncertainty to Engineer for clarification.

1.05 INDUSTRY STANDARDS

A. General Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable standards of the construction industry have the same force and affect and are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith.

1. Referenced standards, referenced directly in Contract Documents or by governing regulations, have precedence over non-referenced standards which are recognized in industry for applicability to work.

2. Where compliance with an industry standard is required, comply with standard in effect as of the date of the Contract Documents.

3. Where compliance with two or more industry standards or sets of requirements is specified and overlapping of these different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement will be enforced. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent to Engineer for a decision before proceeding.

4. In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum, within specified tolerances, or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Engineer for decision before proceeding.

5. Each entity engaged in construction activities on the Project shall be familiar with the industry standards applicable to their work. Where copies of standards are needed for proper performance of the work, the Contractor shall obtain copies directly from the publication source.

B. Abbreviations and Names: Trade association names and titles of general standards are generally abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they are defined to mean the industry recognized name of trade association, standards generating organization, governing authority, or other entity applicable to context of text provision.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01090

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers work-related schedules and submittal requirements including:

1. Progress Schedule.
2. Schedule of Payments.
3. Schedule of Values.
4. Compliance Submittals.
5. Miscellaneous Submittals.
6. Operation and Maintenance Manuals.

B. Related Requirements:

1. Document 00700 - General Conditions

1.02 SCHEDULES

A. Progress Schedule:

1. Submit detailed work progress schedule to Engineer for acceptance within 30 days after execution of the Agreement and prior to submittal of the first partial payment request.
2. The schedule shall show the Work in a graphic format suitable for displaying scheduled and actual progress.

a. Prepare schedule as a horizontal bar chart with separate bar for each major portion of the Work.

3. Submit updated schedule to Engineer for acceptance at least once each month showing actual progress and any proposed changes in the schedule of remaining Work.

B. Schedule of Payments:

1. Within 30 days after execution of the Agreement and prior to the first payment request, submit a schedule of estimated monthly payments. Payment schedule may be incorporated into the progress schedule required under Part 1.02A.
2. Revise and resubmit schedule each time partial payment request varies more than 10 percent from the estimated schedule.

C. Schedule of Values:

1. Within 30 days after execution of the Agreement and prior to the first payment request, prepare and submit a schedule of values for each lump sum bid item.
2. Schedule shall list the value of the component parts of the Work item in sufficient detail to serve as a basis for computing values for partial payment requests during construction.

a. Each item shall include a directly proportional amount of Contractor's overhead and profit.
b. An unbalanced schedule of values providing for overpayment of items of Work which would be performed first will not be accepted.

1.03 SUBMITTALS

A. Compliance submittals include shop drawings, product data and samples.

1. Shop drawings include specially prepared technical data for this project, including drawings, diagrams, performance curves, data sheets, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
2. Product data include standard printed information on materials, products, and systems not specially prepared for this project, other than the designation of selections from available choices.
3. Samples include both fabricated and unfabricated physical examples of materials, products and units of work; both as complete units and as smaller portions of units work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.

B. Miscellaneous submittals related directly to the work include warranties, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, operation and maintenance manuals, and similar information, devices, and materials applicable to the Work and not processed as shop drawings, product data or samples.

C. Individual submittal requirements are specified in applicable Sections for each unit of Work.

1.04 COMPLIANCE SUBMITTAL REQUIREMENTS

A. Compliance submittals shall include but not be limited to the following information:

1. Manufacturer's specifications.
2. Manufacturer's standard drawings, catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data.

    a. Clearly mark each copy to identify materials, products, models, options and other data applicable to this project.
    b. Supplement standard information to provide additional information applicable to this project.

3. Shop fabrication and erection drawings.
4. General equipment outline drawings showing location of major components and overall dimensions.
5. Schematic diagrams for electrical items showing external connections, internal wiring diagrams and one-line diagrams.
6. Material lists or schedules and spare parts lists.
7. Detailed equipment installation drawings and instructions.
8. Physical samples to illustrate functional or aesthetic characteristics of the Product.

B. Each submittal shall be preceded by one or more summary pages containing the following:

1. Date and revision dates.
2. Project name and number.
3. The names of the Owner, Engineer, Contractor, Subcontractor, Supplier, Manufacturer and Detailer as applicable.
4. Identification of product.
5. Division and Section of Work.
6. Identification of any deviations from requirements of the Contract Documents.
7. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of all quantities, dimensions, specified performance criteria, installation requirements and materials, and coordination of submittal with the requirements of the Work and Contract

Documents.

C. Submit Shop Drawings and Product Data electronically in portable document format (pdf).
D. Submit samples as specified in individual specification Sections.

1.05 MISCELLANEOUS SUBMITTAL REQUIREMENTS

A. Miscellaneous Submittals are comprised of those submittals which are related to the work, but do not require Engineer's approval prior to proceeding with the work. Miscellaneous Submittals are defined in Part 1.03B.
B. Unless otherwise specified, submit all Miscellaneous Submittals electronically in portable document format (pdf).
C. Identify each Miscellaneous Submittal by project name and number, specification section and article number, and any deviations from the requirements of the Contract Documents.

1.06 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be prepared by the manufacturer and shall include the following:

1. Index and tabs.
2. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and product data sheets identifying model numbers.
3. Applicable drawings.
4. Warranties and guarantees.
5. Address of nearest manufacturer-authorized service facility.
6. Clearly mark standard drawings, catalog sheets, brochures, diagrams, schedules, charts, illustrations, and other descriptive data to identify materials, products, options, and other data applicable to this project.,
7. Provide additional data as appropriate.

B. Above information shall be bound into appropriately sized three ring type hard back binders.

1. The following information shall be imprinted or affixed by label on the binder front cover.

a. Operation and Maintenance Manual
b. Equipment name
c. Manufacturer's name
d. Project name
e. Owner's name

2. The following information shall be imprinted or affixed by label on the binder spine:

a. O & M Manual
b. Equipment name
c. Manufacturer's name

C. Submit four (4) copies of equipment operation and maintenance manuals.

1.07 ENGINEER'S REVIEW

A. Compliance Submittals:

1. Engineer will review with reasonable promptness and return Compliance Submittals to Contractor with appropriate notations. Engineer will review for compliance with the design concept of the project and information given in the Contract Documents.

2. Engineer's action stamp, for use on Submittals to be returned to Contractor is self-explanatory as marked.
3. Engineer's approval of Compliance Submittals will not relieve Contractor from his responsibility for any deviations from the requirements of the Work and Contract Documents unless Contractor has, in writing, called Engineer's attention to each specific deviation at the time of submission, and Engineer has given written approval of such deviation; nor will Engineer's approval relieve Contractor from responsibility for errors or omissions in the Submittals.
4. Where a Submittal is required by the Specifications, related Work shall not begin until after Submittal approval.

B. Miscellaneous Submittals:

1. Engineer will review Miscellaneous Submittals for conformance with the requirements given in the Contract Documents.
2. Engineer will respond to Contractor on those Miscellaneous Submittals which are deficient.

C. Operation and Maintenance Manuals:

1. Engineer will review Operation and Maintenance Manuals for general content but not for substance.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01300

SECTION 01530
TEMPORARY BARRIERS AND CONTROLS

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes General Requirements for:

1. Protection of Work.

2. Protection of existing property.

3. Barriers.

4. Environmental controls.

5. Traffic control and use of roadways.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION - 02200.

2. Trenching and Backfilling for Utilities: SECTION - 02222.

1.02. REFERENCES:

A. Manual on Uniform Traffic Control Devices (MUTCD).

B. 2017 Missouri Standard Specifications for Highway Construction.

PART 2 – PRODUCTS – Not Applicable.

PART 3 – EXECUTION

3.01. PROTECTION OF WORK AND PROPERTY:

A. General:

1. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all Work and Equipment and Materials free from injury or damage. At the end of each day all new Work likely to be damaged shall be appropriately protected.

2. Notify Engineer immediately at any time operations are stopped due to conditions which make it impossible to continue operations safely or to obtain proper results.

3. Construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, floors, pits, trenches, manholes, and ducts free of water.

B. Property Other than Owner's:

1. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.

2. Names and telephone numbers of representatives of agencies and utilities having jurisdiction over streets and utilities in the Work area can be obtained from the City for the agencies

listed below. Concerned agencies or utilities shall be contacted a minimum of 48 hours prior to performing Work, closing streets and other traffic areas, or excavating near underground utilities or pole lines.

a. Water.

b. Gas.

c. Sanitary sewers.

d. Storm drains.

e. Pipeline companies.

f. Telephone.

g. Electric.

h. Municipal streets.

i. Fire.

j. Police.

k. Right of Way Manager

3. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

4. Where fences are to be breached on private property, the owners thereof shall be contacted and arrangements made to ensure proper protection of any livestock or other property thus exposed.

5. The applicable requirements specified for protection of the Work shall also apply to the protection of existing property of others.

6. Before acceptance of the Work by the City, restore all property affected by Contractor's operations to its original or better condition.

3.02. BARRIERS

A. General:

1. Furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the Work, existing facilities, trees, and plants from construction operations. Remove when no longer needed or at completion of Work.

a. Barriers shall be required on all unattended excavations and at the direction of the Right of Way Manager

2. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or regulatory agencies.

3. Barriers shall be of a neat and reasonable uniform appearance, structurally adequate for the required purposes.

4. Maintain barriers in good repair and clean condition for adequate visibility.

5. Relocate barriers as required by progress of Work.

6. Repair damage caused by installation and restore area to original or better condition. Clean the area.

3.03. ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. Provide positive methods and apply dust control materials to minimize raising dust from construction operations; and to prevent airborne dust from dispersing into the atmosphere.

B. Water and Erosion Control:

1. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.

2. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.

a. Hold the areas of bare soil exposed at one time to a minimum.

b. Provide temporary control measures such as berms, dikes, drains and erosion barriers.

3. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.

4. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and groundwater.

5. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.

C. Debris Control and Clean-Up:

1. Keep the premises free at all times from accumulations of debris, waste materials, and rubbish caused by construction operations and employees. Responsibilities shall include:

a. Adequate trash receptacles about the site, emptied promptly when filled.

b. Periodic cleanup to avoid hazards or interference with operations at the site and to maintain the site in a reasonably neat condition.

c. The keeping of construction materials such as forms and scaffolding neatly stacked.

2. Prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.

D. Pollution Control:

1. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.

2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations deemed acceptable by the appropriate regulatory agency, and replace with suitable compacted fill and topsoil.

3. Take special measures to prevent harmful substances from entering public waters, sanitary, or storm sewers or waters of the state.

3.04. TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Control:

1. Provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas. This includes traffic signals and signs, flagmen, flares, lights, barricades, and other devices or personnel as necessary to adequately protect the public. All construction sign and reflective materials shall conform to the Missouri Standard Specification for Highway Construction. Traffic control measures shall meet the requirements of the MUTCD and shall be reviewed and approved by the Right of Way Manager.

2. Remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified condition when no longer required.

3. Provide and maintain suitable detours or other temporary expedients if necessary.

4. Bridge over open trenches where necessary to maintain traffic.

5. Consult with governing authorities to establish public thoroughfares which will be used as haul routes and site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. Repair roads, walkways, and other traffic areas damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.

2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

END OF SECTION 01530

DIVISION 2 – SITE WORK

SECTION 02200
SITE PREPARATION AND EARTHWORK

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes site preparation activities and certain items of earthwork common to other related Work.

B. Related Work Specified Elsewhere:

1. Trenching and Backfilling for Utilities: SECTION 02222.

1.02. REFERENCES:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):

a. D2167 – Test for Density and Unit Weight of Soil In-Place by Rubber-Balloon Method.

b. D2922 – Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).

2. Occupational Safety and Health Administration (OSHA):

a. Part 1926 – Safety and Health Regulations for Construction.

1.03 MEASUREMENT AND PAYMENT

A. All materials encountered in excavations shall be unclassified regardless of type, composition, character, and condition thereof. Any rock encountered shall be handled at no additional cost to Owner.

B. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

1.04 PROJECT CONDITIONS

A. Existing Conditions: Accept the Project site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.

1. Protect trees, plant materials, lawns and other features not designated for removal.

2. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.

2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others unless permitted in writing by the Owner and then only after acceptable temporary utility services have been provided. Provide a minimum of 48-hour notices to utility companies and receive written notice to proceed before interrupting any utility.

1.05 PROTECTION

A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave-ins, collapse of walls, structures and slopes, both on and adjacent to the site.

B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable OSHA requirements.

C. Repair: Includes the removal and replacement with new materials affected by settlement.

PART 2 – PRODUCTS

2.01. EARTHWORK MATERIALS

A. Topsoil is defined as selectively excavated surface soil that is representative of local soils that produce heavy growths of crops, grass or other vegetation. Satisfactory topsoil is reasonably free of underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic substances or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than 5% by volume of stones or other such objects larger than 1/2" in any dimension for lawn seeded areas and 1" in any dimension in other seeded areas.

B. Materials suitable for use in embankment, structural backfill and fill include material free of debris, roots, organic matter, and frozen matter; free of stone having any dimension greater than 2 inches in areas requiring a high degree of compaction or 4 inches in other embankment and fill areas:

1. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands exclusive of clayey material:

   a. Free-draining.

   b. Materials for which impact compaction will not produce a well-defined, moisture-density relationship curve.

   c. Maximum density by impact methods will generally be less than by vibratory methods.

   d. For which generally less than 15 percent by dry weight, of soil particles pass the No. 200 sieve.

2. Cohesive materials include silts and clays generally exclusive of sands and gravel:

a. Materials for which impact compaction will produce a well-defined, moisture-density relationship curve.

C. Materials unsuitable for use in embankment and fill include all material that contains debris, roots, organic matter, frozen matter, stone (with any dimension greater than 2 inches in areas requiring a high degree of compaction or 4 inches in other embankment and fill areas), or other that are determined by Engineer to be too wet or otherwise unsuitable.

D. Waste materials include excess usable materials and materials unsuitable for use in the Work.

E. Borrow materials include all fill materials, structural backfill and topsoil obtained from locations on or off the jobsite.

PART 3 – EXECUTION

3.01. SITE PREPARATION:

A. Clearing and Grubbing:

1. Perform selective clearing and grubbing as indicated or as necessary to perform excavation, trenching, borrow, and other Work required, and as directed by Engineer.

a. Clearing:

(1) Conduct Work in a manner to prevent damage to property and to provide for the safety of employees and others.

(3) Keep operations within property lines as indicated.

b. Grubbing:

(1) Includes removal and disposal of tree stumps and roots larger 3 inches in diameter.

(2) Remove to a depth of at least 18 inches below existing grade elevation.

(3) Backfill all excavated depressions with approved material and grade to drain.

B. Protection of Trees:

1. Protect tops, trunks, and roots of existing trees on Project site which are to remain, as follows:

a. Box fence around, or otherwise protect trees before any construction Work is started.

b. Do not permit heavy equipment or stockpiles within branch spread.

c. Trim or prune to obtain working space in lieu of complete removal when possible. Conduct operation as follows:

(1) With experienced personnel.

(2) Conform with good horticultural practice.

(3) Preserve natural shape and character.

(4) Protect cuts with approved tree paint.

d. Grade around trees as follows:

(1) Trenching: Where trenching is required around trees which are to remain, avoid cutting the tree roots by careful hand tunneling under or around the roots. Avoid injury to or prolonged exposure of roots.

(2) Raising Grades: Where existing grade at a tree is below the new finished grade and fill not exceeding 16 inches is required, place 1 to 2 inches of clean, washed gravel directly around the tree trunk. Extend gravel out from trunk on all sides at least 18 inches and finish 2 inches above finished grade at tree. Install gravel before earth fill is placed. Do not leave new earth fill in contact with any tree trunks.

(3) Lowering Grades: Regrade by hand to elevation required around existing trees in areas where new finished grade is to be lower. As required, cut the roots cleanly 3 inches below finished grade and cover scars with tree paint.

e. Remove when damage occurs and survival is doubtful.

C. Topsoil Stripping:

1. Strip topsoil from excavation limits of the construction area and stockpile in areas where it will not interfere with construction operations or existing facilities.
2. Strip to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

3. Scrape areas clean of all grass, weeds, brush, roots, and other materials prior to stripping.

4. Stop stripping at a sufficient distance from trees to prevent damage to main root system.

D. Debris and Waste Material:

1. Dispose of debris and waste material from site preparation activities at a location off the jobsite as arranged for by Contractor.

3.02. EARTHWORK:

A. Excavation:

1. Perform excavation of every type of material encountered within the limits of the Work, to the lines and grades indicated on the drawings and as required to complete new construction.

2. Blasting: Not permitted.

3. Dewatering:

a. Control grading around excavations to prevent surface water from flowing into excavation areas.

b. Drain or pump as required to continually maintain all excavations and trenches free of water or mud from any source, and discharge to approved drains or channels.

Commence when water first appears and continue until Work is complete to the extent that no damage will result from hydrostatic pressure, flotation, or other causes.

c. Use pumps of adequate capacity to ensure rapid drainage of area, and construct and use drainage channels and subdrains with pumps as required.

d. Remove subgrade materials rendered unsuitable by excessive wetting and replace with approved backfill material.

4. Stockpiling:

a. Stockpiling in amounts sufficient for and in a manner to segregate materials suitable for the following:

(1) Topsoiling.

(2) Backfilling.

(3) Waste only.

b. Do not obstruct or prevent access to:

(1) Roads and driveways.

(2) Utility control devices.

(3) Ditches or natural drainage channels.

c. Perform in a manner to avoid endangering the Work, stability of banks or structures, or health of trees and shrubs to be saved.

d. Maintain safe distance between toe of stockpile and edge of excavation or trench.

e. Stockpile in other areas or off site when adjacent structures, easement limitations, or other restrictions prohibit sufficient storage adjacent to the Work. Off-site areas shall be arranged for by Contractor.

6. Waste Materials:

a. Remove waste materials from Work area as excavated.

b. Dispose of such materials at a location arranged by, and at the expense of the Contractor.

c. Place excavated rock in the interior of waste area fills so that it will not be exposed to view.

d. Grade waste areas and leave them free draining and with an orderly and neat appearance.

B. Subgrades:

1. Excavate or fill as required to construct subgrades to the elevations and grades indicated. Remove all unsuitable material and replace with Engineer approved fill materials. Perform all wetting, drying, shaping, and compacting required to prepare a suitable subgrade.

C. Site Grading:

1. Rough Grading:

a. All areas within the Project, including excavated and filled sections, and adjacent transition areas shall be reasonably smooth, compacted, and free from irregular surface changes.

b. Degree of finish shall be that ordinarily obtained with blade grader or other power equipment, except as otherwise specified.

c. Finished rough grades shall generally be not more than 0.5 foot above or below established grade or approved cross sections with due allowance for topsoil.

d. Tolerance for areas within 10 feet of structures and areas to be paved shall not exceed 0.15 foot above or below established subgrade.

e. Finish all ditches, swales, and gutters to drain readily.

f. Unless otherwise indicated, slope the subgrade evenly to provide drainage away from structure walls in all directions at a grade not less than 1/4 inch per foot.

g. Provide roundings at top and bottom of banks and at other breaks in grade.

E. Topsoiling:

1. Includes placement of topsoil on all areas not specified to receive paving or other surface treatment (including borrow or waste areas).

2. Materials:

a. Those obtained from excavation which are most suitable and stockpiled for such purpose:

b. Borrow when required.

3. Subgrade Treatment:

a. Clear site of vegetation heavy enough to interfere with proper grading and tillage operations.

b. Clear surfaces of all stones or other objects larger than 2-inches in thickness or diameter, all roots, brush, wire, grade stakes, or other objectionable material.

c. Loosen subgrade by disking or scarifying to a depth of 2 inches wherever compacted by traffic or other causes to permit bonding of the topsoil to the subgrade.

4. Placement of Topsoil:

a. Distribute over required areas without compaction in upper 1 foot, other than that obtained with spreading equipment.

b. To extent material is available within following limits:

(1) Not less than 4 inches in depth.

(2) Do not exceed 2 feet in depth.

c. Shape cuts, fills, and embankments to contours indicated.

d. Grade to match contours of adjacent areas and permit good, natural drainage.

e. Provide gentle mound over trenches.

5. Maintenance:

a. After topsoil has been spread, clear surface of stones or other objects larger than 1 inch in thickness or diameter and all other objects than might interfere with planting and maintenance operations.

b. Protect topsoiled areas from the elements until grass is established and repair eroded areas as required.

c. Keep paved areas clean. Promptly remove topsoil or other dirt dropped upon surfacing.

3.03. FIELD QUALITY CONTROL:

A. Compaction:

1. Owner may, through services of an independent laboratory, test all backfill and subgrades under this Project to determine conformance with specified density relationships.

2. Method of test may be either of the following at Engineer's option:

a. ASTM D2167.

b. ASTM D2922.

B. Subgrades:

1. Engineer will inspect all subgrades to determine conformance with indicated lines and grades.

2. Subgrades shall have a maximum deviation of not more than 1/2 inch in any 10 feet when tested with a 10-foot straightedge applied parallel with and at right angles to the centerlines of subgrade areas, except that subgrades to receive aggregate type surfacing shall have a maximum deviation of not more than 1 inch.

3.04. PROTECTION OF THE WORK:

A. Maintenance:

1. Protect newly graded and topsoiled areas from actions of the elements.

2. Fill and repair settling or erosion occurring prior to landscaping and reestablish grades to the required elevations and slopes.

B. Correction of Backfill Settlement:

1. Contractor is responsible for correcting any settlement of backfill and damages created thereby within 1 year after acceptance of the Work by the City.

2. Contractor to make repairs within 10 days from and after due notification by City of backfill settlement and resulting damage.

3. Contractor to make own arrangements for access to the site for purposes of repair.

END OF SECTION 02200

SECTION 02222
TRENCHING AND BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.01. SUMMARY:

A. This Section includes:

1. Excavation, sheeting, bracing, and all operations necessary for the preparation of trenches for bedding of pipes and pipe appurtenances, conduit, and buried cable.

2. Pipe embedments and encasements.

3. Backfilling of trenches.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

2. Concrete: DIVISION 3 – SECTION 03300.

1.02. REFERENCES:

A. Applicable Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):

a. T104 – Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

2. American Society for Testing and Materials (ASTM):

a. C33 – Standard Specification for Concrete Aggregates.

b. D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

c. D2167 – Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

d. D2922 – Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

e. D4253 – Maximum Index Density of Soils Using a Vibratory Table.

f. D4254 – Minimum Index Density of Soils and Calculation of Relative Density.

3. Occupational Safety and Health Administration (OSHA):

a. Part 1926 - Safety and Health Regulations for Construction.

4. State of Missouri Standard Specifications for Highway Construction.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Includes, but not limited to, the following:

1. Steel reinforcement for concrete encasement.

2. Steel reinforcement for concrete cradle.

3. Concrete as specified in DIVISION 3 – SECTION 03300.

C. Where selecting an option for excavation, trenching and shoring design from local, state, or federal safety regulations such as "OSHA Part 1926" or successor regulations, which request design by a registered professional engineer, the Contractor shall submit to the Engineer of Record (for information only and not for Engineer approval) the following:

1. Copies of design calculations and notes for sloping, benching, support systems, shield systems, and other protective systems approved by a professional engineer registered in the State of Missouri and obtained by Contractor.

2. Documents provided with evidence of Registered Professional Engineer's seal, signature, and date in accordance with appropriate State of Missouri licensing requirements.

1.04 MEASUREMENT AND PAYMENT

A. All materials encountered in excavations shall be unclassified regardless of type, composition, character, and condition thereof. Any rock encountered shall be handled at not additional cost to Owner.

B. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. GRANULAR PIPE EMBEDMENT:

A. Material:

1. Granular pipe embedment shall be crushed limestone consisting of aggregate particles meeting the requirements of ASTM C33, Gradation 67, 1-inch to No. 8 size.

B. Gradation:

Sieve Size	Percent Passing
1-inch	100
3/4-inch	90-100
3/8-inch	20-55
No. 4	0-10
No. 8	0-5

C. Sand:

1. Sand used for bedding shall be capable of passing a 3/4” sieve with not more than 5% retained on a No. 4 sieve.

2.02. PIPE EMBEDMENT FOR GROUNDWATER BARRIER:

A. Barrier material shall be soil meeting classification GC, SL, CL, or ML-CL or Portland cement concrete.

2.03. TRENCH BACKFILL MATERIALS:

A. Obtain from the following:

1. Trenches and other excavations included in the Project.

2. Borrow from location off jobsite.

3. As specified for pipe embedment.

4. Combination of above.

B. Free from organic matter, refuse, ashes, cinders, frozen, or other unsuitable material.

C. Gravel, rock, or shale particle size limited as follows:

1. Not to exceed 2 inches in greatest dimension within 12 inches of pipe or conduit and upper 18 inches of trench.

2. Maximum dimension one-half the depth of layer to be compacted in other areas.

D. Contain sufficient fine materials to provide a dense mass free of voids and capable of satisfactory compaction.

E. Have moisture content enabling satisfactory placement and compaction.

F. Blended or otherwise processed to provide required gradation and moisture content.

G. Use granular material as specified for pipe embedment and trench stabilization unless otherwise indicated.

2.04. COMPACTED GRANULAR BACKFILL:

A. Compacted granular backfill shall be flowable fill or graded gravel as described below:

1. Flowable fill for compacted backfill may be used for cuts in existing roadway, as approved by the Engineer.

2. Gravel for compacted backfill shall conform to the following gradation.

Sieve Size	Percent Passing by Weight
1-inch	100
3/4 inch	85-100
3/8 inch	50-80
No. 4	35-60
No. 40	15-30
No. 200	5-10

3. The gravel mixture shall contain no clay lumps or organic matter.

PART 3 – EXECUTION

3.01. TRENCHING:

A. Equipment and Methods:

1. Types of Equipment and methods may be at Contractor's option, where structures or other facilities are not endangered.

2. Equipment and methods shall be subject to approval of jurisdictional agency where stability or usefulness of other facilities may be impaired.

3. Perform by hand methods when required to save or protect trees, culverts, utilities, or other structures above or below ground.

4. Maximum length of open trench shall be limited to 100 feet in advance and to 100 feet behind pipe installation, except as approved by Engineer.

5. Remove all rocks and hard objects larger than 1” in diameter for a depth of 6” below bottom of pipe.

B. Side Walls:

1. Make vertical or slope within specified trench-width limitations below a horizontal plane 12 inches above top of pipe.

2. Vertical or sloped (stepped) as required for stability, above a horizontal plane 12 inches above top of pipe.

3. Sheet and brace where necessary.

4. Excavate without undercutting.

C. Trench Depth:

1. Trenches shall be excavated to six (6) inches below the bottom of the pipe when set to establish flowlines to provide clearance for the pipe bell and not less than six (6) inches of granular bedding material.

2. Do not exceed the indicated depth where conditions of bottom are satisfactory. Should the trench be excavated more than six (6) inches below the flowline where the bottom conditions are satisfactory, the Contractor shall use only granular bedding material to establish flowline grades.

3. Increase depth as necessary to remove unsuitable supporting materials.

4. Minimum depth of cover over top of pipe is 42 inches.

5. Maximum depth of cover over top of pressure pipe is 72 inches unless approved by the Engineer.

6. Trenches cut to prevent high spots in pressure pipe.

D. Trench Bottom:

1. Protect and maintain when suitable natural materials are encountered.

2. Remove rock fragments and materials disturbed during excavation or raveled from trench walls.

3. Restore to proper subgrade with trench-stabilization material when over-excavated:

a. Correct when trench is over-excavated without authority or to stabilize bottom rendered unsuitable through negligence or improper operations.

b. Placement of Trench Stabilization Material:

(1) Compact in lifts not exceeding 6-inch loose thickness:

(a) With pneumatic or vibratory equipment.

(b) To density specified for granular pipe embedment.

E. Trench Width:

1. Excavate trench to a width which will permit satisfactory joining of the pipe and thorough tamping of the bedding.

2. Minimum trench width shall be pipe outside diameter plus 12" or 24", whichever is greater.

3. Minimum 6-inch clear space between outside diameter of pipe and trench wall when measured at top of pipe.

4. Maximum trench width shall be pipe outside diameter plus 24".

F. Trenching in Fill Areas: Perform trenching in fill areas only after compacted fill has reached an elevation of not less than 1 foot above the top of the pipe.

G. Pipe Deflection:

1. Pipe shall not be deflected by bending.

2. Maximum joint deflection shall be 1/2 of manufacturer's maximum allowable joint deflection.

3.02. PIPE EMBEDMENTS AND ENCASEMENTS:

A. Granular Pipe Embedment:

1. Place granular embedment as follows:

a. Level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length. Granular pipe bedding material shall be a minimum of six (6) inches below the pipe bell.

b. Form depression under each joint so that no part of bell or coupling is in contact with trench when pipe is placed in position.

c. Add second layer simultaneously to both sides of the pipe with care to avoid displacement.

d. Final depth of granular embedment material shall extend twelve (12) inches above the top of pipe bell.

e. Complete promptly after completion of jointing operations and Engineer approval to proceed.

f. Substitute for any part of earth backfill to within 2 feet of final grade at Contractor's option.

g. Obtain level depth of cover over top of pipe for trench width.

2. Compact granular bedding as follows:

a. In lifts not exceeding 12 inches in compacted depth.

b. Rod, space, or use pneumatic or vibratory equipment:

(1) As required to obtain not less than 80% relative density as determined by ASTM Method D4253 and D4254.

(2) Throughout depth of embedment.

B. Arch and Total Concrete Encasement: Arch encasement is not required unless improper trenching or unexpected trench conditions require its use.

1. Include in locations indicated or where approved by Engineer to correct over-width trench condition.

2. Form to dimensions indicated or construct full width of trench.

3. Start and terminate encasement at a pipe joint:

a. Exclude joints from encasement:

(1) Applies only to joints at either end of encasement.

4. Install keyed construction joints coincident with pipe joints at 30- to 36-foot intervals. Provide separation of at least 75% of cross-section area at construction joints. Do not run horizontal steel through joint.

5. Suitably support and block pipe to maintain position and prevent flotation.

6. Place arch encasement promptly after installation of granular embedment.

7. Protect against damage from heavy equipment with layer of earth. Use hand methods to a horizontal plane 12 inches above top of encasement.

C. Concrete Cradle:

1. Include in locations indicated and where designated by Engineer to reinforce unstable trench bottom.

2. Place on undisturbed trench bottom or on stabilized subbase.

3. Form to dimensions indicated or construct full width of trench.

4. Start and terminate concrete cradle at a pipe joint:

a. Exclude joints from cradle:

(1) Applies only to joints at either end of cradle.

5. Place without horizontal construction joints other than indicated.

6. Suitably support and block pipe to maintain position and prevent flotation.

7. Provide anchorage where indicated.

D. Pipe Embedment for Groundwater Barrier:

1. Include pipe embedment for groundwater barrier at intervals not to exceed 400 feet for pressure lines.

2. Use at impervious trench checks.

3. Shape trench bottom to fit the pipe and backfill throughout depth of trench with compacted impervious materials.

4. Soil shall be compacted to 95 percent of maximum density.

3.03. BACKFILLING:

A. Placement:

1. Complete promptly after Engineer approval to proceed:

a. Upon completion of pipe embedment.

b. Only after concrete encasement has obtained 70% of design strength. Determination of design-strength percentage obtained shall be as specified in DIVISION 3 – SECTION 03300.

2. Use hand methods to a horizontal plane 12 inches above top of pipe-barrel conduit or duct banks.

3. Use approved mechanical methods where hand backfill is not required.

4. Place in layers of thickness within compacting ability of equipment used.

5. Until compacted depth over conduit exceeds 3 feet, do not drop fill material over 5 feet. Then distance may be increased 2 feet for each additional foot of cover. Backfill conduit trenches in layers of 4 to 8 inches.

6. Compact to 80% of maximum density at optimum moisture.

B. Compacted Granular Backfill:

1. Compacted granular or flowable backfill shall be required for the full depth of the trench above the embedment and to within six inches of finish grade or subgrade of pavements in the following locations.

a. Where beneath pavements, driveways, curbs, parking lots, sidewalks.

b. Where in streets, roads, alleys or highway shoulders.

c. Where trench walls are within two feet of the back of the street curb.

2. The backfill shall be compacted by a suitable vibratory roller or platform vibrator to not less than 95 percent of maximum density at optimum moisture content as determined by ASTM D2167, ASTM D1557, or ASTM D2922.

3.04. FIELD QUALITY CONTROL:

A. Concrete: Contractor shall test all concrete for use in encasements, cradles, and concrete cut-off walls to determine conformance with Specifications. Method of test shall be as specified in DIVISION 3 – SECTION 03300.

END OF SECTION 02222

SECTION 02605
UTILITY STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers the following utility structures and related appurtenances:

1. Precast concrete manholes.
2. Thrust blocks.

B. Related Work:

1. Section 02220 - Trenching and Backfilling for Utilities
2. Section 02732 - Pressure Pipe Installation
3. Division 3 - Concrete

C. References:

1. American Society for Testing and Materials (ASTM):

a. ASTM A48 - Specification for Gray Iron Castings.
b. ASTM C478 - Specification for Precast Reinforced Concrete Manhole Sections.
c. ASTM C923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

2. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges:

a. Section 3.7.6-HS Loading.

3. Federal Specifications (FS):

a. FS SS-S-00210A - Sealing Compound, Preformed Plastic for Expansion Joints and Pipe Joints, Type 1, Rope Form.

1.02 SUBMITTALS

A. Submit as specified in Section 01300.
B. Certification that products conform to the applicable requirements of the specified standards.
C. Detailed drawings and product data covering precast concrete sections and related appurtenances.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 PRECAST MANHOLES AND RELATED APPURTENANCES

A. Concrete: Reinforced, 4000 psi. Conform to Division 3.
B. Precast manhole sections shall conform to ASTM C478 except as modified herein. Manufacture in accordance with applicable requirements of Part 3.01.
C. Joint sealant shall conform to FS SS-S-00210A and shall be K.T. Snyder “Ram-Nek”, Hamton-Kent “Kent-Seal No. 2”, or approved equal. Cross sectional area as recommended by manhole manufacturer.
D. Resilient manhole/pipe connectors shall conform to ASTM C923 and shall be A-lok “Manhole Pipe Seal”, Press-Seal “Press Wedge Gasket”, or approved equal.
E. Dampproofing shall be Tnemec “H.B. Tnemecol, 46-465”, Mobile Paints “MO-TAR 47”, or approved equal.
F. Castings shall conform to ASTM A48 Class 35B or better.

1. Specific pattern as noted on the drawings.
2. Frames and covers shall have machined horizontal bearing surfaces to provide even seating.
3. Coat with coal-tar pitch varnish applied at the foundry.
4. Stamped inscription consistent with intended use.

G. Non-shrink grout shall be Grace “Supreme”, Master Builders “Master Flow 713” or “Set Grout”, Five Star Products “Five Star Grout” or approved equal.

PART 3 - EXECUTION

3.01 MANHOLES

A. Design and Manufacture:

1. Precast concrete manhole sections shall be used and shall conform to the dimensions and details shown in drawings and specified herein.
2. Base sections with integral inverts shall be provided with circular openings, with continuous circular, resilient pipe connectors cast into the wall.
3. Base sections without integral inverts shall be provided with horseshoe-shaped boxouts where required for setting over an existing pipeline.
4. Manhole tops shall be eccentric type cone sections or flat slab type as required by the drawings.

   a. Flat slab tops shall be designed and reinforced to withstand AASHTO HS20 highway loading.

5. Adjustment rings shall have a thickness not less than 4" nor more than 12" and shall be fiber reinforced.
6. Provide lifting notches on the inside faces of precast sections to facilitate handling.

   a. Depth of lifting notches shall not exceed 1/2 the wall thickness.
   b. Holes extending through the wall will not be acceptable.

B. Construction:

1. Construct manholes on unyielding, undisturbed subgrade.
2. Set base sections on a leveling course of granular embedment material not less than 4" in thickness as specified in Section 02222.
3. Riser and cone sections shall be joined with a double layer of joint sealant to obtain a pliable watertight joint.

a. Place joint sealant strips end to end. Do not overlap ends.
b. Joint surfaces shall be clean and dry.

4. Lifting notches shall be thoroughly wetted and filled with nonmetallic, non-shrink grout, flush with wall.
5. Apply coal-tar dampproofing to exterior walls on all manholes from base to top. Apply in two coats to a minimum dry film thickness of 8-12 mils per coat. Surface preparation shall conform with coating manufacturer's recommendations.
6. All castings, frames and covers shall be set true to line and proper grade on double layer of joint sealant. Limit adjustment rings to one per manhole.

3.02 THRUST BLOCKS

A. Shall conform to the dimensions and details shown in the drawings.
B. Place thrust blocks against unyielding, undisturbed earth or rock.

1. Install thrust blocks at tees, elbows, bends, and dead ends as required.

3.03 FIELD QUALITY CONTROL

A. Inspection and Rejection:

1. The quality of material, the process of manufacture and the finished manhole sections shall be subject to inspection and approval by the Engineer.
2. Manhole sections shall be subject to rejection for failure to conform to any of the specified requirements. In addition, individual sections may be rejected because of any of the following:

a. Fractures or cracks passing through the manhole wall.
b. Defects that indicate imperfect proportioning, mixing, and molding.
c. Surface defects indicating honeycombed or open texture.
d. Damaged or cracked ends where such damage would prevent making a satisfactory joint.

END OF SECTION 02605

SECTION 02615
PRESSURE PIPE AND FITTINGS

PART 1 - GENERAL

1.01. SUMMARY:

A. This Section includes all pressure pipe, fittings, specials and appurtenances.

B. Related Work Specified Elsewhere:

1. Pipe Installation and Testing – SECTION 02620.

2. Utility Valves and Accessories – SECTION 02640.

1.02. REFERENCES:

A. Applicable Standards:

1. American National Standards Institute (ANSSI):

a. ANSI B16.1 – Cast-Iron Pipe Flanges and Flanged Fittings.

2. American Society for Testing and Materials (ASTM):

a. A307 – Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

b. A536 – Ductile Iron Castings.

c. D2000 – Classification System for Rubber Products.

d. D2241 – Polyvinyl Chloride (PVC) Pressure Rated Pipe.

e. D3139 – Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.

f. F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

3. American Water Works Association (AWWA):

a. C104 – Cement Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water.

b. C110 – Ductile-Iron and Gray-Iron Fittings, 3 Inches through 48 Inches, for Water and Other Liquids.

c. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

d. C150 – Thickness Design of Ductile-Iron Pipe.

e. C151 – Ductile-Iron Pipe, Centrifugally Cast, for Water or Other liquids.

f. C153 – Ductile-Iron Compact Fittings, 3 Inches Through 16 Inches, for Water and Other Liquids.

g. C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fittings, 4 In. Through 60 In.

4. National Science Foundation (NSF):

a. NSF 61 – Drinking Water System Components – Health Affects.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Submit the following for acceptance prior to fabrication:

1. Pipe and joint details.

2. Special, fitting and coupling details.

3. Specifications, data sheets and affidavits of compliance for protective shop coatings and linings.

C. Certificates and Affidavits: Furnish the following prior to shipment:

1. Affidavit of compliance with applicable standard.

2. Test certificates.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. PIPE REQUIREMENTS

A. Furnish pipe of materials, joint types and sizes as indicated or specified.

B. Pipe Marking: All pipe and fittings shall be marked conforming to the applicable standard specification under which the pipe is manufactured.

C. All pipe, fittings, and appurtenances shall contain less than 0.25% lead calculated by weighted average.

2.02. DUCTILE-IRON PIPE:

A. Pipe Design and Manufacture:

1. Ductile-iron pipe shall conform to AWWA C150 and C151 except as otherwise specified.

2. Minimum pressure class for mechanical or push-on joint pipe shall be 350 psi.

3. Minimum pressure class for flanged pipe shall be Class 53.

B. Joints:

1. Push-On:

a. All pipe shall be provided with push-on joints unless otherwise noted.

b. Acceptable Manufacturers:

(1) U.S. Pipe and Foundry Company “Tyton”.

(2) American Cast Iron Pipe Company “Fastite”.

(3) James B. Clow & Sons “Bell-Tite”.

2. Restrained:

a. Provide restrained joint pipe where required.

b. Provide restrained joints of following approved types:

(1) Restrained mechanical joint.

(2) Restrained push-on joint.

(3) Boltless or bolted ball and socket joint.

(4) Anchored couplings.

c. Joint restraint shall provide full circle contact and be EBAA Iron “Megalug” or equal.

C. Fittings:

1. Fittings shall conform to AWWA C110 or C153 and shall have a pressure rating of not less than that specified for pipe.

2. Fittings shall be ductile iron.

3. Fittings for pipe with mechanical joints shall have mechanical joints.

4. Fittings for pipe with push-on joints shall have mechanical joints.

5. Include all specials, taps, plugs, flanges and wall fittings as required.

D. Lining:

1. All pipe, fittings and specials for potable water service shall be cement lined in accordance with AWWA C104. Lining shall extend from edge of plain end to the gasket seat in the bell socket.

E. Coating:

1. All buried iron pipe and fittings shall be coated with manufacturer's standard bituminous coating.

2.03. POLYVINYL CHLORIDE (PVC) PRESSURE PIPE:

A. Design and Manufacture of Pipe:

1. PVC pipe for potable water service 6” to 12” in diameter shall be solid wall conforming to AWWA C900 with minimum wall thickness class DR 18 (235 psi).

2. PVC pipe for potable water service 14” to 24” in diameter shall be solid wall conforming to AWWA C905 with minimum wall thickness class DR 18 (235 psi).

3. PVC pipe for potable water service shall bear the National Sanitation Foundation seal for potable water.

B. Pipe Joints:

1. Joint systems shall be integral bell, gasketed type meeting the requirements of ASTM D3139.

2. Elastomeric gaskets shall be synthetic rubber meeting the requirements of ASTM F477.

C. Fittings:

1. Fittings shall be mechanical joint ductile iron as specified in Part 2.02 of this Section.

2.04. COUPLINGS:

A. Plain End Pipe to Plain End Pipe: Mechanical joint sleeves conforming to Part 2.02 of this Section.

B. Plain End Pipe to Flanged Pipe or Fitting: Flanged coupling adapters complying to the following:

1. Body and End Rings: Ductile iron conforming to ASTM A536.
2. Coupling Gasket: SBR conforming to ASTM D2000.
3. Cross Bolts, T-Bolts and Nuts: High-strength low alloy steel conforming to AWWA C111 or ductile iron conforming to ASTM A536.
4. Flange: Drilling conforming to AWWA C110 and ANSI B16.1 Class 125.
5. Flange O-Ring: NBR (Buna-N).
6. Anchor Studs: Type 416 stainless steel.
7. Finish: Fusion bonded epoxy, NFS 61 certified. All surfaces including flanges.
8. Ford Style FFCA, Romac RFCA, or approved equal.

2.05 POLYETHYLENE ENCASEMENT:

A. Specified in Section 02620 Part 3.06.

PART 3 - EXECUTION

3.01. INSTALLATION: Specified in SECTION 02620.

3.02. FIELD TESTING: Specified in SECTION 02620.

END OF SECTION 02615

SECTION 02620
PIPE INSTALLATION AND TESTING

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes:

1. Handling, installation and testing of pipe, fittings, specials and appurtenances as indicated or specified.

2. Concrete anchor and thrust blocks.

B. Related Work specified elsewhere:

1. Trenching and Backfilling for Utilities: SECTION 02222

2. Utility Structures: SECTION 02605

3. Pressure Pipe and Fittings: SECTION 02615

4. Valves and Accessories: SECTION 02640.

5. Concrete: DIVISION 3 – SECTION 03300

1.02. REFERENCES:

A. Applicable Standards:

1. American Water Works Association (AWWA):

a. C105 – Polyethylene Encasement for Ductile-Iron Pipe Systems.

b. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

c. C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride Pressure Pipe and Fittings.

1.03. DELIVERY, STORAGE AND HANDLING:

A. Handle in a manner to ensure installation in sound and undamaged condition.

1. Do not drop or bump.

2. Use slings, lifting lugs, hooks, and other devices designed to protect pipe, joint elements, linings and coatings.

B. Ship, move, and store with provisions to prevent movement or shock contact with adjacent units.

C. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section will not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that work of which it is a part.

PART 2 – PRODUCTS: Specified in respective Sections.

PART 3 – EXECUTION:

3.01. INSTALLATION - GENERAL:

A. Utilize equipment, methods, and materials ensuring installation to lines and grades indicated.

1. Maintain within tolerances specified or acceptable laying schedule.

a. Alignment: ±1 inch per 100 feet in open cut or tunnel.

b. Grade: ±1 inch per 100 feet.

2. Do not lay on blocks unless pipe is to receive total concrete encasement.

3. Accomplish horizontal and vertical curve alignments with bends, bevels, and joint deflections.

a. Limit joint deflection to one-half of manufacturer's recommended maximum.

b. Use short specials preceding curves as required.

4. Obtain acceptance of method proposed for transfer of line and grade from control to the work.

B. Install pipe of size, materials, strength class, and joint type with embedment indicated or specified for plan location. Install pipe so that the identifying information printed on the pipe is turned right side up and visible from the top of trench. Pipe shall be carefully lowered into trench for installation to prevent damage to pipe.

C. Commence laying at downstream end of line and install pipe with bell ends in direction of laying. Obtain approval for deviations therefrom.

D. Clean interior of all pipe, fittings, and joints prior to installation. Exclude entrance of foreign matter during installation and at discontinuance of installation.

1. Close open ends of pipe with snug-fitting closures.

2. Do not let water control measures prove inadequate.

3. Remove water, sand, mud and other undesirable materials from trench before removal of end cap.

4. Contractor shall be responsible for keeping the interior of all pipelines clean and free of foreign matter until placed in operation.

E. Brace or anchor as required to prevent displacement after establishing final position.

F. Perform only when weather and trench conditions are suitable. Do not lay in water.

G. Observe extra precaution when hazardous atmospheres might be encountered.

H. Tracer Wire: All pressure pipe and water service lines shall be installed with a tracer wire to facilitate future location.

1. Tracer wire shall be a #12 AWG (0.0808" diameter fully annealed, high strength solid copper clad steel conductor, HS-CCS), insulated with a 30 mil, high density, high molecular weight polyethylene (HDPE) insulation rated for direct burial use at 30 volts. HS-CCS conductor shall be at 21% conductivity for locate purposes and have a break load strength of 452 pounds. All wire splices shall be made with either rigid fittings or weatherproof connectors specifically designed for direct burial.

2. Tracer wire for water mains shall be extended to the surface into valve boxes at each valve and fire hydrant isolation valve. Construct additional access points as described herein to obtain a maximum spacing of access points of 1000 feet.

    a. A 4-foot copper grounding rod shall be driven into the trench bottom at 1000 foot spacing and secured to the tracer wire with rigid fittings.

3. Tracer wire for water laterals shall be rigidly affixed to the water main's tracer wire and extended into the meter pit.

3.02. JOINTING:

A. General Requirements:

1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks and structures.

2. Perform conforming to manufacturer's recommendations.

3. Clean and lubricate all joint and gasket surfaces with lubricant recommended by the pipe manufacturer.

4. Utilize methods and equipment capable of fully homing or making up joints without damage.

5. Check joint opening and deflection for specification limits.

B. Special Provisions for Jointing Ductile-Iron Pipe:

1. Conform to AWWA C600.

2. Visually examine while suspended and before lowering into trench.

    a. Paint bell, spigot, or other suspected portions with turpentine and dust with cement to check for cracks invisible to the eye.

    b. Remove turpentine and cement by washing when test is satisfactorily completed.

3.03. CUTTING:

A. Cut in neat manner without damage to pipe.

B. Observe Specifications regarding joint locations.

C. Cut ductile-iron pipe with carborundum saw or other acceptable method per manufacturer's instructions.

1. Smooth cut by power grinding to remove burrs and sharp edges.

2. Repair lining as required and approved.

D. Cut PVC pipe with a fine-toothed saw and miter box or tube cutter. After cutting the end of the pipe shall be dressed to remove all roughness and sharp corners and beveled in accordance with the manufacturer's instructions.

3.04. CLOSURE PIECES:

A. Connect two segments of pipeline or a pipeline segment and existing structures with short sections of pipe fabricated for the purpose.

B. Observe Specifications regarding location of joints, type of joints, and pipe materials and strength classifications.

C. Field-fabricated closures, where required, shall be concrete encased between adjacent flexible joints.

D. May be accomplished with solid sleeve.

3.05. TEMPORARY PLUGS:

A. Furnish and install temporary plugs at each end of work for removal by others when completed ahead of adjacent contract.

B. Plugs:

1. Test plugs as manufactured by pipe supplier.

2. Fabricated by Contractor of substantial construction.

3. Watertight up to 150% of test pressure.

4. Secured in place in a manner to facilitate removal when required to connect pipe.

3.06. POLYETHYLENE ENCASEMENT:

A. Encase ductile iron pipe, fittings, valves, and other appurtenances with polyethylene film as indicated or specified.

B. Materials:

1. Polyethylene material shall be as follows:

a. Conform to AWWA C105.

b. Class C (Black).

2. Adhesive tape shall be as follows:

a. Approximately two inches wide and plastic backed.

b. Capable of bonding securely to metal surfaces and/or polyethylene material.

c. Polyken No. 900, Scotchrap No. 50.

C. Installation:

1. Conform to AWWA C105.

2. Use adhesive tape to fasten polyethylene film in place.

3. Minimize exposure of polyethylene film to sunlight.

4. Wrap ductile iron pipe, valves, fittings, and couplings per AWWA C105 installation standards.

3.07. CONCRETE ANCHOR AND THRUST BLOCKS:

A. Install at tees, elbows, bends, and dead ends where indicated.

B. Place against undisturbed earth or rock.

C. Of design indicated or specified.

1. Removable thrust blocks shall be constructed by utilizing a sheet of 1/4-inch plywood to prevent concrete adherence to pipe, fittings or accessories.

2. Apply two coats of coal tar coating to minimum 20 mils dry film thickness on anchor bars, straps and hardware.

3.08. SEPARATION OF WATER MAINS WITH SANITARY SEWERS:

A. Horizontal Separation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer line. The distance shall be measured edge to edge.

2. If local conditions prevent a horizontal separation of 10 feet, a water main may be laid closer than 10 feet to a sanitary or forcemain provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer line. In areas where the recommended separation cannot be obtained, the sewer line shall be constructed of ductile iron pipe (DIP) with slip-on or mechanical joints or the sewer line continuously encased and be pressure tested to 150 psi to ensure water tightness.

B. Vertical Separation:

1. Where water mains cross sewers or forcemains, the water main shall be laid to provide a minimum vertical separation of 18 inches between the outside of the water main and the outside of the sewer line. This shall apply whether the water main is above or below the sewer line or forcemain.

2. At crossings, the full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than 10 feet. Where a water main crosses under a sewer or forcemain, adequate support shall be provided under the sewer or forcemain to maintain line and grade. In other areas where the recommended separation cannot be obtained, one of the following methods must be required:

a. The sewer or forcemain shall be constructed equal to the water pipe and be pressure tested to 150 psi in accordance with Part 3.12 Field Testing, this Section.

b. Either the water line or sewer line (and forcemain) shall be continuously encased or enclosed in a watertight carrier pipe which extends ten feet (10') on both sides of the

crossing, measured perpendicular to the water main. The carrier pipe shall meet the requirements contained in SECTION 02615.

3.09. FIELD TESTING:

A. Acceptance Tests for Pressure Pipelines:

1. Perform hydrostatic pressure and leakage tests.

a. Conform to the procedures described in AWWA C600 or AWWA C605 depending on the type of pressure pipeline installed, Ductile Iron or PVC, respectively.

(1) As modified herein.

(2) Conform to AWWA C600 procedures for all other pipe material specified.

b. Perform after backfilling but prior to the placement of permanent surfacing.

2. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.

a. Contractor shall furnish and install test plugs.

(1) Including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Bracing against structure walls is not allowed.

(2) Be responsible for any damage to public or private property caused by failure of plugs.

3. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 1 fps.

a. All air shall be expelled from the pipeline prior to testing by use of hydrants or taps. Taps shall be plugged after testing is completed.

4. Contractor shall make arrangements with utility owner for water required for testing.

5. Pressure and Leakage Test:

a. Test pressure shall not be less than 125 psi at the highest point along the test section. However, in no case shall the test pressure exceed the rated working pressure for any joint, thrust restraint, valve, fitting, or other connected appurtenance of the test section.

b. Be at least two-hour duration. Maintain pressure throughout test to within ±5 psi of test pressure.

c. Leakage test shall be conducted concurrently with the pressure test by utilizing a hand or motorized pump equipped with a shut-off valve, pressure relief valve, pressure gauge (for line pressure), and graduated tank for measurement of water loss.

d. Leakage shall be defined as the quantity of water that must be supplied into the new pipeline section (makeup water) to maintain pressure within five (5) psi of the specified test pressure.

e. Acceptable when leakage does not exceed that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

L = maximum permissible leakage (makeup water), in gallons per hour.
S = length of pipe tested, in feet.
D = nominal diameter of pipe, in inches.
P = average test pressure during the hydrostatic test, in pounds per square inch (gauges)

f. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr./in. of nominal valve size shall be allowed.

g. When hydrants are in the test section, the test shall be made against the closed hydrant.

h. Repeat test as necessary.

(1) After location of leaks and repair or replacement of defective joints, pipe, fittings or valves. All visible leaks are to be repaired regardless of the amount of leakage.

(2) Until satisfactory performance of test.

i. Engineer and City shall witness pressure and leakage test.

END OF SECTION 02620

SECTION 02640

UTILITY VALVES AND ACCESSORIES

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes all valves and accessories.

B. Related Work Specified Elsewhere:

1. Pipe Installation and Testing: SECTION 02620.

2. Water Distribution System: SECTION 02665

C. Refer to Standard Construction Details for Valve Installation.

1.02. REFERENCES:

A. Applicable Standards:

1. American National Standards Institute (ANSI):

a. A21.11 – Rubber Gasket Joints Cast & Ductile Iron Pipe.

2. American Society for Testing and Materials (ASTM):

a. A126 – Gray Iron Castings for Valves, Flanges and Pipe Fittings.

b. A536 – Ductile Iron Castings.

3. American Water Works Association (AWWA):

a. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

b. C500 – Metal-Seated Gate Valves for Water Supply Service.

c. C509 – Resilient-Seated Gate Valves for Water Supply Service.

d. C550 – Protective Epoxy Interior Coatings for Valves and Hydrants.

e. C600 – Installation of Ductile-Iron Mains and Their Appurtenances.

f. C515 – Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.

4. National Sanitation Foundation (NSF):

a. NSF 61 – Drinking Water System Components – Health Effects

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Include, but not limited to, the following:

1. Catalog data or illustrations showing principal dimensions, parts and materials.

2. Spare parts list referenced to illustration of parts.

3. Assembly and disassembly or repair instructions.

C. Certificates and Affidavits: Furnish prior to shipment. Include the following:

1. Test certificates.

2. Affidavit of compliance with applicable AWWA Standard.

1.04. DELIVERY, STORAGE, AND HANDLING:

A. Ship all valves with suitable end covers to prevent entrance of foreign material into valve body.

B. Protect valves from damage.

1.05 QUALITY ASSURANCE

A. Insertion type valves shall be installed on the host pipe by a factory trained technician. Provide valve manufacturer's certification prior to initiating the installation.

1.06 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Provide valves of same manufacturer throughout where possible.

B. Provide valves with manufacturer's name, pressure rating and flow direction clearly marked on outside of body.

C. Ends: Provide valves with end connections compatible with adjoining pipe. Unless otherwise specified or indicated, comply with the following:

1. All 3-inch or larger buried valves shall have mechanical joint ends.

2. Mechanical joints shall conform to ANSI A21.11.

3. Provide with duck tipped transition gaskets for adaption to PVC pipe.

D. Rotation:

1. Direction of rotation of the wrench nut to open the valve shall be to the left (counterclockwise).

2. Each valve body shall have cast thereon the word "OPEN" and an arrow indicating the direction to open.

E. Wrench Nuts:

1. Two-inch square wrench nuts shall be provided on all buried valves.

2. All wrench nuts shall comply with Section 4.4.13 of AWWA C500.

3. Contractor shall provide two operating keys (T-bars) for operation of the wrench nuts.

2.02 GATE VALVES:

A. Acceptable Manufacturers:

1. American AVK, “Series 65”.

2. Mueller Company, “2360 Series”.

3. Kennedy Valve, “Model KS-RW.

4. M&H Valve Company, “Style 7000”.

B. All gate valves shall conform to AWWA C515 with design working pressure of 250 psi.

C. All gate valves shall be resilient seated wedge type. Valve body and bonnet shall be cast iron conforming to ASTM A126, Grade B, or ductile iron conforming to ASTM 536.

D. All gate valves shall be non-rising stem type with "O"-ring seals.

E. All gate valves shall be mounted horizontal with operator in the vertical position.

2.03 INSERTION VALVES:

A. Acceptable Manufacturers:

1. Advanced Valve Technologies, AVT™ EZ Valve®.

B. Design and Construction Materials:

1. Designed with a built-in isolation valve that allows valve to be installed under pressure.

2. Designed for installation on ductile iron and PVC pipe materials.

3. Working pressure to 250 psi and shell test pressure to 375 psi.

4. Valve components shall meet AWWA C509-01/C515-15 standards and UL classified to NSF/ ANSI Standard 61.

5. Ductile iron valve body and bonnet.

6. Resilient wedge, non-rising stem (NRS) type with O-ring seals.

7. All exposed fastening hardware shall be stainless steel.

2.04. TAPPING SLEEVE AND ISOLATION VALVE:

A. Tapping Sleeve shall be 18-8 type 304 stainless steel with 360° gasket and removable bolts.

B. Tapping Sleeve outlet flange shall be machined for mating with isolation valve.

C. Tapping Sleeve shall be Ford Style FTSS with stainless steel bolts or similar products from Smith-Blair, Mueller, JCM, or Romac.

D. Isolation Valve shall meet the requirements of gate valves section above, except as modified, herein.

E. Valve shall be Flanged x Mechanical Joint end.

F. Valve shall have an oversized seat opening to allow entry of the tapping machine cutters and permit full diameter cuts.

2.05. VALVE BOXES:

A. Acceptable Manufacturers:

1. Clay and Bailey Manufacturing Company.

2. Clow Corporation.

3. Dresser Industries, Inc.

4. Mueller Company.

5. Neenah Foundry Company.

6. Tyler Company.

B Provide for all buried valves.

C. Design:

1. Boxes shall be three-piece cast-iron slide type with 5-1/4-inch shaft.

2. Provide extension stem to bring operating nut within 3 feet of valve box top.

3. Drop cover shall be marked "WATER".

2.06. SHOP PAINTING:

A. Prepare surfaces and paint or coat all valves, fire hydrants, valve boxes, corporation stops, and all related accessories standard of the manufacturer unless otherwise indicated or specified herein.

B. Paint and coatings shall be suitable for the service intended.

C. Submit type of paint or coating proposed with drawings and data prior to fabrication.

2.07 POLYETHYLENE ENCASEMENT:

A. Specified in Section 02620 Part 3.06.

PART 3 – EXECUTION

3.01. INSTALLATION:

A. Comply with provisions of AWWA C600 and as specified.

B. Thoroughly clean and remove all shipping materials prior to setting. Operate all valves from fully opened to totally closed.

C. Install with anchorage where indicated.

D. Set valve boxes plumb with top flush with finished grade. After box is placed in proper position, place and thoroughly tamp earth fill around box.

3.02. FIELD TESTING:

A. Perform on piping and valves as specified in SECTION 02620.

END OF SECTION 02640

SECTION 02675
DISINFECTION OF PIPING

PART 1 – GENERAL

1.01. SUMMARY:

A. This section covers disinfection of potable water piping with a strong chlorine solution.

B. Disinfecting may be performed concurrently with pressure and leakage testing or after pressure and leakage testing at the Contractor's option.

C. All necessary disinfection equipment and materials shall be provided by the Contractor.

D. Related Work Specified Elsewhere:

1. Pipe Installation and Testing – SECTION 02620.

E. Disinfection work shall conform to the requirement of the latest version of AWWA C651, Standard for Disinfecting Water Mains as modified herein.

1.02. REFERENCES:

A. Applicable Standards:

1. American Water Works Association (AWWA).

a. C651 – Standard for Disinfecting Water Mains.

b. B301 – Standard for Liquid Chlorine.

c. B300 – Standard for Hypochlorites.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Includes, but not limited to the following:

1. Product data: Manufacturer's technical data, specification, safety precautions for chlorine products.

2. Results of bacteriological testing on each section of pipe.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. CHLORINE:

A. Calcium Hypochlorite – 70 percent available chlorine.

B. Liquid Chlorine – 99.5 percent available chlorine.

PART 3 – EXECUTION

3.01. PIPE LAYING:

A. Calcium hypochlorite granules shall be placed in pipe sections during construction.

B. Granules (1/2 ounce) shall be placed at upstream end of the first section of pipe, at the upstream end of each branch line, and at 500-foot intervals. Granules shall not be placed in solvent welded PVC pipe.

3.02. FLUSHING:

A. All water lines shall be thoroughly flushed prior to disinfection at a velocity of not less than 3.0 feet per second. The following table indicates the approximate flow rates required to produce a velocity of 3.0 fps in pipes.

Pipe Diameter (in.)	Flow Rate (gpm)
4	120
6	260
8	470
10	730
12	1,060
16	1,880

B. Contractor shall verify that discharge points have adequate drainage to prevent flooding of surrounding area. Location of discharge point shall be approved by the Engineer/Owner.

C. Flushing shall continue until discharge stream is visibly clean (clear) or three pipe volumes have been replaced, whichever is greater.

3.03. FEEDING:

A. Chlorine gas shall be used only as a solution. Introduction of chlorine gas into pipeline directly will not be permitted. Proper feeding operation shall utilize a chlorinator and booster pump with injector.

B. Calcium hypochlorite shall be made into a solution and pumped into the pipeline with a suitable chemical feed pump.

C. Feed chlorine solution at a point no more than 10 feet downstream from the beginning of the new pipeline.

3.04. APPLICATION:

A. Pipeline shall be disinfected by the continuous feed method.

B. Required chlorine to produce an initial 25 milligrams per liter concentration in 100 feet of pipe by diameter shall be as follows:

Pipe Diameter (in)	100% Chlorine (lb)	1% Chlorine Solution (gal)
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02
12	0.120	1.44
16	0.217	2.60

C. Water from the existing distribution system shall be introduced at a constant measured rate into the newly-laid pipeline. The water shall receive a dose of chlorine which is fed at a constant measured rate.

1. The chlorine feed shall be proportioned to the rate of water flow into the pipeline so that the entering water contains at least 25 mg/L of available chlorine. Chlorine application shall be continuous until the entire pipeline is filled with the chlorine solution.

2. To assure that this concentration is maintained, the chlorine residual should be measured at regular intervals in accordance with the procedures described in the latest edition of Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12 or using appropriate chlorine test kits.

3. Amount of chlorine required for each 100 feet of pipe of various diameters is indicated in Part 3.04.B, this section. Solutions of 1 percent chlorine shall be prepared with calcium hypochlorite by mixing one pound of calcium hypochlorite with 8 gallons of water.

4. During the application of chlorine, valves shall be positioned to prevent chlorine solution from flowing back into the line supplying the water. The chlorinated water shall be retained in the pipeline for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24-hour period, the treated water in all portions of the pipeline shall have a residual of not less than 10 mg/L of free chlorine.

3.05. FINAL FLUSHING:

A. After the applicable retention period, heavily chlorinated water shall be flushed from the pipeline until chlorine residual is no higher than that generally prevailing in the system.

B. Apply a chlorine reducing agent to the water to be wasted to neutralize the chlorine residual.

3.06. BACTERIOLOGICAL TEST:

A. After final flushing and before the water main is placed in service, samples shall be collected from the main and be tested for bacteriological quality in accordance with the Standard Methods for the Examination of Water and Wastewater and shall show the absence of coliform organisms.

1. At least two (2) samples shall be taken from each sampling point with 24 hours of separation between samples. Both sets of samples shall show the absence of coliform organisms.

2. Samples points shall be as follows:

a. At 1200-foot intervals along the water main.

b. At the end of the water main.

c. At the end of each branch water main.

B. No hose or fire hydrant shall be used in collection of samples. A corporation cock may be installed in the main with a copper-tube gooseneck assembly for collecting samples. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

3.07. RE-DISINFECTION (REPETITION):

A. If the initial disinfection fails to produce two successive satisfactory bacteriological samples, the water main shall be re-chlorinated by the continuous-feed method of chlorination until two successive satisfactory results of the bacteriological testing are obtained.

END OF SECTION

SECTION 02950
SEEDING AND MULCHING

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes the following areas of Work:

1. Preparation of areas for seeding and sodding.

2. Seeding.

3. Sodding.

4. Mulching.

5. Fertilizing seed and sod areas.

6. Maintenance.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

1.02. SUBMITTALS:

A. Certificates:

1. Seed and fertilizer shall be accompanied by certificate from vendors certifying they meet requirements of these Specifications, stating botanical name, percentage by weight, percentage of purity, germination, and weed seed for each grass seed species.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. TOPSOIL: Specified in SECTION 02200.

2.02. GRASS SEED:

A. Provide fresh, clean, new crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America and as required below.

B. Be labeled according to the U.S. Department of Agriculture Federal Seed Act and shall be furnished in containers with tags showing seed mixture, purity, germination, weed content, name of seller, and date on which seed was tested:

1. Seed Mixture:

a. Meet the following minimum percentage requirements for purity and mix ratio:

Common and Botanical Name	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (Pounds per Acre)
Alta Fescue or Kentucky 31 Fescue (Festuca Elatior, variation Arundinces)	75	100
Rye Grass (Lolium perenee or L. Multiflorum)	80	25
Kentucky Blue Grass (Pac Pratensis)	75	15
Creeping Red Fescue (Festura Ruera)	85	10
Total		150 Pounds

2. Moldy seed or seed that has been damaged in storage shall not be used.

2.03. LIMING MATERIAL:

A. Shall consist of agricultural liming materials conforming to the Missouri Agricultural Liming Materials Act of 1976.

B. Material used for soil neutralization, unless otherwise specified, shall be agricultural lime with not less than 90% passing the No. 8 sieve and containing not less than 65% calcium carbonate equivalent.

C. Manufacturer's certification shall include the minimum pounds of ENM (effective neutralizing material) per ton of the material to be supplied.

2.05. FERTILIZER:

A. Commercial fertilizer of neutral character, with some elements derived from organic sources, containing not less than 4% phosphoric acid, 2% potassium, and percentage of nitrogen required to provide not less than 1.0 lb. of actual nitrogen per 1,000 square feet of lawn area. Provide nitrogen in form that will be available to the lawn during initial period of growth.

B. Deliver to site in labeled bags or containers.

2.06. MULCH:

A. Vegetative Anti-Erosion Mulch: Seed- free salt hay or threshed straw of wheat, rye, oats, barley, or other approved materials.

B. Wood Cellulose Fiber:

1. Not contain germination or growth-inhibiting ingredients.

2. Dyed an appropriate color to aid in visual inspection.

3. Be easily and evenly dispersed when agitated in water.

4. Supply in packages of not more than 100-pound gross weight, and be marked by the manufacturer to show the air-dry weight content.

2.07. JUTE NETTING:

A. Uniform, open, plain weave mesh of smolder-resistant, unbleached single-jute yarn:

1. Yarn of loosely twisted construction and not vary in thickness by more than one-half its normal diameter.

B. Furnish in rolled strips and as follows:

1. Minimum width of 42 inches.

2. 5.5 wrap yarns by 3.5 filling yarns per inch.

C. Staples of No. 11 gauge or heavier steel wire, U-shaped and not less than 6 inches in length.

PART 3 – EXECUTION

3.01. SOIL PREPARATION:

A. Dispose of any growth, rocks, or other obstructions which might interfere with tilling, seeding, sodding, or later maintenance operations. Remove stones over 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.

B. Thoroughly loosen and pulverize topsoil to a depth of at least 4 inches.

C. Grade planting areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions to meet finish grades. Limit fine grading to areas which can be planted within immediate future.

D. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create a muddy soil condition.

E. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

F. Spread planting soil mixture to depth required to meet thickness, grades, and elevations indicated after light rolling and natural settlement.

G. Allow for sod thickness in areas to be sodded.

3.02. LIMING AND FERTILIZING:

A. Lime and fertilizer shall be applied separately, but may be incorporated into the soil in one operation.

B. Lime and fertilizer shall be applied not more than 48 hours before the seeding or sodding unless otherwise authorized by the Engineer.

C. Contractor shall take a minimum of three samples of the topsoil stockpile and through the services of an independent laboratory have test run to ascertain the rates of application of soil amendments required to provide at least the quantity of effective neutralizing material and fertilizers to nourish new growth.

D. Apply lime and fertilizer at the rates recommended by soil analysis in pounds per acre to prepared seedbeds and sod beds.

E. Incorporate fertilizer into the soil to a depth of at least 3 inches by disking, harrowing, or raking, except where applied hydraulically on slopes steeper than 2 horizontal to 1 vertical.

3.03. SEEDING:

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.

C. Sow not less than rate of 100 pounds per acre.

D. Rake seed lightly into top 1/8-inch of soil, roll lightly, and water with fine spray.

E. Seasonal Limitations:

1. Perform seeding only during the following seasons:

a. March 1 to June 15.

b. September 1 to October 30.

F. Methods of Application:

1. Dry Seeding: Spreader or seeding machine.

2. Hydroseeding: Mix seed, fertilizer and pulverized mulch with water and constantly agitate. Do not add seed to water more than 4 hours before application:

a. On slopes of 3 horizontal to 1 vertical or flatter, apply seed separately from fertilizer. Cover seed with soil to an average depth of 1/2-inch by raking or other approved methods.

b. On slopes steeper than 3 horizontal to 1 vertical, a Type 3 Mulch, meeting the content and application requirements specified in Section 802 of the Missouri Standard Specifications for Highway Construction is required.

3.04 MULCHING:

A. Apply a mulch covering to all seeded areas.

B. Apply vegetative mulch to a loose depth of 1-1/2 inches by means of a mechanical spreader or other approved methods.

C. Apply wood-cellulose fiber mulch hydraulically at the rate of 1,000 pounds per acre:

1. Mulch and seed may be applied in a single operation.

2. Apply mulch to achieve a uniform coverage of the soil surface.

D. Immediately follow the application of the mulch, water the seeded area in one watering, in sufficient amount to penetrate the seedbed to a minimum of 2 inches. Perform so as not to cause erosion or damage to the seeded surface.

E. Protect seeded areas against hot, dry weather or drying winds by applying mulch not more than 24 hours after completion of seeding operations.

3.05. RECONDITIONING EXISTING GRASS AREAS:

A. Recondition existing grass areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition the areas where settlement or washouts occur or where minor regrading is required. Recondition other existing grass areas where indicated.

B. Provide fertilizer, seed or sod, and soil amendments as specified for new grass and as required to provide satisfactorily reconditioned grass growth. Provide new planting soil as required to fill low spots and meet new finish grades.

C. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.

D. Remove diseased or unsatisfactory grass areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other construction materials. Replace with new topsoil.

E. Where substantial grass remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps and cultivate soil, fertilize, and seed. Remove weeds before seeding or, if extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.

F. Water newly planted areas and keep moist until new grass is established.

3.07. PROTECTION:

A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.08. MAINTENANCE:

A. Mow grass to a height of 2 inches as soon as there is enough top growth to cut with mower. Remove no more than 40% of grass leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted.

B. Remove weeds by pulling or chemical treatment.

C. Perform maintenance until the date of final acceptance by City.

D. Seeded Areas:

1. Water as required by good practice and as necessary to obtain a flourishing cover.

2. Repair any portion of the seeded surface which becomes gullied or otherwise damaged, or the seeding becomes damaged or destroyed.

E. Apply second fertilizer application after first mowing and when grass is dry. Use fertilizer which will provide not less than 1.0 pound of actual nitrogen per 1,000 square feet of lawn area.

3.09. ACCEPTANCE OF LAWNS:

A. When lawn Work is Substantially Complete, including maintenance, Engineer and City will, upon request, make an inspection to determine acceptability:

1. Lawn Work may be inspected for acceptance in parts agreeable to City, provided Work offered for inspection is complete, including maintenance.

B. Replant rejected Work and continue specified maintenance until re-inspected by Engineer and City and found to be acceptable.

C. Seeded lawns will be acceptable provided requirements, including maintenance, have been complied with and healthy, uniform, close stand of specified grass is established free of weeds, bare spots, and surface irregularities.

3.10. CLEANUP: Promptly remove soil and debris created by lawn Work from paved areas. Clean wheels of vehicles prior to leaving site to avoid tracking soil onto surfacing of roads, walks, or other paved areas.

END OF SECTION

SECTION 02960
ROADWAY SURFACE, CURB, AND SIDEWALK REPLACEMENT

PART 1 – GENERAL

1.01. SUMMARY

A. This Section includes the replacement of all roadway surfaces, curbs and sidewalks removed or damaged during construction.

1. Concrete pavement, asphaltic pavement, crushed stone pavement, concrete curbs, and concrete sidewalk pavement, whether public or private, which is cut or damaged during construction of the project shall be replaced so as to conform to the lines and grades of the original surface, and shall be of a quality, thickness, and appearance equal to or better than that of the surface as it existed prior to construction.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

2. Trenching and Backfilling for Utilities: Section 02222.

3. Concrete: DIVISION 3 – SECTION 03300.

C. Refer to Standard Construction Details for Pavement Replacement.

1.02 REFERENCES:

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T99 – Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop.

B. American Society for Testing and Materials (ASTM)

1. ASTM D1190 - Specification for Concrete Joint Sealer, Hot-Poured Elastic Type.

2. ASTM D1751 - Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. COMPACTED GRANULAR BACKFILL: Specified in SECTION 02222.

2.02. CONCRETE: Specified in DIVISION 3 – SECTION 03300.

A. Expansion Joint Filler shall be bituminous type, 1/2" thick, conforming to ASTM D1751.

B. Hot-Poured Joint Sealing Compound shall conform to ASTM D1190.

2.03. CRUSHED STONE PAVEMENT:

A. Shall consist of a natural or artificial mixture of hard, durable, uniformly graded particles of coarse and fine limestone aggregate.

B. The natural or processed mixture shall conform to the following:

Sieve Size	Percent Passing
2-inch	100
1-inch	55-85
3/4-inch	50-80
No. 4	30-60

PART 3 – EXECUTION

3.01. GENERAL:

A. Existing paving shall be cut vertically and horizontally to straight lines.

B. The trench shall be backfilled with compacted granular or flowable backfill as specified in SECTION 02222.

C. The level shall be maintained by the Contractor until all secondary settling has occurred. Additional compacted granular backfill may be required to maintain the trench in a suitable condition for traffic during this period.

D. At the time of final repair, the Contractor shall remove sufficient material to allow placement of the roadway, curb or sidewalk surfacing to the thickness specified within this Section.

3.02. ROADWAY SURFACE, CURB AND SIDEWALK REPLACEMENT:

A. Asphaltic Concrete Pavement:

1. Asphalt surfaces, including private drives, shall be replaced with concrete surfacing equal to the thickness of the existing asphalt pavement or 8 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The final pavement repair elevation shall match the elevation of the adjacent pavement.

B. Concrete Pavement:

1. Concrete surfaces, including private drives, shall be replaced with concrete surfacing equal to the thickness of existing pavement or 8 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The final pavement repair elevation shall match the elevation of the adjacent pavement.

C. Crushed Stone Pavement:

1. Crushed stone surfaces, including county roads, and city streets, as well as dirt, or gravel shoulders of paved streets, roads, walking trails, or highways, shall be replaced with crushed stone pavement.

2. The crushed stone shall be placed and compacted in layers to a finished thickness of 6-inches.

    a. The number of layers and the thickness of each layer shall be construed at the Contractor's option subject to the limitation that the compacted thickness of any one course or layer shall not exceed 4 inches.

3. The crushed stone shall be handled in such as manner as to avoid undue segregation.

4. Preliminary compaction shall be performed by means of pneumatic-tire rollers.

5. Finish compaction shall be carried to completion by means of self-propelled steel-wheeled rollers weighting not less than 10 tons.

6. Proper moisture contact shall be maintained by wetting the surface or allowing it to dry as required during shaping and compacting operations.

7. The crushed stone pavement shall be compacted to not less than 95 percent of the maximum density at optimum moisture content as determined by AASHTO T99.

8. The final pavement repair elevation shall match the elevation of the adjacent pavement.

D. Sidewalk Replacement:

1. Sidewalks shall be replaced with concrete surfacing equal to the thickness of existing sidewalk or 4 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The sidewalk repair elevation shall match the elevation of the adjacent pavement.

4. In all cases, sidewalk replacement shall be constructed to meet all ADA requirements.

    a. Contractor is required to install ADA compliant curb ramps at all street or alleyway crossings even if a curb ramp did not previously exist.

E. Curb Replacement:

1. Construct curb and gutter to the cross-section and gutter cross-slope of that removed.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. Place bituminous preformed expansion joints, 1/2" thick and precut to exact cross-section of the curb and gutter at the radii of all changes in direction and at intervals not greater than 50'.

4. Provide contraction joints at intervals not exceeding 6'.

    a. Contraction joints shall consist of a groove at least 1" deep, and 1/8" to 1/2" in width, sawed in the green concrete, or

    b. plane of weakness formed by inserting a removable metal template.

5. Fill all expansion and contraction joints with joint sealing compound, finished slightly concave so as not to overflow the joint.

6. Round all exposed edges of curb and gutter to a 1/2" radius with a suitable edging tool.

7. Exposed surfaces shall be finished smooth and even with a steel trowel and given a light broom finish.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03300
CONCRETE

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and other appurtenant work.

B. All cast-in-place concrete shall be accurately formed and properly placed and finished as shown on the drawings and specified herein.

C. Contractor shall inform the Engineer at least 24 hours in advance of the times and places at which he intends to place concrete.

D. Submit as specified in DIVISION 1 – SECTION 01300.

1.02. REFERENCES:

A. Applicable Standards:

1. American Concrete Institute (ACI):

a. 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

b. 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.

c. 305R – Guide to Hot Weather Concreting.

d. 306R – Guide to Cold Weather Concreting.

e. 308 – Standard Practice for Curing Concrete.

f. 309R – Guide for Consolidation of Concrete.

2. American Society for Testing and Materials (ASTM):

a. A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

b. C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.

c. C33 – Standard Specification for Concrete Aggregates.

d. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

e. C94 – Standard Specification for Ready-Mixed Concrete.

f. C109 – Method of Test for Compressive Strength of Hydraulic Cement Mortars.

g. C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.

h. C150 – Standard Specification for Portland Cement.

i. C172 – Standard Practice for Sampling Freshly Made Concrete.

j. C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

k. C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

l. C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

m. C494 – Standard Specification for Chemical Admixtures for Concrete.

n. C566 – Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

o. C962 – Standard Guide for Use of Elastomeric Joint Sealants.

p. D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

q. D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Submit as specified in SECTION 01300. Include the following:

1. Manufacturer's product data with application and installation instructions for proprietary materials and items including admixtures, patching compounds, waterstops, joint systems, curing compounds and others as requested.

2. Certification that products conform to the applicable requirements of the specified standards.

3. Laboratory test reports for concrete materials and mix design tests as specified.

4. Samples of materials as specified and as otherwise required, including names, sources, and descriptions.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. CONCRETE:

A. Materials:

1. Portland cement shall conform to ASTM C150, Types I, II, or V. One sack of cement shall be considered as one cubic foot of volume or 94 pounds by weight.

2. Fine Aggregate shall be clean natural sand in conformance with ASTM C33.

3. Coarse Aggregate shall be crushed rock, washed gravel, or other inert granular material conforming to ASTM C33. Coarse aggregate gradation shall conform to ASTM C33, Size 57.

4. Water shall be potable, clean, and free from deleterious substances. Non-potable water may be used only if it produces mortar cubes having 7- and 28-day compressive strengths equal to the strength of similar specimens made with potable water, when tested in accordance with ASTM C109.

5. Air-entrainment admixtures shall conform to ASTM C260.

6. Water reducing, retarding, and accelerating admixtures shall conform to ASTM C494.

7. Reinforcing Steel shall conform to ASTM A615.

B. Required Concrete Qualities and Proportions:

1. Concrete Strengths:

a. Structural Concrete: All concrete shall be considered structural concrete unless otherwise indicated or specified and shall be provided to develop a compressive strength of not less than 4,000 psi at 28-days for field-cured cylinders.

(1) Air Content: 3.5% to 6.5% by volume as tested in accordance with ASTM C231.

(2) Cement Content: 564 pounds per cubic yard of concrete (6-sack per cubic yard).

(3) Water-Cement Ratio: Shall not exceed 0.45 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio calculated.

b. Fill Concrete: Shall be provided to develop a compressive strength of not less than 2,500 psi at 28-days for field-cured cylinders.

(1) Air Content: 3.5% to 6.5% by volume as tested in accordance with ASTM C231.

(2) Water-Cement Ratio: Shall not exceed 0.55 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio calculated.

2. Mix Proportions:

a. Concrete shall be proportioned to conform to ACI 211.1

b. Mix proportions for all concrete, unless otherwise specified, shall be selected preferably on the basis of field experience; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design.

c. Slump of concrete shall be the minimum that is practicable and shall conform with the following:

(1) Footings, Heavy Walls, Piers, Buttresses shall be a maximum of 4” and a minimum of 2”.

(2) Light Walls, Slabs, Beams, Columns, Stairs shall be a maximum of 5” and a minimum of 3”.

(3) Concrete floors with monolith finish shall be a maximum of 3" and a minimum of 2".

C. Mixing Concrete:

1. Ready-Mixed Concrete shall conform with ASTM C94.

2. Batch Mixing at Site:

a. Concrete shall be mixed in a batch mixer, conforming to the requirements of the Mixer Manufacturer's Bureau of the Associated General Contractors of America. The mixer shall bear a manufacturer's rating plate indicated the rated capacity and the recommended revolutions per minutes.

(1) Mixer shall be equipped with a suitable charging hopper, water storage tank, and a water-measuring device.

(2) The mixer shall be clean and the pickup and throw-over blades shall be replaced when they have lost 10 percent of their original depth.

b. The batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to ensure that additional water cannot be added during mixing and that the batch cannot be discharged until the required mixing time has elapsed.

c. Each batch of two (2) cubic yards or less shall be mixed for not less than 11.5 minutes. The minimum mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.

3. Admixtures: Shall be as specified in Part 2.01.A.5 and 2.01.A.6, this Section.

4. Retempering: Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retempered, but shall be discarded.

5. Indiscriminate addition of water to increase slump or workability shall be prohibited. When concrete arrives at the project with slump below that suitable for placing, water may be added only by authorized representatives of the concrete supplier, and then only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded.

2.02. GROUT

A. Non-Shrink, Non-Metallic Grout:

1. Shall be used unless otherwise indicated or specified.

2. Required for setting equipment recommended by the manufacturer to be set with non-shrinking grout and in other places as indicated or required.

3. Shall be manufactured by one of the following:

a. W.R. Meadows – 588-10K.

b. L&M Construction Chemicals – Crystex.

c. Five Star Products – Five Star Grout.

d. Master Builders Solutions by BASF – Masterflow 713.

e. Sauereisen Cements Company – No. F-100.

f. Cormix International – Congrout GP.

4. Prepare and place conforming to manufacturer's recommendations.

B. Grout for Dry Packing:

1. Volume: 1-part Portland cement to 2-parts sand.

2. Keep water to a minimum as required for placing by the dry packing method.

3. Place after the mixed grout has been allowed to stand for 2-hours.

4. The sand and cement shall be as specified for concrete.

C. Grout for Bonding:

1. Proportion (by weight): 1-part cement to 1-1/2 parts sand.

2. Keep water to a minimum.

2.03. CONCRETE ACCESSORIES:

A. Waterstops:

1. Serrated virgin polyvinyl chloride equal to one of the following:

a. Tamma Industries – Horn/Durajoint Type 3.

b. Vulcan Metal Products Company – Vulco 8013.

2. Plastic Waterstop: Performed plastic waterstop as manufactured by Synko-Flex Products Co.

B. Expansion Joints:

1. Expansion Joint Filler: Premolded cork of thickness indicated and conforming to ASTM D1752, Type III, self-expanding cork. Use at all locations unless indicated to be asphalt-impregnated fiber.

2. Expansion Join Filler: Preformed asphalt-impregnated fiber of thickness indicated and conforming to ASTM D1751.

3. Bond Breaker: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer for preventing sealant from adhering to joint filler materials or joint surfaces at the bottom of the joint where such adhesion would result in sealant failure.

4. Sealant Backer Rod (closed cell, compatible with sealant):

a. Bostick Construction Products Division.

b. Chem-Calk – Backer Rod.

c. Dow Chemical Company – Ethafoam.

d. Hercules Foam Backer Rod.

e. Sonneborn Building Products – Sonofoam.

f. W.R. Meadows – Sealtight Backer Rod.

5. Joint Sealant:

a. Two-component polysulfide system as manufactured by one of the following:

(1) A.C. Horn – Hornflex L.

(2) Pecora – Synthacalk GC-2.

PART 3 – EXECUTION

3.01. Preparation for Concrete Placement:

A. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

B. Openings Through Concrete: Provide openings through concrete as indicated and for the proper installation of all equipment, piping, wiring, ductwork and similar items installed included in the Work.

C. Installation of Embedded Items:

1. Provide for accurate installation of embedded items included in the Work.

2. During cold weather, protect embedded items from moisture which may freeze, expand, and crack the concrete structure.

3. Grease or tape anchor bolt threads to protect from concrete splatter.

D. Formwork:

1. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions shown on the drawings.

2. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

3. Forms shall be thoroughly cleaned and oiled before concrete is placed and shall not be removed until the concrete has hardened sufficiently to support all loads without damage.

E. Reinforcement:

1. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while concrete is being placed and compacted.

F. Installation of Joints:

1. Construction Joints:

a. Location:

(1) Obtain Engineer's approval of joints located by Contractor prior to preparation of reinforcing steel shop drawings.

b. Preparation and Installation:

(1) Clean and break laitance or other foreign material from bonding surface.

(2) Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.

(3) Provide waterstops and shear keys as indicated or specified and as required in any new construction joint requested by Contractor.

c. Waterstops:

(1) Install conforming to manufacturer's standard installation instructions.

(2) All joints and splices of PVC waterstop shall be 100% fused.

2. Expansion Joints:

a. Install filler, backer rod and sealant in strict conformance with manufacturer's written instructions.

b. Reinforcing steel shall not extend through expansion joints unless indicated otherwise.

c. Attach rigid joint filler to the face of the joint prior to placing adjacent concrete. The filler shall occupy the entire width of the joint.

d. Install sealant backer rod for sealant except where indicated to be omitted. Install bond breaker where indicated.

e. Clean joint surfaces immediately before application of sealant.

f. Install joint sealants to conform to ASTM C962. Tool sealant to provide smooth, uniform bead with a slightly concave surface, eliminate air pockets, and insure sealant contact and adhesion with sides of joint.

g. Protect joints from moisture and ice during freezing.

3. Contraction Joints: As specified in Part 3.03 - Finishing, this Section.

G. All embedded items, formwork, reinforcement, and joints shall be reviewed by the City before any concrete Is placed.

3.02 PLACING OF CONCRETE:

A. Conventional Placing:

1. General Requirements:

a. Conform to ACI 304.

b. Bonding surfaces, including reinforcement, shall be clean, free of laitance and foreign materials.

c. Face horizontal bonding surfaces with 1-inch-thick coat of fresh "grout for bonding". Wet all other surfaces.

d. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.

e. Use forms for all concrete except where otherwise indicated or specified.

f. Do not place concrete that has partially hardened or has been contaminated by foreign materials.

g. Prevent mud or foreign materials from entering the concrete or forms during placement operations.

h. Where required, a polyethylene vapor barrier or 4 mil. thickness, or approved equal, shall be installed in accordance with the manufacturer's recommendations. A layer of sand shall be placed on the granular fill to protect the vapor barrier during placement of concrete.

2. Conveying:

a. Convey concrete from the mixer and deposit in place by methods which will prevent the segregation or loss of materials.

b. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end.

c. Aluminum conveying equipment shall not be used.

3. Depositing:

a. Place concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness with the section.

b. Maximum free drop of concrete and grout for bonding shall be 5 feet, in walls 10 inches or less in thickness, with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10 feet.

c. When moisture barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier.

4. Consolidation of Concrete:

a. Consolidate concrete in conformance with ACI 309. Characteristics and application of concrete vibrators shall be as set forth in Table 5.1.4.

b. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep on hand adequate standby equipment in good operating condition.

c. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled, as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate.

d. Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer. Do not drag vibrators through the concrete. Insert and withdraw vibrator slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by use of a vibrator.

e. Consolidate concrete layer to full depth when using a surface vibrator. Use thinner layers or a more powerful vibrator if necessary to achieve complete consolidation.

f. Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.

5. Time Requirements:

a. Place concrete at a sufficient rate to assure that lifts below have not taken initial set before fresh concrete is deposited.

b. Place concrete within 45 minutes after mixing. This period may be extended to 1 hour and 30 minutes provided that the combined air temperature, relative humidity, and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation, and that the specified mixing water is not exceeded. Concrete which has partially set shall not be re-tempered but shall be discarded.

6. Placing Concrete at Joints:

a. Bed horizontal joints with 1 inch of grout for bonding.

b. Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids.

c. Take special precautions to avoid bending or displacing waterstop while placing concrete around it.

d. Delay construction at a joint a minimum of 16 hours where placement is continued past joint, except where otherwise indicated.

3.03. FINISHING:

A. Unformed Surfaces:

1. Screed Finish:

a. Use as first stage for all concrete finishes.

b. Use as final finish on surfaces that will be covered by additional concrete, grout placement, or mortar setting bed except as otherwise specified.

c. Immediately after screeding, use a wood float, darby, or bullfloat to eliminate high and low spots and to embed large aggregate. This shall be done in a manner to produce even, uniform surfaces so that surface irregularities do not exceed 3/8 inch in 10 feet when used as final finish.

2. Floated Finish:

a. Use as second stage of broomed, troweled, or magnesium-troweled finish.

b. Float with mechanical float. Hand floating will be permitted only in areas inaccessible to mechanical float.

c. On surfaces not to receive troweled or magnesium-troweled finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8 inch in 10 feet, except at floor drains.

3. Broomed Finish:

a. Use as final finish on all outdoor slabs including pavements and sidewalks.

b. After floated finish, draw a stiff bristle broom across the surface making uniform corrugations, perpendicular to the direction of traffic, not more than 1/16 inch deep.

4. Troweled Finish:

a. Use as final finish on all other unformed surfaces not otherwise indicated or specified.

b. Trowel with steel trowel, mechanical or hand, to obtain a smooth, dense finish. The final troweling shall be done after the concrete has become hard enough so that no mortar adheres to the edge of trowel and a ringing sound is produced as the trowel passes over the surface.

c. Do not trowel before surface water has evaporated or has been removed with a squeegee.

d. Finish to a true uniform surface so that surface irregularities do not exceed 1/8 inch in 10 feet, except at floor drains.

e. Do not add sand or cement to the floor surface.

5. Magnesium-Troweled Finish:

a. Perform as specified in Part 3.03.A.4 - Troweled Finish, this Section, except use a magnesium trowel by hand instead of a steel trowel to obtain a dense, but not slick, finish.

b. Use where floor will receive protective coating after curing.

6. Contraction Joints:

a. Locate as indicated.

b. Maintain true alignment with straightedge.

c. Joints shall be grooved except where sawed joints or preformed joints are indicated.

d. Grooved Joints:

(1) Perform during the finishing process.

(2) Width of groove shall not exceed 1/4 inch.

(3) Depth of groove shall be at least 1 inch.

e. Sawed Joints:

(1) Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur. (Usually required 4 to 12 hours after finishing.)

(2) Make joints approximately 1/8 inch wide with depth as indicated.

(3) Seal with the same type sealant specified for expansion joint sealant.

B. Formed Surfaces:

1. Repair surface defects as specified in Part 3.03.C - Repair of Defective Surfaces, this Section.

C. Repair of Defective Surfaces:

1. Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area.

2. Repairing:

a. Repair as soon as forms have been removed.

b. Chip surface back to minimum depth of 1/2 inch, chip edges perpendicular to surface, pre-wet depression and brush with neat cement immediately before patching.

c. Patch surfaces using stiff mortar with same sand-cement radio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.

d. Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes.

e. Moist-cure for 3 days or use curing compound.

f. Engineer shall be notified of areas containing defects or where reinforcing steel is exposed, prior to determination of repair method.

3.04 CURING:

A. Cure all concrete by one of the following methods in accordance with ACI 308:

1. Leaving in forms for a minimum of 7 days. Keep formwork wet to prevent drying of concrete surfaces.

2. Use of saturated bats, soaker hoses, or sprinkler for a minimum of 7 days. Keep concrete continuously wet.

3. Using one coat of a liquid membrane forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.

4. Using polyethylene sheets applied in full contact with surfaces.

5. Curing of concrete during hot or cold weather shall conform to Parts 3.05 and 3.06 - Hot Weather Concreting and Cold Weather Concreting, respectively, this Section.

3.05 HOT WEATHER CONCRETING:

A. Follow the recommendations of ACI 305 if any of the following conditions occur:

1. When the temperature is 90°F or above.

2. When the temperature is likely to rise above 90°F within the 24-hour period after concrete placement.

3. When there is any combination of high air temperature, low relative humidity, and wind velocity which would impair either concrete strength or quality.

B. Concrete shall have a maximum temperature of 85°F during placement.

C. Dampen subgrade and forms with cool water immediately prior to placement of concrete.

D. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305 (Figure 2.1.5) does not exceed 0.2 pounds per square foot per hour.

E. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.

F. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.

G. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water-saturated material to all exposed surfaces; horizontal, vertical, and otherwise. After the 24-hour interval, continue curing using one of the following methods:

1. Moist curing for 6 days.

2. Application of one coat of curing compound conforming to ASTM C309, Type 2.

3. Application and maintenance of curing paper or heat-reflecting plastic sheets for 6 more days.

H. Begin curing formed concrete immediately after placing. Curing shall consist of keeping forms continuously wet for 24 hours. Thereafter, continue curing using one of the following methods:

1. Loosen forms and position soaker hose so that water runs down along concrete surfaces. Continue for 6 days.

2. Strip forms and apply curing compound conforming to ASTM C309, Type 2. Do not allow concrete surfaces to dry prior to application of curing compound.

3.06 COLD WEATHER CONCRETING:

A. When the temperature is 40°F or is likely to fall below 40°F during the 24-hour period after concrete placement, follow the recommendations of ACI 306 to prevent loss of concrete strength or quality.

B. Minimum temperature for concrete as mixed shall be as indicated on lines 2, 3, and 4 of Table 1.4.1 of ACI 306. Maximum temperature for concrete as mixed shall be 10°F greater than the corresponding minimum temperature.

C. Place and maintain concrete so that its temperature is never less than the temperature indicated on line 1 of Table 1.4.1 of ACI 306. Maintain the required temperature for the time duration indicated on Table 1.4.2 of ACI 306.

D. Monitor temperature of concrete in place at corners or edges of formwork as applicable.

E. Air Heaters:

1. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines.

2. Oil- or coke-burning salamanders will not be permitted.

3. Heaters shall be ultramatic portable heaters made by the Union Chill Mat Company or Engineer approved equal.

4. Personnel shall be present at all times to maintain safe, continuous operation of heating system.

F. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur.

G. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.

H. The maximum allowable temperature drop during the first 24-hour period after protection is discontinued shall be as indicated on line 5 of Table 1.4.1 of ACI 306.

I. Cure the concrete in accordance with Chapter 5 of ACI 306.

3.07 LOW-STRENGTH CONCRETE:

A. Low-Strength Concrete:

1. Defined as either:

a. Concrete whose average, of any sets of three consecutive 28-day strength tests, is below the required 28-day strength.

b. Concrete whose individual 28-day strength test (average of two cylinders) is more than 500 psi below the required 28-day strength.

2. Should concrete meet either definition of low-strength concrete as a minimum, the Contractor shall take the following steps:

a. Increase the cement content. The increase shall be based on a statistical evaluation of the strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature as follows:

(1) If sufficient concrete has been furnished to accumulate 30 tests, these should be used to establish a new target average strength in accordance with ACI 318, Section 4.3.1.
(2) If less than 30 tests have been made, the new target average strength should be at least as great as the average strength used in the initial selection of the mix proportions. Increase the target average strength based on a statistical evaluation of the available strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature. If the statistical average equals or exceeds the initial mix-design level, a further increase in the average level is required.

b. Remove and replace with acceptable concrete when the quality and location of the concrete is such that the Engineer considers the strength or durability of the structure is impaired and so orders.

B. Potentially Low-Strength Concrete: Defined as concrete whose 7-day test (average of two cylinders) is less than 70% of the specified minimum 28-day compressive strength.

3.08 TESTING:

A. Field Testing of Concrete Plant and Mixing Trucks:

1. The concrete plant shall be inspected and tested to ensure conformance with ACI 304 and the "Concrete Plant Standards of the Concrete Plant Manufacturers Bureau". The scales shall be calibrated at the initial setup and at 3-month intervals thereafter.

2. Mixing trucks shall be inspected and tested to ensure conformance with ACI 304 and "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau" of the National Ready-Mix Concrete Association. Tests shall be done at initial setup and every 3 months thereafter.

3. Submit test reports when requested.

B. Field Testing of Concrete and Making of Concrete Test Cylinders:

1. Contractor shall furnish on request test equipment, test cylinder molds, and certified personnel to perform all required field tests, make the required concrete test cylinders, and deliver test cylinders to the testing laboratory. The prescribed tests shall be made in the presence of or with the concurrence of the City.

2. Field testing personnel shall be on-site throughout placement of concrete.

3. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172 except samples for slump, air and temperature tests shall be taken from the first portion of the batch discharge. Samples shall be taken at random and at the point of truck discharge.

a. Moisture content, ASTM C566. Perform this test a minimum of twice a day and adjust the amount of mix water to compensate for the moisture content of the aggregates.

b. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (four cylinders) from each day's placement for each 100 cubic yards or fraction thereof.

c. Slump test conforming to ASTM C143. Perform tests on the first batch produced each day, for every 50 cubic yards or fraction thereafter, and with every set of test cylinders. Additional tests shall be run when directed by the Engineer.

d. Air content test conforming to ASTM C231. Perform for first batch of day and with each set of test cylinders.

e. The batch of concrete being tested for slump or air content shall not be placed until acceptable results are obtained.

f. Discard concrete used for slump and air tests.

g. Perform concrete and air temperature tests for first batch of day and with each set of test cylinders. Additional readings shall be taken when directed by the Engineer.

h. Any batch of concrete with slump or air content not in conformance with Specifications shall be rejected.

i. Furnish slump, air content, and temperature test results to the testing laboratory for inclusion in the cylinder rest reports.

C. Laboratory Testing of Aggregates and Concrete During Construction:

1. An independent testing laboratory will be selected and paid by the Developer/Owner to perform the required laboratory tests and statistical evaluations of aggregates and concrete being used in the Work.
2. Laboratory will cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders 7 days of age and two at 28 days of age.

3. Contractor shall have the right to observe all phases of concrete cylinder curing and testing. Should Contractor observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify Developer/Owner in writing.

4. Contractor shall assist laboratory in obtaining Samples of fine and coarse aggregate for testing.

5. The Contractor shall make arrangements with the testing laboratory to receive copies of test reports. The cost of providing a maximum of two copies of each report to the Contractor will be paid by the Developer/Owner.

6. Should the test results indicate low strength concrete as defined in Part 3.07 - Low-Strength Concrete, this Section, Contractor shall take immediate corrective action.

7. Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to Engineer's approval.

8. Should the material tests taken during construction indicate nonconformance with the Specifications, the Contractor shall take immediately corrective action.

END OF SECTION

SECTION 13324
ELECTROMAGNETIC FLOW METERS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers equipment, material and service requirements for furnishing, installing, and acceptance testing electromagnetic flow meter(s) and appurtenances. The principal items shall include the following:

1. Measuring Tube.
2. Electronic Register.
3. Ancillary AMR Device.

B. Related work:

1. Section 02605 - Utility Structures
2. Section 02615 - Pressure Pipe and Fittings
3. Section 02620 - Pipe Installation and Testing

C. References:

1. American National Standards Institute (ANSI).

a. B16.5 – Pipe Flanges & Flanged Fittings.

1.02 SUBMITTALS

A. Submit as specified in Section 01300.
B. Furnish manufacturer's catalog data and illustrations showing principal dimensions, parts, and materials. Include technical description and specifications.
C. Furnish corrosion protection system details.
D. Furnish application performance guarantee.
E. Furnish installation/operating instructions and service manuals for the specific equipment provided.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 ELECTROMAGNETIC FLOW METER

A. Acceptable Manufacturers:

1. Sensus Hydroverse.
2. Substitutions not permitted.

B. General:

1. Flow meter shall be of the electromagnetic type and provide for measurement of flow in full pipes.
2. Flow meter shall operate by means of pulsed D.C. coil excitation and be auto-zeroing.
3. Flow meter shall be obstructionless and installed between two pipe flanges having the same nominal diameter as the flow meter end connections.
4. Meter size as indicated on the drawings. Reduced bore 8-inch and smaller, full bore 10-inch and larger.
5. Capable of indicating and totalizing.
6. Compatible with Sensus FlexNet® AMR network.

C. Service Parameters:

1. Measurement of potable water.
2. Operate on battery power.
3. Operating air temperature: -4° to 140° F.
4. Operating water temperature: 33° to 122° F.
5. Maximum operating pressure: 232 psi.
6. Low-flow cut-off 0 - 10% of maximum flow.
7. Accuracy of ± 0.2%.

D. Measuring Tube:

1. Reduced port type constructed of carbon steel with flanges conforming to ANSI B16.5 Class 150 standard.
2. Provide Polyurethane or Neoprene liner.
3. Provide grounding by means of 316 stainless grounding electrodes or grounding rings.
4. Capable of indefinite submergence up to 30 feet without degradation.
5. Provide corrosion-resistant protective coating on sensor exterior, applied in accordance with the coating system manufacturer's recommendations.

E. Electronic Register:

1. Provide sensor mounted register with all necessary circuitry to utilize the signal from the sensor.
2. Equip with an LCD display showing actual flow in GPM and totalized flow in gallons. Display shall also indicate settings and faults.
3. Provided with an automatic zero setting, an auto-range function and low flow cut-off.
4. Capable of detecting the following fault conditions:

    a. Loss of DC current to the coil.
    b. Load on the current output.

F. Batteries:

1. Type: Primary lithium cells based on Lithium-Thionyl chloride chemistry.
2. Cylindrical bobbin type construction.
3. Nominal Voltage: 3.6 V
4. Non-flammable electrolyte.
5. Compliant with IEC 60086-4 safety standard and IEC 60079-11 intrinsic safety standard.
6. UL 1642 certified.
7. Field replaceable.
8. Equal to SAFT LS 33600.

2.02 AMR DEVICE

A. Acceptable Manufacturers:

1. Sensus Model 520M Smartpoint.
2. Substitutions not permitted.

B. Device to be installed in pit set environment with wired connection to flow meter register.

1. Provide 22 AWG solid wire 3-conductor shielded cable including all necessary tools and materials required for installation.
2. Cable, tools, materials, and installation procedures as recommended by Sensus.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install flow meter tube and register as indicated and as recommended by the manufacturer. Maintain straight pipe lengths of not less than 5 pipe diameters upstream and 2 pipe diameters downstream of meter.
B. Provide all necessary materials and components as required for a complete and operable installation.

3.02 FIELD TESTING

A. Manufacturer's Services:

1. Provide equipment manufacturer's services at the job site to check installation, to perform initial start-up and operational test, and to instruct Owner's personnel in the proper operation and maintenance of the equipment.
2. Services to be performed by an authorized representative of the flow meter manufacturer.

B. Operational Test:

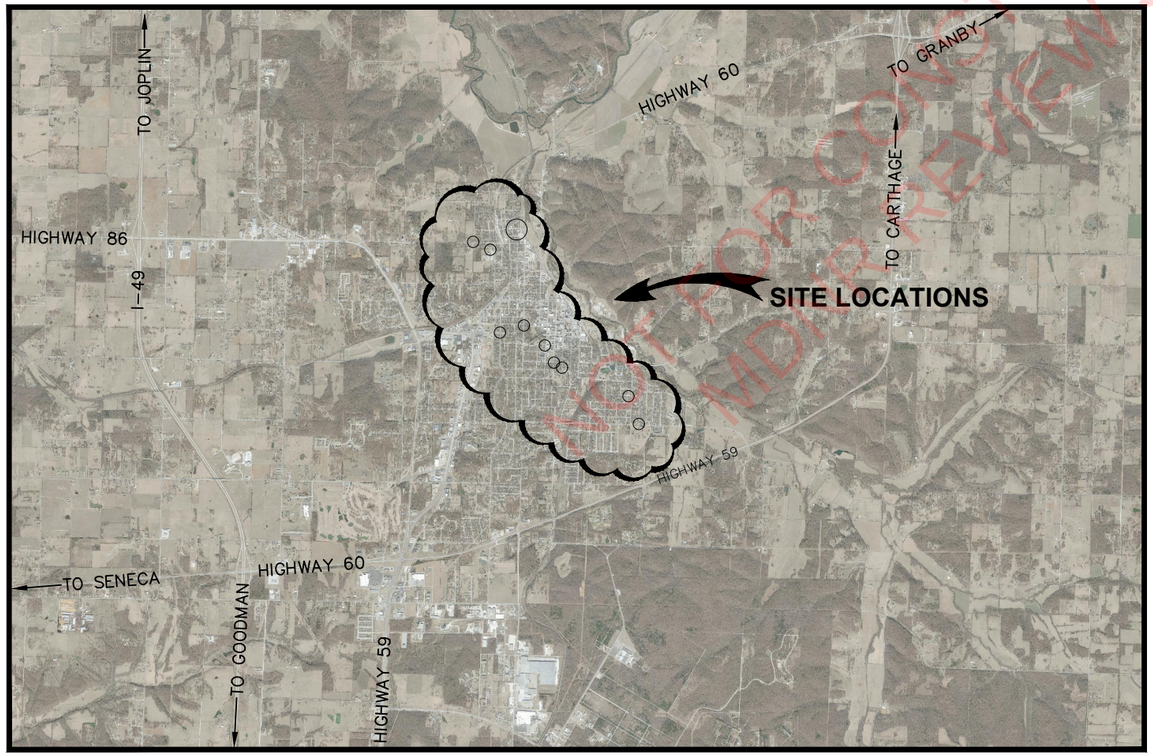
1. Prior to acceptance, an operational test of the flow meter shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Operational test shall demonstrate that the equipment is not defective; is in safe and satisfactory operating condition; and conforms with the specified operating conditions.
2. Make all necessary equipment adjustments and corrective work indicated by tests. Repeat operational tests as necessary.
3. Submit two copies of written report stating operations performed and results obtained.

END OF SECTION 13324

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\1 LOCATION MAP & INDEX.DWG

NEOSHO MASTER WATER METER INSTALLATION

CITY OF NEOSHO



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N.T.S.

INDEX TO DRAWINGS	
DRAWING TITLE	DWG. NO.
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WATER METER A & B PLAN	3
WATER METER C & D PLAN	4
WATER METER E PLAN	5
WATER METER G & H PLAN	6
WATER METER I PLAN	7
WATER METER K PLAN	8
DETAILS	9

NOTE: WATER METER F AND J OMITTED FROM PROJECT

811 Know what's **below.** **Call** before you dig.

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI · THOMAS ERWIN HANCOCK · NUMBER E-30067 · REGISTERED PROFESSIONAL ENGINEER

04-06-2021

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY: CSJ
CKD. BY: JTB
APPD. BY: TEH
DATE : APRIL 2021

LOCATION MAP & INDEX
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 1

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\2 OVERALL SITE PLAN.DWG

OWNER/DEVELOPER:

CITY OF NEOSHO
203 E. MAIN ST.
NEOSHO, MISSOURI 64850
417-451-8050

SITE SUMMARY:

TOTAL AREA = 0.10 ACRES± (11 SITES)
TOTAL DISTURBED AREA = 0.10 ACRES

BENCHMARKS:

1. TEMPORARY BENCHMARK NO. 1 – RR SPIKE IN PP
   ELEVATION = 997.73 DATUM = NAVD 1988 AND MNDR MONUMENT VASSAR, PID GG0589.

REFERENCE POINTS:

1. EXISTING 60d NAIL (SURVEY CONTROL POINT #213)
   N=255659.71
   E=2824745.50
   EL=1056.97
2. EXISTING 60d NAIL (SURVEY CONTROL POINT #214)
   N=255819.65
   E=2824746.65
   EL=1054.48

PROJECT DATUM:

HOR: MISSOURI STATE PLANE COORDINATE SYSTEM OF 1983, WESTERN ZONE BY USE OF MODOT CONTINUOUSLY OPERATING GNSS RTK NETWORK, BASED ON ALLGEIER, MARTIN AND ASSOCIATES TOPOGRAPHIC SURVEY, PROJECT NO. "NEOS7000114", DATED DECEMBER 3, 2020.
VER: NORTH AMERICAN VERTICAL DATUM 1988 BY USE OF MODOT CONTINUOUSLY OPERATING GNSS RTK NETWORK & MDNR MONUMENT VASSAR, PID GG0589.

FLOOD HAZARD DETERMINATION:

NO PART OF THIS PROJECT LIES WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA.

EROSION & SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING EROSION AND DISCHARGE OF SEDIMENT FROM THE SITE AT ALL TIMES DURING CONSTRUCTION IN ACCORDANCE WITH CITY OF NEOSHO STANDARDS. THE CONTRACTOR SHALL PROVIDE NECESSARY MEASURES DURING ALL PHASES OF HIS OPERATIONS REGARDLESS OF WHETHER THEY ARE SPECIFICALLY NOTED ON THIS PLAN AND SHALL MAINTAIN AND REPLACE CONTROLS AS NECESSARY DURING THE COURSE OF HIS OPERATIONS.
2. CONTRACTOR SHALL PROTECT ANY STORM INLETS FROM SEDIMENT THAT TAKE STORM WATER FROM THE AREA OF CONSTRUCTION.
3. TEMPORARY CONSTRUCTION ENTRANCE/EXIT(S), SILT FENCES, DITCH CHECK DIKES OR OTHER INITIAL SEDIMENT CONTROLS MUST BE INSTALLED PRIOR TO ANY OTHER WORK.
4. WHEELS MUST BE CLEANED TO REMOVE MUD PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES OR SITE ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
5. THE CONTRACTOR SHALL CLEAN STREETS BOTH INTERIOR AND ADJACENT TO THE SITE, AS NEEDED AFTER EACH RAINFALL, AND AT THE END OF CONSTRUCTION.
6. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST DURING CONSTRUCTION AND SHALL WATER CONSTRUCTION AREAS WHENEVER CONDITIONS WARRANT.
7. THE CONTRACTOR SHALL RETAIN FLOATABLE WIND BLOWN MATERIALS ON SITE BY STORING ALL TRASH AND BUILDING MATERIAL WASTE IN ENCLOSURES UNTIL PROPER DISPOSAL AT AN OFF-SITE FACILITY. CONTRACTOR TO CHECK ADJACENT AREAS DAILY AND PICK UP CONSTRUCTION WASTE MATERIALS AND DEBRIS THAT HAVE BLOWN OR WASHED OFF-SITE.
8. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING ACCUMULATED SEDIMENT (SILT) FROM STORM DRAINS PRIOR TO APPROVAL OF CONSTRUCTION.
9. THE CONTRACTOR SHALL STABILIZE ALL DISTURBED AREAS NOT SUBJECT TO CONSTRUCTION ACTIVITY WITHIN 14 CALENDAR DAYS AFTER ACTIVITY HAS CEASED.
10. ALL DISTURBED AREAS NOT RECEIVING OTHER PERMANENT STABILIZATION SUCH AS PAVEMENT, ROOFS, SOD, ETC., SHALL BE SEEDED AND MULCHED, AS SPECIFIED IN SECTION 02950 BEFORE TEMPORARY EROSION AND SEDIMENT CONTROLS CAN BE REMOVED AND PRIOR TO FINAL APPROVAL OF CONSTRUCTION.

GENERAL NOTES:

1. ALL CONSTRUCTION PERFORMED ON THIS PROJECT SHALL CONFORM WITH THE LATEST REVISION OF THE CITY OF NEOSHO'S STANDARD SPECIFICATIONS FOR PUBLIC WATER AND WASTEWATER SYSTEM IMPROVEMENTS AND DRAWINGS EXCEPT AS AMENDED IN THESE PLANS AND THE PROJECT MANUAL.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE WORK ZONE SAFETY GUIDELINES OF PART VI OF THE MUTCD & SECTION 01530 THE CITY OF NEOSHO STANDARD SPECIFICATIONS.
3. LOCATIONS OF EXISTING UTILITIES (UNDERGROUND, SURFACE AND OVERHEAD) AS SHOWN ON PLANS ARE APPROXIMATE, LOCATED WITH INFORMATION PROVIDED BY OTHERS. CONTRACTOR SHALL CONTACT ALL UTILITIES PRIOR TO EXCAVATION, AND SHALL BE RESPONSIBLE FOR THE EXACT LOCATION AND PRESERVATION OF ALL UTILITY LINES. UTILITY LOCATING SERVICE, SUCH AS MISSOURI ONE CALL SYSTEM 811, SHALL BE CONTACTED BY THE CONTRACTOR 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
4. "SCREENED" (LIGHT) DELINEATION INDICATED ON THE DRAWINGS DENOTES EXISTING FACILITIES. "SCREENED" INFORMATION WAS TAKEN FROM EXISTING CONSTRUCTION DRAWINGS AND DATA, IS FOR REFERENCE ONLY, AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO THE ORDERING OF MATERIALS AND BEGINNING OF CONSTRUCTION. "BOLD" DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS CONTRACT.
5. ALL CONSTRUCTION AND EXCAVATION ACTIVITIES SHALL BE CONFINED TO EASEMENTS, RIGHT-OF-WAY AND/OR WORK AREA LIMITS AS SHOWN ON DRAWINGS.
6. CONTRACTOR'S STAGING, PARKING AND MATERIAL STORAGE SHALL BE PROVIDED ON CITY PROPERTY AND CONFINED TO EASEMENT LIMITS, TO BE COORDINATED WITH THE OWNER. PROVIDING ADDITIONAL STORAGE OR PARKING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
7. CONTRACTOR SHALL PRESERVE OR REMOVE AND REPLACE ALL SIGNS, MAIL BOXES, BOLLARDS AND OTHER SITE FEATURES WITHIN THE LIMITS OF THE PROPOSED IMPROVEMENTS.
8. REMOVE ALL FENCES AS NECESSARY FOR CONSTRUCTION AND RESTORE WITH LIKE MATERIAL TO ORIGINAL OR BETTER CONDITION.
9. ALL TRAFFICWAYS INCLUDING DRIVEWAYS, ALLEYWAYS AND SIDEWALKS SHALL REMAIN ACCESSIBLE TO RESIDENTIAL AND EMERGENCY VEHICLES DURING PROJECT DURATION.
10. ALL MATERIALS ENCOUNTERED IN EXCAVATIONS SHALL BE UNCLASSIFIED REGARDLESS OF TYPE, COMPOSITION, CHARACTER AND CONDITION THEREOF.
11. BLASTING WILL BE NOT PERMITTED IN THE PROSECUTION OF THE WORK ON THIS PROJECT.
12. ALL SURFACES (CONCRETE, ASPHALT, GRAVEL OR DIRT) AND THEIR APPURTENANCES (CURBS, CULVERTS, ETC.) DISTURBED DURING CONSTRUCTION SHALL BE REPLACED WITH LIKE MATERIALS PER PLANS AND SPECIFICATIONS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRS OF ANY DAMAGE OR RUTTING TO EXISTING PAVEMENT MADE BY CONSTRUCTION EQUIPMENT. UPON PROJECT COMPLETION, EXISTING PAVEMENT SHALL BE OF EQUAL TO OR BETTER CONDITION OF THAT IN EXISTENCE PRIOR TO BEGINNING.
14. TRAFFIC CONTROL SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE, PLACE AND MAINTAIN ALL BARRIERS (CONES, BARRELS, ETC.) AND SAFETY PERSONNEL (FLAGMEN) AS NECESSARY FOR A SAFE WORKING ENVIRONMENT.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LINE AND GRADE STAKING REQUIRED TO COMPLETE THE PROJECT.
16. CONTRACTOR SHALL, AT HIS EXPENSE, RETAIN THE SERVICES OF A PLS LICENSED IN MISSOURI, WHO SHALL BE RESPONSIBLE FOR RESTORING ANY INCIDENTALLY DAMAGED SURVEY MONUMENTS NOT SCHEDULED FOR REMOVAL AS PART OF CONSTRUCTION PROJECT. CONTRACTOR SHALL NOTIFY THE CITY OF JOPLIN OF ANY MONUMENTS DAMAGED BY AN OUTSIDE PARTY.
17. BURNING OF COMBUSTIBLE DEBRIS AND WASTE MATERIAL FROM CLEARING AND GRUBBING OPERATIONS WILL NOT BE PERMITTED ON-SITE. DISPOSE OF ALL NON-COMBUSTIBLE DEBRIS AND WASTE MATERIAL AT OFF-SITE LOCATION ARRANGED FOR BY CONTRACTOR.
18. IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
19. THE DUTY OF THE ENGINEER OR OWNER TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.
20. THE CONTRACTOR SHALL KEEP THE PROJECT NEAT AND ORDERLY AT ALL TIMES WHILE CONSTRUCTION IS TAKING PLACE. ACCESS STREETS TO THE PROJECT SHALL BE KEPT CLEAR OF MUD, DEBRIS, PAPER AND WASTE MATERIAL AT ALL TIMES. THE PROPER AMOUNT OF INSPECTION SHALL BE CALLED FOR AT THE CORRECT TIMES OR ANY AND ALL WORK MAY BE REJECTED.
21. CONTRACTOR SHALL EXERCISE CAUTION TO GUARD AGAINST THE DEGRADATION OF THE WATERS OF THE STATE DUE TO CONSTRUCTION RELATED POLLUTANTS (SILT, DEBRIS, AND PETROLEUM PRODUCTS).
22. CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITY WITH ALL UTILITY CO.'s, AT&T, COMCAST, SUDDENLINK, LIBERTY UTILITIES EMPIRE DISTRICT, MISSOURI GAS ENERGY, AND THE CITY OF NEOSHO.
23. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO OTHER EXISTING UTILITIES. IN THE EVENT ANY OTHER UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE RESPECTIVE UTILITY AND MAKE EVERY ATTEMPT TO KEEP INTERRUPTION OF SAID UTILITY SERVICE TO A MINIMUM. ALL COST ASSOCIATED WITH DAMAGE TO OTHER UTILITIES AND THEIR SUBSEQUENT REPAIRS DUE TO CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
24. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING WATER SERVICE TO ALL CUSTOMERS AT ALL TIMES DURING THE PROJECT. CONTRACTOR SHALL PLAN WORK ACCORDINGLY AND COORDINATE WORK SEQUENCE WITH CITY OF NEOSHO. CONTRACTOR SHALL PROVIDE ALL NECESSARY MATERIALS, EQUIPMENT AND LABOR TO ENSURE NO SERVICE INTERRUPTIONS.

UTILITY CONTACTS:

ELECTRIC: LIBERTY UTILITIES EMPIRE DISTRICT – CHRIS BARKER (417) 438-0370

GAS: MISSOURI GAS ENERGY/LACLEDE GROUP – KEN STEGAL (417) 626-4831

SEWER: CITY OF NEOSHO – NATE SILER (417) 451-8050

WATER: CITY OF NEOSHO – NATE SILER (417) 451-8050

CABLE: COMCAST – (888) 375-4888
SUDDENLINK COMMUNICATIONS – (417) 451-2564

PHONE: AT&T – KENNY KENWORTHY (417) 625-8092

LEGEND

	BENCHMARK OR T.B.M.
	CONTROL POINT
C	CABLE PEDESTAL
	GUY WIRE
	FIRE HYDRANT
	GAS METER
	GAS VALVE
M	MANHOLE
	LIGHT POLE
	POWER POLE
TP	TELEPHONE PEDESTAL
	TRANSFORMER
	EXISTING WATER METER
	PROPOSED WATER METER
	EXISTING WATER VALVE
	PROPOSED WATER VALVE
FL FL	EXISTING WATER-FIRE
FL FL	PROPOSED WATER-FIRE
W W	EXISTING WATERLINE
W W	PROPOSED WATERLINE
C/T	PRE
OHE	EXISTING OVERHEAD ELECTRIC
UGE	EXISTING UNDERGROUND ELECTRIC
GAS	EXISTING GAS
S S	EXISTING SEWER
SS	EXISTING STORM
TEL	EXISTING TELEPHONE
	EXISTING PROPERTY LINE
	EXISTING RIGHT OF WAY

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE:	APRIL 2021

OVERALL SITE PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 2

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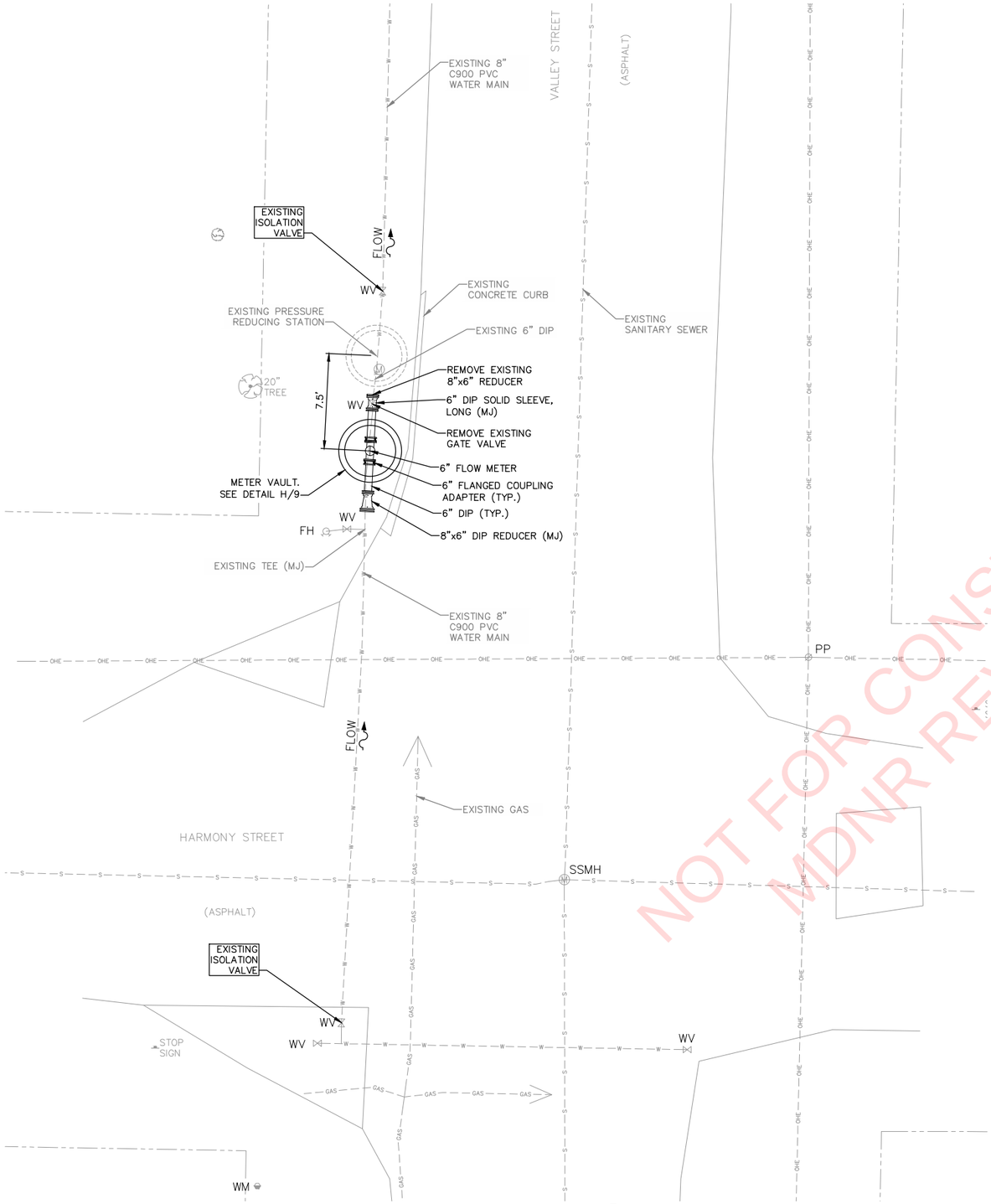

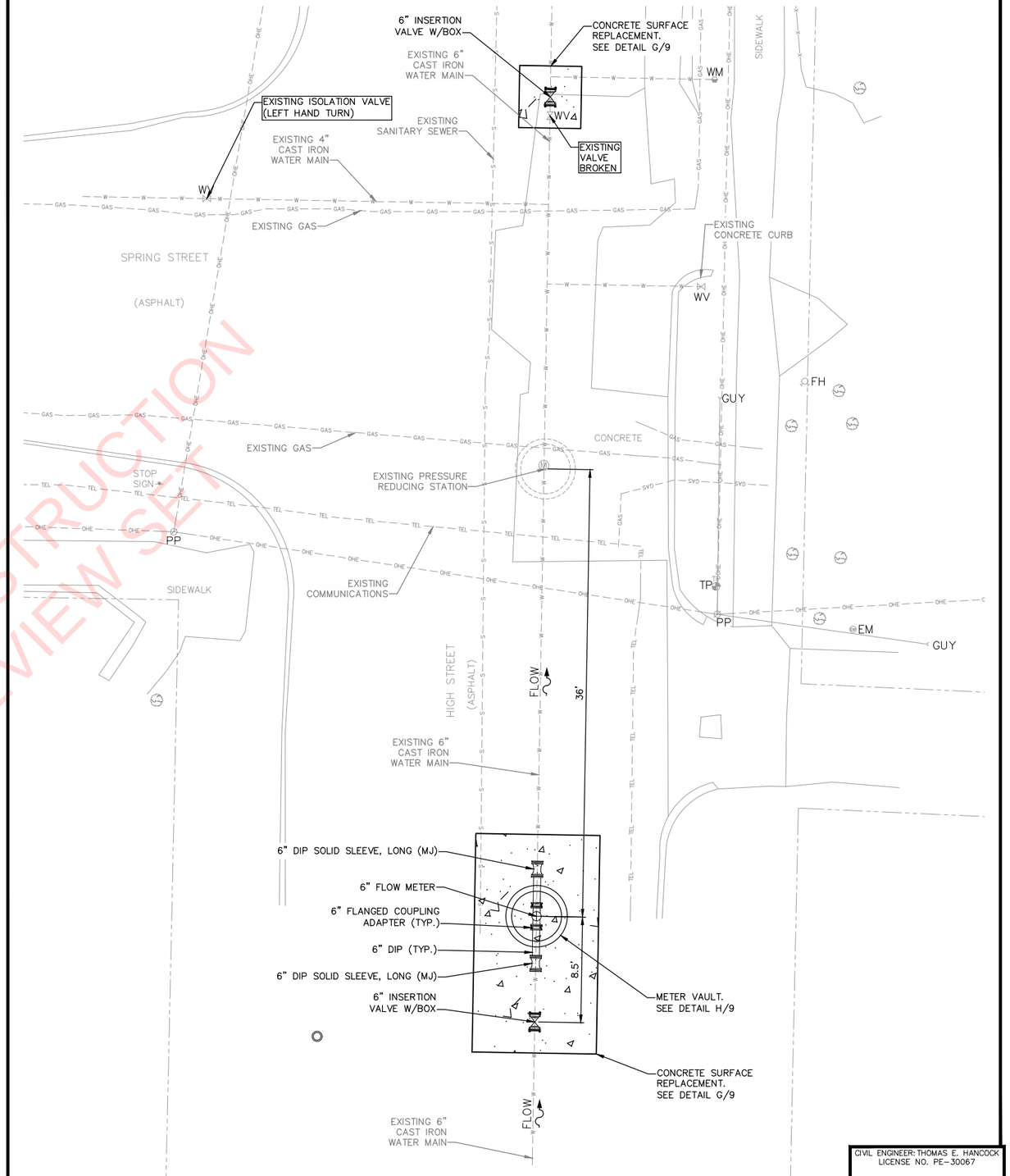

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER A & B PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 3

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

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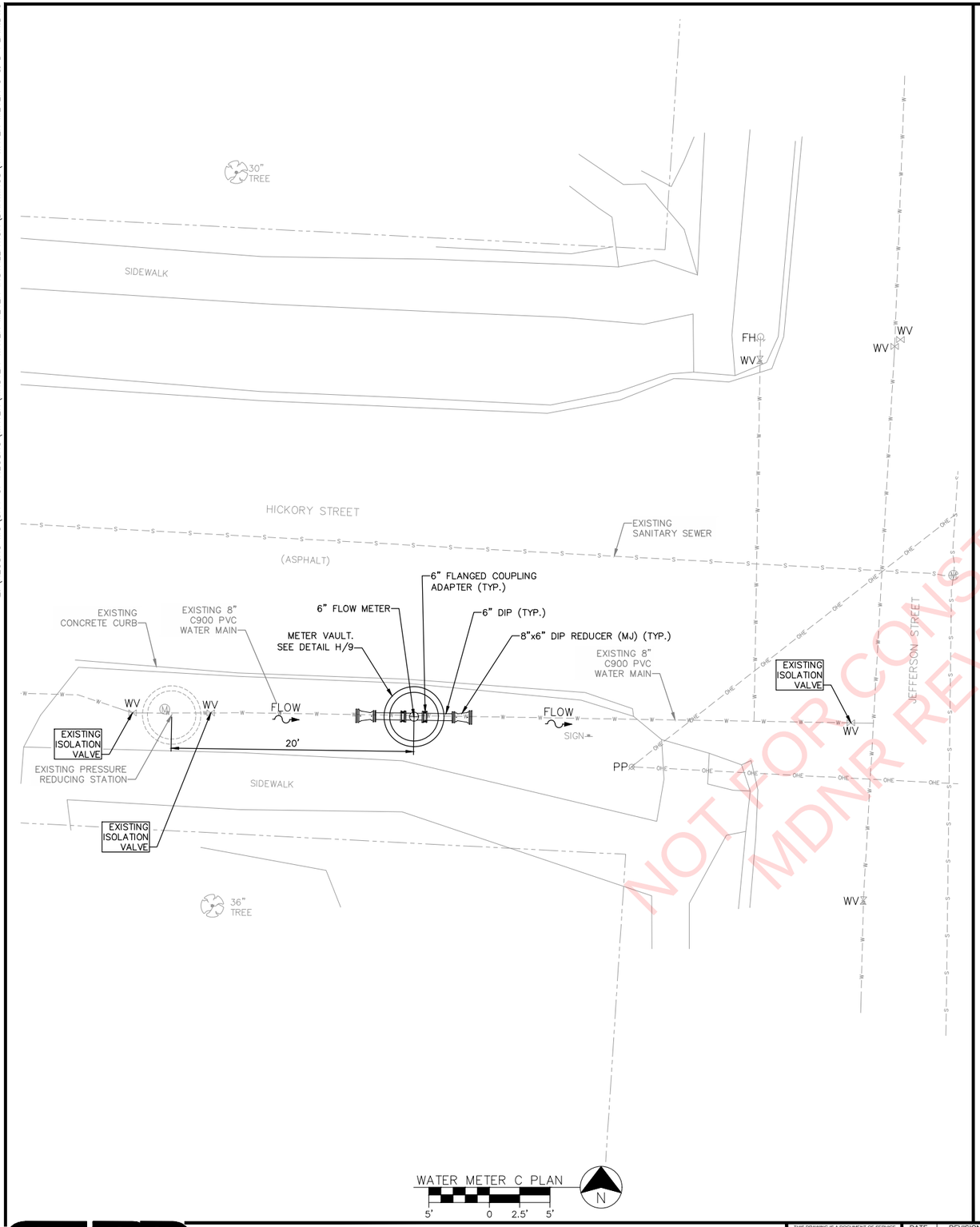

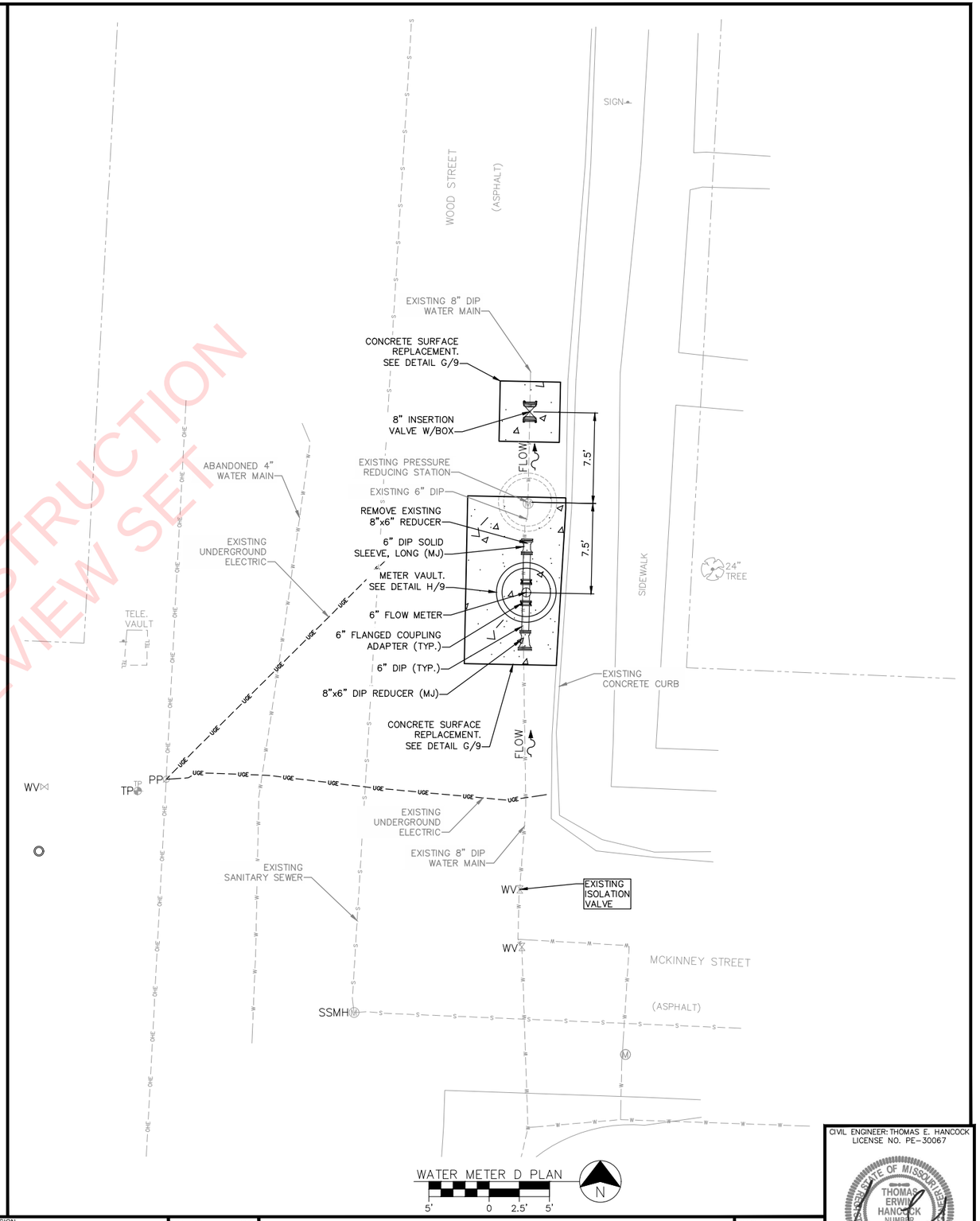

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY
MISSOURI NO. 000427

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER C & D PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 4

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

04-06-2021

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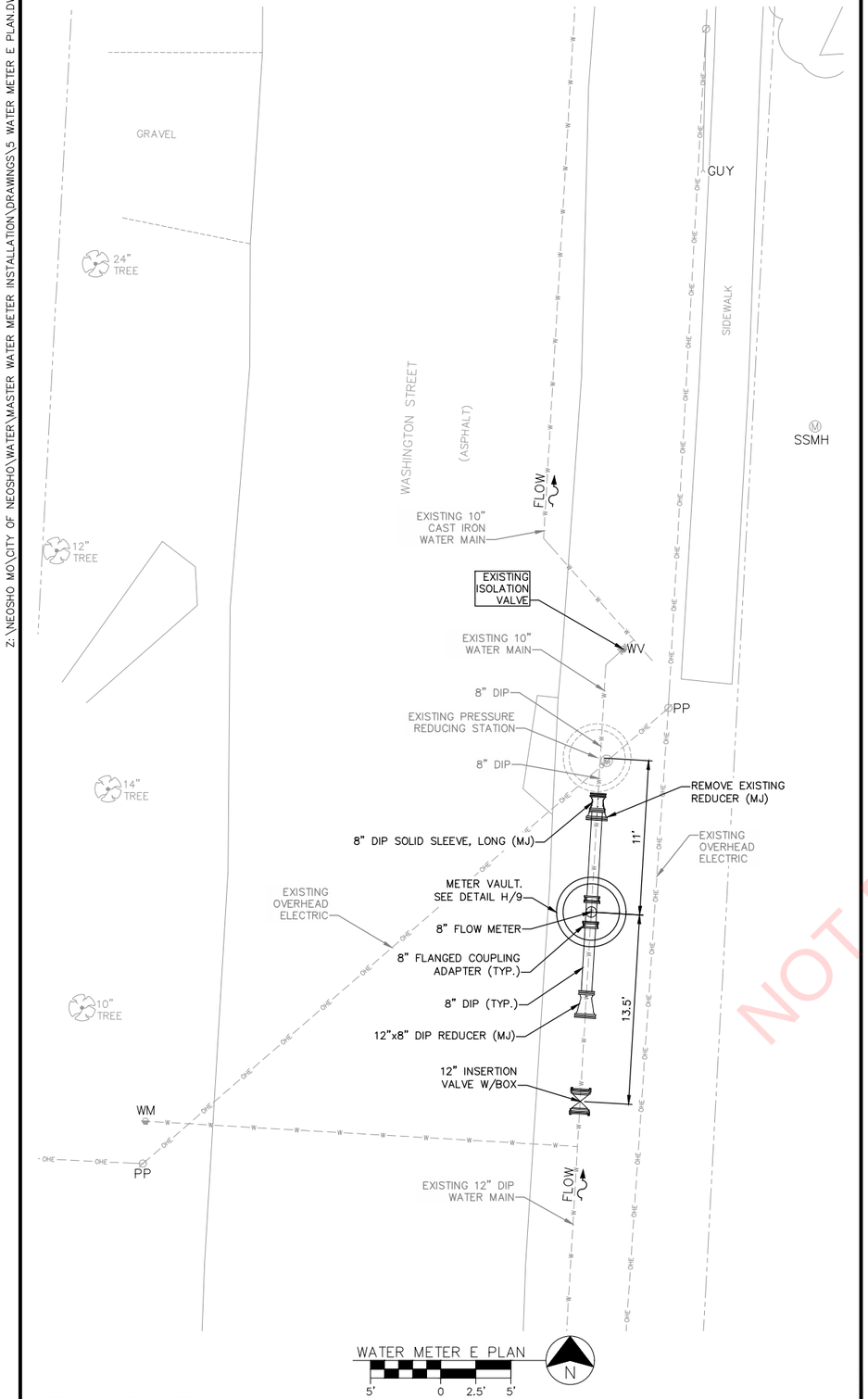


METER F OMITTED FROM PROJECT

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

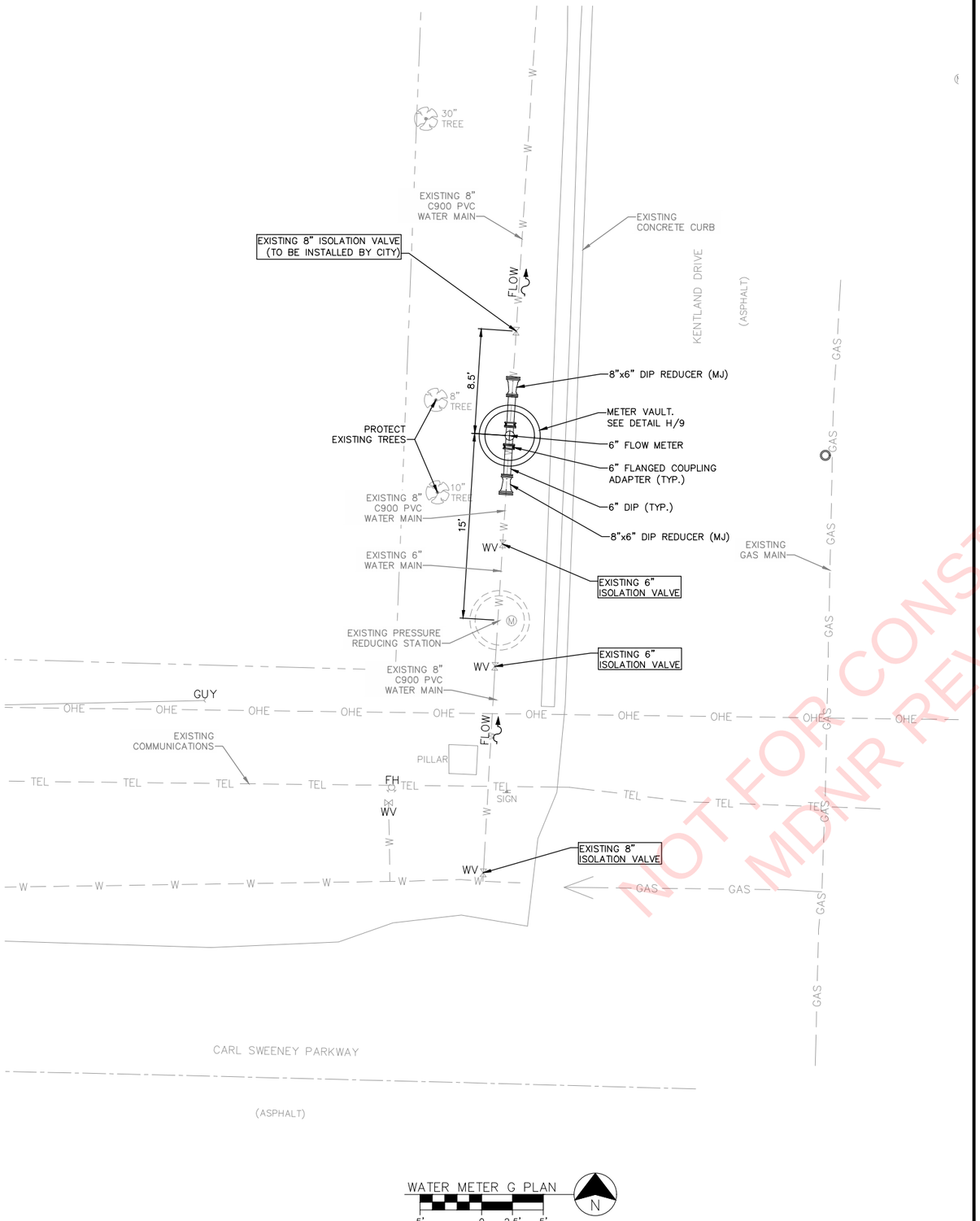
WATER METER E PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 5

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\6 WATER METER G & H PLAN.DWG



WATER METER G PLAN

5' 0 2.5' 5'

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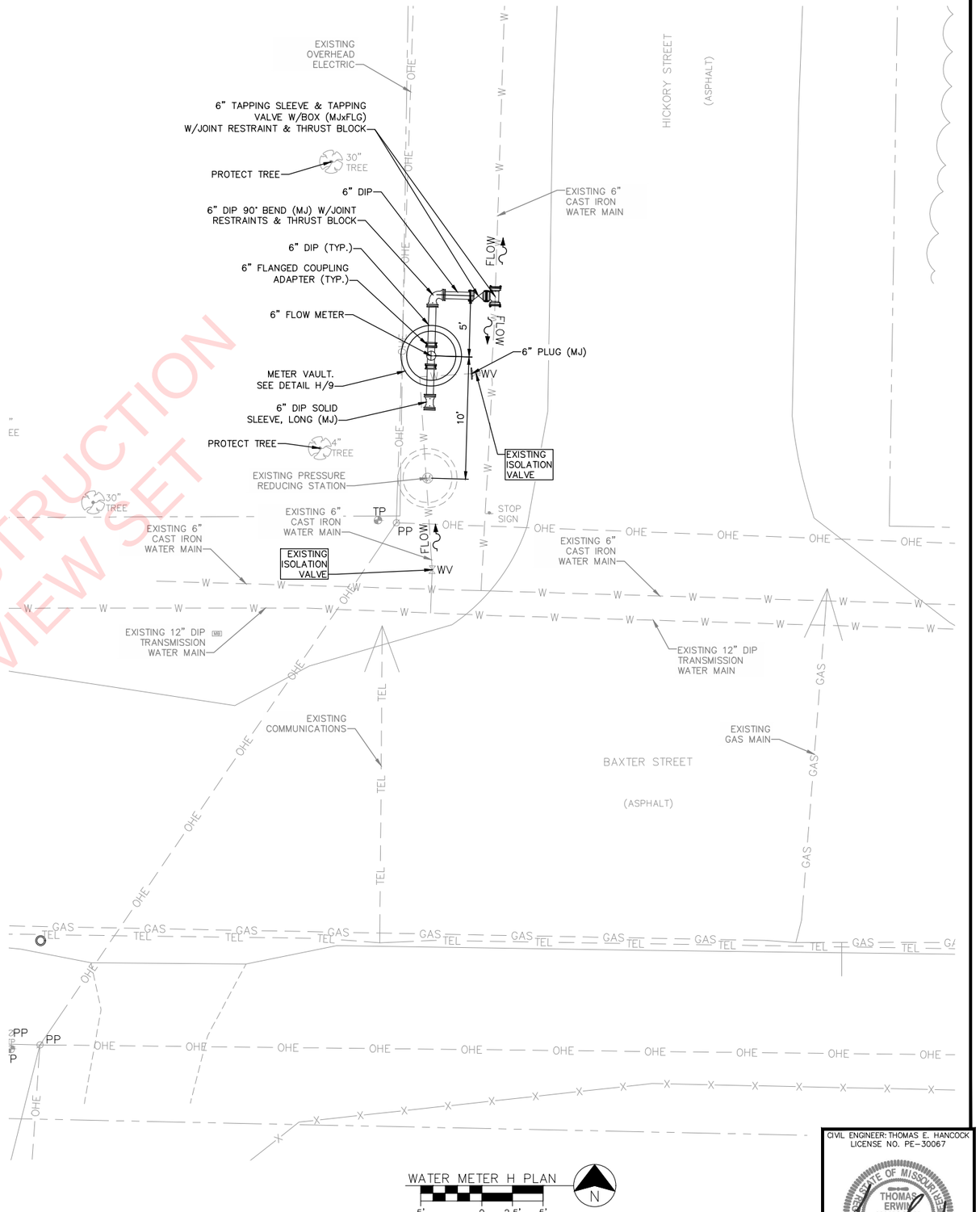

WATER METER H PLAN

5' 0 2.5' 5'

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ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
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APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER G & H PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 6

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

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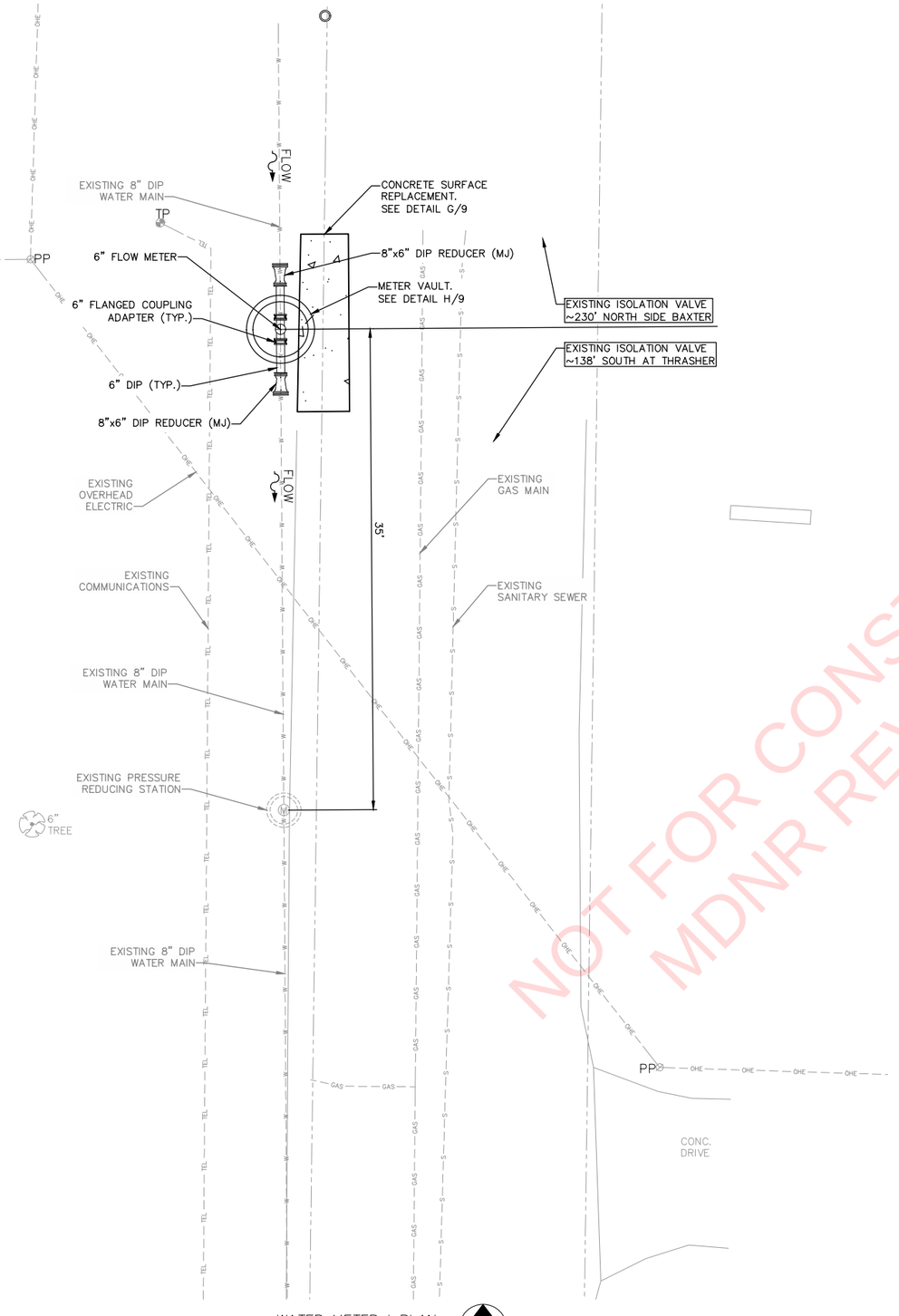

WATER METER I PLAN

5' 0 2.5' 5'

N

METER J OMITTED FROM PROJECT

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

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WATER METER I PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

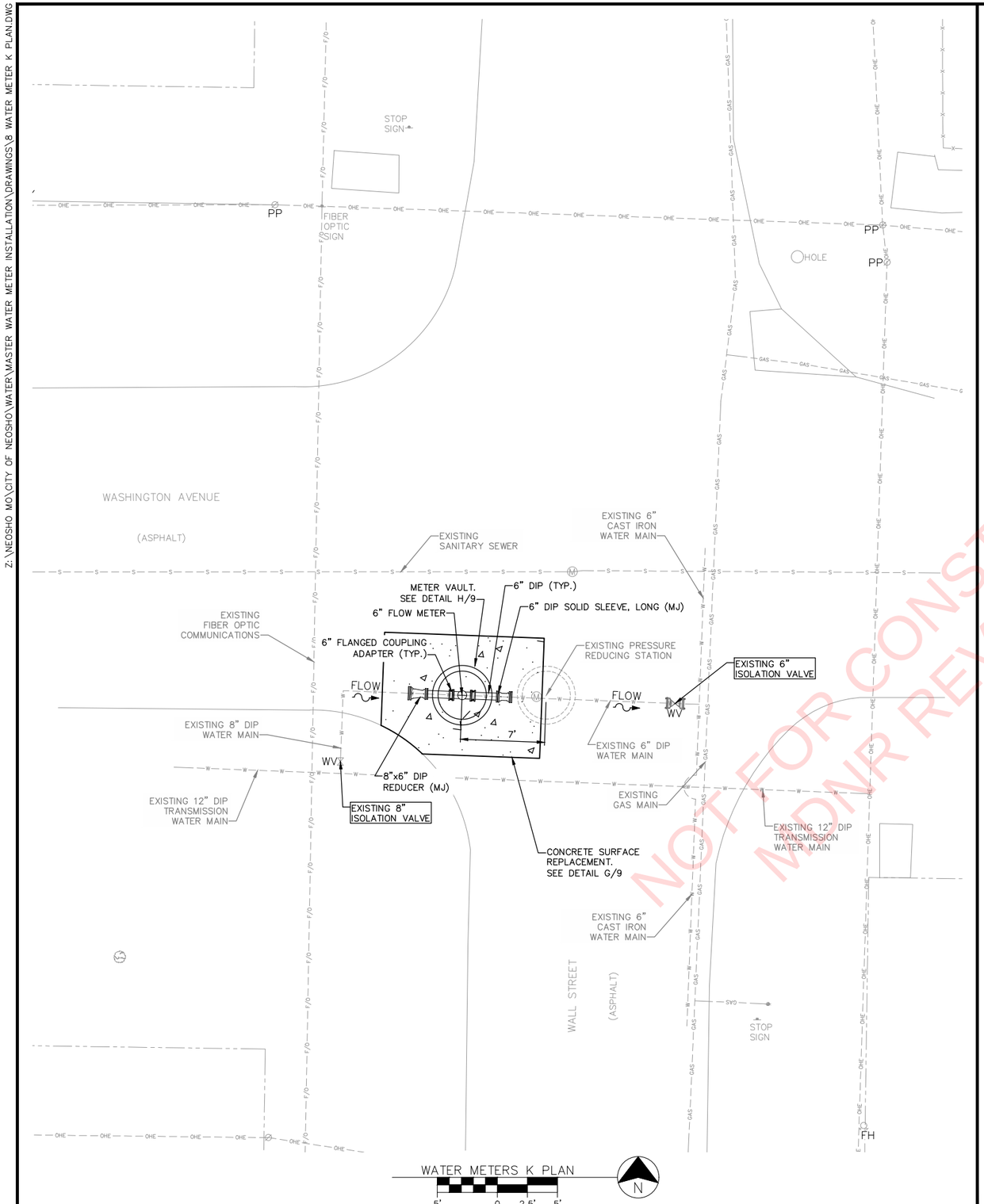
DWG. NO. 7

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\8 WATER METER K PLAN.DWG



ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

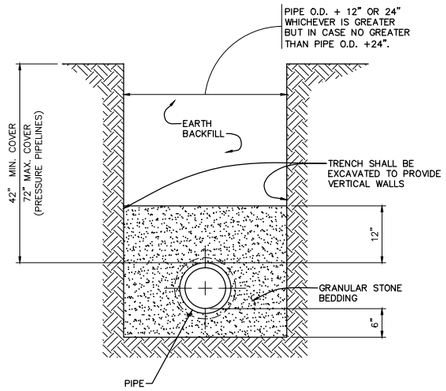
WATER METER K PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 8

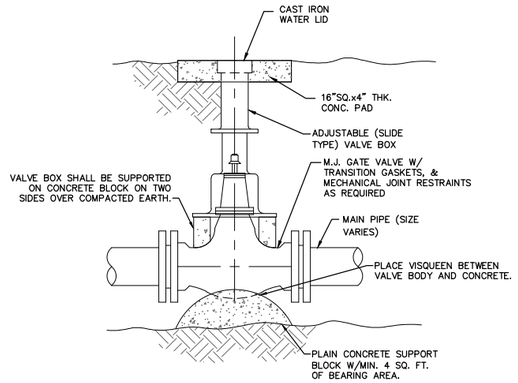
CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

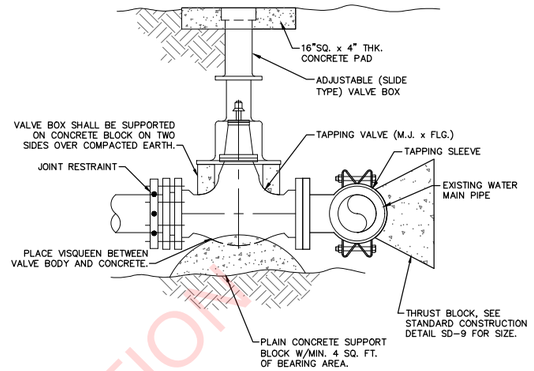


STANDARD TRENCH & BEDDING DETAILS (SD-2)
NTS
A 9

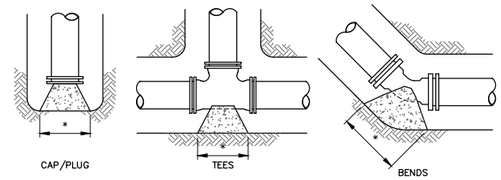


GATE VALVE INSTALLATION (SD-4)
NTS
B 9

NOTE:
CONTRACTOR SHALL FIELD VERIFY TYPE & SIZE OF EXISTING PIPES TO BE TAPPED



TAPPING SLEEVE & VALVE INSTALLATION (SD-5)
NTS
C 9



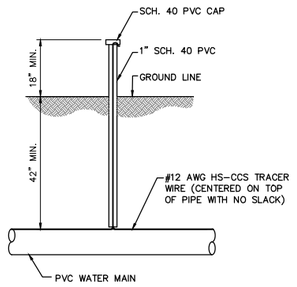
* SEE THRUST BLOCK SIZING TABLE

CONCRETE THRUST BLOCK SIZING

PIPE SIZE (IN)	*MINIMUM AREA OF BEARING ON UNDISTURBED SOIL (SF)				
	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES, PLUGS, CAPS, & HYDRANTS
4 & 6	3	2	1	1	3
8	6	3	2	1	4
10	9	5	3	2	6
12	12	7	4	2	9
14	17	9	5	3	12
16	22	12	6	3	16

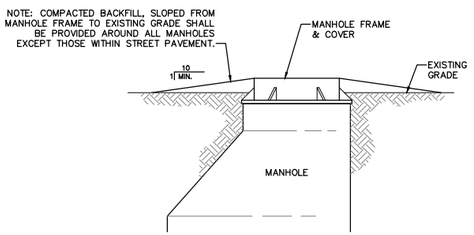
AREAS ARE BASED ON A WORKING PRESSURE OF 150 P.S.I. AND A SOIL RESISTANCE OF 2000 POUNDS PER SQUARE FOOT.

THRUST BLOCK DETAIL (SD-9)
NTS
D 9

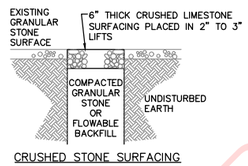


NOTES:
1. DETECTION WIRE RISERS SHALL BE INSTALLED AS REQUIRED TO PROVIDE A RISER SPACING, INCLUDING THOSE AT GATE VALVES, FLUSH STATIONS, AND FIRE HYDRANTS, NOT EXCEEDING 1000 FEET.
2. THE CITY PREFERS NO SPLICES. IF NECESSARY, USE RIGID FITTINGS OR WATERPROOF CONNECTORS SPECIFICALLY DESIGNED FOR DIRECT BURIAL AS DIRECTED BY MANUFACTURER.
3. DETECTION WIRE SHALL BE LOOPED ON OUTSIDE OF VALVE BOX AND ENTER 6" BELOW THE LID.

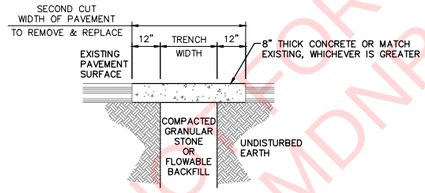
DETECTION WIRE RISER DETAIL (SD-14)
NTS
E 9



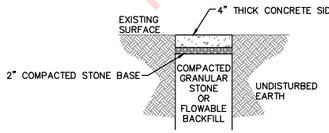
MANHOLE GRADING DETAIL (SD-15)
NTS
F 9



CRUSHED STONE SURFACING



ASPHALT AND CONCRETE SURFACING



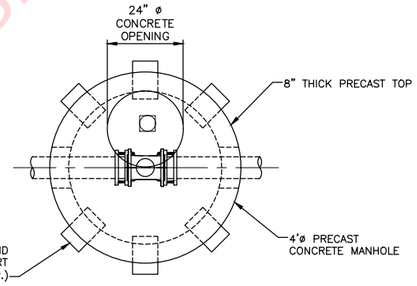
SIDEWALK REPLACEMENT

NOTES

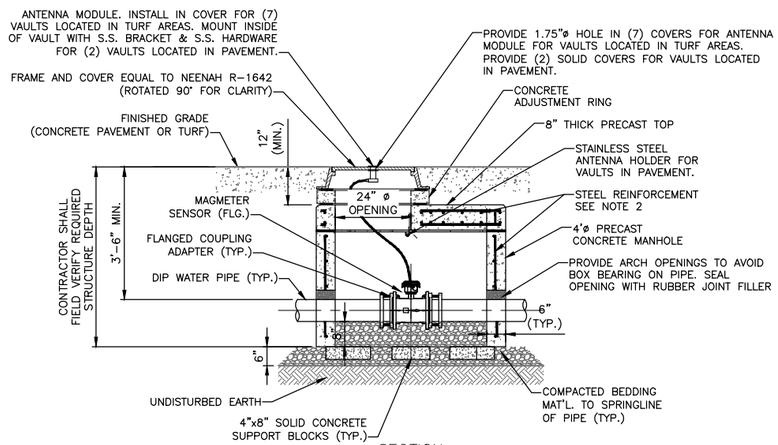
PAVEMENT SHALL BE REMOVED AT THE TRENCH WIDTH AFTER THE FIRST CUT WITHOUT DAMAGE TO ADJACENT PAVEMENT.

AFTER TRENCH IS PROPERLY BACKFILLED, PAVEMENT SHALL BE CUT AND REMOVED AN ADDITIONAL 12" ON EACH SIDE OF THE FIRST SAW CUT, AS SHOWN. THE SECOND CUT SHALL BE SAWN TO FULL DEPTH OF THE EXISTING SURFACE.

PAVEMENT REPLACEMENT DETAIL (SD-21)
NTS
G 9



TOP



SECTION

METER VAULT DETAIL
NTS
H 9

VALVE VAULT NOTES:

1. STRUCTURAL DESIGN AND STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM C890 SHALL BE PROVIDED BY PRECASTER.
2. PRECAST VALVE VAULT & TOP SHALL BE DESIGNED FOR HS-20 LOADING.
3. PRECAST MANHOLE SHALL CONFORM TO ASTM C478.
4. PROVIDE DIAGONAL BARS ON FOURS SIDES OF MANWAY OPENING.
5. FRAME & SECTION JOINTS SHALL BE SET ON CONSEAL BUTYL RUBBER SEALANT.
6. SUBMIT SHOP DRAWINGS AND SEALED DESIGN CALCULATIONS FOR ALL STRUCTURES & COMPONENTS TO CIVIL ENGINEER PRIOR TO CONSTRUCTION.
7. ALL JOINTS, ADJUSTMENT RINGS, TOP SLABS & FRAMES SHALL BE SET ON JOINT SEALER EQUAL TO CONSEAL BUTYL RUBBER SEALANT.
8. REPAIR ALL LIFTING HOLES WITH NON-SHRINK GROUT
9. ALL EXPOSED EDGES SHALL HAVE A 3/4" CHAMFER.
10. PROVIDE COPOLYMER POLYPROPYLENE PLASTIC STEEL REINFORCED MANHOLE STEPS ALIGNED WITH OPENING.

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY: CSJ
CKD. BY: JTB
APPD. BY: TEH
DATE: APRIL 2021

DETAILS
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 9

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067
STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

April 14, 2021

Nate Siler
Neosho PWS
203 East Main Street
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000042-21

Dear Nate Siler:

Enclosed is approval on plans and specifications for nine master water meter installations to serve the Neosho PWS, of Newton County, Missouri.

Please be advised this facility may be required to obtain other permits from the Missouri Department of Natural Resources. It is your responsibility to ensure that any and all necessary permits for this facility have been obtained.

NOTE: You, as the applicant, should be aware that you will need to obtain final construction approval from the Department for this project, once it has been constructed and completed. In order to do this, you will need to have your engineer complete the enclosed "Statement of Work Completed" form, or online at https://dnr.mo.gov/forms/780-2825-f.pdf. This may require you to make additional arrangements with your engineer to provide this service to you. Once your engineer has completed this form for you, you should return it to this office. We will then make arrangements with our regional office staff to conduct a final inspection and issue a final construction approval.

If you were adversely affected by this decision, you may be entitled to pursue an appeal before the Administrative Hearing Commission (AHC). To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal must be directed to: Administrative Hearing Commission, United States Post Office Building, Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102. Phone: 573-751-2422, fax: 573-751-5018, and website: www.oa.mo.gov/ahc.

If you have any questions concerning this construction permit approval or if you need any further assistance, please contact Diane Muenks by phone at 573-751-5924, or contact the engineer by email at megan.torrence@dnr.mo.gov, or email me at maher.jaafari@dnr.mo.gov.

You may also request to set up an appointment referred to as a Compliance Assistance Visit (CAV). CAVs will assist with understanding regulatory requirements, help with achieving and maintaining compliance, and provide a continuing resource for technical assistance. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at: http://dnr.mo.gov/cav/compliance.htm. The online CAV request can be found at http://dnr.mo.gov/cav/compliance.htm. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

MJ:mtm

Enclosure

c: Alleger, Martin and Associates
Southwest Regional Office

DEPARTMENT OF NATURAL RESOURCES OF MISSOURI

APPROVAL ON PLANS AND SPECIFICATIONS FOR MASTER WATER METER INSTALLTION

Neosho PWS
Newton County, Missouri

Review Number 5000042-21

INTRODUCTION

Detailed plans and specifications dated April 6 2021, for master water meter installations to serve the Neosho PWS, in Newton County, Missouri were submitted for review and approval by Allgeier, Martin and Associates, of Joplin, Missouri.

BRIEF DESCRIPTION

In general, these plans and specifications provide for installation of nine master water meters next to existing pressure reducing valves throughout the distribution system. Each of the water meters will be installed in a below ground concrete vault with the necessary valves, fittings, piping, and other appurtenances conforming to American Water Works Association standards as per detailed plans and specifications. Before being placed in serve, the waterlines will be pressure tested, flushed, disinfected, and sampled for bacteriological analysis.

Megan Torrence

Megan Torrence
Drinking Water Infrastructure Permits and Engineering Section

APPROVAL TO CONSTRUCT

The engineering plans and specifications described above were examined as to sanitary features of design which may affect the operation of the sanitary works, including size, capacities of the units, and factors which may affect the efficiency and ease of operation. Approval as regards these points is hereby given.

Approval is given with the understanding that final inspection and approval of the completed work shall be made by the Department of Natural Resources before same is accepted and placed in operation. If construction is not commenced two (2) years after the date of issue or there is a halt in construction of more than two years, the approval to construct will be void unless an extension of time has been granted by the department.

In the examination of plans and specifications, the Department of Natural Resources, Public Drinking Water Program does not examine the structural features of design or efficiency of mechanical equipment. This approval does not include approval of these features.

The Department of Natural Resources, Public Drinking Water Program reserves the right to withdraw the approval of plans and specifications at any time it is found that additional treatment or alterations are necessary to assure reasonable operating efficiency and to afford adequate protection to public health.

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

April 14, 2021

David Kennedy, City Administrator
City of Neosho
203 E. Main St
Neosho, MO 64850

FINDING OF COMPLIANCE

Dear David Kennedy:

An engineering sanitary survey was conducted by staff from the Missouri Department of Natural Resources on January 26, 2021, of the City of Neosho public water system (system). The system operates under the public water system identification number MO5010560.

Compliance with Safe Drinking Water Law was evaluated. The entity was found to be **in compliance** based upon the observations made at the time of the evaluation. The enclosed report describes the findings and may provide important recommendation to ensure continued compliance. Your cooperation in implementing those recommendations will be appreciated.

If you have any questions or would like to schedule a time to meet with Department staff to discuss compliance requirements, please contact Clinton Finn of my staff, by calling 417-891-4300, by email at clinton.finn@dnr.mo.gov, or via mail at Southwest Regional Office, 2040 West Woodland, Springfield, Missouri 65807-5912.

Sincerely,

SOUTHWEST REGIONAL OFFICE

Mark Rader, Chief
Drinking Water Section

MDR/cfb

c: Ken Brady, Local Manager, Alliance Water Resources
Nate Siler, Director of Public Works, City of Neosho
Public Drinking Water Branch, Monitoring Section

145.pdwp.mo5010560.Neosho.x.2021.04.14.ssr.x.cjf

Carbon Copy Address Attachment

- Include information for each individual identified in the carbon copy line that is not a MDNR staff member in one of the groups below.
- All DEQ Program staff will receive documents via the exchange drive.
- All SWRO and other MDNR staff will receive documents via email.
- All Basecamp groups will receive documents via Basecamp (technical staff responsibility once final .pdf received). Note that technical staff copying a basecamp group will also carbon copy themselves.

Physical (mailing) Addresses:

Email Addresses: (for those that have indicated this is the preferred method of receipt)

kbrdy@alliancewater.com (Ken Brady, Local Manager, Alliance Water Resources)

nsiler@neoshomo.org (Nate Siler, Director of Public Works, City of Neosho)

FAX Numbers: (for those that have indicated this is the preferred method of receipt)

Missouri Department of Natural Resources
Southwest Regional Office/Public Drinking Water Branch
Report of Engineering Sanitary Survey
City of Neosho
Newton County, Missouri
Public Water System ID Number MO5010560
April 14, 2021

Introduction

An engineering sanitary survey was made by the Missouri Department of Natural Resources of the community public water system serving Neosho on January 26, 2021.

Missouri Public Drinking Water Regulation 10 CSR 60-2.010(2)(S)(2) defines a sanitary survey as an on-site engineering inspection and review of a public water system, its supply source(s), treatment of supply source(s), treatment facilities, and distribution system(s), for the purpose of evaluating their adequacy, reliability, and safety for producing and distributing drinking water. 10 CSR 60-4.010(7)(A) further defines a sanitary survey for surface water systems and systems using groundwater under the direct influence of surface water, as an on-site review, under the supervision of an engineer, of the water source, facilities, equipment, operation, maintenance, and monitoring compliance, in order to evaluate the adequacy of the system, its sources and operations, and the distribution of safe drinking water. Like a compliance and operation type of inspection, this survey reviews all eight critical components applicable to the public water system which are: 1.Source; 2.Treatment; 3.Distribution System; 4.Finished Water Storage; 5.Pumps, Pump Facilities and Controls; 6.Monitoring, Reporting and Data Verification; 7.System Management and Operation; and 8.Operator Compliance with Department Requirements.

The following people were present at the time of the inspection:

Alliance Water Resources
Ken Brady, Local Manager
Steve Parnell, Designated Operator

City of Neosho
Nate Siler, Public Works Director, City of Neosho

Missouri Department of Natural Resources
Clinton Finn, P.E. Environmental Engineer, SWRO

Facility Description and History

The Neosho public water system serves 12,157 people (according to the 2019 Consumer Confidence Report) in the community through 5,194 connections. There are 4,541 residential customers, 613 commercial customers, and 40 manufacturing customers connected to this system that operates year-round. The water system has developed a mix of water sources to ensure an adequate supply of water. On average, 87 percent of the system water is supplied by Shoal Creek

and is treated in the Neosho Water Treatment Plant. The remaining 13 percent of water is supplied by two active wells in the system. The water treatment plant, wells, and storage tanks are operated and maintained by Alliance Water Resources for the city of Neosho. The distribution system is operated and maintained by the city of Neosho Public Works Department.

The system requires an operator properly certified at the Treatment A and Distribution III levels. Chef Operator Ken Brady, of Alliance Water Resources, has a Treatment A certificate, and Alliance Water Resources has several backup operators that are also certified at the Treatment A level. Operator James Carnicle has a Distribution III certificate. There are other Alliance Water Resources staff and city of Neosho staff with various levels of treatment and distribution certificates.

Description of Sources

The system is supplied by a surface water source and two active wells located in the Spring River Watershed (HUC#11070207), described as follows.

(A) Surface Water Source and Treatment

The City of Neosho utilizes surface water provided by an impoundment of Shoal Creek as its primary water supply. The Shoal Creek raw water intake structure is about 1.25 miles north of the city square and about 2,100 feet northwest from the intersection of U.S. Highway 60 Business and Lime Kiln Road. Details of the source and the intake structure that draws from it may be found in the *E2.02 PUBLIC WATER SYSTEM RECORD* form attached to this report.

The plant is a traditional design based upon the addition of coagulating chemicals in a rapid mix chamber, followed by flocculation, sedimentation, rapid sand filtration, disinfection by chlorine addition, on site storage (below grade clearwell), and finally pumping into the distribution system, which included distribution storage.

The capacity of the treatment plant has been generally taken to be 5 MGD. The plant's design features are shown in the attached Form E2.02. More detailed historical treatment plant information can be found in the 2017 Engineering Sanitary Survey.

(B) Ground Water Sources

The system is supplied by two active state approved wells and has one inactive well that has not been in use for several years. Details of these wells are provided in the *GROUND WATER SUPPLY RECORD E2.03* form attached to this report.

Storage

There are two types of storage in the Neosho system; A) below grade concrete reservoirs apart from the treatment plant and B) above grade or elevated steel storage tanks serving the distribution system.

(A) Below Grade Storage consists of the following tanks

Location	Dimensions (ft) L x W x D	Nominal Volume (gals)	Usable Volume (gals)	Usable Fire Volume (gals)
Camp Crowder Booster Station Reservoir	150′ x 150′ x 12′ O.F. = 1,239 msl	2,000,000	2,000,000	2,000,000 if power is available
Backwash Tank (on hillside above WTP)	34′ in diameter with 11′ sidewater depth O.F. = 1,062 msl	75,000	74,700	N/A (not counted for this purpose)
Plant Clearwell	115′ x 42′ x 12.7′ O.F. = 993 msl	460,000	422,000	422,000 But normally not counted as distribution storage

(B) Storage consists of the elevated tanks (and or standpipes) listed in the following table:

Tank Identifier	Baxter St.	Dewey & Finney	Camp Crowder Tanks
Location	Baxter St.	Dewey & Finney	North & South Tanks at Camp Crowder
Pressure Zone Identifier	Middle	Middle	High
Pressure Zone High Elevation (feet msl)	1,200	1,200	1,350
Pressure Zone Low Elevation (feet msl)	1,050	1,050	1,180
Tank Shape	Standpipe	Torosphere	Torosphere
Tank Overflow Elevation (feet msl)	1,280	1,286.5	North 1,396.5 South 1,411.3
Tank Nominal Volume at Overflow (gallon)	1,700,000	400,000	2 @ 400,000
Tank Usable Storage Volume (gallon)>20psi	719,000	400,000	800,000
Tank Usable Fire Volume (gallon)	1,600,000*	400,000	800,000

* There is standby trailer mounted emergency generator available and the station has an electrical plug ready

Total Distribution System Gross Storage Volume totals 4,900,000 gallons. This figure does not count clearwell and backwash tank volumes at the plant. This storage volume exceeds the average daily production for calendar year 2020, which is 3,604,000 gallons.

The needed fire storage is generally figured based upon a commercial fire flow of 3,500 gpm for three hours. This would be a volume of 630,000 gallons. Total usable storage for fire flow is approximately 2,900,000 gallons of elevated storage and a possible 2,000,000 gallons of storage in the ground reservoir.

Pumping Facilities, Pumps and Control System

Neosho has two major distribution pump stations which are used to boost pressure in areas of higher elevation and to fill tanks.

(A) Crowder Pump Station

This station was constructed in 1942 as part of the U.S. Army's plan for development of Camp Crowder as a training base. The pump station is located on what is now called Doniphan Ave., just northeast of its intersection with Kit Carson Blvd. A 20-inch transmission main from the treatment plant empties into the 2 MG concrete reservoir from which this pump station takes its suction. The pumps and their characteristics are listed in the E2.02 form. A 350KW standby diesel generator has been placed on a new concrete pad on the southwest end of the station.

(B) Baxter Street Booster Pump Station

This station was constructed in 2003. The purpose is to boost the service radius and pressures for the area to the north and west of the Baxter Street standpipe. This service area is along U.S. Highway 71 B leading towards Interstate 49. The station was built by crews from the City of Neosho own staff.

The building is rectangular in plan about 30 feet long by 18 feet wide with a 10 feet ceiling height. The building is built on a side-hill section, partially below grade, and partially above. Its walls are constructed of reinforced cast-in-place concrete and concrete block and it has a wood truss, and composition shingle roof. The building does have powered ventilation and heating systems.

There are four end suction style horizontal centrifugal pumps inside. These are mounted on concrete pads and have flexible connecters to TEFC motors. The table in Form E2.02 lists the pumps and their characteristics.

There is a portable trailer mounted standby emergency generator adjacent to the pump station. It is rated at 150 KW.

Distribution System

Neosho continues to expand its water system as the community grows and has several pressure reducing stations. A March 2017 report from Allgeier Martin Engineers included a detailed discussion of the distribution system. It provided an estimate of the system's pipe inventory. For the two major pressure zones, the middle pressure zone and the high pressure zone, which is the Camp Crowder area. The March 2017 pipe inventory report as follows:

Middle Pressure Zone			High Pressure Zone	
Pipe Size (in)	Length (ft)		Pipe Size (in)	Length (ft)
2	2,600		4	3,800
4	70,600		6	36,800
6	82,100		8	167,500
8	125,500		10	4,000
10	16,500		12	81,400
12	14,500		16	20,300
Total	311,800		Total	313,800

Since this report it has been estimated that Neosho currently has approximately 150 miles of distribution piping.

History of Notice of Violations (NOV)

There has been one NOV issued by the Department to the Neosho system in the past three years. The system was in violation of the Lead and Copper Rule monitoring requirements during calendar year 2019. This violation triggered a public notice action which the City did eventually post, and responded to the Department with the required information. This resulted in a return to compliance with regulations.

Discussion of Inspection and Observation

I contacted Steve Parnell, Water Treatment Plant Supervisor, for Alliance Water Resources, on January 14, 2021 to schedule an engineering sanitary survey inspection for January 26. The inspection was conducted during normal business hours.

Upon arrival, I met with Parnell and Ken Brady of Alliance Water Resources at the water treatment plant and discussed the scope and the purpose of the inspection. I followed these men on a tour on the water treatment plant, and then with Parnell only on a tour of the distribution system storage tanks and booster pump stations.

During the plant tour it was observed that the first stage rapid mix motor was not functioning. Parnell indicated that it stopped working about a week and a half prior to the inspection. He said that a new motor has been ordered, and that the turbulence of the raw water entrance is providing a sufficient mix considering current influent conditions. The remainder of the plant equipment, instruments, laboratory, and procedures used were all satisfactory as far as I could discern.

During the inspection of the storage tanks it was observed that the overflow pipes at the Baxter Street standpipe and at both elevated storage tanks in Camp Crowder discharge over the ground which is causing erosion. At the Dewey and Finney Streets elevated tank the ground around the

riser foundation has eroded leaving a hole under the foundation. The reservoir access structure at the Camp Crowder Booster Station Reservoir is in poor condition and does not appear to be watertight.

After the facilities tour I reviewed the records for the system, and they were adequate. Records that I reviewed included turbidity monitoring, CT records, chemical use, water production, well production, violation records, construction records, Emergency Operating Plan, backflow records, tower maintenance, and sampling records.

There have not been any major improvements to the water treatment plant, wells, storage tanks, or booster pump stations since the last inspection.

Sampling and Monitoring

Because of the complexity of the treatment facilities, and the system's well equipped and staffed laboratory, it was deemed unnecessary to conduct separate sampling, monitoring and validation testing. Operational tests and methods used to control the treatment processes and water quality were observed during the inspection. The operators collect and analyze water from primary sources (Shoal Creek and the wells), plant influent, and treated water on a daily basis. The distribution system is sampled for bacteriological quality and chlorine residual levels. The Neosho laboratory does not conduct its own bacteriological analysis. These samples are submitted to the State Health Department laboratory.

Engineering Assessment

Treatment capacity has been reported to be 5.0 MGD and a conservative combined capacity of the two wells is 0.4 MGD, for a combined system capacity of 5.4 MGD. This is sufficient capacity to meet the current and estimated future average day usage.

System Parameters	Current (2020 Estimate)	20 Year Projection
Population	12,157	13,455
Total Active Service Connections	5,194	5,748
Average Day Usage (MGD)	3.6	3.99
Maximum Day Usage (MGD)	3.8	4.19
Recommended Commercial Fire Flow (gpm)	3,500 for 2 hours	3,500 for 2 hours
Recommended Residential Fire Flow (gpm)	1,500 for 2 hours	1,500 for 2 hours

The water system has 4.9 million gallons of storage capacity in distribution, which is sufficient to meet the peak diurnal flow plus fire flow for two separate fires requiring 3,500 gpm for two hours.

There are no major source or treatment capacity needs for this system, and the distribution system is being maintained as needed to reduce the water loss rates.

As of August 2019, the Neosho Water Treatment Plant has been placed in the Bin 2 classification of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2). Bin 2 of the LT2 rule requires Neosho to provide an additional log of cryptosporidium removal from 3 log (99.9%) to achieve 4 log (99.99%) and/or inactivation. The system has requested that the Departments Infrastructure Permits and Engineering Section review the individual and combined filter performance for the 2018 and 2019 years to determine if the system meets the requirements necessary to achieve the inactivation established by the LT2 rule, without the need to make any improvement to the existing facility.

Compliance Determination and Required Actions

The system was found to be in compliance with the Missouri Safe Drinking Water Regulations based on the observations made at the time of the inspection as described.

Unsatisfactory Findings

During the time of the inspection and the file review no violations of the Safe Drinking Water Regulations were noted for the past two years.

Recommendations

1. The overflow pipes at the Baxter St. standpipe and both of the elevated storage tanks at Camp Crowder, do not discharge over a drainage inlet structure or splash plate, and are showing signs of erosion of the ground around these tanks.

The storage tank overflow pipe should be over a drainage inlet structure or a splash plate to catch or disperse the overflow water and prevent erosion from undermining the storage structure.

The Department recommends modifying the overflow pipe on the Baxter St. standpipe and both elevated storage tanks at Camp Crowder to terminate at an elevation between 12 and 24 inches above a drainage inlet structure or a splash plate.

2. During the inspection of the elevated storage tank at Dewey St. and Finney Ave. it was observed that there is excessive erosion of the ground supporting the concrete footings for the center riser pipe of this pedestal legged tank. This may become an issue if the footing begins to break into pieces. It is suggested that a structural engineer be advised as to the condition of the footings.

The public water system should take action to prevent further erosion that could cause damage to the footing.

3. The public water system does not have an adequate tank inspection and cleaning program for all storage facilities. Underground concrete water storage tanks need to be included in the routine tank inspection schedule, specifically the 2,000,000 gallon underground reservoir.

The public water system should include all storage facilities in the tank interior inspection and cleaning program.

Additional Comments and Conclusions

As per Missouri State Statute 640.115 RSMo, all water systems must notify and provide engineering plans and specifications to the Department prior to any new construction, qualified alteration, or extension of your water system. Qualified alterations include those that would change or alter plant capacity or treatment processes such as adding, removing, or changing chemical additives and/or their injection locations, altering finished water storage capacity, pumping capacity, line pressures, etc. If you have questions regarding qualified alterations, please contact the Missouri Department of Natural Resources, Public Drinking Water Branch, by calling 573-751-5331 or by mail at P.O. Box 176, Jefferson City, MO 65102.

The process of planning for necessary maintenance and upgrades should be a continuous process with constant re-evaluation, establishing both short term and long term goals. It is strongly recommended that an annual review of water/sewer (if a combined system) rates be evaluated and compared to revenues and available finances. As appropriate, the supply should increase rates as needed to meet the needs of their operations budget/expenses and capital improvement programs. You can contact the Department's Financial Assistance Center for guidance/assistance on calculating user rates at (573) 751-1192.

When maintaining, upgrading or replacing systems, much care and consideration must be taken, as the processes are generally very expensive and can take years to complete. Please see the attached planning a drinking water project which outlines the steps in a capital improvement project. https://dnr.mo.gov/pubs/pub2649.htm The first step in a project is obtaining an engineer and completing an engineering report. The Department has drinking water engineering report grants available and guidance materials for obtaining an engineer please contact the Financial Assistance Center at 573-751-1192 for more information on applying for these grants. The Department of Agriculture Rural Development also has engineering report grants available for eligible systems https://www.rd.usda.gov/programs-services/search-special-evaluation-assistance-rural-communities-and-households

In the future should it become necessary to obtain funding for upgrades and replacements after an engineering evaluation, the Department invites the PWS Name to review the information

found in the following funding comparison table:
https://dnr.mo.gov/env/wpp/srf/docs/mwwrc-comparison.pdf and apply to the Missouri Water and Wastewater Review Committee https://dnr.mo.gov/env/wpp/srf/additional-resources.htm Applicants are expected to contact funding agencies prior to submittal to review funding options, and submit a proposal requesting funds from the agency or agencies that fits their needs.

Signatures

SUBMITTED BY:

Clinton J. Finn, P.E.
Environmental Engineer III
Southwest Regional Office

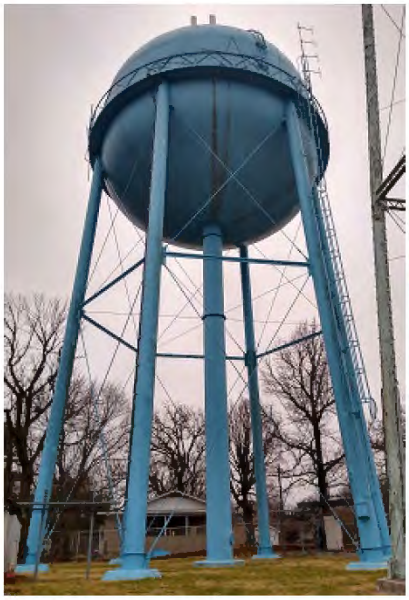
Attachments

Photograph Addendum 1 through 9
Form E2.02 PUBLIC WATER SUPPLY RECORD
Form GROUND WATER SUPPLY RECORD E2.03

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY

PHOTOGRAPH ADDENDUM

REGIONAL OFFICE
Southwest Regional Office



PHOTOGRAPH #1 & #2
TAKEN BY: Clinton Finn
ENTITY: Neosho PWS
PERMIT: MO5010560
LOCATION: Dewey St. and Finney Ave.
DESCRIPTION: Elevated Storage Tank and Riser Foundation Erosion
DATE TAKEN: January 26, 2021
PROGRAM: Public Drinking Water Branch

PHOTOGRAPH #3 & #4
TAKEN BY: Clinton Finn
ENTITY: Neosho PWS
PERMIT: MO5010560
LOCATION: Baxter St.
DESCRIPTION: Standpipe Storage Tank and Overflow Pipe
DATE TAKEN: January 26, 2021
PROGRAM: Public Drinking Water Branch

PHOTOGRAPH #5
TAKEN BY: Clinton Finn
ENTITY: Neosho PWS
PERMIT: MO5010560
LOCATION: Crowder Reservoir and Booster Station
DESCRIPTION: Reservoir Access Structure
DATE TAKEN: January 26, 2021
PROGRAM: Public Drinking Water Branch

PHOTOGRAPH #6 & #7
TAKEN BY: Clinton Finn
ENTITY: Neosho PWS
PERMIT: MO5010560
LOCATION: Camp Crowder
DESCRIPTION: SW Elevated Crowder Tank and Overflow Pipe
DATE TAKEN: January 26, 2021
PROGRAM: Public Drinking Water Branch

PHOTOGRAPH #8 & #9
TAKEN BY: Clinton Finn
ENTITY: Neosho PWS
PERMIT: MO5010560
LOCATION: Camp Crowder
DESCRIPTION: NE Elevated Crowder Tank and Overflow Pipe
DATE TAKEN: January 26, 2021
PROGRAM: Public Drinking Water Branch

E2.02 PUBLIC WATER SYSTEM RECORD

SYSTEM	Neosho		**PWS ID #**	MO5010560		**INITIAL**	CJF
COUNTY	Newton	**OWNER**	City of Neosho	**PLANT CAPACITY**	Surface WTP 5.0 MGD		
POPULATION	12,157		**SERVICES SERVED**	5,400			
DESIGN ENGINEER			**DATE THIS FORM COMPLETED**	February 18, 2021			

INTERCONNECTIONS:

Systems	Purpose	Connections	Approved
None			

SOURCE: Ground Water __2__ wells. (See Form E2.03)

SOURCE: Stream Supply

Name	Drainage Area	Capacity	Water Levels	Recreation Control
Shoal Creek (Impounded by a weir)	188,000 acres	6 MGD	8 foot	Yes

INTAKE:

Type/Location	Construction	Protection	Water Levels Controls	Dimensions
Circular structure on the south side of Shoal Creek, with a screened port wetwell submerged below the level of the weir.	Reinforced concrete	Two coarse screens	Only one level	Port is 5′ tall by 10′ wide

STORAGE: Purified Water Total Capacity

Type/Location	Capacity	Construction	Elevations	Dimensions
Elevated Torospherical/ Dewey & Finley Sts.	400,000 gals.	Steel/Multi-legged	Outfall 1,286.5′ msl	98′ tall, 45′ dia. tank
Standpipe/Baxter St.	1,700,000 gals.	Steel	Outfall 1,280′ msl	60′ dia. by 83′ tall
Ground Reservoir/ Crowder	2,000,000 gals.	Reinforced concrete	Outfall 1,256′ msl	150′ x 150′ x 12′
Elevated Torospherical/ Crowder-North	400,000 gals.	Steel/Multi-legged	Outfall 1,396.5′ msl	
Elevated Torospherical/ Crowder-South	400,000 gals.	Steel/Multi-legged	Outfall 1,411.3′ msl	

METERS:

Raw Water	20″ McCrometer Mag Meter Model UM-06, Range 185-32, 700 gpm in driveway vault
High Service	16″ Foxboro Flowtube with Model IMT25 transmitter, Range 1,000-5,000 gpm in H.S. pump discharge
Filter Effluent	Each of 4 filters has a BIF DP type venturi flowtube with flow transmitter 0 to 1,600 gpm
Backwash	No backwash flow meter. Tank has 75,000 gal. capacity and entire volume used for a single filter wash.
Other	Miscellaneous meter used on chlorine and plant service

CHEMICAL TREATMENT:

Chemical Used	How Applied	Where Applied	Feeder Range	Average Dose
Coagulant/Polyaluminum hydrochloride (PAC) Brentag #4140	Peristaltic feed pump	Raw water line just ahead of rapid mix	100 gpd at 25 psi	11.3 mg/l
Chlorine Gas	Vacuum gas system with 2,000 lbs. cylinders	Multiple application points: raw water, second stage rapid mix, filter influent, filter effluent		3.46 mg/l

PUMPS: (not including wells)

Purpose	Type	#	Manufacture	Location	Capacity/HP
Raw Water	Vertical Turbine	1		Shoal Creek Intake	875 gpm/15
Raw Water	Vertical Turbine	2		Shoal Creek Intake	875 gpm/15
Raw Water	Vertical Turbine	3		Shoal Creek Intake	1,750 gpm/25
Raw Water	Vertical Turbine	4		Shoal Creek Intake	1,750 gpm/25
High Service	End Suction	1		High Service Pump Bldg.	1,750 gpm/200
High Service	End Suction	2		High Service Pump Bldg.	1,750 gpm/200
High Service	End Suction	3		High Service Pump Bldg.	1,750 gpm/200
Booster	Horizontal Centrifugal	1		Baxter St. Pump Station	350 gpm/25
Booster	Horizontal Centrifugal	2		Baxter St. Pump Station	350 gpm/25
Booster	Horizontal Centrifugal	3		Baxter St. Pump Station	800 gpm/50
Booster	Horizontal Centrifugal	4		Baxter St. Pump Station	800 gpm/50
Booster	Horizontal Centrifugal	1		Camp Crowder	1,100 gpm/75
Booster	Horizontal Centrifugal	2		Camp Crowder	1,100 gpm/75
Booster	Horizontal Centrifugal	3		Camp Crowder	2,200 gpm/150
Booster	Horizontal Centrifugal	4		Camp Crowder	2,200 gpm/150

MIXING CHAMBERS:

Type	Capacity	Detention	Flow	G^{-1}/sec & mixer info.
Stage 1 Rapid Mix Split between two identical chambers	2 at 530 gals. each	9 seconds	Total 5 MGD, 2.5 MGD each	353 sec-1, 0.5 Hp mixer motor
Stage 1 Flocculator Made of two identical units each 27′ by 22.67′ and 12′ deep	2 at 55,000 gals. each	31.6 minutes	Total 5 MGD, 2.5 MGD each	95 sec-1, 5 Hp mixer motor
Stage 2 Rapid Mix 6-ft. square by 6.23′ sidewall depth	1 at 1,678 gals.	29 seconds	5 MGD	361 sec-1, 2 Hp motor
Stage 2 Flocculator Made of a single unit 34.08′ square by 12′ sidewall depth	1 at 104,000 gals.	30 minutes	5 MGD	55 sec-1, 3 Hp motor

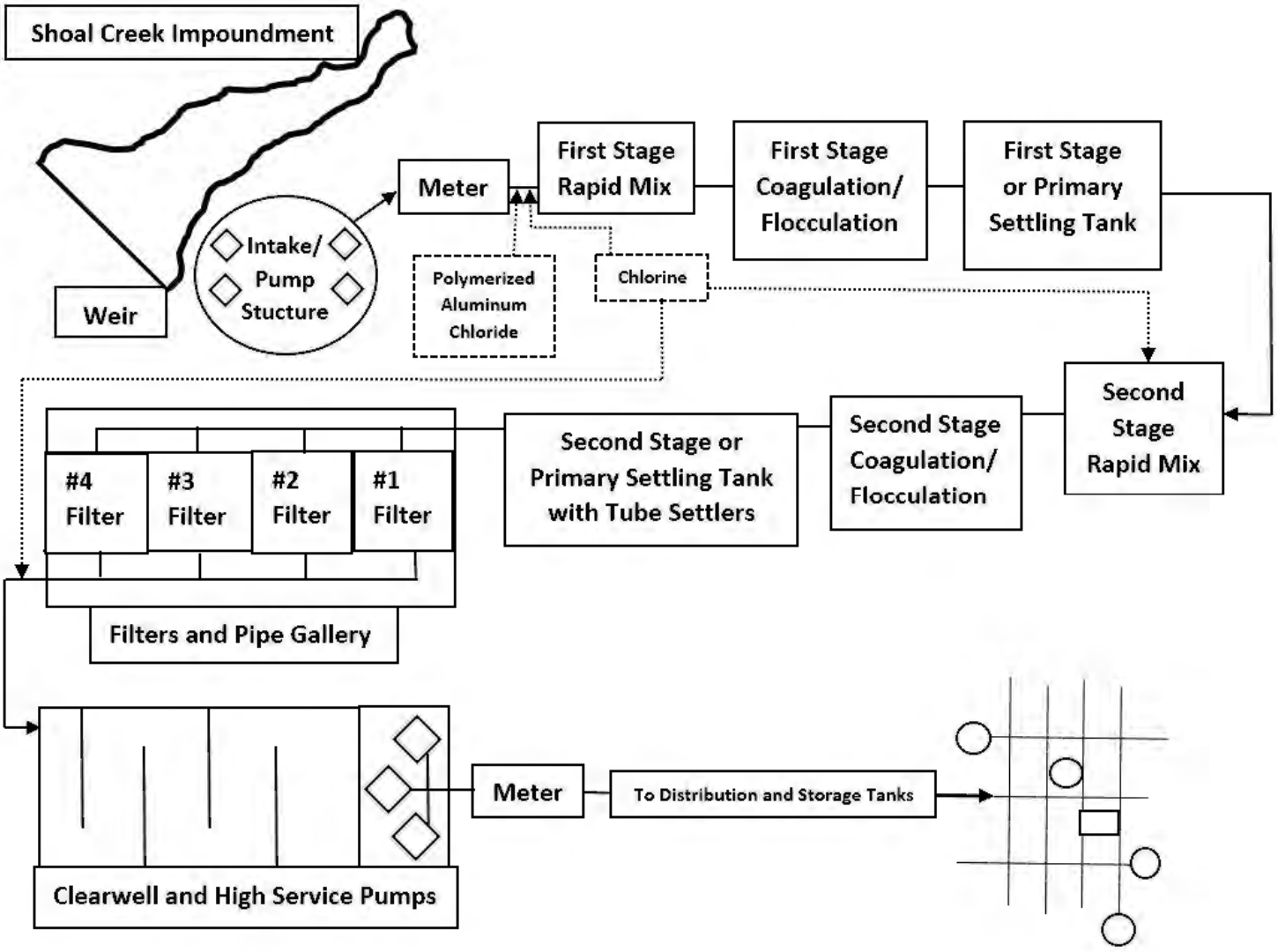
SEDIMENTATION BASINS:

Type	Construction	Capacity	Detention	Flow	Dimensions
Stage 1	Reinforced concrete, covered with metal building, circular sludge collector	260,000 gals.	75 minutes	5 MGD	53.83′ square by 12′ sidewall depth
Stage 2 two units in parallel	Reinforced concrete, covered with metal building, circular sludge collector	646,000 gals. total, 323,000 gals. each	186 minutes	5 MGD	83.75′ long by 43′ wide by 12′ sidewall depth

FILTERS:

TYPE	Rapid sand gravity in reinforced concrete basins			**NUMBER**	4
SIZE	2 cells per filter, each 20′ long by 12′ wide, with each filter being 24′ x 20′ for a total of 480 sf per filter		**CAPACITY**	4 filters at 480 sf each = 1,920 sf For 5 MGD, total capacity is 1.81 gpm/sf	
Type Valves	Pneumatically operated butterfly, 6 per filter		**Type Underdrain**	Roberts Infinity dual parallel lateral plastic block	
Media Depths	Dual media, 18″ of anthracite with effective size of 0.6 to 0.8 mm, 12″ of silica sand with effective size of 0.45 to 0.55 mm				
Gravel Depths	The supporting media is 5.1″ of torpedo sand, with effective size of 0.8 to 2.0 mm				
Method of Backwash	Gravity feed from backwash tank on the hill to the south of the WTP, 75,000 gals.		**Rate**	15 gpm/sf wash rate, for 10 minutes	
Loss of Head Gauges	Head loss gauges located on operating console		**Rate Controllers**	Venture tube and butterfly valves	
Rate of flow	Filter rate = 1.81 gpm/sf Air wash rate = 3 scfm/sf at 5 psi	**Surface Wash Facilities**		Roberts/Aires managed air system and 1,440 scfm blower	

FLOW DIAGRAM:



HIGH RATE SETTLING UNITS:

Type	Brentwood Industries Model 6024 fiberglass and PVC tube settlers						
Purpose	Fiberglass sheets inclined at 60 degrees from horizontal, installed in the secondary settling basins, 24″ deep and wide by 12′ long					**Number**	2
Dimensions	21.5′ wide by 43′ long in each basin, 868 sf per basin				**Capacity**	5 MGD	
Weir Loading						**Flow**	
Up Flow Rate	2 gpm/sf			**Detention**	Greater than 3 hours		
Sludge Withdrawal:	**Continuous**		**Automatic**		**Manual**	X	

LABORATORY TESTS: Bacteriological

Where is test made	Missouri Department of Health Lab

LABORATORY TESTS: Chemical

Alkalinity	Titration Method	**Hardness**	Titration Method
pH	Hach SensION 3 Meter	**Fluoride**	Not used
Fe	Hach Model DR900	**Mn**	Not routinely tested
Turbidity	Hach Model 2100 N		
Chlorine	Hach Pocket Coloimeter Model 46700-12		
Aluminum	Not routinely tested		
Other	Phosphate by Hach PhosVer 3 AccuVac and Hach Pocket Colorimeter 58700-06		

PLANT WASTE WATER DISPOSAL:

Type of sludge	Primary mud of settled raw water from Shoal Creek		
Method of disposal	40 foot diameter circular concrete basin with a 10′ sidewall depth		
Point of discharge	Sanitary sewer to the Neosho WWTP	**NPDES Permit**	
Domestic waste	Sanitary sewer	**Method of disposal**	WWTP

MAJOR IMPROVEMENTS:

Description	Cost	Date Of Final	Engineer	Date Entered & Initial

GROUND WATER SUPPLY RECORD E2.03

System Name	Neosho	ID #	MO5010560

WELL DATA	Well No. 2	Well No. 3	Well No. 4	
Date Drilled	1937	1944	1944	
Location	Dewey & Finley	Wheeler St.	Coler St. (Pet Milk)	
Latitude	36.86093°	36.87562°	36.87313°	
Longitude	94.37236°	94.36972°	94.3689°	
Legal Location	SW1/4, NW1/4, Sec. 30, T25N, R32W	NW1/4, NW1/4, Sec. 19, T25N, R32W	SW1/4, NW1/4, Sec. 19, T25N, R32W	
Pump Type	Submersible	Submersible	Pump pulled in 2012	
Total Depth of Well	1,248′	1,180′	995′	
Depth & Size of Casing	405′ of 10″	368′ of 13″	368′ of 8″	
Casing Materials	Steel	Steel	Steel	
Size Hole Below Casing				
Static Water Level				
Draw Down & Yield				
Water Bearing Strata				
Elevation of Top of Well				
Ground Elevation				
Top Seal Method				
Bottom Seal				
Pitless Unit				
Pump Horsepower		125		
Manufacturer				
Capacity				
Pump Setting		696′		
Meter				
Gravel Pack				
Size & Length of Screen				
Type of Standby Power				
Surface Drainage				
Date Abandoned				
Date Plugged				

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
PUBLIC DRINKING WATER BRANCH

CONSUMER CONFIDENCE REPORT DISTRIBUTION CERTIFICATION

PUBLIC WATER SUPPLY NAME	PUBLIC WATER SUPPLY ID NUMBER	POPULATION
City of Neosho	MO 5010561	12157

Population = number of connections x 2.5

Water systems serving 10,000 or more people must use:
Distribution method 1

Water systems serving 500 or more people but less than 10,000 must use:
Distribution method 1 or
Distribution method 2, 3 and 4

Water systems serving less than 500 people must use:
Distribution method 1 or
Distribution methods 2, 3 and 4 or
Distribution methods 3 and 4

FOR PDWB OFFICE USE ONLY

DATE RECEIVED 5/3/2021

ENTERED BY SW

COMMENTS

The following methods were used to distribute the Consumer Confidence Report (CCR) to our customers:

☑ 1. CCR directly delivered using one or more method below (Must submit copy of CCR and notification given to customer)

- ☒ Provided direct Web address to customer.
  Provide the direct Web address URL here www.dnr.mo.gov/ccr/MO5010560.pdf
  Example: "The current CCR is available at www.dnr.mo.gov/ccr/MOXXXXXXX.pdf. Call (#) for paper copy"
  Replace XXXXXXX above with PWS ID # for your system and replace (#) with PWS contact phone number.
- ☐ Hand delivered full report.
- ☐ Mail paper copy. Submit copy of CCR and any supporting documentation. (ie. newsletter, postal receipts, etc.)
- ☐ Email. Submit copy of email notification to customers
- ☐ Other. Describe delivery method _____

Date(s) distributed 4-15-2022

☐ 2. Published the complete CCR in the local newspaper.
Submit copy of newspaper clipping and affidavit. Date(s) published _____

☑ 3. Inform customers the CCR will not be mailed, but is available upon request.
List method(s) used below (examples – newspaper, water bills, newsletter, etc.). Submit notice given to customers.
paper bills, Paper copy at City Hall, 203E Main & PW office, 200 Nelson Ave Neosho, MO
Date(s) distributed 4-30-2022

☑ 4. Post the complete CCR continuously at the local water office.
☑ Good faith effort in other public buildings within the water system service area. (ie. City Hall, Public Library, etc.)
Date 4-30 2022 and locations posted: www.neoshomo.org

CERTIFIED BY:

This community public water system confirms it has distributed its Consumer Confidence Report (CCR) for the 2021 calendar year to its customers and the appropriate notices of availability have been given and that the information contained in its CCR is correct and consistent with the compliance monitoring data previously submitted to the Missouri Department of Natural Resources.

NAME	Ken Brady
TITLE	Local Manager
EMAIL ADDRESS	Kbrady@allianceWater.com
PHONE NUMBER WITH AREA CODE	417-451-8080
FAX NUMBER WITH AREA CODE	417-451-8074

For more information or assistance filling out this form, contact the department's Consumer Confidence Report coordinator at 800-361-4827 or 573-526-3832

Please submit the following items to meet requirements:

☑ Completed certification form
☑ Copy of the distributed/available CCR
☐ Any additional paperwork requested on this form

Email: CCR@dnr.mo.gov **Fax:** 573-751-3110

Mail: Missouri Department of Natural Resources
Public Drinking Water Branch
ATTN: CCR Coordinator
P.O. Box 176
Jefferson City, MO 65102-0176

NEOSHO PWS

Public Water System ID Number: MO5010560

2021 Annual Water Quality Report

(Consumer Confidence Report)

This report is intended to provide you with important information about your drinking water and the efforts made to provide safe drinking water.

Attencion!

Este informe contiene información muy importante. Tradúscalo o prequntele a alguien que lo entienda bien.
[Translated: This report contains very important information. Translate or ask someone who understands this very well.]

What is the source of my water?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and groundwater wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Our water comes from the following source(s):

Source Name	Type
DEWEY & FINNEY	GROUND WATER
SHOAL CREEK	SURFACE WATER
215 WHEELER ST	GROUND WATER

Source Water Assessment

The Department of Natural Resources conducted a source water assessment to determine the susceptibility of our water source to potential contaminants. This process involved the establishment of source water area delineations for each well or surface water intake and then a contaminant inventory was performed within those delineated areas to assess potential threats to each source. Assessment maps and summary information sheets are available on the internet at https://drinkingwater.missouri.edu/. The Missouri Source Water Protection and Assessment maps and information sheets provide a foundation upon which a more comprehensive source water protection plan can be developed.

Why are there contaminants in my water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

Contaminants that may be present in source water include:
A. Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
B. Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming.
C. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
D. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
E. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Natural Resources prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Department of Health regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Is our water system meeting other rules that govern our operations?

The Missouri Department of Natural Resources regulates our water system and requires us to test our water on a regular basis to ensure its safety. Our system has been assigned the identification number MO5010560 for the purposes of tracking our test results. Last year, we tested for a variety of contaminants. The detectable results of these tests are on the following pages of this report. Any violations of state requirements or standards will be further explained later in this report.

How might I become actively involved?

If you would like to observe the decision-making process that affect drinking water quality or if you have any further questions about your drinking water report, please call us at **417-451-8050** to inquire about scheduled meetings or contact persons.

Do I need to take any special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Terms and Abbreviations

Population: 12157. This is the equivalent residential population served including non-bill paying customers.
90th percentile: For Lead and Copper testing. 10% of test results are above this level and 90% are below this level.
AL: Action Level, or the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.
HAA5: Haloacetic Acids (mono-, di- and tri-chloracetic acid, and mono- and di-bromoacetic acid) as a group.
LRAA: Locational Running Annual Average, or the locational average of sample analytical results for samples taken during the previous four calendar quarters.
MCLG: Maximum Contaminant Level Goal, or the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL: Maximum Contaminant Level, or the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
n/a: not applicable.
nd: not detectable at testing limits.
NTU: Nephelometric Turbidity Unit, used to measure cloudiness in drinking water.
ppb: parts per billion or micrograms per liter.
ppm: parts per million or milligrams per liter.
RAA: Running Annual Average, or the average of sample analytical results for samples taken during the previous four calendar quarters.
Range of Results: Shows the lowest and highest levels found during a testing period, if only one sample was taken, then this number equals the Highest Test Result or Highest Value.
SMCL: Secondary Maximum Contaminant Level, or the secondary standards that are non-enforceable guidelines for contaminants and may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply
TT: Treatment Technique, or a required process intended to reduce the level of a contaminant in drinking water.
TTHM: Total Trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) as a group.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

March 2, 2022

NEOSHO PWS

Public Water System ID Number: MO5010560

2021 Annual Water Quality Report

(Consumer Confidence Report)

Contaminants Report

NEOSHO PWS will provide a printed hard copy of the CCR upon request. To request a copy of this report to be mailed, please call us at **417-451-8050**. The CCR can also be found on the internet at www.dnr.mo.gov/ccr/MO5010560.pdf.

The state has reduced monitoring requirements for certain contaminants to less often than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Records with a sample year more than one year old are still considered representative. No data older than 5 years need be included. If more than one sample is collected during the monitoring period, the Range of Sampled Results will show the lowest and highest tested results. The Highest Test Result, Highest LRAA, or Highest Value must be below the maximum contaminant level (MCL) or the contaminant has exceeded the level of health based standards and a violation is issued to the water system.

Regulated Contaminants

Regulated Contaminants	Collection Date	Highest Test Result	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
BARIUM	3/30/2021	0.0589	0.0104 - 0.0589	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
NITRATE-NITRITE	3/30/2021	4.563	0 - 4.563	ppm	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Disinfection Byproducts	Sample Point	Monitoring Period	Highest LRAA	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
(HAA5)	DBPDUAL-01	2021	40	15.8 - 49	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-02	2021	40	13.9 - 46.2	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-03	2021	31	13.6 - 44	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-04	2021	31	11.7 - 42.6	ppb	60	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-01	2021	51	19.9 - 64.5	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-02	2021	43	16.1 - 56.8	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-03	2021	39	17.5 - 46.6	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-04	2021	40	16.1 - 47.8	ppb	80	0	Byproduct of drinking water disinfection

TOC	Collection Date	Highest Value	Range of Sampled Results	Unit	TT	Typical Source
CARBON, TOTAL	10/5/2021	1.12	0.71 - 1.12	MG/L	0	Naturally present in the environment

Lead and Copper	Date	90th Percentile: 90% of your water utility levels were less than	Range of Sampled Results (low – high)	Unit	AL	Sites Over AL	Typical Source
COPPER	2020	0.113	0.00174 - 0.899	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2020	4.21	0 - 66.8	ppb	15	2	Corrosion of household plumbing systems

Radionuclides	Collection Date	Highest Value	Range of Sampled Result(s)	Unit	MCL	MCLG	Typical Source
COMBINED RADIUM (-226 & -228)	9/22/2021	1.5	1.5	pCi/l	5	0	Erosion of natural deposits
GROSS ALPHA PARTICLE ACTIVITY	9/22/2021	3.9	3.9	pCi/l			Erosion of natural deposits
RADIUM-226	9/22/2021	1.5	1.5	pCi/l	5	0	

% of samples in compliance with Standard	Months Occurred	Monitoring Violation	Highest Single Measurement	Month Occurred	Sources	In Compliance
98	12	NO	0.997	DEC	SOIL RUNOFF	YES

Violations and Health Effects Information

During the 2021 calendar year, we had the below noted violation(s) of drinking water regulations.

Compliance Period	Analyte	Type
No Violations Occurred in the Calendar Year of 2021		

Additional Required Health Effects Language:

Infants and children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the Safe Drinking Water Hotline (800-426-4791). Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Special Lead and Copper Notice:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. NEOSHO PWS is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800-426-4791) or at http://water.epa.gov/drink/info/lead/index.cfm.

March 2, 2022

NEOSHO PWS

Public Water System ID Number: MO5010560

2021 Annual Water Quality Report

(Consumer Confidence Report)

All contaminant sample results from past and present compliance monitoring are available online at the Missouri DNR Drinking Water Watch website at www.dnr.mo.gov/DWW/. To see the Lead and Copper results, enter your water system's name in the box titled Water System Name, then select Find Water Systems at the bottom of the page. On the next screen, click on the Water System Number. At the top of the next page, under the Help column, click on Other Chemical Results by Analyte. Scroll down to Lead and click the blue Analyte Code (1030). A Sample Collection Date range may need to be entered. The Lead and Copper locations will be displayed under the heading Sample Comments. Scroll to find your location and click on the Sample No. for results. If you assisted the water system in taking a Lead and Copper sample but cannot find your location on the list, please contact NEOSHO PWS for your results.

Optional Monitoring (not required by EPA)

Optional Contaminants

Monitoring is not required for optional contaminants.

Secondary Contaminants	Collection Date	Your Water System Highest Sampled Result	Range of Sampled Result(s) (low - high)	Unit	SMCL
ALKALINITY, CACO3 STABILITY	3/30/2021	170	151 - 170	MG/L	
ALKALINITY, TOTAL	10/5/2021	150	132 - 150	MG/L	
BROMIDE	1/6/2020	0.0324	0.0324	MG/L	0.05
CALCIUM	3/30/2021	49	35.6 - 49	MG/L	
CHLORIDE	3/30/2021	12.5	0 - 12.5	MG/L	250
HARDNESS, CARBONATE	3/30/2021	164	135 - 164	MG/L	
IRON	3/30/2021	0.00859	0 - 0.00859	MG/L	0.3
MAGNESIUM	3/30/2021	18.2	3.14 - 18.2	MG/L	
MANGANESE	3/30/2021	0.00221	0 - 0.00221	MG/L	0.05
PH	3/30/2021	7.9	7.59 - 7.9	PH	8.5
POTASSIUM	3/30/2021	2.13	1.09 - 2.13	MG/L	
SODIUM	3/30/2021	5.47	3.18 - 5.47	MG/L	
SULFATE	3/30/2021	13	5.87 - 13	MG/L	250
TDS	3/30/2021	204	182 - 204	MG/L	500
ZINC	3/30/2021	0.0048	0.00121 - 0.0048	MG/L	5

Secondary standards are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply.

March 2, 2022

City of Neosho
203 E. Main Neosho, MO
417-451-8060
For online bill pay, go to
www.neoshomo.org

Account Statement

ACCOUNT INFORMATION

ACCOUNT:	**010923-000**
SERVICE ADDRESS:	1910 Pineville Road
SERVICE PERIOD:	4/1/2022 to 4/30/2022 (30 days)
BILLING DATE:	4/27/2022
DUE DATE:	**5/15/2022**

METER READING

	Previous Reading		Current Reading		
Serial No	Date	Reading	Date	Reading	Cons
90251595	3/1/2022	1435	4/4/2022	1493	58

JEFFREY K. WILLIS
1910 Pinevlle Rd.
Neosho, MO 64850

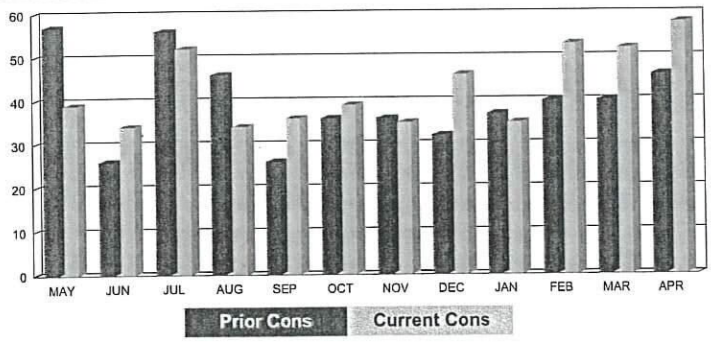
SPECIAL MESSAGE

This bill is due on May 15th. If paid after that date, a 12% penalty will be applied to both the water and sewer portions of the bill. City Offices will be closed on May 30th for Memorial Day. For the 2021 Quality Water Report go to www.dnr.mo.gov/ccr/MO5010560.pdf
After June 30th the City of Neosho will no longer buy back the WCA trash tags. If you have any WCA trash tags that you would like to turn in for a refund please bring them to the collections department at City Hall.

CURRENT CHARGES

Water	33.92
Primacy Fee	0.44
Meter Fee	1.49
Trash Pickup	10.95
Tax	0.89
TOTAL CURRENT CHARGES	**47.69**

USAGE HISTORY



BILL SUMMARY

PREVIOUS BALANCE	45.12
PAYMENTS RECEIVED	-45.12
ADJUSTMENTS	0.00
ADDITIONAL BILLING	0.00
CURRENT CHARGES	47.69
TOTAL AMOUNT DUE	**47.69**

Payment Coupon

ACCOUNT INFORMATION

PLEASE RETURN THIS PORTION ALONG WITH YOUR PAYMENT
PLEASE MAKE CHECK PAYABLE TO:
CITY OF NEOSHO

ACCOUNT:	**010923-000**
SERVICE ADDRESS:	1910 Pineville Road
SERVICE PERIOD:	4/1/2022 to 4/30/2022 (30 days)
BILLING DATE:	4/27/2022
DUE DATE:	**5/15/2022**

JEFFREY K. WILLIS
1910 Pinevlle Rd.
Neosho, MO 64850

AMOUNT DUE

TOTAL AMOUNT DUE BY **5/15/2022** **47.69**

AMOUNT ENCLOSED

REMIT PAYMENT TO:

CITY OF NEOSHO WATER DEPT.
203 E. MAIN
NEOSHO, MO 64850

pop 12157

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
DRINKING WATER BRANCH

CONSUMER CONFIDENCE REPORT DISTRIBUTION CERTIFICATION

FOR OFFICE USE ONLY	
ENTERED BY	SW
DATE	5/4/2021

PUBLIC WATER SUPPLY NAME	PUBLIC WATER SUPPLY ID NUMBER
City of Neosho	MO 5010560

Population = number of connections x 2.5

Water systems serving 10,000 or more people must use:
Distribution method 1

Water systems serving 500 or more people but less than 10,000 must use:
Distribution method 1 or
Distribution method 2, 3, and 4

Water systems serving less than 500 people must use:
Distribution method 1 or
Distribution methods 2, 3 and 4 or
Distribution methods 3 and 4

FOR MDNR-PDWB OFFICE USE ONLY

DATE RECEIVED

The following methods were used to distribute the Consumer Confidence Report (CCR) to our customers:

☑ **1. CCR directly delivered using one or more method below (Must submit copy of CCR and notification given to customer)**

- ■ Direct delivery using internet Uniform Resource Locator (URL) with contact information to request paper copy.
  Provide the direct URL Internet address here: www.dnr.mo.gov/ccr/MO5010560.pdf
  Example: "The current CCR is available at www.dnr.mo.gov/ccr/MOXXXXXXX.pdf call (#) for paper copy"
  Replace XXXXXXX above with PWS ID # for your system and replace (#) with PWS contact phone number.
- ☐ Hand delivered full report.
- ☐ Mail – paper copy – **Submit copy of CCR and any supporting documentation.** (ie. newsletter, postal receipts, etc.)
- ☐ E-mail. **(Submit copy of email notification to customers)**
- ☐ Other: **(Describe delivery method here)** _____

Date(s) Distributed 4/30/2021

☐ **2. Published the complete CCR in the local newspaper.**

- ☐ Attach copy of newspaper clipping or affidavit. **Date(s) Published** _____

☑ **3. Inform customers the CCR will not be mailed, but is available upon request and provide PWS contact telephone number.**
List method(s) used below (examples – newspaper, water bills, newsletter, etc.). Submit notice given to customers.

Water bills, Paper Copy at City Hall, 203 E Main + PW office 200 Nelson Ave Neosho, MO
Date(s) Distributed 4/30/2021

☑ **4. Post the complete CCR continuously at the local water office.**

- ☑ Good faith effort in other public buildings within the water system service area. (ie. City Hall, Public Library, etc.)

Date 4/30/2021 **and Location(s) posted:** www.neoshomo.org

CERTIFIED BY:

This community public water system confirms it has distributed its Consumer Confidence Report (CCR) for the 2020 calendar year to its customers and the appropriate notices of availability have been given and that the information contained in its CCR is correct and consistent with the compliance monitoring data previously submitted to the Missouri Department of Natural Resources.

NAME	TITLE	EMAIL ADDRESS	PHONE NUMBER WITH AREA CODE	FAX NUMBER WITH AREA CODE
Ken Brady	Local Manager	Kbrady@alliancewater.com	417-451-8080	417-451-8074

If you have any questions, concerns, or need assistance filling out this form, please contact the CCR Coordinator at: (573) 526-3832

Please submit the following items to meet requirements:

- ☑ **completed certification form**
- ☑ **a copy of the distributed/available CCR**
- ☐ **any additional paperwork requested on this form**

Email: CCR@dnr.mo.gov **FAX:** (573) 751-3110

Mail: Missouri Department of Natural Resources
Public Drinking Water Branch
ATTN: CCR Coordinator
P.O. Box 176
Jefferson City, MO 65102-0176

MO 780-2212 (03-15)

NEOSHO PWS

Public Water System ID Number: MO5010560

2020 Annual Water Quality Report

(Consumer Confidence Report)

This report is intended to provide you with important information about your drinking water and the efforts made to provide safe drinking water.

Attencion!

Este informe contiene información muy importante. Tradúscalo o prequntele a alguien que lo entienda bien.
[Translated: This report contains very important information. Translate or ask someone who understands this very well.]

What is the source of my water?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and groundwater wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Our water comes from the following source(s):

Source Name	Type
DEWEY & FINNEY	GROUND WATER
SHOAL CREEK	SURFACE WATER
215 WHEELER ST	GROUND WATER

Source Water Assessment

The Department of Natural Resources conducted a source water assessment to determine the susceptibility of our water source to potential contaminants. This process involved the establishment of source water area delineations for each well or surface water intake and then a contaminant inventory was performed within those delineated areas to assess potential threats to each source. Assessment maps and summary information sheets are available on the internet at http://drinkingwater.missouri.edu/swip/swipmaps/pwssid.htm. To access the maps for your water system you will need the State-assigned identification code, which is printed at the top of this report. The Source Water Inventory Project maps and information sheets provide a foundation upon which a more comprehensive source water protection plan can be developed.

Why are there contaminants in my water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

Contaminants that may be present in source water include:
A. Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
B. Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming.
C. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
D. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
E. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Natural Resources prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Department of Health regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Is our water system meeting other rules that govern our operations?

The Missouri Department of Natural Resources regulates our water system and requires us to test our water on a regular basis to ensure its safety. Our system has been assigned the identification number MO5010560 for the purposes of tracking our test results. Last year, we tested for a variety of contaminants. The detectable results of these tests are on the following pages of this report. Any violations of state requirements or standards will be further explained later in this report.

How might I become actively involved?

If you would like to observe the decision-making process that affect drinking water quality or if you have any further questions about your drinking water report, please call us at **417-451-8050** to inquire about scheduled meetings or contact persons.

Do I need to take any special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Terms and Abbreviations

Population: 12157. This is the equivalent residential population served including non-bill paying customers.
90th percentile: For Lead and Copper testing, 10% of test results are above this level and 90% are below this level.
AL: Action Level, or the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.
HAA5: Haloacetic Acids (mono-, di- and tri-chloracetic acid, and mono- and di-bromoacetic acid) as a group.
LRAA: Locational Running Annual Average, or the locational average of sample analytical results for samples taken during the previous four calendar quarters.
MCLG: Maximum Contaminant Level Goal, or the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL: Maximum Contaminant Level, or the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
n/a: not applicable.
nd: not detectable at testing limits.
NTU: Nephelometric Turbidity Unit, used to measure cloudiness in drinking water.
ppb: parts per billion or micrograms per liter.
ppm: parts per million or milligrams per liter.
RAA: Running Annual Average, or the average of sample analytical results for samples taken during the previous four calendar quarters.
Range of Results: Shows the lowest and highest levels found during a testing period, if only one sample was taken, then this number equals the Highest Test Result or Highest Value.
SMCL: Secondary Maximum Contaminant Level, or the secondary standards that are non-enforceable guidelines for contaminants and may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply
TT: Treatment Technique, or a required process intended to reduce the level of a contaminant in drinking water.
TTHM: Total Trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) as a group.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

April 2, 2021

NEOSHO PWS

Public Water System ID Number: MO5010560

2020 Annual Water Quality Report

(Consumer Confidence Report)

Contaminants Report

NEOSHO PWS will provide a printed hard copy of the CCR upon request. To request a copy of this report to be mailed, please call us at **417-451-8050**. The CCR can also be found on the internet at www.dnr.mo.gov/ccr/MO5010560.pdf.

The state has reduced monitoring requirements for certain contaminants to less often than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Records with a sample year more than one year old are still considered representative. No data older than 5 years need be included. If more than one sample is collected during the monitoring period, the Range of Sampled Results will show the lowest and highest tested results. The Highest Test Result, Highest LRAA, or Highest Value must be below the maximum contaminant level (MCL) or the contaminant has exceeded the level of health based standards and a violation is issued to the water system.

Regulated Contaminants

Regulated Contaminants	Collection Date	Highest Test Result	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
ATRAZINE	5/26/2020	0.4	0 - 0.4	ppb	3	3	Runoff from herbicide used on row crops
BARIUM	3/16/2020	0.0578	0.0175 - 0.0578	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
NITRATE-NITRITE	3/16/2020	3.3	0.128 - 3.3	ppm	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Disinfection Byproducts	Sample Point	Monitoring Period	Highest LRAA	Range of Sampled Result(s) (low – high)	Unit	MCL	MCLG	Typical Source
(HAA5)	DBPDUAL-01	2020	42	29.1 - 48	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-02	2020	42	25.1 - 53.3	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-03	2020	38	18.5 - 40	ppb	60	0	Byproduct of drinking water disinfection
(HAA5)	DBPDUAL-04	2020	35	21.1 - 40.9	ppb	60	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-01	2020	52	29.9 - 62.5	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-02	2020	47	28.4 - 53.9	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-03	2020	39	19.7 - 48.1	ppb	80	0	Byproduct of drinking water disinfection
TTHM	DBPDUAL-04	2020	41	21.4 - 49.9	ppb	80	0	Byproduct of drinking water disinfection

TOC	Collection Date	Highest Value	Range of Sampled Results	Unit	TT	Typical Source
CARBON, TOTAL	10/13/2020	1.36	0.6 - 1.36	MG/L	0	Naturally present in the environment

Lead and Copper	Date	90th Percentile: 90% of your water utility levels were less than	Range of Sampled Results (low – high)	Unit	AL	Sites Over AL	Typical Source
COPPER	2020	0.113	0.00174 - 0.899	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2020	4.21	0 - 66.8	ppb	15	2	Corrosion of household plumbing systems

Radionuclides	Collection Date	Highest Value	Range of Sampled Result(s)	Unit	MCL	MCLG	Typical Source
GROSS ALPHA PARTICLE ACTIVITY	4/4/2018	7.4	7.4	pCi/l			Erosion of natural deposits

% of samples in compliance with Standard	Months Occurred	Monitoring Violation	Highest Single Measurement	Month Occurred	Sources	In Compliance
100	12	NO	0.293	MAY	SOIL RUNOFF	YES

Unregulated Contaminant Monitoring Rule (UCMR)	Collection Date of HV	Highest Value (HV)	Range of Sampled Result(s)	Unit
Bromide	01/06/20	32.4	22.5 - 32.4	ppb
HAA5	05/20/19	59.92	11.71 - 59.92	ppb
HAA6Br	05/20/19	11.67	5.03 - 11.67	ppb
HAA9	05/20/19	70.44	16.74 - 70.44	ppb
Manganese	02/25/19	1.8	1.4 - 1.8	ppb
Total Organic Carbon	05/20/19	2320	2320	ppb

Violations and Health Effects Information

During the 2020 calendar year, we had the below noted violation(s) of drinking water regulations.

Compliance Period	Analyte	Type
No Violations Occurred in the Calendar Year of 2020		

April 2, 2021

NEOSHO PWS

Public Water System ID Number: MO5010560

2020 Annual Water Quality Report

(Consumer Confidence Report)

Additional Required Health Effects Language:

Infants and children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the Safe Drinking Water Hotline (800-426-4791).

Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

* Special Notice Regarding HAA5 Results

The Department of Natural Resources voided our system's HAA5 sample results for one or more monitoring periods from July 2019 through June 2020. While our system submitted samples to the Department for analysis, due to laboratory procedural errors, the Department determined the results for the monitoring periods left blank in the table below to be invalid. As a result, our system does not have a valid monitoring result for those monitoring periods.

Water System and Location Information					Updated HAA Sample Results (mg/L)				Updated LRAA Compliance Calculation			
PWSID	PWS Name	Analyte	Location ID	Location	3Q2019	4Q2019	1Q2020	2Q2020	3Q2019	4Q2019	1Q2020	2Q2020
MO5010560	NEOSHO	HAA5	DBPDUAL-01	AIRPORT - TERRY JOHNSON DR	0.0305	0.0498	0.0291		0.029	0.036	0.037	0.036
MO5010560	NEOSHO	HAA5	DBPDUAL-02	MFA OIL CO - 13953 PENN LN	0.0346	0.0394	0.0251		0.038	0.041	0.042	0.033
MO5010560	NEOSHO	HAA5	DBPDUAL-03	PUBLIC WORKS - 715 N COLLEGE ST	0.0265	0.0374	0.0234		0.033	0.038	0.038	0.029
MO5010560	NEOSHO	HAA5	DBPDUAL-04	CROWDER WWTP - 675 RADIO RD	0.0302	0.0347	0.0211		0.03	0.034	0.035	0.029

Special Lead and Copper Notice:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. NEOSHO PWS is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800-426-4791) or at http://water.epa.gov/drink/info/lead/index.cfm.

All contaminant sample results from past and present compliance monitoring are available online at the Missouri DNR Drinking Water Watch website at www.dnr.mo.gov/DWW/. To see the Lead and Copper results, enter your water system's name in the box titled Water System Name, then select Find Water Systems at the bottom of the page. On the next screen, click on the Water System Number. At the top of the next page, under the Help column, click on Other Chemical Results by Analyte. Scroll down to Lead and click the blue Analyte Code (1030). A Sample Collection Date range may need to be entered. The Lead and Copper locations will be displayed under the heading Sample Comments. Scroll to find your location and click on the Sample No. for results. If you assisted the water system in taking a Lead and Copper sample but cannot find your location on the list, please contact NEOSHO PWS for your results.

Optional Monitoring (not required by EPA)

Optional Contaminants

Monitoring is not required for optional contaminants.

Secondary Contaminants	Collection Date	Your Water System Highest Sampled Result	Range of Sampled Result(s) (low - high)	Unit	SMCL
ALKALINITY, CACO3 STABILITY	3/16/2020	200	128 - 200	MG/L	
ALKALINITY, TOTAL	10/13/2020	166	136 - 166	MG/L	
ALUMINUM	3/16/2020	0.0161	0 - 0.0161	MG/L	0.05
BROMIDE	1/6/2020	0.0324	0.0324	MG/L	0.05
CALCIUM	3/16/2020	48.2	39.6 - 48.2	MG/L	
CHLORIDE	3/16/2020	13.8	0 - 13.8	MG/L	250
HARDNESS, CARBONATE	3/16/2020	183	133 - 183	MG/L	
IRON	3/16/2020	0.00609	0 - 0.00609	MG/L	0.3
MAGNESIUM	3/16/2020	20.4	3.05 - 20.4	MG/L	
PH	3/16/2020	7.76	7.5 - 7.76	PH	8.5
POTASSIUM	3/16/2020	2.4	0 - 2.4	MG/L	
SODIUM	3/16/2020	6.67	2.74 - 6.67	MG/L	
SULFATE	3/16/2020	10.8	7.05 - 10.8	MG/L	250
TDS	3/16/2020	176	169 - 176	MG/L	500
ZINC	3/16/2020	0.0112	0.00739 - 0.0112	MG/L	5

Secondary standards are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. EPA recommends these standards but does not require water systems to comply.

April 2, 2021

City of Neosho
203 E. Main Neosho, MO
417-451-8060
For online bill pay, go to
www.neoshomo.org

Account Statement

ACCOUNT INFORMATION

ACCOUNT:	**021743-000**
SERVICE ADDRESS:	738 E McKinney
SERVICE PERIOD:	4/1/2021 to 4/30/2021 (30 days)
BILLING DATE:	4/27/2021
DUE DATE:	**5/15/2021**

BW GAS & CONVENIENCE RETAIL LLC
138 Conant Street
Beverly, MA 01915

METER READING

	Previous Reading		Current Reading		
Serial No	Date	Reading	Date	Reading	Cons
74521633	3/8/2021	8156	4/8/2021	8212	56

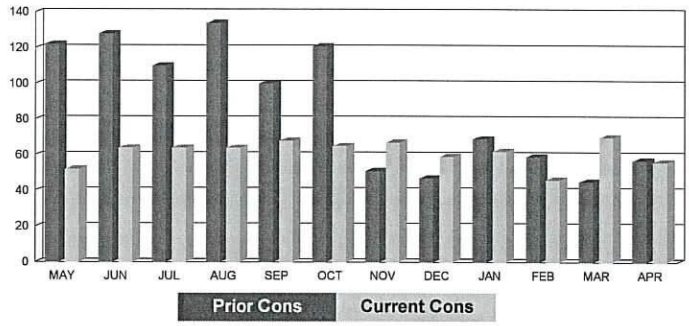
SPECIAL MESSAGE

This bill is due on May 15th. If paid after that date, a 12% penalty will be applied to both the water and sewer portions of the bill. City offices will be closed on May 31st for Memorial Day. For 2020 Quality Water Report go to www.dnr.mo.gov/ccr/MO5010560.pdf.
The trash service company will be changing from WCA to Republic as of June 1st. Watch for updates and more information on our website and facebook page.

CURRENT CHARGES

Water	33.09
Sewer	39.37
Primacy Fee	0.23
Sewer Connect	0.25
Meter Fee	1.49
Tax	2.93
TOTAL CURRENT CHARGES	**77.36**

USAGE HISTORY



BILL SUMMARY

PREVIOUS BALANCE	91.59
PAYMENTS RECEIVED	-91.59
ADJUSTMENTS	0.00
ADDITIONAL BILLING	0.00
CURRENT CHARGES	77.36
TOTAL AMOUNT DUE	**77.36**

Payment Coupon

AMOUNT DUE

TOTAL AMOUNT DUE BY **5/15/2021** **77.36**

ACCOUNT INFORMATION

PLEASE RETURN THIS PORTION ALONG WITH YOUR PAYMENT
PLEASE MAKE CHECK PAYABLE TO:
CITY OF NEOSHO

ACCOUNT:	**021743-000**
SERVICE ADDRESS:	738 E McKinney
SERVICE PERIOD:	4/1/2021 to 4/30/2021 (30 days)
BILLING DATE:	4/27/2021
DUE DATE:	**5/15/2021**

BW GAS & CONVENIENCE RETAIL LLC
138 Conant Street
Beverly, MA 01915

AMOUNT ENCLOSED

AUTO PAY

REMIT PAYMENT TO:

CITY OF NEOSHO WATER DEPT.
203 E. MAIN
NEOSHO, MO 64850

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Dru Buntin, Director

SEP 1 0 2021

David Kennedy
Neosho PWS
203 East Main Street
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000059-20

Dear David Kennedy:

The Missouri Department of Natural Resources' Public Drinking Water Branch, Infrastructure Permits and Engineering Section is in receipt of six months of turbidity data to complete your Long Term 2 (LT2) Enhanced Surface Water Treatment Rule Plan for Neosho PWS, of Newton County, Missouri.

Neosho PWS has requested approval to use the enhanced Combined Filter Effluent (CFE) option from the LT2 toolbox for 0.5 log credit, which has the following requirements:

- CFE turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the values recorded at each filter in each month measured at least every four hours.

And the enhanced Individual Filter Effluent (IFE) option from the LT2 toolbox for another 0.5 log credit, which has the following requirements:

- IFE turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the values recorded at each filter in each month measured at least every 15 minutes; and
- No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

The data provided between March 2021 and August 2021 showed compliance with all the requirements for CFE. Filters 2, 3, and 4 met all the requirements for IFE for every month. However, Filter 1 had three consecutive readings above 0.3 NTU in the month of July 2021, putting it out of compliance for that month. Filter 1 was in compliance the other five months.

We are requesting additional data from October 2020 – February 2021. Please submit the data in an Excel spreadsheet by September 27, 2021.

Please note, LT2 compliance must be **achieved by January 31, 2022**. If the CFE and IFE requirements cannot be met, Neosho PWS must select one or more other options listed in EPA's LT2 Enhanced Surface Water Treatment Rule Toolbox and have the additional treatment in place by the above deadline. The guidance manual can be found at the following link: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1009JLI.txt.

Further action on your submittal awaits your satisfactory response to the above comments. One hard copy and one electronic copy of the revised information should be submitted by mail to Public Drinking Water Permits and Engineering Section, P.O. Box 176, Jefferson City, MO 65102 or by email to pdwb.engineeringwaterpermits@dnr.mo.gov for further review. If you have any questions, or if we could be of assistance to you, feel free to call me at 573-522-1801. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

MJ:mtp

c: Allgeier, Martin and Associates, Inc.
Ken Brady, Neosho PWS
Southwest Regional Office
Monitoring Section, PDWB

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
PUBLIC DRINKING WATER BRANCH/FINANCIAL ASSISTANCE CENTER
CONSTRUCTION PERMIT APPLICATION

FOR OFFICE USE ONLY	
REVIEW NO.	5000042-21
DATE RECEIVED	3/30/2021

No fee is required for a construction permit.
If you have any questions, call 1-800-361-4827 or 573-751-5924 (PDWB) or 573-751-1192 (FAC)
Submit one copy of the application and two copies (one hard copy and one electronic copy) of required documentation to: Permits and Engineering Section or Financial Assistance Center (For DWSRF projects), P.O. Box 176, Jefferson City, Missouri 65102-0176 **Or email to: pdwb.engineeringwaterpermits@dnr.mo.gov**

Per 640.115 - Construction, extension or alteration of a public water system shall be in accordance with the rules and regulations of the Safe Drinking Water Commission. Requirements for submission, review and approval of engineering reports, plans and specifications for public water supply planning and construction must be in accordance with 10 CSR 60-3.010, 10 CSR 60-10.010, and 10 CSR 60-13 (For DWSRF projects).

Is this project being funded by DWSRF? ☐ Yes ☑ No

NAME OF PROJECT

MASTER WATER METER INSTALLATION

PUBLIC WATER SYSTEM INFORMATION

NAME OF PUBLIC WATER SYSTEM	CONTACT PERSON	TITLE	PUBLIC WATER SYSTEM ID NO
CITY OF NEOSHO, MO	NATE SILER	PUBLIC WORKS DIRECTOR	MO5010560

ADDRESS	CITY	STATE	ZIP CODE
203 E. MAIN ST.	NEOSHO	MO	64850

TELEPHONE NUMBER	E-MAIL ADDRESS
417-451-8071	NSILER@NEOSHOMO.ORG

CONSULTANT ENGINEER INFORMATION

CONSULTING FIRM	CONSULTANT ENGINEER NAME
ALLGEIER, MARTIN and ASSOCIATES, INC.	THOMAS HANCOCK, PE

ADDRESS	CITY	STATE	ZIP CODE
7231 EAST 24TH STREET	JOPLIN	MO	64804

TELEPHONE NUMBER	E-MAIL ADDRESS
417-680-7200	TOM.HANCOCK@AMCE.COM

DEVELOPER OF PROJECT INFORMATION

If the developer of project is different from the public water system, a signed acceptance letter from the public water system must be provided stating that upon completion of construction, the water system will own, operate and maintain the water system facilities.

DEVELOPER OF PROJECT NAME	TITLE

ADDRESS	CITY	STATE	ZIP CODE

TELEPHONE NUMBER	E-MAIL ADDRESS

PROJECT LOCATION

COUNTY	1\4, OF	1\4, OF	SECTION	TOWNSHIP	RANGE	LATITUDE	LONGITUDE
NEWTON - SEE ATTACH "A"							

SCOPE OF THE PROPOSED PROJECT (DESCRIBE THE PROJECT COMPLETELY. ATTACH ADDITIONAL SHEETS OF PAPER IF NECESSARY.)

MASTER METER INSTALLATIONS AT NINE EXISTING PRESSURE REDUCING STATION LOCATIONS INCLUDING PRECAST CONCRETE VAULTS, ISOLATION VALVES, PIPING, AND RELATED APPURTENANCES

PROPOSED WATER SUPPLY SOURCE

New community and non-transient non-community water systems commencing operation after October 1, 1999 or systems applying for DWSRF financing shall show as part of their application that the public water system will meet the minimum technical, managerial, and financial (TMF) capacity requirements. A TMF checklist is available upon request from the department.

The following information must be provided for new or modifications to water supply sources:
***Must be affixed with professional engineer's seal**

Well	Surface water intake	Interconnection with PWS
☐ Engineering Report* or Review No. _____	☐ Engineering Report* or Review No. _____	☐ Engineering Report* or Review No. _____
☐ Detailed Plans*	☐ Detailed Plans*	☐ Detailed Plans*
☐ Technical Specifications*	☐ Technical Specifications*	☐ Technical Specifications*
☐ Well Site Survey from Regional Office		☐ Name of Public Water Supplier _____
☐ Estimated Casing Depth letter from Water Resources Center		☐ Water Purchase Agreement (Permanent Interconnections only)

PROPOSED STORAGE

The following information must be provided for new or modifications to storage tanks:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*

Dimensions _____ ft
Capacity _____ gal
Ground Elevation _____ ft
Overflow Elevation _____ ft

PROPOSED WATERLINE

The following information must be provided for new or modifications to waterlines:
***Must be affixed with professional engineer's seal**

☑ Detailed Plans*
☑ Technical Specifications*or Standard Specifications* Review No. _____ or Supervised Program Specifications* Review No._____
☐ Hydraulic Analysis* (For Complete Distribution Systems or at the Department's discretion)

Line Size at Point of Connection SEE ATTACH "A" inch
Available Flow at Point of Connection SEE ATTACH "A" gpm
Residual Pressure at Point of Connection SEE ATTACH "A" psi
Fire Demand (if applicable) _____ gpm
Residual Pressure at End of Proposed Waterline _____ psi

Any potential contamination near the proposed site? ☐ Yes ☑ No
If Yes, must be shown on the Detailed Plans

PROPOSED PUMPING

The following information must be provided for new or modifications to pumping stations:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*
☐ Pump Curve

Number of Pumps _____
Capacity / pump _____ gpm
Total Dynamic Head _____ ft

PROPOSED TREATMENT PROVIDED

The following information must be provided for new or modifications to treatment:
***Must be affixed with professional engineer's seal**

☐ Engineering Report* or Review No. _____
☐ Detailed Plans *
☐ Technical Specifications*
☐ Product or Equipment Literature (if applicable)
☐ Design Basis for size/capacity of units or chemical dosages*
☐ Description of testing equipment

PROPOSED WASTE DISPOSAL FACILITIES FOR WATER TREATMENT

The following information must be provided for new or modifications to waste disposal facilities:
***Must be affixed with professional engineer's seal**

☐ Detailed Plans*
☐ Technical Specifications*
☐ Design Basis for size/capacity of units*

Number of Units _____
Capacity / Unit _____ gal
Final Disposal of sludge _____

CERTIFICATION

I certify that I have personally examined and am familiar with the information in this application and believe that the information submitted is accurate and complete. I am aware that making a false statement or misrepresentation in this application is grounds for denying or revoking the construction permit. I may also be guilty of a misdemeanor and upon conviction, may be punished by fine or imprisonment.

SIGNATURE OF RESPONSIBLE OFFICIAL	DATE
	03/29/2021
TYPE OR PRINT NAME OF RESPONSIBLE OFFICAL	TITLE
NATE SILER	PUBLIC WORKS DIRECTOR

ATTACHMENT “A”

MNDR CONSTRUCTION PERMIT

PROJECT:

MASTER WATER METER INSTALLATION

NEOSHO, MO

PROJECT LOCATION:

A NE ¼ OF SE ¼ OF SECTION 24, T25N, R32W, LAT N 36.869079 (d), LONG W 94.376823 (d)

B NW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.869900 (d) , LONG W 94.373235 (d)

C SW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.867597 (d) , LONG W 94.370014 (d)

D SW ¼ OF SW ¼ OF SECTION 19, T25N, R31W, LAT N 36.865524 (d) , LONG W 94.368700 (d)

E NE ¼ OF NW ¼ OF SECTION 30, T25N, R31W, LAT N 36.864695 (d), LONG W 94.367454 (d)

F OMITTED FROM PROJECT

G SE ¼ OF NE ¼ OF SECTION 30, T25N, R31W, LAT N 36.858047 (d), LONG W 94.355973 (d)

H SW ¼ OF SE ¼ OF SECTION 13, T25N, R32W, LAT N 36.880021 (d), LONG W 94.380699 (d)

I NE ¼ OF NE ¼ OF SECTION 24, T25N, R32W, LAT N 36.879277 (d), LONG W 94.377557 (d)

J OMITTED FROM PROJECT

K SE ¼ OF SE ¼ OF SECTION 13, T25N, R32W, LAT N 36.881625 (d) , LONG W 94.374847 (d)

LINE SIZE, AVAILABLE FLOW, AND PRESSURE AT CONNECTION

A 8” 2267 GPM @ 68 PSI RESIDUAL

B 6” 1430 GPM @ 25 PSI RESIDUAL

C 8” 2114 GPM @ 54 PSI RESIDUAL

D 8” 2096 GPM @ 42 PSI RESIDUAL

E 12” 2062 GPM @ 40 PSI RESIDUAL

F OMITTED FROM PROJECT

G 8” 3391 GPM @ 54 PSI RESIDUAL

H 6” 3069 GPM @ 58 PSI RESIDUAL

I 8” 2091 GPM @ 68 PSI RESIDUAL

J OMITTED FROM PROJECT

K 8” 2404 GPM @ 81 PSI RESIDUAL

CONTRACT DOCUMENTS, SPECIFICATIONS, AND DRAWINGS FOR MASTER WATER METER INSTALLATION NEOSHO, MISSOURI

EST 1839 NEOSHO MISSOURI

April 6, 2021

Prepared by

ALLGEIER, MARTIN and ASSOCIATES, INC.
Consulting Engineers • Hydrologists • Surveyors
Joplin, MO • Kansas City, MO • Rolla, MO • Springfield, MO
Missouri Certificate of Authority No. 000427

TABLE OF CONTENTS

DIVISION 3 – CONCRETE

DIVISION 13 – SPECIAL CONSTRUCTION

INDEX TO CONSTRUCTION DRAWINGS

With regard to this Project, and Pursuant to RSMO 327.411, Allgeier, Martin and Associates and the Professional whose personal seal and signature appears below assume responsibility only for the drawings, specifications, and other documents bearing the personal seal of the undersigned Professional, and hereby disclaim any responsibility for all other drawings, specifications, or other documents which do not contain the personal seal of the undersigned Professional.

04-06-2021

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes basic identification of the Work and other related activities.

B. Related Requirements:

1. Document 00500 - Agreement Form
2. Document 00700 - General Conditions
3. Document 00800 - Supplemental Conditions

1.02 PROJECT DESCRIPTION

A. Project location is Neosho, Newton County, Missouri, as shown on the drawings.

B. Access to the work site(s) is available via public roads and streets.

C. The project consists of construction of water master meter installations, including but not limited to, precast concrete meter vaults, electromagnetic flow meters with radio transceiver modules, related piping, and miscellaneous work required for completion of the project. All work indicated on the drawings and specifications is to be performed unless deleted by Owner's change order.

D. Inclusive in the work is close coordination with all appropriate jurisdictional agencies and responsibility for construction standards, traffic control, and safety requirements of these agencies.

1.03 TYPE OF CONTRACT

A. All general construction work and related items required to complete this project will be included in a single general construction contract.

B. Provide and pay, except as otherwise specifically stated in the Contract Documents, for all materials, labor, tools, equipment, connections, transportation, superintendence, temporary construction of every nature, all other services, facilities, and cost of every nature whatsoever necessary to execute and complete the entire Work being done under the Contract Documents and deliver it complete in every respect.

1.04 WORK BY OTHERS

A. No Work by others is contemplated, although the Owner reserves the right to do Work within the project site.

1.05 CONTRACTOR'S USE OF SITE

A. Confine operations at the site to the Owner's property and construction easements indicated on the drawings.

B. Keep existing driveways and entrances serving private property clear and available to the

property owner at all times.

C. Do not unreasonably encumber the site with materials or equipment.

1.06 SCHEDULING OF WORK AND WORK SEQUENCE

A. Schedule all work, including location of utilities, to coordinate with appropriate jurisdictional agencies.

B. Construction sequence shall be determined by the Contractor subject to the Owner's need to continue operations of existing facilities.

C. Where Work is on or adjacent to existing facilities, exercise caution and schedule operations to ensure that functions of present facilities will not be endangered. Shutdown of Owner's operating facilities to perform the Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

1.07 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

1.08 COPIES OF DOCUMENTS

A. Contractor will be provided, at no cost, a maximum of four (4) sets of full-size Contract Drawings, Specifications, and any Addenda thereto, for execution of the Work.

B. Additional copies of the above document will be supplied at printing and delivery cost upon request.

1.09 REGULATORY REQUIREMENTS

A. Obtain all necessary permits and comply with all codes of construction or permit requirements of all authorities having jurisdiction.

B. Pay for any bond, fees, other charges, design, work or materials associated with obtaining the necessary permits, including all City of Neosho permits.

C. Any traffic control plans required by regulatory agencies as part of their permit shall be prepared and carried out, at the contractor's expense, in accordance with the M.U.T.C.D., latest version. Barricades, signs, and signals shall be maintained. The signs shall indicate actual conditions that exist on the road ahead.

1.10 REFERENCES AND STANDARDS

A. The latest edition of the following specifications cover certain specified materials and methods to be utilized. Abbreviations as used in the specifications shall mean the following:

1. AWWA: American Water Works Association
2. AGA: American Gas Association

3. ASTM: American Society for Testing and Materials
4. AASHTO: American Association of State Highway & Transportation Officials
5. ANSI: American National Standards Institute
6. APS: American Petroleum Institute
7. ASA: American Standards Association
8. DOT: Federal Department of Transportation
9. AWS: American Welding Society
10. AREA: American Railway Engineering Association
11. ACI: American Concrete Institute
12. BOCA: Building Officials and Code Administrators

1.11 ENVIRONMENTAL

A. In the event of spillage or discharge of oil to the environment, the Contractor shall comply with the provisions of Title 40 Code of Federal Regulations: Part 110 – Discharge of Oil: Part 112 – Oil Pollution Prevention; Part 300 – National Oil and Hazardous Substances Pollution Contingency Plans; and all applicable State, County, and municipal regulations.

B. The Contractor and Owner, in their respective obligations under the terms of the Contract, shall conform to the provisions of the Clean Air Act (41 U.S.C. 7506©).

1.12 SAFETY

A. Precautions shall be exercised at all times by the Contractor for the protection of persons, employees, and property. The safety provisions of applicable laws, local building and construction codes (OSHA and manufacturer's safety requirements) shall be observed. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01010

SECTION 01040
COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers the following requirements:

1. Project Coordination.
2. Site Administration.
3. Field Engineering.
4. Project Meetings.

B. Related Requirements:

1. DOCUMENT 00700 - General Conditions
2. DOCUMENT 00800 - Supplemental Conditions
3. SECTION 01010 - Summary of Work

1.02 PROJECT COORDINATION

A. Coordinate scheduling, submittals and work of the various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provision for accommodating items installed later.
B. Verify characteristics of elements of interrelated operating equipment are compatible. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate work with other contractors performing work under these Documents.
D. Coordinate work with any subcontractors to assure that one subcontractor's work does not delay another's work.
E. Coordinate work with major equipment and material suppliers to assure timely procurement and delivery of equipment and materials to the site.

1.03 SITE ADMINISTRATION

A. Contractor shall be responsible for all areas of the site used by it and by all subcontractors in the performance of the work.
B. Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others.
C. Contractor has the right to exclude from the site all persons who have no purpose related to the Work or its inspection, and may require persons on the site, except Owner's employees, to observe the same regulations as Contractor requires of its employees.

1.04 FIELD ENGINEERING

A. Survey control and reference points which, in the Engineer's opinion, are necessary to enable the Contractor to perform the Work are indicated on the drawings. The Contractor shall locate and protect survey control and reference points and be responsible for laying out the Work.

Elevations shown on the drawings and referred to in the specifications are based on the benchmarks shown.

B. The Contractor shall perform all construction staking and surveying he may find necessary or convenient to enable him to construct each element of the Work in the correct position to correspond to the information shown on the drawings. Modifications to avoid unknown or mislocated facilities are to be expected.

C. The Contractor shall be responsible for the preservation of all benchmarks and control monuments, property corners, and public land corners within, or adjacent to, the project limits. If any of these markers are disturbed or destroyed, the cost of replacing them will charged to the Contractor.

1.05 PROJECT MEETINGS

A. Preconstruction Conference:

1. Owner/Engineer will administer a meeting within 15 days after execution of the Agreement, to review items stated in the agenda and to establish a working understanding between the parties as to their relationships. The conference shall be attended by:

   a. Contractor and its Superintendent.
   b. Representatives of principal Subcontractors, suppliers and manufacturers as appropriate.
   c. Engineer.
   d. Owner and its Resident Project Representative.
   e. Representatives of authorities having jurisdiction over the project as appropriate.

2. Agenda:

   a. Project schedule.
   b. Project coordination.
   c. Procedures and processing of Contractor's Submittals, Change Orders and Applications for Payments.
   d. Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
   e. Construction facilities and controls.
   f. Critical work sequencing.
   g. Procedures for maintaining Record Documents.
   h. Procedures for testing.
   i. Temporary utilities if applicable.
   j. Safety and first aid.

3. Owner/Engineer will arrange for keeping the minutes and distribute copies to all persons in attendance.

B. Progress Meetings:

1. Contractor shall schedule and administer meetings at times requested by Owner/Engineer, not to exceed once per month. Meetings shall be attended by:

   a. Contractor and its Superintendent

b. Representatives of all Subcontractors active on the site.
c. Engineer.
d. Owner and its Resident Project Representative.
e. Others as requested by Contractor, Engineer or Owner.

2. Agenda:

a. Review previous meeting minutes.
b. Review of work progress since previous meeting.
c. Field observations, problems, and conflicts
d. Identification of problems which impede planned progress.
e. Review status of Contractor's submittals.
f. Review of off-site fabrication and delivery schedules.
g. Maintenance of progress schedule.
h. Corrective measures and procedures to regain projected schedule.
i. Revisions to progress schedule.
j. Planned progress during succeeding work period.
k. Effect of proposed changes on progress schedule and completion date.
l. Other business relating to the Work.

3. Owner/Engineer will arrange for keeping of minutes and distribute copies to all persons in attendance and those affected by decisions made.

PART 2 - PRODUCTS: NOT APPLICABLE.

PART 3 - EXECUTION: NOT APPLICABLE.

END OF SECTION 01040

SECTION 01090
DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes definitions of terms and symbols used in the Contract Documents, explanation of specification format and content, and establishes edition dates for standards referenced elsewhere in the specifications.

B. Related Requirements:

1. Document 00700 - General Conditions

1.02 DEFINITIONS

A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents, including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in the Contract Documents are defined generally in this section. Definitions and explanations of this section are not necessarily complete or exclusive but are general for the Work to the extent not stated more explicitly in another provision of the Contract Documents.

1. "General Requirements" are the provisions or requirements of the DIVISION 1 - Sections, and which apply to the entire work of the Contract.

2. The term "indicated" is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.

3. Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and permitted", mean "directed by Engineer", "requested by Engineer", etc. However, no such implied meaning will be interpreted to extend Engineer's responsibility into Contractor's area of construction supervision.

4. Where used in conjunction with Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of the term "approved" will be held to limitations of Engineer's responsibilities and duties as specified in the General Conditions and Supplemental General Conditions. In no case will "approval" by Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

5. "Project Site" is the area available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings and may or may not be identical with description of land upon which project is to be built.

6. When applied to equipment and materials, the words "furnish", "install" and "provide" shall mean the following:

a. The word “furnish” shall mean to supply, pay for, and deliver to project site, ready for assembly, installation, etc., as applicable in each instance.
b. The word “install” shall mean to assemble, erect, place into position, incorporate into the Work, adjust, clean and make fit for intended use, as applicable in each instance.
c. The word “provide” shall mean to furnish and install, complete and ready for intended use, as applicable in each instance.

7. “Installer” shall mean the entity (person or firm) engaged by Contractor or its subcontractor (at any lower tier) for performance of a particular unit of work at project site, including installation, erection, application, and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

8. “Testing Laboratory” shall mean an independent entity engaged to perform specific inspections or tests of the Work, either at the project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

B. Basic contract terms used in the Contract Documents are defined in the GENERAL CONDITIONS.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATIONS

A. Specification Format: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute’s 16-Division format and Master format numbering system. Some portions may not fully comply, and no particular significance will be attached to such compliance or non-compliance.

1. Divisions and Sections: For convenience, basic unit of specification text is a “section”, each unit of which is numbered and named. These are organized into related families of sections, and various families of sections are organized into “divisions”, which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.

2. Section Numbering: Used to facilitate cross-references in Contract Documents. Sections are organized in numerical sequence; however, numbering sequence is not complete, and listing of sections in Index at beginning of Contract Documents must be consulted to determine numbers and names of specification sections in Contract Documents.

3. Page Numbering: Numbered independently for each section. Section number is shown with page number at bottom of each page, to facilitate location of text.

4. Parts: Each section of specifications generally has been subdivided into three basic “parts” for uniformity and convenience (Part 1 - General, Part 2 - Products and Part 3 - Execution). These titles do not limit the meaning of text within. Some sections may not contain all three parts when not applicable.

B. Specification Content: These specifications use certain general characteristics of content and conventions in the use of language which are explained as follows:

1. Imperative Language: These specifications are written in imperative and abbreviated form. Unless specifically stated otherwise, this imperative language is directed at the

Contractor. Incomplete sentences shall be completed by inserting “shall”, “the Contractor shall”, “shall be”, and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings.

2. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

3. Abbreviations: The language of these specifications and other Contract Documents is of the abbreviated type in certain instances and implies words and meanings which will be appropriately interpreted. Specific abbreviations are frequently used for trade association names and titles of general standards.

C. Assignment of Specialists: In certain instances, specification text requires that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as “expert” for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of contract requirements remains with the Contractor.

D. Trades: Except as otherwise indicated, the use of titles such as “carpentry” in specification text implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as “carpenter”), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

1.04 DRAWING SYMBOLS

A. Except as otherwise indicated, graphics symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Refer instances of uncertainty to Engineer for clarification.

1.05 INDUSTRY STANDARDS

A. General Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable standards of the construction industry have the same force and affect and are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith.

1. Referenced standards, referenced directly in Contract Documents or by governing regulations, have precedence over non-referenced standards which are recognized in industry for applicability to work.

2. Where compliance with an industry standard is required, comply with standard in effect as of the date of the Contract Documents.

3. Where compliance with two or more industry standards or sets of requirements is specified and overlapping of these different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement will be enforced. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent to Engineer for a decision before proceeding.

4. In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum, within specified tolerances, or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Engineer for decision before proceeding.

5. Each entity engaged in construction activities on the Project shall be familiar with the industry standards applicable to their work. Where copies of standards are needed for proper performance of the work, the Contractor shall obtain copies directly from the publication source.

B. Abbreviations and Names: Trade association names and titles of general standards are generally abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they are defined to mean the industry recognized name of trade association, standards generating organization, governing authority, or other entity applicable to context of text provision.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01090

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers work-related schedules and submittal requirements including:

1. Progress Schedule.
2. Schedule of Payments.
3. Schedule of Values.
4. Compliance Submittals.
5. Miscellaneous Submittals.
6. Operation and Maintenance Manuals.

B. Related Requirements:

1. Document 00700 - General Conditions

1.02 SCHEDULES

A. Progress Schedule:

1. Submit detailed work progress schedule to Engineer for acceptance within 30 days after execution of the Agreement and prior to submittal of the first partial payment request.
2. The schedule shall show the Work in a graphic format suitable for displaying scheduled and actual progress.

a. Prepare schedule as a horizontal bar chart with separate bar for each major portion of the Work.

3. Submit updated schedule to Engineer for acceptance at least once each month showing actual progress and any proposed changes in the schedule of remaining Work.

B. Schedule of Payments:

1. Within 30 days after execution of the Agreement and prior to the first payment request, submit a schedule of estimated monthly payments. Payment schedule may be incorporated into the progress schedule required under Part 1.02A.
2. Revise and resubmit schedule each time partial payment request varies more than 10 percent from the estimated schedule.

C. Schedule of Values:

1. Within 30 days after execution of the Agreement and prior to the first payment request, prepare and submit a schedule of values for each lump sum bid item.
2. Schedule shall list the value of the component parts of the Work item in sufficient detail to serve as a basis for computing values for partial payment requests during construction.

a. Each item shall include a directly proportional amount of Contractor's overhead and profit.
b. An unbalanced schedule of values providing for overpayment of items of Work which would be performed first will not be accepted.

1.03 SUBMITTALS

A. Compliance submittals include shop drawings, product data and samples.

1. Shop drawings include specially prepared technical data for this project, including drawings, diagrams, performance curves, data sheets, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
2. Product data include standard printed information on materials, products, and systems not specially prepared for this project, other than the designation of selections from available choices.
3. Samples include both fabricated and unfabricated physical examples of materials, products and units of work; both as complete units and as smaller portions of units work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.

B. Miscellaneous submittals related directly to the work include warranties, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, operation and maintenance manuals, and similar information, devices, and materials applicable to the Work and not processed as shop drawings, product data or samples.

C. Individual submittal requirements are specified in applicable Sections for each unit of Work.

1.04 COMPLIANCE SUBMITTAL REQUIREMENTS

A. Compliance submittals shall include but not be limited to the following information:

1. Manufacturer's specifications.
2. Manufacturer's standard drawings, catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data.

    a. Clearly mark each copy to identify materials, products, models, options and other data applicable to this project.
    b. Supplement standard information to provide additional information applicable to this project.

3. Shop fabrication and erection drawings.
4. General equipment outline drawings showing location of major components and overall dimensions.
5. Schematic diagrams for electrical items showing external connections, internal wiring diagrams and one-line diagrams.
6. Material lists or schedules and spare parts lists.
7. Detailed equipment installation drawings and instructions.
8. Physical samples to illustrate functional or aesthetic characteristics of the Product.

B. Each submittal shall be preceded by one or more summary pages containing the following:

1. Date and revision dates.
2. Project name and number.
3. The names of the Owner, Engineer, Contractor, Subcontractor, Supplier, Manufacturer and Detailer as applicable.
4. Identification of product.
5. Division and Section of Work.
6. Identification of any deviations from requirements of the Contract Documents.
7. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of all quantities, dimensions, specified performance criteria, installation requirements and materials, and coordination of submittal with the requirements of the Work and Contract

Documents.

C. Submit Shop Drawings and Product Data electronically in portable document format (pdf).
D. Submit samples as specified in individual specification Sections.

1.05 MISCELLANEOUS SUBMITTAL REQUIREMENTS

A. Miscellaneous Submittals are comprised of those submittals which are related to the work, but do not require Engineer's approval prior to proceeding with the work. Miscellaneous Submittals are defined in Part 1.03B.
B. Unless otherwise specified, submit all Miscellaneous Submittals electronically in portable document format (pdf).
C. Identify each Miscellaneous Submittal by project name and number, specification section and article number, and any deviations from the requirements of the Contract Documents.

1.06 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be prepared by the manufacturer and shall include the following:

1. Index and tabs.
2. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and product data sheets identifying model numbers.
3. Applicable drawings.
4. Warranties and guarantees.
5. Address of nearest manufacturer-authorized service facility.
6. Clearly mark standard drawings, catalog sheets, brochures, diagrams, schedules, charts, illustrations, and other descriptive data to identify materials, products, options, and other data applicable to this project.,
7. Provide additional data as appropriate.

B. Above information shall be bound into appropriately sized three ring type hard back binders.

1. The following information shall be imprinted or affixed by label on the binder front cover.

a. Operation and Maintenance Manual
b. Equipment name
c. Manufacturer's name
d. Project name
e. Owner's name

2. The following information shall be imprinted or affixed by label on the binder spine:

a. O & M Manual
b. Equipment name
c. Manufacturer's name

C. Submit four (4) copies of equipment operation and maintenance manuals.

1.07 ENGINEER'S REVIEW

A. Compliance Submittals:

1. Engineer will review with reasonable promptness and return Compliance Submittals to Contractor with appropriate notations. Engineer will review for compliance with the design concept of the project and information given in the Contract Documents.

2. Engineer's action stamp, for use on Submittals to be returned to Contractor is self-explanatory as marked.
3. Engineer's approval of Compliance Submittals will not relieve Contractor from his responsibility for any deviations from the requirements of the Work and Contract Documents unless Contractor has, in writing, called Engineer's attention to each specific deviation at the time of submission, and Engineer has given written approval of such deviation; nor will Engineer's approval relieve Contractor from responsibility for errors or omissions in the Submittals.
4. Where a Submittal is required by the Specifications, related Work shall not begin until after Submittal approval.

B. Miscellaneous Submittals:

1. Engineer will review Miscellaneous Submittals for conformance with the requirements given in the Contract Documents.
2. Engineer will respond to Contractor on those Miscellaneous Submittals which are deficient.

C. Operation and Maintenance Manuals:

1. Engineer will review Operation and Maintenance Manuals for general content but not for substance.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION 01300

SECTION 01530
TEMPORARY BARRIERS AND CONTROLS

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes General Requirements for:

1. Protection of Work.

2. Protection of existing property.

3. Barriers.

4. Environmental controls.

5. Traffic control and use of roadways.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION - 02200.

2. Trenching and Backfilling for Utilities: SECTION - 02222.

1.02. REFERENCES:

A. Manual on Uniform Traffic Control Devices (MUTCD).

B. 2017 Missouri Standard Specifications for Highway Construction.

PART 2 – PRODUCTS – Not Applicable.

PART 3 – EXECUTION

3.01. PROTECTION OF WORK AND PROPERTY:

A. General:

1. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all Work and Equipment and Materials free from injury or damage. At the end of each day all new Work likely to be damaged shall be appropriately protected.

2. Notify Engineer immediately at any time operations are stopped due to conditions which make it impossible to continue operations safely or to obtain proper results.

3. Construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, floors, pits, trenches, manholes, and ducts free of water.

B. Property Other than Owner's:

1. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.

2. Names and telephone numbers of representatives of agencies and utilities having jurisdiction over streets and utilities in the Work area can be obtained from the City for the agencies

listed below. Concerned agencies or utilities shall be contacted a minimum of 48 hours prior to performing Work, closing streets and other traffic areas, or excavating near underground utilities or pole lines.

a. Water.

b. Gas.

c. Sanitary sewers.

d. Storm drains.

e. Pipeline companies.

f. Telephone.

g. Electric.

h. Municipal streets.

i. Fire.

j. Police.

k. Right of Way Manager

3. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

4. Where fences are to be breached on private property, the owners thereof shall be contacted and arrangements made to ensure proper protection of any livestock or other property thus exposed.

5. The applicable requirements specified for protection of the Work shall also apply to the protection of existing property of others.

6. Before acceptance of the Work by the City, restore all property affected by Contractor's operations to its original or better condition.

3.02. BARRIERS

A. General:

1. Furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the Work, existing facilities, trees, and plants from construction operations. Remove when no longer needed or at completion of Work.

a. Barriers shall be required on all unattended excavations and at the direction of the Right of Way Manager

2. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or regulatory agencies.

3. Barriers shall be of a neat and reasonable uniform appearance, structurally adequate for the required purposes.

4. Maintain barriers in good repair and clean condition for adequate visibility.

5. Relocate barriers as required by progress of Work.

6. Repair damage caused by installation and restore area to original or better condition. Clean the area.

3.03. ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. Provide positive methods and apply dust control materials to minimize raising dust from construction operations; and to prevent airborne dust from dispersing into the atmosphere.

B. Water and Erosion Control:

1. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.

2. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.

a. Hold the areas of bare soil exposed at one time to a minimum.

b. Provide temporary control measures such as berms, dikes, drains and erosion barriers.

3. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.

4. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and groundwater.

5. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.

C. Debris Control and Clean-Up:

1. Keep the premises free at all times from accumulations of debris, waste materials, and rubbish caused by construction operations and employees. Responsibilities shall include:

a. Adequate trash receptacles about the site, emptied promptly when filled.

b. Periodic cleanup to avoid hazards or interference with operations at the site and to maintain the site in a reasonably neat condition.

c. The keeping of construction materials such as forms and scaffolding neatly stacked.

2. Prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.

D. Pollution Control:

1. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.

2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations deemed acceptable by the appropriate regulatory agency, and replace with suitable compacted fill and topsoil.

3. Take special measures to prevent harmful substances from entering public waters, sanitary, or storm sewers or waters of the state.

3.04. TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Control:

1. Provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas. This includes traffic signals and signs, flagmen, flares, lights, barricades, and other devices or personnel as necessary to adequately protect the public. All construction sign and reflective materials shall conform to the Missouri Standard Specification for Highway Construction. Traffic control measures shall meet the requirements of the MUTCD and shall be reviewed and approved by the Right of Way Manager.

2. Remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified condition when no longer required.

3. Provide and maintain suitable detours or other temporary expedients if necessary.

4. Bridge over open trenches where necessary to maintain traffic.

5. Consult with governing authorities to establish public thoroughfares which will be used as haul routes and site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. Repair roads, walkways, and other traffic areas damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.

2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

END OF SECTION 01530

DIVISION 2 – SITE WORK

SECTION 02200
SITE PREPARATION AND EARTHWORK

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes site preparation activities and certain items of earthwork common to other related Work.

B. Related Work Specified Elsewhere:

1. Trenching and Backfilling for Utilities: SECTION 02222.

1.02. REFERENCES:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):

a. D2167 – Test for Density and Unit Weight of Soil In-Place by Rubber-Balloon Method.

b. D2922 – Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).

2. Occupational Safety and Health Administration (OSHA):

a. Part 1926 – Safety and Health Regulations for Construction.

1.03 MEASUREMENT AND PAYMENT

A. All materials encountered in excavations shall be unclassified regardless of type, composition, character, and condition thereof. Any rock encountered shall be handled at no additional cost to Owner.

B. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

1.04 PROJECT CONDITIONS

A. Existing Conditions: Accept the Project site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.

1. Protect trees, plant materials, lawns and other features not designated for removal.

2. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.

2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others unless permitted in writing by the Owner and then only after acceptable temporary utility services have been provided. Provide a minimum of 48-hour notices to utility companies and receive written notice to proceed before interrupting any utility.

1.05 PROTECTION

A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave-ins, collapse of walls, structures and slopes, both on and adjacent to the site.

B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable OSHA requirements.

C. Repair: Includes the removal and replacement with new materials affected by settlement.

PART 2 – PRODUCTS

2.01. EARTHWORK MATERIALS

A. Topsoil is defined as selectively excavated surface soil that is representative of local soils that produce heavy growths of crops, grass or other vegetation. Satisfactory topsoil is reasonably free of underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic substances or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than 5% by volume of stones or other such objects larger than 1/2" in any dimension for lawn seeded areas and 1" in any dimension in other seeded areas.

B. Materials suitable for use in embankment, structural backfill and fill include material free of debris, roots, organic matter, and frozen matter; free of stone having any dimension greater than 2 inches in areas requiring a high degree of compaction or 4 inches in other embankment and fill areas:

1. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands exclusive of clayey material:

   a. Free-draining.

   b. Materials for which impact compaction will not produce a well-defined, moisture-density relationship curve.

   c. Maximum density by impact methods will generally be less than by vibratory methods.

   d. For which generally less than 15 percent by dry weight, of soil particles pass the No. 200 sieve.

2. Cohesive materials include silts and clays generally exclusive of sands and gravel:

a. Materials for which impact compaction will produce a well-defined, moisture-density relationship curve.

C. Materials unsuitable for use in embankment and fill include all material that contains debris, roots, organic matter, frozen matter, stone (with any dimension greater than 2 inches in areas requiring a high degree of compaction or 4 inches in other embankment and fill areas), or other that are determined by Engineer to be too wet or otherwise unsuitable.

D. Waste materials include excess usable materials and materials unsuitable for use in the Work.

E. Borrow materials include all fill materials, structural backfill and topsoil obtained from locations on or off the jobsite.

PART 3 – EXECUTION

3.01. SITE PREPARATION:

A. Clearing and Grubbing:

1. Perform selective clearing and grubbing as indicated or as necessary to perform excavation, trenching, borrow, and other Work required, and as directed by Engineer.

a. Clearing:

(1) Conduct Work in a manner to prevent damage to property and to provide for the safety of employees and others.

(3) Keep operations within property lines as indicated.

b. Grubbing:

(1) Includes removal and disposal of tree stumps and roots larger 3 inches in diameter.

(2) Remove to a depth of at least 18 inches below existing grade elevation.

(3) Backfill all excavated depressions with approved material and grade to drain.

B. Protection of Trees:

1. Protect tops, trunks, and roots of existing trees on Project site which are to remain, as follows:

a. Box fence around, or otherwise protect trees before any construction Work is started.

b. Do not permit heavy equipment or stockpiles within branch spread.

c. Trim or prune to obtain working space in lieu of complete removal when possible. Conduct operation as follows:

(1) With experienced personnel.

(2) Conform with good horticultural practice.

(3) Preserve natural shape and character.

(4) Protect cuts with approved tree paint.

d. Grade around trees as follows:

(1) Trenching: Where trenching is required around trees which are to remain, avoid cutting the tree roots by careful hand tunneling under or around the roots. Avoid injury to or prolonged exposure of roots.

(2) Raising Grades: Where existing grade at a tree is below the new finished grade and fill not exceeding 16 inches is required, place 1 to 2 inches of clean, washed gravel directly around the tree trunk. Extend gravel out from trunk on all sides at least 18 inches and finish 2 inches above finished grade at tree. Install gravel before earth fill is placed. Do not leave new earth fill in contact with any tree trunks.

(3) Lowering Grades: Regrade by hand to elevation required around existing trees in areas where new finished grade is to be lower. As required, cut the roots cleanly 3 inches below finished grade and cover scars with tree paint.

e. Remove when damage occurs and survival is doubtful.

C. Topsoil Stripping:

1. Strip topsoil from excavation limits of the construction area and stockpile in areas where it will not interfere with construction operations or existing facilities.
2. Strip to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

3. Scrape areas clean of all grass, weeds, brush, roots, and other materials prior to stripping.

4. Stop stripping at a sufficient distance from trees to prevent damage to main root system.

D. Debris and Waste Material:

1. Dispose of debris and waste material from site preparation activities at a location off the jobsite as arranged for by Contractor.

3.02. EARTHWORK:

A. Excavation:

1. Perform excavation of every type of material encountered within the limits of the Work, to the lines and grades indicated on the drawings and as required to complete new construction.

2. Blasting: Not permitted.

3. Dewatering:

a. Control grading around excavations to prevent surface water from flowing into excavation areas.

b. Drain or pump as required to continually maintain all excavations and trenches free of water or mud from any source, and discharge to approved drains or channels.

Commence when water first appears and continue until Work is complete to the extent that no damage will result from hydrostatic pressure, flotation, or other causes.

c. Use pumps of adequate capacity to ensure rapid drainage of area, and construct and use drainage channels and subdrains with pumps as required.

d. Remove subgrade materials rendered unsuitable by excessive wetting and replace with approved backfill material.

4. Stockpiling:

a. Stockpiling in amounts sufficient for and in a manner to segregate materials suitable for the following:

(1) Topsoiling.

(2) Backfilling.

(3) Waste only.

b. Do not obstruct or prevent access to:

(1) Roads and driveways.

(2) Utility control devices.

(3) Ditches or natural drainage channels.

c. Perform in a manner to avoid endangering the Work, stability of banks or structures, or health of trees and shrubs to be saved.

d. Maintain safe distance between toe of stockpile and edge of excavation or trench.

e. Stockpile in other areas or off site when adjacent structures, easement limitations, or other restrictions prohibit sufficient storage adjacent to the Work. Off-site areas shall be arranged for by Contractor.

6. Waste Materials:

a. Remove waste materials from Work area as excavated.

b. Dispose of such materials at a location arranged by, and at the expense of the Contractor.

c. Place excavated rock in the interior of waste area fills so that it will not be exposed to view.

d. Grade waste areas and leave them free draining and with an orderly and neat appearance.

B. Subgrades:

1. Excavate or fill as required to construct subgrades to the elevations and grades indicated. Remove all unsuitable material and replace with Engineer approved fill materials. Perform all wetting, drying, shaping, and compacting required to prepare a suitable subgrade.

C. Site Grading:

1. Rough Grading:

a. All areas within the Project, including excavated and filled sections, and adjacent transition areas shall be reasonably smooth, compacted, and free from irregular surface changes.

b. Degree of finish shall be that ordinarily obtained with blade grader or other power equipment, except as otherwise specified.

c. Finished rough grades shall generally be not more than 0.5 foot above or below established grade or approved cross sections with due allowance for topsoil.

d. Tolerance for areas within 10 feet of structures and areas to be paved shall not exceed 0.15 foot above or below established subgrade.

e. Finish all ditches, swales, and gutters to drain readily.

f. Unless otherwise indicated, slope the subgrade evenly to provide drainage away from structure walls in all directions at a grade not less than 1/4 inch per foot.

g. Provide roundings at top and bottom of banks and at other breaks in grade.

E. Topsoiling:

1. Includes placement of topsoil on all areas not specified to receive paving or other surface treatment (including borrow or waste areas).

2. Materials:

a. Those obtained from excavation which are most suitable and stockpiled for such purpose:

b. Borrow when required.

3. Subgrade Treatment:

a. Clear site of vegetation heavy enough to interfere with proper grading and tillage operations.

b. Clear surfaces of all stones or other objects larger than 2-inches in thickness or diameter, all roots, brush, wire, grade stakes, or other objectionable material.

c. Loosen subgrade by disking or scarifying to a depth of 2 inches wherever compacted by traffic or other causes to permit bonding of the topsoil to the subgrade.

4. Placement of Topsoil:

a. Distribute over required areas without compaction in upper 1 foot, other than that obtained with spreading equipment.

b. To extent material is available within following limits:

(1) Not less than 4 inches in depth.

(2) Do not exceed 2 feet in depth.

c. Shape cuts, fills, and embankments to contours indicated.

d. Grade to match contours of adjacent areas and permit good, natural drainage.

e. Provide gentle mound over trenches.

5. Maintenance:

a. After topsoil has been spread, clear surface of stones or other objects larger than 1 inch in thickness or diameter and all other objects than might interfere with planting and maintenance operations.

b. Protect topsoiled areas from the elements until grass is established and repair eroded areas as required.

c. Keep paved areas clean. Promptly remove topsoil or other dirt dropped upon surfacing.

3.03. FIELD QUALITY CONTROL:

A. Compaction:

1. Owner may, through services of an independent laboratory, test all backfill and subgrades under this Project to determine conformance with specified density relationships.

2. Method of test may be either of the following at Engineer's option:

a. ASTM D2167.

b. ASTM D2922.

B. Subgrades:

1. Engineer will inspect all subgrades to determine conformance with indicated lines and grades.

2. Subgrades shall have a maximum deviation of not more than 1/2 inch in any 10 feet when tested with a 10-foot straightedge applied parallel with and at right angles to the centerlines of subgrade areas, except that subgrades to receive aggregate type surfacing shall have a maximum deviation of not more than 1 inch.

3.04. PROTECTION OF THE WORK:

A. Maintenance:

1. Protect newly graded and topsoiled areas from actions of the elements.

2. Fill and repair settling or erosion occurring prior to landscaping and reestablish grades to the required elevations and slopes.

B. Correction of Backfill Settlement:

1. Contractor is responsible for correcting any settlement of backfill and damages created thereby within 1 year after acceptance of the Work by the City.

2. Contractor to make repairs within 10 days from and after due notification by City of backfill settlement and resulting damage.

3. Contractor to make own arrangements for access to the site for purposes of repair.

END OF SECTION 02200

SECTION 02222
TRENCHING AND BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.01. SUMMARY:

A. This Section includes:

1. Excavation, sheeting, bracing, and all operations necessary for the preparation of trenches for bedding of pipes and pipe appurtenances, conduit, and buried cable.

2. Pipe embedments and encasements.

3. Backfilling of trenches.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

2. Concrete: DIVISION 3 – SECTION 03300.

1.02. REFERENCES:

A. Applicable Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):

a. T104 – Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

2. American Society for Testing and Materials (ASTM):

a. C33 – Standard Specification for Concrete Aggregates.

b. D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

c. D2167 – Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

d. D2922 – Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

e. D4253 – Maximum Index Density of Soils Using a Vibratory Table.

f. D4254 – Minimum Index Density of Soils and Calculation of Relative Density.

3. Occupational Safety and Health Administration (OSHA):

a. Part 1926 - Safety and Health Regulations for Construction.

4. State of Missouri Standard Specifications for Highway Construction.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Includes, but not limited to, the following:

1. Steel reinforcement for concrete encasement.

2. Steel reinforcement for concrete cradle.

3. Concrete as specified in DIVISION 3 – SECTION 03300.

C. Where selecting an option for excavation, trenching and shoring design from local, state, or federal safety regulations such as "OSHA Part 1926" or successor regulations, which request design by a registered professional engineer, the Contractor shall submit to the Engineer of Record (for information only and not for Engineer approval) the following:

1. Copies of design calculations and notes for sloping, benching, support systems, shield systems, and other protective systems approved by a professional engineer registered in the State of Missouri and obtained by Contractor.

2. Documents provided with evidence of Registered Professional Engineer's seal, signature, and date in accordance with appropriate State of Missouri licensing requirements.

1.04 MEASUREMENT AND PAYMENT

A. All materials encountered in excavations shall be unclassified regardless of type, composition, character, and condition thereof. Any rock encountered shall be handled at not additional cost to Owner.

B. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. GRANULAR PIPE EMBEDMENT:

A. Material:

1. Granular pipe embedment shall be crushed limestone consisting of aggregate particles meeting the requirements of ASTM C33, Gradation 67, 1-inch to No. 8 size.

B. Gradation:

Sieve Size	Percent Passing
1-inch	100
3/4-inch	90-100
3/8-inch	20-55
No. 4	0-10
No. 8	0-5

C. Sand:

1. Sand used for bedding shall be capable of passing a 3/4” sieve with not more than 5% retained on a No. 4 sieve.

2.02. PIPE EMBEDMENT FOR GROUNDWATER BARRIER:

A. Barrier material shall be soil meeting classification GC, SL, CL, or ML-CL or Portland cement concrete.

2.03. TRENCH BACKFILL MATERIALS:

A. Obtain from the following:

1. Trenches and other excavations included in the Project.

2. Borrow from location off jobsite.

3. As specified for pipe embedment.

4. Combination of above.

B. Free from organic matter, refuse, ashes, cinders, frozen, or other unsuitable material.

C. Gravel, rock, or shale particle size limited as follows:

1. Not to exceed 2 inches in greatest dimension within 12 inches of pipe or conduit and upper 18 inches of trench.

2. Maximum dimension one-half the depth of layer to be compacted in other areas.

D. Contain sufficient fine materials to provide a dense mass free of voids and capable of satisfactory compaction.

E. Have moisture content enabling satisfactory placement and compaction.

F. Blended or otherwise processed to provide required gradation and moisture content.

G. Use granular material as specified for pipe embedment and trench stabilization unless otherwise indicated.

2.04. COMPACTED GRANULAR BACKFILL:

A. Compacted granular backfill shall be flowable fill or graded gravel as described below:

1. Flowable fill for compacted backfill may be used for cuts in existing roadway, as approved by the Engineer.

2. Gravel for compacted backfill shall conform to the following gradation.

Sieve Size	Percent Passing by Weight
1-inch	100
3/4 inch	85-100
3/8 inch	50-80
No. 4	35-60
No. 40	15-30
No. 200	5-10

3. The gravel mixture shall contain no clay lumps or organic matter.

PART 3 – EXECUTION

3.01. TRENCHING:

A. Equipment and Methods:

1. Types of Equipment and methods may be at Contractor's option, where structures or other facilities are not endangered.

2. Equipment and methods shall be subject to approval of jurisdictional agency where stability or usefulness of other facilities may be impaired.

3. Perform by hand methods when required to save or protect trees, culverts, utilities, or other structures above or below ground.

4. Maximum length of open trench shall be limited to 100 feet in advance and to 100 feet behind pipe installation, except as approved by Engineer.

5. Remove all rocks and hard objects larger than 1” in diameter for a depth of 6” below bottom of pipe.

B. Side Walls:

1. Make vertical or slope within specified trench-width limitations below a horizontal plane 12 inches above top of pipe.

2. Vertical or sloped (stepped) as required for stability, above a horizontal plane 12 inches above top of pipe.

3. Sheet and brace where necessary.

4. Excavate without undercutting.

C. Trench Depth:

1. Trenches shall be excavated to six (6) inches below the bottom of the pipe when set to establish flowlines to provide clearance for the pipe bell and not less than six (6) inches of granular bedding material.

2. Do not exceed the indicated depth where conditions of bottom are satisfactory. Should the trench be excavated more than six (6) inches below the flowline where the bottom conditions are satisfactory, the Contractor shall use only granular bedding material to establish flowline grades.

3. Increase depth as necessary to remove unsuitable supporting materials.

4. Minimum depth of cover over top of pipe is 42 inches.

5. Maximum depth of cover over top of pressure pipe is 72 inches unless approved by the Engineer.

6. Trenches cut to prevent high spots in pressure pipe.

D. Trench Bottom:

1. Protect and maintain when suitable natural materials are encountered.

2. Remove rock fragments and materials disturbed during excavation or raveled from trench walls.

3. Restore to proper subgrade with trench-stabilization material when over-excavated:

a. Correct when trench is over-excavated without authority or to stabilize bottom rendered unsuitable through negligence or improper operations.

b. Placement of Trench Stabilization Material:

(1) Compact in lifts not exceeding 6-inch loose thickness:

(a) With pneumatic or vibratory equipment.

(b) To density specified for granular pipe embedment.

E. Trench Width:

1. Excavate trench to a width which will permit satisfactory joining of the pipe and thorough tamping of the bedding.

2. Minimum trench width shall be pipe outside diameter plus 12" or 24", whichever is greater.

3. Minimum 6-inch clear space between outside diameter of pipe and trench wall when measured at top of pipe.

4. Maximum trench width shall be pipe outside diameter plus 24".

F. Trenching in Fill Areas: Perform trenching in fill areas only after compacted fill has reached an elevation of not less than 1 foot above the top of the pipe.

G. Pipe Deflection:

1. Pipe shall not be deflected by bending.

2. Maximum joint deflection shall be 1/2 of manufacturer's maximum allowable joint deflection.

3.02. PIPE EMBEDMENTS AND ENCASEMENTS:

A. Granular Pipe Embedment:

1. Place granular embedment as follows:

a. Level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length. Granular pipe bedding material shall be a minimum of six (6) inches below the pipe bell.

b. Form depression under each joint so that no part of bell or coupling is in contact with trench when pipe is placed in position.

c. Add second layer simultaneously to both sides of the pipe with care to avoid displacement.

d. Final depth of granular embedment material shall extend twelve (12) inches above the top of pipe bell.

e. Complete promptly after completion of jointing operations and Engineer approval to proceed.

f. Substitute for any part of earth backfill to within 2 feet of final grade at Contractor's option.

g. Obtain level depth of cover over top of pipe for trench width.

2. Compact granular bedding as follows:

a. In lifts not exceeding 12 inches in compacted depth.

b. Rod, space, or use pneumatic or vibratory equipment:

(1) As required to obtain not less than 80% relative density as determined by ASTM Method D4253 and D4254.

(2) Throughout depth of embedment.

B. Arch and Total Concrete Encasement: Arch encasement is not required unless improper trenching or unexpected trench conditions require its use.

1. Include in locations indicated or where approved by Engineer to correct over-width trench condition.

2. Form to dimensions indicated or construct full width of trench.

3. Start and terminate encasement at a pipe joint:

a. Exclude joints from encasement:

(1) Applies only to joints at either end of encasement.

4. Install keyed construction joints coincident with pipe joints at 30- to 36-foot intervals. Provide separation of at least 75% of cross-section area at construction joints. Do not run horizontal steel through joint.

5. Suitably support and block pipe to maintain position and prevent flotation.

6. Place arch encasement promptly after installation of granular embedment.

7. Protect against damage from heavy equipment with layer of earth. Use hand methods to a horizontal plane 12 inches above top of encasement.

C. Concrete Cradle:

1. Include in locations indicated and where designated by Engineer to reinforce unstable trench bottom.

2. Place on undisturbed trench bottom or on stabilized subbase.

3. Form to dimensions indicated or construct full width of trench.

4. Start and terminate concrete cradle at a pipe joint:

a. Exclude joints from cradle:

(1) Applies only to joints at either end of cradle.

5. Place without horizontal construction joints other than indicated.

6. Suitably support and block pipe to maintain position and prevent flotation.

7. Provide anchorage where indicated.

D. Pipe Embedment for Groundwater Barrier:

1. Include pipe embedment for groundwater barrier at intervals not to exceed 400 feet for pressure lines.

2. Use at impervious trench checks.

3. Shape trench bottom to fit the pipe and backfill throughout depth of trench with compacted impervious materials.

4. Soil shall be compacted to 95 percent of maximum density.

3.03. BACKFILLING:

A. Placement:

1. Complete promptly after Engineer approval to proceed:

a. Upon completion of pipe embedment.

b. Only after concrete encasement has obtained 70% of design strength. Determination of design-strength percentage obtained shall be as specified in DIVISION 3 – SECTION 03300.

2. Use hand methods to a horizontal plane 12 inches above top of pipe-barrel conduit or duct banks.

3. Use approved mechanical methods where hand backfill is not required.

4. Place in layers of thickness within compacting ability of equipment used.

5. Until compacted depth over conduit exceeds 3 feet, do not drop fill material over 5 feet. Then distance may be increased 2 feet for each additional foot of cover. Backfill conduit trenches in layers of 4 to 8 inches.

6. Compact to 80% of maximum density at optimum moisture.

B. Compacted Granular Backfill:

1. Compacted granular or flowable backfill shall be required for the full depth of the trench above the embedment and to within six inches of finish grade or subgrade of pavements in the following locations.

a. Where beneath pavements, driveways, curbs, parking lots, sidewalks.

b. Where in streets, roads, alleys or highway shoulders.

c. Where trench walls are within two feet of the back of the street curb.

2. The backfill shall be compacted by a suitable vibratory roller or platform vibrator to not less than 95 percent of maximum density at optimum moisture content as determined by ASTM D2167, ASTM D1557, or ASTM D2922.

3.04. FIELD QUALITY CONTROL:

A. Concrete: Contractor shall test all concrete for use in encasements, cradles, and concrete cut-off walls to determine conformance with Specifications. Method of test shall be as specified in DIVISION 3 – SECTION 03300.

END OF SECTION 02222

SECTION 02605
UTILITY STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers the following utility structures and related appurtenances:

1. Precast concrete manholes.
2. Thrust blocks.

B. Related Work:

1. Section 02220 - Trenching and Backfilling for Utilities
2. Section 02732 - Pressure Pipe Installation
3. Division 3 - Concrete

C. References:

1. American Society for Testing and Materials (ASTM):

a. ASTM A48 - Specification for Gray Iron Castings.
b. ASTM C478 - Specification for Precast Reinforced Concrete Manhole Sections.
c. ASTM C923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

2. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges:

a. Section 3.7.6-HS Loading.

3. Federal Specifications (FS):

a. FS SS-S-00210A - Sealing Compound, Preformed Plastic for Expansion Joints and Pipe Joints, Type 1, Rope Form.

1.02 SUBMITTALS

A. Submit as specified in Section 01300.
B. Certification that products conform to the applicable requirements of the specified standards.
C. Detailed drawings and product data covering precast concrete sections and related appurtenances.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 PRECAST MANHOLES AND RELATED APPURTENANCES

A. Concrete: Reinforced, 4000 psi. Conform to Division 3.
B. Precast manhole sections shall conform to ASTM C478 except as modified herein. Manufacture in accordance with applicable requirements of Part 3.01.
C. Joint sealant shall conform to FS SS-S-00210A and shall be K.T. Snyder “Ram-Nek”, Hamton-Kent “Kent-Seal No. 2”, or approved equal. Cross sectional area as recommended by manhole manufacturer.
D. Resilient manhole/pipe connectors shall conform to ASTM C923 and shall be A-lok “Manhole Pipe Seal”, Press-Seal “Press Wedge Gasket”, or approved equal.
E. Dampproofing shall be Tnemec “H.B. Tnemecol, 46-465”, Mobile Paints “MO-TAR 47”, or approved equal.
F. Castings shall conform to ASTM A48 Class 35B or better.

1. Specific pattern as noted on the drawings.
2. Frames and covers shall have machined horizontal bearing surfaces to provide even seating.
3. Coat with coal-tar pitch varnish applied at the foundry.
4. Stamped inscription consistent with intended use.

G. Non-shrink grout shall be Grace “Supreme”, Master Builders “Master Flow 713” or “Set Grout”, Five Star Products “Five Star Grout” or approved equal.

PART 3 - EXECUTION

3.01 MANHOLES

A. Design and Manufacture:

1. Precast concrete manhole sections shall be used and shall conform to the dimensions and details shown in drawings and specified herein.
2. Base sections with integral inverts shall be provided with circular openings, with continuous circular, resilient pipe connectors cast into the wall.
3. Base sections without integral inverts shall be provided with horseshoe-shaped boxouts where required for setting over an existing pipeline.
4. Manhole tops shall be eccentric type cone sections or flat slab type as required by the drawings.

   a. Flat slab tops shall be designed and reinforced to withstand AASHTO HS20 highway loading.

5. Adjustment rings shall have a thickness not less than 4" nor more than 12" and shall be fiber reinforced.
6. Provide lifting notches on the inside faces of precast sections to facilitate handling.

   a. Depth of lifting notches shall not exceed 1/2 the wall thickness.
   b. Holes extending through the wall will not be acceptable.

B. Construction:

1. Construct manholes on unyielding, undisturbed subgrade.
2. Set base sections on a leveling course of granular embedment material not less than 4" in thickness as specified in Section 02222.
3. Riser and cone sections shall be joined with a double layer of joint sealant to obtain a pliable watertight joint.

a. Place joint sealant strips end to end. Do not overlap ends.
b. Joint surfaces shall be clean and dry.

4. Lifting notches shall be thoroughly wetted and filled with nonmetallic, non-shrink grout, flush with wall.
5. Apply coal-tar dampproofing to exterior walls on all manholes from base to top. Apply in two coats to a minimum dry film thickness of 8-12 mils per coat. Surface preparation shall conform with coating manufacturer's recommendations.
6. All castings, frames and covers shall be set true to line and proper grade on double layer of joint sealant. Limit adjustment rings to one per manhole.

3.02 THRUST BLOCKS

A. Shall conform to the dimensions and details shown in the drawings.
B. Place thrust blocks against unyielding, undisturbed earth or rock.

1. Install thrust blocks at tees, elbows, bends, and dead ends as required.

3.03 FIELD QUALITY CONTROL

A. Inspection and Rejection:

1. The quality of material, the process of manufacture and the finished manhole sections shall be subject to inspection and approval by the Engineer.
2. Manhole sections shall be subject to rejection for failure to conform to any of the specified requirements. In addition, individual sections may be rejected because of any of the following:

a. Fractures or cracks passing through the manhole wall.
b. Defects that indicate imperfect proportioning, mixing, and molding.
c. Surface defects indicating honeycombed or open texture.
d. Damaged or cracked ends where such damage would prevent making a satisfactory joint.

END OF SECTION 02605

SECTION 02615
PRESSURE PIPE AND FITTINGS

PART 1 - GENERAL

1.01. SUMMARY:

A. This Section includes all pressure pipe, fittings, specials and appurtenances.

B. Related Work Specified Elsewhere:

1. Pipe Installation and Testing – SECTION 02620.

2. Utility Valves and Accessories – SECTION 02640.

1.02. REFERENCES:

A. Applicable Standards:

1. American National Standards Institute (ANSSI):

a. ANSI B16.1 – Cast-Iron Pipe Flanges and Flanged Fittings.

2. American Society for Testing and Materials (ASTM):

a. A307 – Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

b. A536 – Ductile Iron Castings.

c. D2000 – Classification System for Rubber Products.

d. D2241 – Polyvinyl Chloride (PVC) Pressure Rated Pipe.

e. D3139 – Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.

f. F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

3. American Water Works Association (AWWA):

a. C104 – Cement Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water.

b. C110 – Ductile-Iron and Gray-Iron Fittings, 3 Inches through 48 Inches, for Water and Other Liquids.

c. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

d. C150 – Thickness Design of Ductile-Iron Pipe.

e. C151 – Ductile-Iron Pipe, Centrifugally Cast, for Water or Other liquids.

f. C153 – Ductile-Iron Compact Fittings, 3 Inches Through 16 Inches, for Water and Other Liquids.

g. C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fittings, 4 In. Through 60 In.

4. National Science Foundation (NSF):

a. NSF 61 – Drinking Water System Components – Health Affects.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Submit the following for acceptance prior to fabrication:

1. Pipe and joint details.

2. Special, fitting and coupling details.

3. Specifications, data sheets and affidavits of compliance for protective shop coatings and linings.

C. Certificates and Affidavits: Furnish the following prior to shipment:

1. Affidavit of compliance with applicable standard.

2. Test certificates.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. PIPE REQUIREMENTS

A. Furnish pipe of materials, joint types and sizes as indicated or specified.

B. Pipe Marking: All pipe and fittings shall be marked conforming to the applicable standard specification under which the pipe is manufactured.

C. All pipe, fittings, and appurtenances shall contain less than 0.25% lead calculated by weighted average.

2.02. DUCTILE-IRON PIPE:

A. Pipe Design and Manufacture:

1. Ductile-iron pipe shall conform to AWWA C150 and C151 except as otherwise specified.

2. Minimum pressure class for mechanical or push-on joint pipe shall be 350 psi.

3. Minimum pressure class for flanged pipe shall be Class 53.

B. Joints:

1. Push-On:

a. All pipe shall be provided with push-on joints unless otherwise noted.

b. Acceptable Manufacturers:

(1) U.S. Pipe and Foundry Company “Tyton”.

(2) American Cast Iron Pipe Company “Fastite”.

(3) James B. Clow & Sons “Bell-Tite”.

2. Restrained:

a. Provide restrained joint pipe where required.

b. Provide restrained joints of following approved types:

(1) Restrained mechanical joint.

(2) Restrained push-on joint.

(3) Boltless or bolted ball and socket joint.

(4) Anchored couplings.

c. Joint restraint shall provide full circle contact and be EBAA Iron “Megalug” or equal.

C. Fittings:

1. Fittings shall conform to AWWA C110 or C153 and shall have a pressure rating of not less than that specified for pipe.

2. Fittings shall be ductile iron.

3. Fittings for pipe with mechanical joints shall have mechanical joints.

4. Fittings for pipe with push-on joints shall have mechanical joints.

5. Include all specials, taps, plugs, flanges and wall fittings as required.

D. Lining:

1. All pipe, fittings and specials for potable water service shall be cement lined in accordance with AWWA C104. Lining shall extend from edge of plain end to the gasket seat in the bell socket.

E. Coating:

1. All buried iron pipe and fittings shall be coated with manufacturer's standard bituminous coating.

2.03. POLYVINYL CHLORIDE (PVC) PRESSURE PIPE:

A. Design and Manufacture of Pipe:

1. PVC pipe for potable water service 6” to 12” in diameter shall be solid wall conforming to AWWA C900 with minimum wall thickness class DR 18 (235 psi).

2. PVC pipe for potable water service 14” to 24” in diameter shall be solid wall conforming to AWWA C905 with minimum wall thickness class DR 18 (235 psi).

3. PVC pipe for potable water service shall bear the National Sanitation Foundation seal for potable water.

B. Pipe Joints:

1. Joint systems shall be integral bell, gasketed type meeting the requirements of ASTM D3139.

2. Elastomeric gaskets shall be synthetic rubber meeting the requirements of ASTM F477.

C. Fittings:

1. Fittings shall be mechanical joint ductile iron as specified in Part 2.02 of this Section.

2.04. COUPLINGS:

A. Plain End Pipe to Plain End Pipe: Mechanical joint sleeves conforming to Part 2.02 of this Section.

B. Plain End Pipe to Flanged Pipe or Fitting: Flanged coupling adapters complying to the following:

1. Body and End Rings: Ductile iron conforming to ASTM A536.
2. Coupling Gasket: SBR conforming to ASTM D2000.
3. Cross Bolts, T-Bolts and Nuts: High-strength low alloy steel conforming to AWWA C111 or ductile iron conforming to ASTM A536.
4. Flange: Drilling conforming to AWWA C110 and ANSI B16.1 Class 125.
5. Flange O-Ring: NBR (Buna-N).
6. Anchor Studs: Type 416 stainless steel.
7. Finish: Fusion bonded epoxy, NFS 61 certified. All surfaces including flanges.
8. Ford Style FFCA, Romac RFCA, or approved equal.

2.05 POLYETHYLENE ENCASEMENT:

A. Specified in Section 02620 Part 3.06.

PART 3 - EXECUTION

3.01. INSTALLATION: Specified in SECTION 02620.

3.02. FIELD TESTING: Specified in SECTION 02620.

END OF SECTION 02615

SECTION 02620
PIPE INSTALLATION AND TESTING

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes:

1. Handling, installation and testing of pipe, fittings, specials and appurtenances as indicated or specified.

2. Concrete anchor and thrust blocks.

B. Related Work specified elsewhere:

1. Trenching and Backfilling for Utilities: SECTION 02222

2. Utility Structures: SECTION 02605

3. Pressure Pipe and Fittings: SECTION 02615

4. Valves and Accessories: SECTION 02640.

5. Concrete: DIVISION 3 – SECTION 03300

1.02. REFERENCES:

A. Applicable Standards:

1. American Water Works Association (AWWA):

a. C105 – Polyethylene Encasement for Ductile-Iron Pipe Systems.

b. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

c. C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride Pressure Pipe and Fittings.

1.03. DELIVERY, STORAGE AND HANDLING:

A. Handle in a manner to ensure installation in sound and undamaged condition.

1. Do not drop or bump.

2. Use slings, lifting lugs, hooks, and other devices designed to protect pipe, joint elements, linings and coatings.

B. Ship, move, and store with provisions to prevent movement or shock contact with adjacent units.

C. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section will not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that work of which it is a part.

PART 2 – PRODUCTS: Specified in respective Sections.

PART 3 – EXECUTION:

3.01. INSTALLATION - GENERAL:

A. Utilize equipment, methods, and materials ensuring installation to lines and grades indicated.

1. Maintain within tolerances specified or acceptable laying schedule.

a. Alignment: ±1 inch per 100 feet in open cut or tunnel.

b. Grade: ±1 inch per 100 feet.

2. Do not lay on blocks unless pipe is to receive total concrete encasement.

3. Accomplish horizontal and vertical curve alignments with bends, bevels, and joint deflections.

a. Limit joint deflection to one-half of manufacturer's recommended maximum.

b. Use short specials preceding curves as required.

4. Obtain acceptance of method proposed for transfer of line and grade from control to the work.

B. Install pipe of size, materials, strength class, and joint type with embedment indicated or specified for plan location. Install pipe so that the identifying information printed on the pipe is turned right side up and visible from the top of trench. Pipe shall be carefully lowered into trench for installation to prevent damage to pipe.

C. Commence laying at downstream end of line and install pipe with bell ends in direction of laying. Obtain approval for deviations therefrom.

D. Clean interior of all pipe, fittings, and joints prior to installation. Exclude entrance of foreign matter during installation and at discontinuance of installation.

1. Close open ends of pipe with snug-fitting closures.

2. Do not let water control measures prove inadequate.

3. Remove water, sand, mud and other undesirable materials from trench before removal of end cap.

4. Contractor shall be responsible for keeping the interior of all pipelines clean and free of foreign matter until placed in operation.

E. Brace or anchor as required to prevent displacement after establishing final position.

F. Perform only when weather and trench conditions are suitable. Do not lay in water.

G. Observe extra precaution when hazardous atmospheres might be encountered.

H. Tracer Wire: All pressure pipe and water service lines shall be installed with a tracer wire to facilitate future location.

1. Tracer wire shall be a #12 AWG (0.0808" diameter fully annealed, high strength solid copper clad steel conductor, HS-CCS), insulated with a 30 mil, high density, high molecular weight polyethylene (HDPE) insulation rated for direct burial use at 30 volts. HS-CCS conductor shall be at 21% conductivity for locate purposes and have a break load strength of 452 pounds. All wire splices shall be made with either rigid fittings or weatherproof connectors specifically designed for direct burial.

2. Tracer wire for water mains shall be extended to the surface into valve boxes at each valve and fire hydrant isolation valve. Construct additional access points as described herein to obtain a maximum spacing of access points of 1000 feet.

    a. A 4-foot copper grounding rod shall be driven into the trench bottom at 1000 foot spacing and secured to the tracer wire with rigid fittings.

3. Tracer wire for water laterals shall be rigidly affixed to the water main's tracer wire and extended into the meter pit.

3.02. JOINTING:

A. General Requirements:

1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks and structures.

2. Perform conforming to manufacturer's recommendations.

3. Clean and lubricate all joint and gasket surfaces with lubricant recommended by the pipe manufacturer.

4. Utilize methods and equipment capable of fully homing or making up joints without damage.

5. Check joint opening and deflection for specification limits.

B. Special Provisions for Jointing Ductile-Iron Pipe:

1. Conform to AWWA C600.

2. Visually examine while suspended and before lowering into trench.

    a. Paint bell, spigot, or other suspected portions with turpentine and dust with cement to check for cracks invisible to the eye.

    b. Remove turpentine and cement by washing when test is satisfactorily completed.

3.03. CUTTING:

A. Cut in neat manner without damage to pipe.

B. Observe Specifications regarding joint locations.

C. Cut ductile-iron pipe with carborundum saw or other acceptable method per manufacturer's instructions.

1. Smooth cut by power grinding to remove burrs and sharp edges.

2. Repair lining as required and approved.

D. Cut PVC pipe with a fine-toothed saw and miter box or tube cutter. After cutting the end of the pipe shall be dressed to remove all roughness and sharp corners and beveled in accordance with the manufacturer's instructions.

3.04. CLOSURE PIECES:

A. Connect two segments of pipeline or a pipeline segment and existing structures with short sections of pipe fabricated for the purpose.

B. Observe Specifications regarding location of joints, type of joints, and pipe materials and strength classifications.

C. Field-fabricated closures, where required, shall be concrete encased between adjacent flexible joints.

D. May be accomplished with solid sleeve.

3.05. TEMPORARY PLUGS:

A. Furnish and install temporary plugs at each end of work for removal by others when completed ahead of adjacent contract.

B. Plugs:

1. Test plugs as manufactured by pipe supplier.

2. Fabricated by Contractor of substantial construction.

3. Watertight up to 150% of test pressure.

4. Secured in place in a manner to facilitate removal when required to connect pipe.

3.06. POLYETHYLENE ENCASEMENT:

A. Encase ductile iron pipe, fittings, valves, and other appurtenances with polyethylene film as indicated or specified.

B. Materials:

1. Polyethylene material shall be as follows:

a. Conform to AWWA C105.

b. Class C (Black).

2. Adhesive tape shall be as follows:

a. Approximately two inches wide and plastic backed.

b. Capable of bonding securely to metal surfaces and/or polyethylene material.

c. Polyken No. 900, Scotchrap No. 50.

C. Installation:

1. Conform to AWWA C105.

2. Use adhesive tape to fasten polyethylene film in place.

3. Minimize exposure of polyethylene film to sunlight.

4. Wrap ductile iron pipe, valves, fittings, and couplings per AWWA C105 installation standards.

3.07. CONCRETE ANCHOR AND THRUST BLOCKS:

A. Install at tees, elbows, bends, and dead ends where indicated.

B. Place against undisturbed earth or rock.

C. Of design indicated or specified.

1. Removable thrust blocks shall be constructed by utilizing a sheet of 1/4-inch plywood to prevent concrete adherence to pipe, fittings or accessories.

2. Apply two coats of coal tar coating to minimum 20 mils dry film thickness on anchor bars, straps and hardware.

3.08. SEPARATION OF WATER MAINS WITH SANITARY SEWERS:

A. Horizontal Separation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer line. The distance shall be measured edge to edge.

2. If local conditions prevent a horizontal separation of 10 feet, a water main may be laid closer than 10 feet to a sanitary or forcemain provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer line. In areas where the recommended separation cannot be obtained, the sewer line shall be constructed of ductile iron pipe (DIP) with slip-on or mechanical joints or the sewer line continuously encased and be pressure tested to 150 psi to ensure water tightness.

B. Vertical Separation:

1. Where water mains cross sewers or forcemains, the water main shall be laid to provide a minimum vertical separation of 18 inches between the outside of the water main and the outside of the sewer line. This shall apply whether the water main is above or below the sewer line or forcemain.

2. At crossings, the full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than 10 feet. Where a water main crosses under a sewer or forcemain, adequate support shall be provided under the sewer or forcemain to maintain line and grade. In other areas where the recommended separation cannot be obtained, one of the following methods must be required:

a. The sewer or forcemain shall be constructed equal to the water pipe and be pressure tested to 150 psi in accordance with Part 3.12 Field Testing, this Section.

b. Either the water line or sewer line (and forcemain) shall be continuously encased or enclosed in a watertight carrier pipe which extends ten feet (10') on both sides of the

crossing, measured perpendicular to the water main. The carrier pipe shall meet the requirements contained in SECTION 02615.

3.09. FIELD TESTING:

A. Acceptance Tests for Pressure Pipelines:

1. Perform hydrostatic pressure and leakage tests.

a. Conform to the procedures described in AWWA C600 or AWWA C605 depending on the type of pressure pipeline installed, Ductile Iron or PVC, respectively.

(1) As modified herein.

(2) Conform to AWWA C600 procedures for all other pipe material specified.

b. Perform after backfilling but prior to the placement of permanent surfacing.

2. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.

a. Contractor shall furnish and install test plugs.

(1) Including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Bracing against structure walls is not allowed.

(2) Be responsible for any damage to public or private property caused by failure of plugs.

3. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 1 fps.

a. All air shall be expelled from the pipeline prior to testing by use of hydrants or taps. Taps shall be plugged after testing is completed.

4. Contractor shall make arrangements with utility owner for water required for testing.

5. Pressure and Leakage Test:

a. Test pressure shall not be less than 125 psi at the highest point along the test section. However, in no case shall the test pressure exceed the rated working pressure for any joint, thrust restraint, valve, fitting, or other connected appurtenance of the test section.

b. Be at least two-hour duration. Maintain pressure throughout test to within ±5 psi of test pressure.

c. Leakage test shall be conducted concurrently with the pressure test by utilizing a hand or motorized pump equipped with a shut-off valve, pressure relief valve, pressure gauge (for line pressure), and graduated tank for measurement of water loss.

d. Leakage shall be defined as the quantity of water that must be supplied into the new pipeline section (makeup water) to maintain pressure within five (5) psi of the specified test pressure.

e. Acceptable when leakage does not exceed that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

L = maximum permissible leakage (makeup water), in gallons per hour.
S = length of pipe tested, in feet.
D = nominal diameter of pipe, in inches.
P = average test pressure during the hydrostatic test, in pounds per square inch (gauges)

f. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr./in. of nominal valve size shall be allowed.

g. When hydrants are in the test section, the test shall be made against the closed hydrant.

h. Repeat test as necessary.

(1) After location of leaks and repair or replacement of defective joints, pipe, fittings or valves. All visible leaks are to be repaired regardless of the amount of leakage.

(2) Until satisfactory performance of test.

i. Engineer and City shall witness pressure and leakage test.

END OF SECTION 02620

SECTION 02640

UTILITY VALVES AND ACCESSORIES

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes all valves and accessories.

B. Related Work Specified Elsewhere:

1. Pipe Installation and Testing: SECTION 02620.

2. Water Distribution System: SECTION 02665

C. Refer to Standard Construction Details for Valve Installation.

1.02. REFERENCES:

A. Applicable Standards:

1. American National Standards Institute (ANSI):

a. A21.11 – Rubber Gasket Joints Cast & Ductile Iron Pipe.

2. American Society for Testing and Materials (ASTM):

a. A126 – Gray Iron Castings for Valves, Flanges and Pipe Fittings.

b. A536 – Ductile Iron Castings.

3. American Water Works Association (AWWA):

a. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

b. C500 – Metal-Seated Gate Valves for Water Supply Service.

c. C509 – Resilient-Seated Gate Valves for Water Supply Service.

d. C550 – Protective Epoxy Interior Coatings for Valves and Hydrants.

e. C600 – Installation of Ductile-Iron Mains and Their Appurtenances.

f. C515 – Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.

4. National Sanitation Foundation (NSF):

a. NSF 61 – Drinking Water System Components – Health Effects

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Include, but not limited to, the following:

1. Catalog data or illustrations showing principal dimensions, parts and materials.

2. Spare parts list referenced to illustration of parts.

3. Assembly and disassembly or repair instructions.

C. Certificates and Affidavits: Furnish prior to shipment. Include the following:

1. Test certificates.

2. Affidavit of compliance with applicable AWWA Standard.

1.04. DELIVERY, STORAGE, AND HANDLING:

A. Ship all valves with suitable end covers to prevent entrance of foreign material into valve body.

B. Protect valves from damage.

1.05 QUALITY ASSURANCE

A. Insertion type valves shall be installed on the host pipe by a factory trained technician. Provide valve manufacturer's certification prior to initiating the installation.

1.06 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Provide valves of same manufacturer throughout where possible.

B. Provide valves with manufacturer's name, pressure rating and flow direction clearly marked on outside of body.

C. Ends: Provide valves with end connections compatible with adjoining pipe. Unless otherwise specified or indicated, comply with the following:

1. All 3-inch or larger buried valves shall have mechanical joint ends.

2. Mechanical joints shall conform to ANSI A21.11.

3. Provide with duck tipped transition gaskets for adaption to PVC pipe.

D. Rotation:

1. Direction of rotation of the wrench nut to open the valve shall be to the left (counterclockwise).

2. Each valve body shall have cast thereon the word "OPEN" and an arrow indicating the direction to open.

E. Wrench Nuts:

1. Two-inch square wrench nuts shall be provided on all buried valves.

2. All wrench nuts shall comply with Section 4.4.13 of AWWA C500.

3. Contractor shall provide two operating keys (T-bars) for operation of the wrench nuts.

2.02 GATE VALVES:

A. Acceptable Manufacturers:

1. American AVK, “Series 65”.

2. Mueller Company, “2360 Series”.

3. Kennedy Valve, “Model KS-RW.

4. M&H Valve Company, “Style 7000”.

B. All gate valves shall conform to AWWA C515 with design working pressure of 250 psi.

C. All gate valves shall be resilient seated wedge type. Valve body and bonnet shall be cast iron conforming to ASTM A126, Grade B, or ductile iron conforming to ASTM 536.

D. All gate valves shall be non-rising stem type with "O"-ring seals.

E. All gate valves shall be mounted horizontal with operator in the vertical position.

2.03 INSERTION VALVES:

A. Acceptable Manufacturers:

1. Advanced Valve Technologies, AVT™ EZ Valve®.

B. Design and Construction Materials:

1. Designed with a built-in isolation valve that allows valve to be installed under pressure.

2. Designed for installation on ductile iron and PVC pipe materials.

3. Working pressure to 250 psi and shell test pressure to 375 psi.

4. Valve components shall meet AWWA C509-01/C515-15 standards and UL classified to NSF/ ANSI Standard 61.

5. Ductile iron valve body and bonnet.

6. Resilient wedge, non-rising stem (NRS) type with O-ring seals.

7. All exposed fastening hardware shall be stainless steel.

2.04. TAPPING SLEEVE AND ISOLATION VALVE:

A. Tapping Sleeve shall be 18-8 type 304 stainless steel with 360° gasket and removable bolts.

B. Tapping Sleeve outlet flange shall be machined for mating with isolation valve.

C. Tapping Sleeve shall be Ford Style FTSS with stainless steel bolts or similar products from Smith-Blair, Mueller, JCM, or Romac.

D. Isolation Valve shall meet the requirements of gate valves section above, except as modified, herein.

E. Valve shall be Flanged x Mechanical Joint end.

F. Valve shall have an oversized seat opening to allow entry of the tapping machine cutters and permit full diameter cuts.

2.05. VALVE BOXES:

A. Acceptable Manufacturers:

1. Clay and Bailey Manufacturing Company.

2. Clow Corporation.

3. Dresser Industries, Inc.

4. Mueller Company.

5. Neenah Foundry Company.

6. Tyler Company.

B Provide for all buried valves.

C. Design:

1. Boxes shall be three-piece cast-iron slide type with 5-1/4-inch shaft.

2. Provide extension stem to bring operating nut within 3 feet of valve box top.

3. Drop cover shall be marked "WATER".

2.06. SHOP PAINTING:

A. Prepare surfaces and paint or coat all valves, fire hydrants, valve boxes, corporation stops, and all related accessories standard of the manufacturer unless otherwise indicated or specified herein.

B. Paint and coatings shall be suitable for the service intended.

C. Submit type of paint or coating proposed with drawings and data prior to fabrication.

2.07 POLYETHYLENE ENCASEMENT:

A. Specified in Section 02620 Part 3.06.

PART 3 – EXECUTION

3.01. INSTALLATION:

A. Comply with provisions of AWWA C600 and as specified.

B. Thoroughly clean and remove all shipping materials prior to setting. Operate all valves from fully opened to totally closed.

C. Install with anchorage where indicated.

D. Set valve boxes plumb with top flush with finished grade. After box is placed in proper position, place and thoroughly tamp earth fill around box.

3.02. FIELD TESTING:

A. Perform on piping and valves as specified in SECTION 02620.

END OF SECTION 02640

SECTION 02675
DISINFECTION OF PIPING

PART 1 – GENERAL

1.01. SUMMARY:

A. This section covers disinfection of potable water piping with a strong chlorine solution.

B. Disinfecting may be performed concurrently with pressure and leakage testing or after pressure and leakage testing at the Contractor's option.

C. All necessary disinfection equipment and materials shall be provided by the Contractor.

D. Related Work Specified Elsewhere:

1. Pipe Installation and Testing – SECTION 02620.

E. Disinfection work shall conform to the requirement of the latest version of AWWA C651, Standard for Disinfecting Water Mains as modified herein.

1.02. REFERENCES:

A. Applicable Standards:

1. American Water Works Association (AWWA).

a. C651 – Standard for Disinfecting Water Mains.

b. B301 – Standard for Liquid Chlorine.

c. B300 – Standard for Hypochlorites.

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

B. Includes, but not limited to the following:

1. Product data: Manufacturer's technical data, specification, safety precautions for chlorine products.

2. Results of bacteriological testing on each section of pipe.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. CHLORINE:

A. Calcium Hypochlorite – 70 percent available chlorine.

B. Liquid Chlorine – 99.5 percent available chlorine.

PART 3 – EXECUTION

3.01. PIPE LAYING:

A. Calcium hypochlorite granules shall be placed in pipe sections during construction.

B. Granules (1/2 ounce) shall be placed at upstream end of the first section of pipe, at the upstream end of each branch line, and at 500-foot intervals. Granules shall not be placed in solvent welded PVC pipe.

3.02. FLUSHING:

A. All water lines shall be thoroughly flushed prior to disinfection at a velocity of not less than 3.0 feet per second. The following table indicates the approximate flow rates required to produce a velocity of 3.0 fps in pipes.

Pipe Diameter (in.)	Flow Rate (gpm)
4	120
6	260
8	470
10	730
12	1,060
16	1,880

B. Contractor shall verify that discharge points have adequate drainage to prevent flooding of surrounding area. Location of discharge point shall be approved by the Engineer/Owner.

C. Flushing shall continue until discharge stream is visibly clean (clear) or three pipe volumes have been replaced, whichever is greater.

3.03. FEEDING:

A. Chlorine gas shall be used only as a solution. Introduction of chlorine gas into pipeline directly will not be permitted. Proper feeding operation shall utilize a chlorinator and booster pump with injector.

B. Calcium hypochlorite shall be made into a solution and pumped into the pipeline with a suitable chemical feed pump.

C. Feed chlorine solution at a point no more than 10 feet downstream from the beginning of the new pipeline.

3.04. APPLICATION:

A. Pipeline shall be disinfected by the continuous feed method.

B. Required chlorine to produce an initial 25 milligrams per liter concentration in 100 feet of pipe by diameter shall be as follows:

Pipe Diameter (in)	100% Chlorine (lb)	1% Chlorine Solution (gal)
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02
12	0.120	1.44
16	0.217	2.60

C. Water from the existing distribution system shall be introduced at a constant measured rate into the newly-laid pipeline. The water shall receive a dose of chlorine which is fed at a constant measured rate.

1. The chlorine feed shall be proportioned to the rate of water flow into the pipeline so that the entering water contains at least 25 mg/L of available chlorine. Chlorine application shall be continuous until the entire pipeline is filled with the chlorine solution.

2. To assure that this concentration is maintained, the chlorine residual should be measured at regular intervals in accordance with the procedures described in the latest edition of Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12 or using appropriate chlorine test kits.

3. Amount of chlorine required for each 100 feet of pipe of various diameters is indicated in Part 3.04.B, this section. Solutions of 1 percent chlorine shall be prepared with calcium hypochlorite by mixing one pound of calcium hypochlorite with 8 gallons of water.

4. During the application of chlorine, valves shall be positioned to prevent chlorine solution from flowing back into the line supplying the water. The chlorinated water shall be retained in the pipeline for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24-hour period, the treated water in all portions of the pipeline shall have a residual of not less than 10 mg/L of free chlorine.

3.05. FINAL FLUSHING:

A. After the applicable retention period, heavily chlorinated water shall be flushed from the pipeline until chlorine residual is no higher than that generally prevailing in the system.

B. Apply a chlorine reducing agent to the water to be wasted to neutralize the chlorine residual.

3.06. BACTERIOLOGICAL TEST:

A. After final flushing and before the water main is placed in service, samples shall be collected from the main and be tested for bacteriological quality in accordance with the Standard Methods for the Examination of Water and Wastewater and shall show the absence of coliform organisms.

1. At least two (2) samples shall be taken from each sampling point with 24 hours of separation between samples. Both sets of samples shall show the absence of coliform organisms.

2. Samples points shall be as follows:

a. At 1200-foot intervals along the water main.

b. At the end of the water main.

c. At the end of each branch water main.

B. No hose or fire hydrant shall be used in collection of samples. A corporation cock may be installed in the main with a copper-tube gooseneck assembly for collecting samples. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

3.07. RE-DISINFECTION (REPETITION):

A. If the initial disinfection fails to produce two successive satisfactory bacteriological samples, the water main shall be re-chlorinated by the continuous-feed method of chlorination until two successive satisfactory results of the bacteriological testing are obtained.

END OF SECTION

SECTION 02950
SEEDING AND MULCHING

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section includes the following areas of Work:

1. Preparation of areas for seeding and sodding.

2. Seeding.

3. Sodding.

4. Mulching.

5. Fertilizing seed and sod areas.

6. Maintenance.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

1.02. SUBMITTALS:

A. Certificates:

1. Seed and fertilizer shall be accompanied by certificate from vendors certifying they meet requirements of these Specifications, stating botanical name, percentage by weight, percentage of purity, germination, and weed seed for each grass seed species.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. TOPSOIL: Specified in SECTION 02200.

2.02. GRASS SEED:

A. Provide fresh, clean, new crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America and as required below.

B. Be labeled according to the U.S. Department of Agriculture Federal Seed Act and shall be furnished in containers with tags showing seed mixture, purity, germination, weed content, name of seller, and date on which seed was tested:

1. Seed Mixture:

a. Meet the following minimum percentage requirements for purity and mix ratio:

Common and Botanical Name	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (Pounds per Acre)
Alta Fescue or Kentucky 31 Fescue (Festuca Elatior, variation Arundinces)	75	100
Rye Grass (Lolium perenee or L. Multiflorum)	80	25
Kentucky Blue Grass (Pac Pratensis)	75	15
Creeping Red Fescue (Festura Ruera)	85	10
Total		150 Pounds

2. Moldy seed or seed that has been damaged in storage shall not be used.

2.03. LIMING MATERIAL:

A. Shall consist of agricultural liming materials conforming to the Missouri Agricultural Liming Materials Act of 1976.

B. Material used for soil neutralization, unless otherwise specified, shall be agricultural lime with not less than 90% passing the No. 8 sieve and containing not less than 65% calcium carbonate equivalent.

C. Manufacturer's certification shall include the minimum pounds of ENM (effective neutralizing material) per ton of the material to be supplied.

2.05. FERTILIZER:

A. Commercial fertilizer of neutral character, with some elements derived from organic sources, containing not less than 4% phosphoric acid, 2% potassium, and percentage of nitrogen required to provide not less than 1.0 lb. of actual nitrogen per 1,000 square feet of lawn area. Provide nitrogen in form that will be available to the lawn during initial period of growth.

B. Deliver to site in labeled bags or containers.

2.06. MULCH:

A. Vegetative Anti-Erosion Mulch: Seed- free salt hay or threshed straw of wheat, rye, oats, barley, or other approved materials.

B. Wood Cellulose Fiber:

1. Not contain germination or growth-inhibiting ingredients.

2. Dyed an appropriate color to aid in visual inspection.

3. Be easily and evenly dispersed when agitated in water.

4. Supply in packages of not more than 100-pound gross weight, and be marked by the manufacturer to show the air-dry weight content.

2.07. JUTE NETTING:

A. Uniform, open, plain weave mesh of smolder-resistant, unbleached single-jute yarn:

1. Yarn of loosely twisted construction and not vary in thickness by more than one-half its normal diameter.

B. Furnish in rolled strips and as follows:

1. Minimum width of 42 inches.

2. 5.5 wrap yarns by 3.5 filling yarns per inch.

C. Staples of No. 11 gauge or heavier steel wire, U-shaped and not less than 6 inches in length.

PART 3 – EXECUTION

3.01. SOIL PREPARATION:

A. Dispose of any growth, rocks, or other obstructions which might interfere with tilling, seeding, sodding, or later maintenance operations. Remove stones over 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.

B. Thoroughly loosen and pulverize topsoil to a depth of at least 4 inches.

C. Grade planting areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions to meet finish grades. Limit fine grading to areas which can be planted within immediate future.

D. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create a muddy soil condition.

E. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

F. Spread planting soil mixture to depth required to meet thickness, grades, and elevations indicated after light rolling and natural settlement.

G. Allow for sod thickness in areas to be sodded.

3.02. LIMING AND FERTILIZING:

A. Lime and fertilizer shall be applied separately, but may be incorporated into the soil in one operation.

B. Lime and fertilizer shall be applied not more than 48 hours before the seeding or sodding unless otherwise authorized by the Engineer.

C. Contractor shall take a minimum of three samples of the topsoil stockpile and through the services of an independent laboratory have test run to ascertain the rates of application of soil amendments required to provide at least the quantity of effective neutralizing material and fertilizers to nourish new growth.

D. Apply lime and fertilizer at the rates recommended by soil analysis in pounds per acre to prepared seedbeds and sod beds.

E. Incorporate fertilizer into the soil to a depth of at least 3 inches by disking, harrowing, or raking, except where applied hydraulically on slopes steeper than 2 horizontal to 1 vertical.

3.03. SEEDING:

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.

C. Sow not less than rate of 100 pounds per acre.

D. Rake seed lightly into top 1/8-inch of soil, roll lightly, and water with fine spray.

E. Seasonal Limitations:

1. Perform seeding only during the following seasons:

a. March 1 to June 15.

b. September 1 to October 30.

F. Methods of Application:

1. Dry Seeding: Spreader or seeding machine.

2. Hydroseeding: Mix seed, fertilizer and pulverized mulch with water and constantly agitate. Do not add seed to water more than 4 hours before application:

a. On slopes of 3 horizontal to 1 vertical or flatter, apply seed separately from fertilizer. Cover seed with soil to an average depth of 1/2-inch by raking or other approved methods.

b. On slopes steeper than 3 horizontal to 1 vertical, a Type 3 Mulch, meeting the content and application requirements specified in Section 802 of the Missouri Standard Specifications for Highway Construction is required.

3.04 MULCHING:

A. Apply a mulch covering to all seeded areas.

B. Apply vegetative mulch to a loose depth of 1-1/2 inches by means of a mechanical spreader or other approved methods.

C. Apply wood-cellulose fiber mulch hydraulically at the rate of 1,000 pounds per acre:

1. Mulch and seed may be applied in a single operation.

2. Apply mulch to achieve a uniform coverage of the soil surface.

D. Immediately follow the application of the mulch, water the seeded area in one watering, in sufficient amount to penetrate the seedbed to a minimum of 2 inches. Perform so as not to cause erosion or damage to the seeded surface.

E. Protect seeded areas against hot, dry weather or drying winds by applying mulch not more than 24 hours after completion of seeding operations.

3.05. RECONDITIONING EXISTING GRASS AREAS:

A. Recondition existing grass areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition the areas where settlement or washouts occur or where minor regrading is required. Recondition other existing grass areas where indicated.

B. Provide fertilizer, seed or sod, and soil amendments as specified for new grass and as required to provide satisfactorily reconditioned grass growth. Provide new planting soil as required to fill low spots and meet new finish grades.

C. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.

D. Remove diseased or unsatisfactory grass areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other construction materials. Replace with new topsoil.

E. Where substantial grass remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps and cultivate soil, fertilize, and seed. Remove weeds before seeding or, if extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.

F. Water newly planted areas and keep moist until new grass is established.

3.07. PROTECTION:

A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.08. MAINTENANCE:

A. Mow grass to a height of 2 inches as soon as there is enough top growth to cut with mower. Remove no more than 40% of grass leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted.

B. Remove weeds by pulling or chemical treatment.

C. Perform maintenance until the date of final acceptance by City.

D. Seeded Areas:

1. Water as required by good practice and as necessary to obtain a flourishing cover.

2. Repair any portion of the seeded surface which becomes gullied or otherwise damaged, or the seeding becomes damaged or destroyed.

E. Apply second fertilizer application after first mowing and when grass is dry. Use fertilizer which will provide not less than 1.0 pound of actual nitrogen per 1,000 square feet of lawn area.

3.09. ACCEPTANCE OF LAWNS:

A. When lawn Work is Substantially Complete, including maintenance, Engineer and City will, upon request, make an inspection to determine acceptability:

1. Lawn Work may be inspected for acceptance in parts agreeable to City, provided Work offered for inspection is complete, including maintenance.

B. Replant rejected Work and continue specified maintenance until re-inspected by Engineer and City and found to be acceptable.

C. Seeded lawns will be acceptable provided requirements, including maintenance, have been complied with and healthy, uniform, close stand of specified grass is established free of weeds, bare spots, and surface irregularities.

3.10. CLEANUP: Promptly remove soil and debris created by lawn Work from paved areas. Clean wheels of vehicles prior to leaving site to avoid tracking soil onto surfacing of roads, walks, or other paved areas.

END OF SECTION

SECTION 02960
ROADWAY SURFACE, CURB, AND SIDEWALK REPLACEMENT

PART 1 – GENERAL

1.01. SUMMARY

A. This Section includes the replacement of all roadway surfaces, curbs and sidewalks removed or damaged during construction.

1. Concrete pavement, asphaltic pavement, crushed stone pavement, concrete curbs, and concrete sidewalk pavement, whether public or private, which is cut or damaged during construction of the project shall be replaced so as to conform to the lines and grades of the original surface, and shall be of a quality, thickness, and appearance equal to or better than that of the surface as it existed prior to construction.

B. Related Work Specified Elsewhere:

1. Site Preparation and Earthwork: SECTION 02200.

2. Trenching and Backfilling for Utilities: Section 02222.

3. Concrete: DIVISION 3 – SECTION 03300.

C. Refer to Standard Construction Details for Pavement Replacement.

1.02 REFERENCES:

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T99 – Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop.

B. American Society for Testing and Materials (ASTM)

1. ASTM D1190 - Specification for Concrete Joint Sealer, Hot-Poured Elastic Type.

2. ASTM D1751 - Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.03. SUBMITTALS:

A. Submit as specified in DIVISION 1 – SECTION 01300.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. COMPACTED GRANULAR BACKFILL: Specified in SECTION 02222.

2.02. CONCRETE: Specified in DIVISION 3 – SECTION 03300.

A. Expansion Joint Filler shall be bituminous type, 1/2" thick, conforming to ASTM D1751.

B. Hot-Poured Joint Sealing Compound shall conform to ASTM D1190.

2.03. CRUSHED STONE PAVEMENT:

A. Shall consist of a natural or artificial mixture of hard, durable, uniformly graded particles of coarse and fine limestone aggregate.

B. The natural or processed mixture shall conform to the following:

Sieve Size	Percent Passing
2-inch	100
1-inch	55-85
3/4-inch	50-80
No. 4	30-60

PART 3 – EXECUTION

3.01. GENERAL:

A. Existing paving shall be cut vertically and horizontally to straight lines.

B. The trench shall be backfilled with compacted granular or flowable backfill as specified in SECTION 02222.

C. The level shall be maintained by the Contractor until all secondary settling has occurred. Additional compacted granular backfill may be required to maintain the trench in a suitable condition for traffic during this period.

D. At the time of final repair, the Contractor shall remove sufficient material to allow placement of the roadway, curb or sidewalk surfacing to the thickness specified within this Section.

3.02. ROADWAY SURFACE, CURB AND SIDEWALK REPLACEMENT:

A. Asphaltic Concrete Pavement:

1. Asphalt surfaces, including private drives, shall be replaced with concrete surfacing equal to the thickness of the existing asphalt pavement or 8 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The final pavement repair elevation shall match the elevation of the adjacent pavement.

B. Concrete Pavement:

1. Concrete surfaces, including private drives, shall be replaced with concrete surfacing equal to the thickness of existing pavement or 8 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The final pavement repair elevation shall match the elevation of the adjacent pavement.

C. Crushed Stone Pavement:

1. Crushed stone surfaces, including county roads, and city streets, as well as dirt, or gravel shoulders of paved streets, roads, walking trails, or highways, shall be replaced with crushed stone pavement.

2. The crushed stone shall be placed and compacted in layers to a finished thickness of 6-inches.

    a. The number of layers and the thickness of each layer shall be construed at the Contractor's option subject to the limitation that the compacted thickness of any one course or layer shall not exceed 4 inches.

3. The crushed stone shall be handled in such as manner as to avoid undue segregation.

4. Preliminary compaction shall be performed by means of pneumatic-tire rollers.

5. Finish compaction shall be carried to completion by means of self-propelled steel-wheeled rollers weighting not less than 10 tons.

6. Proper moisture contact shall be maintained by wetting the surface or allowing it to dry as required during shaping and compacting operations.

7. The crushed stone pavement shall be compacted to not less than 95 percent of the maximum density at optimum moisture content as determined by AASHTO T99.

8. The final pavement repair elevation shall match the elevation of the adjacent pavement.

D. Sidewalk Replacement:

1. Sidewalks shall be replaced with concrete surfacing equal to the thickness of existing sidewalk or 4 inches, whichever is greater.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. The sidewalk repair elevation shall match the elevation of the adjacent pavement.

4. In all cases, sidewalk replacement shall be constructed to meet all ADA requirements.

    a. Contractor is required to install ADA compliant curb ramps at all street or alleyway crossings even if a curb ramp did not previously exist.

E. Curb Replacement:

1. Construct curb and gutter to the cross-section and gutter cross-slope of that removed.

2. Concrete shall be placed as specified in DIVISION 3 – SECTION 03300.

3. Place bituminous preformed expansion joints, 1/2" thick and precut to exact cross-section of the curb and gutter at the radii of all changes in direction and at intervals not greater than 50'.

4. Provide contraction joints at intervals not exceeding 6'.

    a. Contraction joints shall consist of a groove at least 1" deep, and 1/8" to 1/2" in width, sawed in the green concrete, or

    b. plane of weakness formed by inserting a removable metal template.

5. Fill all expansion and contraction joints with joint sealing compound, finished slightly concave so as not to overflow the joint.

6. Round all exposed edges of curb and gutter to a 1/2" radius with a suitable edging tool.

7. Exposed surfaces shall be finished smooth and even with a steel trowel and given a light broom finish.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03300
CONCRETE

PART 1 – GENERAL

1.01. SUMMARY:

A. This Section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and other appurtenant work.

B. All cast-in-place concrete shall be accurately formed and properly placed and finished as shown on the drawings and specified herein.

C. Contractor shall inform the Engineer at least 24 hours in advance of the times and places at which he intends to place concrete.

D. Submit as specified in DIVISION 1 – SECTION 01300.

1.02. REFERENCES:

A. Applicable Standards:

1. American Concrete Institute (ACI):

a. 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

b. 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.

c. 305R – Guide to Hot Weather Concreting.

d. 306R – Guide to Cold Weather Concreting.

e. 308 – Standard Practice for Curing Concrete.

f. 309R – Guide for Consolidation of Concrete.

2. American Society for Testing and Materials (ASTM):

a. A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

b. C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.

c. C33 – Standard Specification for Concrete Aggregates.

d. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

e. C94 – Standard Specification for Ready-Mixed Concrete.

f. C109 – Method of Test for Compressive Strength of Hydraulic Cement Mortars.

g. C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.

h. C150 – Standard Specification for Portland Cement.

i. C172 – Standard Practice for Sampling Freshly Made Concrete.

j. C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

k. C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

l. C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

m. C494 – Standard Specification for Chemical Admixtures for Concrete.

n. C566 – Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

o. C962 – Standard Guide for Use of Elastomeric Joint Sealants.

p. D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

q. D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Submit as specified in SECTION 01300. Include the following:

1. Manufacturer's product data with application and installation instructions for proprietary materials and items including admixtures, patching compounds, waterstops, joint systems, curing compounds and others as requested.

2. Certification that products conform to the applicable requirements of the specified standards.

3. Laboratory test reports for concrete materials and mix design tests as specified.

4. Samples of materials as specified and as otherwise required, including names, sources, and descriptions.

1.04 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 – PRODUCTS

2.01. CONCRETE:

A. Materials:

1. Portland cement shall conform to ASTM C150, Types I, II, or V. One sack of cement shall be considered as one cubic foot of volume or 94 pounds by weight.

2. Fine Aggregate shall be clean natural sand in conformance with ASTM C33.

3. Coarse Aggregate shall be crushed rock, washed gravel, or other inert granular material conforming to ASTM C33. Coarse aggregate gradation shall conform to ASTM C33, Size 57.

4. Water shall be potable, clean, and free from deleterious substances. Non-potable water may be used only if it produces mortar cubes having 7- and 28-day compressive strengths equal to the strength of similar specimens made with potable water, when tested in accordance with ASTM C109.

5. Air-entrainment admixtures shall conform to ASTM C260.

6. Water reducing, retarding, and accelerating admixtures shall conform to ASTM C494.

7. Reinforcing Steel shall conform to ASTM A615.

B. Required Concrete Qualities and Proportions:

1. Concrete Strengths:

a. Structural Concrete: All concrete shall be considered structural concrete unless otherwise indicated or specified and shall be provided to develop a compressive strength of not less than 4,000 psi at 28-days for field-cured cylinders.

(1) Air Content: 3.5% to 6.5% by volume as tested in accordance with ASTM C231.

(2) Cement Content: 564 pounds per cubic yard of concrete (6-sack per cubic yard).

(3) Water-Cement Ratio: Shall not exceed 0.45 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio calculated.

b. Fill Concrete: Shall be provided to develop a compressive strength of not less than 2,500 psi at 28-days for field-cured cylinders.

(1) Air Content: 3.5% to 6.5% by volume as tested in accordance with ASTM C231.

(2) Water-Cement Ratio: Shall not exceed 0.55 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio calculated.

2. Mix Proportions:

a. Concrete shall be proportioned to conform to ACI 211.1

b. Mix proportions for all concrete, unless otherwise specified, shall be selected preferably on the basis of field experience; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design.

c. Slump of concrete shall be the minimum that is practicable and shall conform with the following:

(1) Footings, Heavy Walls, Piers, Buttresses shall be a maximum of 4” and a minimum of 2”.

(2) Light Walls, Slabs, Beams, Columns, Stairs shall be a maximum of 5” and a minimum of 3”.

(3) Concrete floors with monolith finish shall be a maximum of 3" and a minimum of 2".

C. Mixing Concrete:

1. Ready-Mixed Concrete shall conform with ASTM C94.

2. Batch Mixing at Site:

a. Concrete shall be mixed in a batch mixer, conforming to the requirements of the Mixer Manufacturer's Bureau of the Associated General Contractors of America. The mixer shall bear a manufacturer's rating plate indicated the rated capacity and the recommended revolutions per minutes.

(1) Mixer shall be equipped with a suitable charging hopper, water storage tank, and a water-measuring device.

(2) The mixer shall be clean and the pickup and throw-over blades shall be replaced when they have lost 10 percent of their original depth.

b. The batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to ensure that additional water cannot be added during mixing and that the batch cannot be discharged until the required mixing time has elapsed.

c. Each batch of two (2) cubic yards or less shall be mixed for not less than 11.5 minutes. The minimum mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.

3. Admixtures: Shall be as specified in Part 2.01.A.5 and 2.01.A.6, this Section.

4. Retempering: Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retempered, but shall be discarded.

5. Indiscriminate addition of water to increase slump or workability shall be prohibited. When concrete arrives at the project with slump below that suitable for placing, water may be added only by authorized representatives of the concrete supplier, and then only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded.

2.02. GROUT

A. Non-Shrink, Non-Metallic Grout:

1. Shall be used unless otherwise indicated or specified.

2. Required for setting equipment recommended by the manufacturer to be set with non-shrinking grout and in other places as indicated or required.

3. Shall be manufactured by one of the following:

a. W.R. Meadows – 588-10K.

b. L&M Construction Chemicals – Crystex.

c. Five Star Products – Five Star Grout.

d. Master Builders Solutions by BASF – Masterflow 713.

e. Sauereisen Cements Company – No. F-100.

f. Cormix International – Congrout GP.

4. Prepare and place conforming to manufacturer's recommendations.

B. Grout for Dry Packing:

1. Volume: 1-part Portland cement to 2-parts sand.

2. Keep water to a minimum as required for placing by the dry packing method.

3. Place after the mixed grout has been allowed to stand for 2-hours.

4. The sand and cement shall be as specified for concrete.

C. Grout for Bonding:

1. Proportion (by weight): 1-part cement to 1-1/2 parts sand.

2. Keep water to a minimum.

2.03. CONCRETE ACCESSORIES:

A. Waterstops:

1. Serrated virgin polyvinyl chloride equal to one of the following:

a. Tamma Industries – Horn/Durajoint Type 3.

b. Vulcan Metal Products Company – Vulco 8013.

2. Plastic Waterstop: Performed plastic waterstop as manufactured by Synko-Flex Products Co.

B. Expansion Joints:

1. Expansion Joint Filler: Premolded cork of thickness indicated and conforming to ASTM D1752, Type III, self-expanding cork. Use at all locations unless indicated to be asphalt-impregnated fiber.

2. Expansion Join Filler: Preformed asphalt-impregnated fiber of thickness indicated and conforming to ASTM D1751.

3. Bond Breaker: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer for preventing sealant from adhering to joint filler materials or joint surfaces at the bottom of the joint where such adhesion would result in sealant failure.

4. Sealant Backer Rod (closed cell, compatible with sealant):

a. Bostick Construction Products Division.

b. Chem-Calk – Backer Rod.

c. Dow Chemical Company – Ethafoam.

d. Hercules Foam Backer Rod.

e. Sonneborn Building Products – Sonofoam.

f. W.R. Meadows – Sealtight Backer Rod.

5. Joint Sealant:

a. Two-component polysulfide system as manufactured by one of the following:

(1) A.C. Horn – Hornflex L.

(2) Pecora – Synthacalk GC-2.

PART 3 – EXECUTION

3.01. Preparation for Concrete Placement:

A. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

B. Openings Through Concrete: Provide openings through concrete as indicated and for the proper installation of all equipment, piping, wiring, ductwork and similar items installed included in the Work.

C. Installation of Embedded Items:

1. Provide for accurate installation of embedded items included in the Work.

2. During cold weather, protect embedded items from moisture which may freeze, expand, and crack the concrete structure.

3. Grease or tape anchor bolt threads to protect from concrete splatter.

D. Formwork:

1. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions shown on the drawings.

2. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

3. Forms shall be thoroughly cleaned and oiled before concrete is placed and shall not be removed until the concrete has hardened sufficiently to support all loads without damage.

E. Reinforcement:

1. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while concrete is being placed and compacted.

F. Installation of Joints:

1. Construction Joints:

a. Location:

(1) Obtain Engineer's approval of joints located by Contractor prior to preparation of reinforcing steel shop drawings.

b. Preparation and Installation:

(1) Clean and break laitance or other foreign material from bonding surface.

(2) Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.

(3) Provide waterstops and shear keys as indicated or specified and as required in any new construction joint requested by Contractor.

c. Waterstops:

(1) Install conforming to manufacturer's standard installation instructions.

(2) All joints and splices of PVC waterstop shall be 100% fused.

2. Expansion Joints:

a. Install filler, backer rod and sealant in strict conformance with manufacturer's written instructions.

b. Reinforcing steel shall not extend through expansion joints unless indicated otherwise.

c. Attach rigid joint filler to the face of the joint prior to placing adjacent concrete. The filler shall occupy the entire width of the joint.

d. Install sealant backer rod for sealant except where indicated to be omitted. Install bond breaker where indicated.

e. Clean joint surfaces immediately before application of sealant.

f. Install joint sealants to conform to ASTM C962. Tool sealant to provide smooth, uniform bead with a slightly concave surface, eliminate air pockets, and insure sealant contact and adhesion with sides of joint.

g. Protect joints from moisture and ice during freezing.

3. Contraction Joints: As specified in Part 3.03 - Finishing, this Section.

G. All embedded items, formwork, reinforcement, and joints shall be reviewed by the City before any concrete Is placed.

3.02 PLACING OF CONCRETE:

A. Conventional Placing:

1. General Requirements:

a. Conform to ACI 304.

b. Bonding surfaces, including reinforcement, shall be clean, free of laitance and foreign materials.

c. Face horizontal bonding surfaces with 1-inch-thick coat of fresh "grout for bonding". Wet all other surfaces.

d. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.

e. Use forms for all concrete except where otherwise indicated or specified.

f. Do not place concrete that has partially hardened or has been contaminated by foreign materials.

g. Prevent mud or foreign materials from entering the concrete or forms during placement operations.

h. Where required, a polyethylene vapor barrier or 4 mil. thickness, or approved equal, shall be installed in accordance with the manufacturer's recommendations. A layer of sand shall be placed on the granular fill to protect the vapor barrier during placement of concrete.

2. Conveying:

a. Convey concrete from the mixer and deposit in place by methods which will prevent the segregation or loss of materials.

b. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end.

c. Aluminum conveying equipment shall not be used.

3. Depositing:

a. Place concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness with the section.

b. Maximum free drop of concrete and grout for bonding shall be 5 feet, in walls 10 inches or less in thickness, with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10 feet.

c. When moisture barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier.

4. Consolidation of Concrete:

a. Consolidate concrete in conformance with ACI 309. Characteristics and application of concrete vibrators shall be as set forth in Table 5.1.4.

b. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep on hand adequate standby equipment in good operating condition.

c. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled, as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate.

d. Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer. Do not drag vibrators through the concrete. Insert and withdraw vibrator slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by use of a vibrator.

e. Consolidate concrete layer to full depth when using a surface vibrator. Use thinner layers or a more powerful vibrator if necessary to achieve complete consolidation.

f. Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.

5. Time Requirements:

a. Place concrete at a sufficient rate to assure that lifts below have not taken initial set before fresh concrete is deposited.

b. Place concrete within 45 minutes after mixing. This period may be extended to 1 hour and 30 minutes provided that the combined air temperature, relative humidity, and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation, and that the specified mixing water is not exceeded. Concrete which has partially set shall not be re-tempered but shall be discarded.

6. Placing Concrete at Joints:

a. Bed horizontal joints with 1 inch of grout for bonding.

b. Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids.

c. Take special precautions to avoid bending or displacing waterstop while placing concrete around it.

d. Delay construction at a joint a minimum of 16 hours where placement is continued past joint, except where otherwise indicated.

3.03. FINISHING:

A. Unformed Surfaces:

1. Screed Finish:

a. Use as first stage for all concrete finishes.

b. Use as final finish on surfaces that will be covered by additional concrete, grout placement, or mortar setting bed except as otherwise specified.

c. Immediately after screeding, use a wood float, darby, or bullfloat to eliminate high and low spots and to embed large aggregate. This shall be done in a manner to produce even, uniform surfaces so that surface irregularities do not exceed 3/8 inch in 10 feet when used as final finish.

2. Floated Finish:

a. Use as second stage of broomed, troweled, or magnesium-troweled finish.

b. Float with mechanical float. Hand floating will be permitted only in areas inaccessible to mechanical float.

c. On surfaces not to receive troweled or magnesium-troweled finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8 inch in 10 feet, except at floor drains.

3. Broomed Finish:

a. Use as final finish on all outdoor slabs including pavements and sidewalks.

b. After floated finish, draw a stiff bristle broom across the surface making uniform corrugations, perpendicular to the direction of traffic, not more than 1/16 inch deep.

4. Troweled Finish:

a. Use as final finish on all other unformed surfaces not otherwise indicated or specified.

b. Trowel with steel trowel, mechanical or hand, to obtain a smooth, dense finish. The final troweling shall be done after the concrete has become hard enough so that no mortar adheres to the edge of trowel and a ringing sound is produced as the trowel passes over the surface.

c. Do not trowel before surface water has evaporated or has been removed with a squeegee.

d. Finish to a true uniform surface so that surface irregularities do not exceed 1/8 inch in 10 feet, except at floor drains.

e. Do not add sand or cement to the floor surface.

5. Magnesium-Troweled Finish:

a. Perform as specified in Part 3.03.A.4 - Troweled Finish, this Section, except use a magnesium trowel by hand instead of a steel trowel to obtain a dense, but not slick, finish.

b. Use where floor will receive protective coating after curing.

6. Contraction Joints:

a. Locate as indicated.

b. Maintain true alignment with straightedge.

c. Joints shall be grooved except where sawed joints or preformed joints are indicated.

d. Grooved Joints:

(1) Perform during the finishing process.

(2) Width of groove shall not exceed 1/4 inch.

(3) Depth of groove shall be at least 1 inch.

e. Sawed Joints:

(1) Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur. (Usually required 4 to 12 hours after finishing.)

(2) Make joints approximately 1/8 inch wide with depth as indicated.

(3) Seal with the same type sealant specified for expansion joint sealant.

B. Formed Surfaces:

1. Repair surface defects as specified in Part 3.03.C - Repair of Defective Surfaces, this Section.

C. Repair of Defective Surfaces:

1. Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area.

2. Repairing:

a. Repair as soon as forms have been removed.

b. Chip surface back to minimum depth of 1/2 inch, chip edges perpendicular to surface, pre-wet depression and brush with neat cement immediately before patching.

c. Patch surfaces using stiff mortar with same sand-cement radio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.

d. Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes.

e. Moist-cure for 3 days or use curing compound.

f. Engineer shall be notified of areas containing defects or where reinforcing steel is exposed, prior to determination of repair method.

3.04 CURING:

A. Cure all concrete by one of the following methods in accordance with ACI 308:

1. Leaving in forms for a minimum of 7 days. Keep formwork wet to prevent drying of concrete surfaces.

2. Use of saturated bats, soaker hoses, or sprinkler for a minimum of 7 days. Keep concrete continuously wet.

3. Using one coat of a liquid membrane forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.

4. Using polyethylene sheets applied in full contact with surfaces.

5. Curing of concrete during hot or cold weather shall conform to Parts 3.05 and 3.06 - Hot Weather Concreting and Cold Weather Concreting, respectively, this Section.

3.05 HOT WEATHER CONCRETING:

A. Follow the recommendations of ACI 305 if any of the following conditions occur:

1. When the temperature is 90°F or above.

2. When the temperature is likely to rise above 90°F within the 24-hour period after concrete placement.

3. When there is any combination of high air temperature, low relative humidity, and wind velocity which would impair either concrete strength or quality.

B. Concrete shall have a maximum temperature of 85°F during placement.

C. Dampen subgrade and forms with cool water immediately prior to placement of concrete.

D. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305 (Figure 2.1.5) does not exceed 0.2 pounds per square foot per hour.

E. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.

F. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.

G. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water-saturated material to all exposed surfaces; horizontal, vertical, and otherwise. After the 24-hour interval, continue curing using one of the following methods:

1. Moist curing for 6 days.

2. Application of one coat of curing compound conforming to ASTM C309, Type 2.

3. Application and maintenance of curing paper or heat-reflecting plastic sheets for 6 more days.

H. Begin curing formed concrete immediately after placing. Curing shall consist of keeping forms continuously wet for 24 hours. Thereafter, continue curing using one of the following methods:

1. Loosen forms and position soaker hose so that water runs down along concrete surfaces. Continue for 6 days.

2. Strip forms and apply curing compound conforming to ASTM C309, Type 2. Do not allow concrete surfaces to dry prior to application of curing compound.

3.06 COLD WEATHER CONCRETING:

A. When the temperature is 40°F or is likely to fall below 40°F during the 24-hour period after concrete placement, follow the recommendations of ACI 306 to prevent loss of concrete strength or quality.

B. Minimum temperature for concrete as mixed shall be as indicated on lines 2, 3, and 4 of Table 1.4.1 of ACI 306. Maximum temperature for concrete as mixed shall be 10°F greater than the corresponding minimum temperature.

C. Place and maintain concrete so that its temperature is never less than the temperature indicated on line 1 of Table 1.4.1 of ACI 306. Maintain the required temperature for the time duration indicated on Table 1.4.2 of ACI 306.

D. Monitor temperature of concrete in place at corners or edges of formwork as applicable.

E. Air Heaters:

1. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines.

2. Oil- or coke-burning salamanders will not be permitted.

3. Heaters shall be ultramatic portable heaters made by the Union Chill Mat Company or Engineer approved equal.

4. Personnel shall be present at all times to maintain safe, continuous operation of heating system.

F. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur.

G. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.

H. The maximum allowable temperature drop during the first 24-hour period after protection is discontinued shall be as indicated on line 5 of Table 1.4.1 of ACI 306.

I. Cure the concrete in accordance with Chapter 5 of ACI 306.

3.07 LOW-STRENGTH CONCRETE:

A. Low-Strength Concrete:

1. Defined as either:

a. Concrete whose average, of any sets of three consecutive 28-day strength tests, is below the required 28-day strength.

b. Concrete whose individual 28-day strength test (average of two cylinders) is more than 500 psi below the required 28-day strength.

2. Should concrete meet either definition of low-strength concrete as a minimum, the Contractor shall take the following steps:

a. Increase the cement content. The increase shall be based on a statistical evaluation of the strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature as follows:

(1) If sufficient concrete has been furnished to accumulate 30 tests, these should be used to establish a new target average strength in accordance with ACI 318, Section 4.3.1.
(2) If less than 30 tests have been made, the new target average strength should be at least as great as the average strength used in the initial selection of the mix proportions. Increase the target average strength based on a statistical evaluation of the available strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature. If the statistical average equals or exceeds the initial mix-design level, a further increase in the average level is required.

b. Remove and replace with acceptable concrete when the quality and location of the concrete is such that the Engineer considers the strength or durability of the structure is impaired and so orders.

B. Potentially Low-Strength Concrete: Defined as concrete whose 7-day test (average of two cylinders) is less than 70% of the specified minimum 28-day compressive strength.

3.08 TESTING:

A. Field Testing of Concrete Plant and Mixing Trucks:

1. The concrete plant shall be inspected and tested to ensure conformance with ACI 304 and the "Concrete Plant Standards of the Concrete Plant Manufacturers Bureau". The scales shall be calibrated at the initial setup and at 3-month intervals thereafter.

2. Mixing trucks shall be inspected and tested to ensure conformance with ACI 304 and "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau" of the National Ready-Mix Concrete Association. Tests shall be done at initial setup and every 3 months thereafter.

3. Submit test reports when requested.

B. Field Testing of Concrete and Making of Concrete Test Cylinders:

1. Contractor shall furnish on request test equipment, test cylinder molds, and certified personnel to perform all required field tests, make the required concrete test cylinders, and deliver test cylinders to the testing laboratory. The prescribed tests shall be made in the presence of or with the concurrence of the City.

2. Field testing personnel shall be on-site throughout placement of concrete.

3. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172 except samples for slump, air and temperature tests shall be taken from the first portion of the batch discharge. Samples shall be taken at random and at the point of truck discharge.

a. Moisture content, ASTM C566. Perform this test a minimum of twice a day and adjust the amount of mix water to compensate for the moisture content of the aggregates.

b. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (four cylinders) from each day's placement for each 100 cubic yards or fraction thereof.

c. Slump test conforming to ASTM C143. Perform tests on the first batch produced each day, for every 50 cubic yards or fraction thereafter, and with every set of test cylinders. Additional tests shall be run when directed by the Engineer.

d. Air content test conforming to ASTM C231. Perform for first batch of day and with each set of test cylinders.

e. The batch of concrete being tested for slump or air content shall not be placed until acceptable results are obtained.

f. Discard concrete used for slump and air tests.

g. Perform concrete and air temperature tests for first batch of day and with each set of test cylinders. Additional readings shall be taken when directed by the Engineer.

h. Any batch of concrete with slump or air content not in conformance with Specifications shall be rejected.

i. Furnish slump, air content, and temperature test results to the testing laboratory for inclusion in the cylinder rest reports.

C. Laboratory Testing of Aggregates and Concrete During Construction:

1. An independent testing laboratory will be selected and paid by the Developer/Owner to perform the required laboratory tests and statistical evaluations of aggregates and concrete being used in the Work.
2. Laboratory will cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders 7 days of age and two at 28 days of age.

3. Contractor shall have the right to observe all phases of concrete cylinder curing and testing. Should Contractor observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify Developer/Owner in writing.

4. Contractor shall assist laboratory in obtaining Samples of fine and coarse aggregate for testing.

5. The Contractor shall make arrangements with the testing laboratory to receive copies of test reports. The cost of providing a maximum of two copies of each report to the Contractor will be paid by the Developer/Owner.

6. Should the test results indicate low strength concrete as defined in Part 3.07 - Low-Strength Concrete, this Section, Contractor shall take immediate corrective action.

7. Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to Engineer's approval.

8. Should the material tests taken during construction indicate nonconformance with the Specifications, the Contractor shall take immediately corrective action.

END OF SECTION

SECTION 13324
ELECTROMAGNETIC FLOW METERS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers equipment, material and service requirements for furnishing, installing, and acceptance testing electromagnetic flow meter(s) and appurtenances. The principal items shall include the following:

1. Measuring Tube.
2. Electronic Register.
3. Ancillary AMR Device.

B. Related work:

1. Section 02605 - Utility Structures
2. Section 02615 - Pressure Pipe and Fittings
3. Section 02620 - Pipe Installation and Testing

C. References:

1. American National Standards Institute (ANSI).

a. B16.5 – Pipe Flanges & Flanged Fittings.

1.02 SUBMITTALS

A. Submit as specified in Section 01300.
B. Furnish manufacturer's catalog data and illustrations showing principal dimensions, parts, and materials. Include technical description and specifications.
C. Furnish corrosion protection system details.
D. Furnish application performance guarantee.
E. Furnish installation/operating instructions and service manuals for the specific equipment provided.

1.03 MEASUREMENT AND PAYMENT

A. Work of this Section shall not be measured or paid for separately but shall be included in the unit or lump sum price set forth in the Bid Schedule for that Work of which it is a part.

PART 2 - PRODUCTS

2.01 ELECTROMAGNETIC FLOW METER

A. Acceptable Manufacturers:

1. Sensus Hydroverse.
2. Substitutions not permitted.

B. General:

1. Flow meter shall be of the electromagnetic type and provide for measurement of flow in full pipes.
2. Flow meter shall operate by means of pulsed D.C. coil excitation and be auto-zeroing.
3. Flow meter shall be obstructionless and installed between two pipe flanges having the same nominal diameter as the flow meter end connections.
4. Meter size as indicated on the drawings. Reduced bore 8-inch and smaller, full bore 10-inch and larger.
5. Capable of indicating and totalizing.
6. Compatible with Sensus FlexNet® AMR network.

C. Service Parameters:

1. Measurement of potable water.
2. Operate on battery power.
3. Operating air temperature: -4° to 140° F.
4. Operating water temperature: 33° to 122° F.
5. Maximum operating pressure: 232 psi.
6. Low-flow cut-off 0 - 10% of maximum flow.
7. Accuracy of ± 0.2%.

D. Measuring Tube:

1. Reduced port type constructed of carbon steel with flanges conforming to ANSI B16.5 Class 150 standard.
2. Provide Polyurethane or Neoprene liner.
3. Provide grounding by means of 316 stainless grounding electrodes or grounding rings.
4. Capable of indefinite submergence up to 30 feet without degradation.
5. Provide corrosion-resistant protective coating on sensor exterior, applied in accordance with the coating system manufacturer's recommendations.

E. Electronic Register:

1. Provide sensor mounted register with all necessary circuitry to utilize the signal from the sensor.
2. Equip with an LCD display showing actual flow in GPM and totalized flow in gallons. Display shall also indicate settings and faults.
3. Provided with an automatic zero setting, an auto-range function and low flow cut-off.
4. Capable of detecting the following fault conditions:

    a. Loss of DC current to the coil.
    b. Load on the current output.

F. Batteries:

1. Type: Primary lithium cells based on Lithium-Thionyl chloride chemistry.
2. Cylindrical bobbin type construction.
3. Nominal Voltage: 3.6 V
4. Non-flammable electrolyte.
5. Compliant with IEC 60086-4 safety standard and IEC 60079-11 intrinsic safety standard.
6. UL 1642 certified.
7. Field replaceable.
8. Equal to SAFT LS 33600.

2.02 AMR DEVICE

A. Acceptable Manufacturers:

1. Sensus Model 520M Smartpoint.
2. Substitutions not permitted.

B. Device to be installed in pit set environment with wired connection to flow meter register.

1. Provide 22 AWG solid wire 3-conductor shielded cable including all necessary tools and materials required for installation.
2. Cable, tools, materials, and installation procedures as recommended by Sensus.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install flow meter tube and register as indicated and as recommended by the manufacturer. Maintain straight pipe lengths of not less than 5 pipe diameters upstream and 2 pipe diameters downstream of meter.
B. Provide all necessary materials and components as required for a complete and operable installation.

3.02 FIELD TESTING

A. Manufacturer's Services:

1. Provide equipment manufacturer's services at the job site to check installation, to perform initial start-up and operational test, and to instruct Owner's personnel in the proper operation and maintenance of the equipment.
2. Services to be performed by an authorized representative of the flow meter manufacturer.

B. Operational Test:

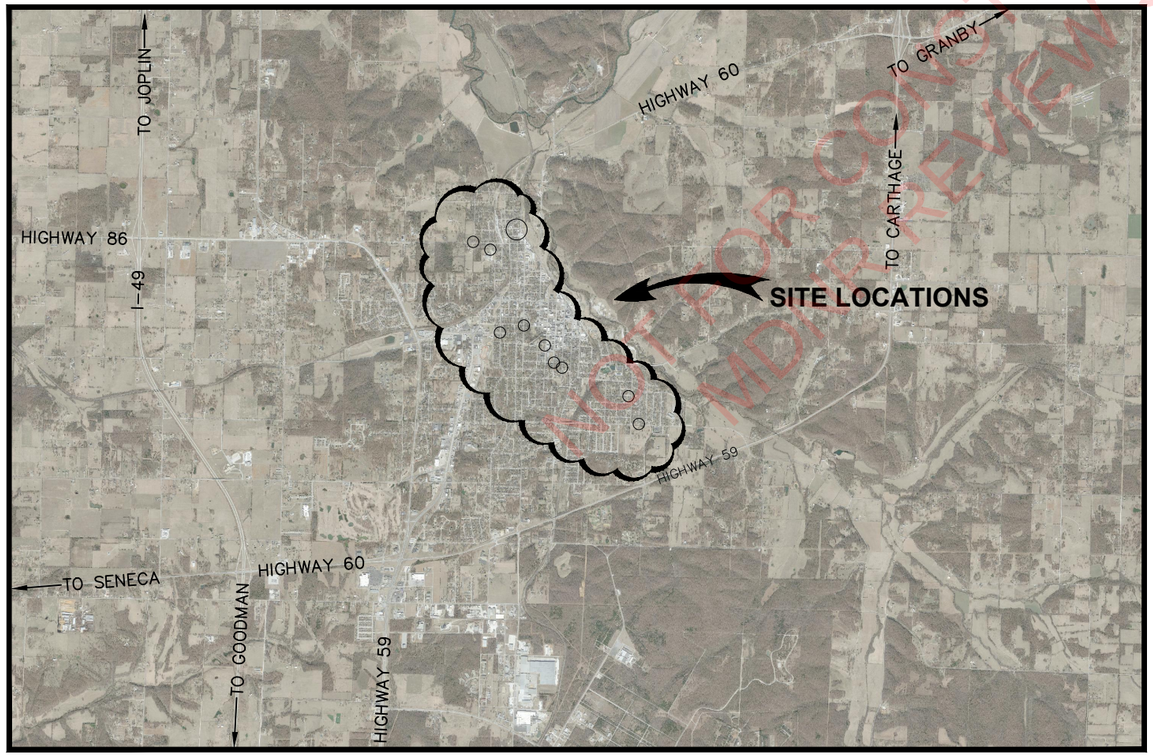
1. Prior to acceptance, an operational test of the flow meter shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Operational test shall demonstrate that the equipment is not defective; is in safe and satisfactory operating condition; and conforms with the specified operating conditions.
2. Make all necessary equipment adjustments and corrective work indicated by tests. Repeat operational tests as necessary.
3. Submit two copies of written report stating operations performed and results obtained.

END OF SECTION 13324

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\1 LOCATION MAP & INDEX.DWG

NEOSHO MASTER WATER METER INSTALLATION

CITY OF NEOSHO



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N.T.S.

INDEX TO DRAWINGS	
DRAWING TITLE	DWG. NO.
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WATER METER E PLAN	5
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NOTE: WATER METER F AND J OMITTED FROM PROJECT

811 Know what's **below.** **Call** before you dig.

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI · THOMAS ERWIN HANCOCK · NUMBER E-30067 · REGISTERED PROFESSIONAL ENGINEER

04-06-2021

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY: CSJ
CKD. BY: JTB
APPD. BY: TEH
DATE : APRIL 2021

LOCATION MAP & INDEX
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 1

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\2 OVERALL SITE PLAN.DWG

OWNER/DEVELOPER:

CITY OF NEOSHO
203 E. MAIN ST.
NEOSHO, MISSOURI 64850
417-451-8050

SITE SUMMARY:

TOTAL AREA = 0.10 ACRES± (11 SITES)
TOTAL DISTURBED AREA = 0.10 ACRES

BENCHMARKS:

1. TEMPORARY BENCHMARK NO. 1 – RR SPIKE IN PP
   ELEVATION = 997.73 DATUM = NAVD 1988 AND MNDR MONUMENT VASSAR, PID GG0589.

REFERENCE POINTS:

1. EXISTING 60d NAIL (SURVEY CONTROL POINT #213)
   N=255659.71
   E=2824745.50
   EL=1056.97
2. EXISTING 60d NAIL (SURVEY CONTROL POINT #214)
   N=255819.65
   E=2824746.65
   EL=1054.48

PROJECT DATUM:

HOR: MISSOURI STATE PLANE COORDINATE SYSTEM OF 1983, WESTERN ZONE BY USE OF MODOT CONTINUOUSLY OPERATING GNSS RTK NETWORK, BASED ON ALLGEIER, MARTIN AND ASSOCIATES TOPOGRAPHIC SURVEY, PROJECT NO. "NEOS7000114", DATED DECEMBER 3, 2020.
VER: NORTH AMERICAN VERTICAL DATUM 1988 BY USE OF MODOT CONTINUOUSLY OPERATING GNSS RTK NETWORK & MDNR MONUMENT VASSAR, PID GG0589.

FLOOD HAZARD DETERMINATION:

NO PART OF THIS PROJECT LIES WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA.

EROSION & SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING EROSION AND DISCHARGE OF SEDIMENT FROM THE SITE AT ALL TIMES DURING CONSTRUCTION IN ACCORDANCE WITH CITY OF NEOSHO STANDARDS. THE CONTRACTOR SHALL PROVIDE NECESSARY MEASURES DURING ALL PHASES OF HIS OPERATIONS REGARDLESS OF WHETHER THEY ARE SPECIFICALLY NOTED ON THIS PLAN AND SHALL MAINTAIN AND REPLACE CONTROLS AS NECESSARY DURING THE COURSE OF HIS OPERATIONS.
2. CONTRACTOR SHALL PROTECT ANY STORM INLETS FROM SEDIMENT THAT TAKE STORM WATER FROM THE AREA OF CONSTRUCTION.
3. TEMPORARY CONSTRUCTION ENTRANCE/EXIT(S), SILT FENCES, DITCH CHECK DIKES OR OTHER INITIAL SEDIMENT CONTROLS MUST BE INSTALLED PRIOR TO ANY OTHER WORK.
4. WHEELS MUST BE CLEANED TO REMOVE MUD PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES OR SITE ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
5. THE CONTRACTOR SHALL CLEAN STREETS BOTH INTERIOR AND ADJACENT TO THE SITE, AS NEEDED AFTER EACH RAINFALL, AND AT THE END OF CONSTRUCTION.
6. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST DURING CONSTRUCTION AND SHALL WATER CONSTRUCTION AREAS WHENEVER CONDITIONS WARRANT.
7. THE CONTRACTOR SHALL RETAIN FLOATABLE WIND BLOWN MATERIALS ON SITE BY STORING ALL TRASH AND BUILDING MATERIAL WASTE IN ENCLOSURES UNTIL PROPER DISPOSAL AT AN OFF-SITE FACILITY. CONTRACTOR TO CHECK ADJACENT AREAS DAILY AND PICK UP CONSTRUCTION WASTE MATERIALS AND DEBRIS THAT HAVE BLOWN OR WASHED OFF-SITE.
8. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING ACCUMULATED SEDIMENT (SILT) FROM STORM DRAINS PRIOR TO APPROVAL OF CONSTRUCTION.
9. THE CONTRACTOR SHALL STABILIZE ALL DISTURBED AREAS NOT SUBJECT TO CONSTRUCTION ACTIVITY WITHIN 14 CALENDAR DAYS AFTER ACTIVITY HAS CEASED.
10. ALL DISTURBED AREAS NOT RECEIVING OTHER PERMANENT STABILIZATION SUCH AS PAVEMENT, ROOFS, SOD, ETC., SHALL BE SEEDED AND MULCHED, AS SPECIFIED IN SECTION 02950 BEFORE TEMPORARY EROSION AND SEDIMENT CONTROLS CAN BE REMOVED AND PRIOR TO FINAL APPROVAL OF CONSTRUCTION.

GENERAL NOTES:

1. ALL CONSTRUCTION PERFORMED ON THIS PROJECT SHALL CONFORM WITH THE LATEST REVISION OF THE CITY OF NEOSHO'S STANDARD SPECIFICATIONS FOR PUBLIC WATER AND WASTEWATER SYSTEM IMPROVEMENTS AND DRAWINGS EXCEPT AS AMENDED IN THESE PLANS AND THE PROJECT MANUAL.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE WORK ZONE SAFETY GUIDELINES OF PART VI OF THE MUTCD & SECTION 01530 THE CITY OF NEOSHO STANDARD SPECIFICATIONS.
3. LOCATIONS OF EXISTING UTILITIES (UNDERGROUND, SURFACE AND OVERHEAD) AS SHOWN ON PLANS ARE APPROXIMATE, LOCATED WITH INFORMATION PROVIDED BY OTHERS. CONTRACTOR SHALL CONTACT ALL UTILITIES PRIOR TO EXCAVATION, AND SHALL BE RESPONSIBLE FOR THE EXACT LOCATION AND PRESERVATION OF ALL UTILITY LINES. UTILITY LOCATING SERVICE, SUCH AS MISSOURI ONE CALL SYSTEM 811, SHALL BE CONTACTED BY THE CONTRACTOR 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
4. "SCREENED" (LIGHT) DELINEATION INDICATED ON THE DRAWINGS DENOTES EXISTING FACILITIES. "SCREENED" INFORMATION WAS TAKEN FROM EXISTING CONSTRUCTION DRAWINGS AND DATA, IS FOR REFERENCE ONLY, AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO THE ORDERING OF MATERIALS AND BEGINNING OF CONSTRUCTION. "BOLD" DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS CONTRACT.
5. ALL CONSTRUCTION AND EXCAVATION ACTIVITIES SHALL BE CONFINED TO EASEMENTS, RIGHT-OF-WAY AND/OR WORK AREA LIMITS AS SHOWN ON DRAWINGS.
6. CONTRACTOR'S STAGING, PARKING AND MATERIAL STORAGE SHALL BE PROVIDED ON CITY PROPERTY AND CONFINED TO EASEMENT LIMITS, TO BE COORDINATED WITH THE OWNER. PROVIDING ADDITIONAL STORAGE OR PARKING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
7. CONTRACTOR SHALL PRESERVE OR REMOVE AND REPLACE ALL SIGNS, MAIL BOXES, BOLLARDS AND OTHER SITE FEATURES WITHIN THE LIMITS OF THE PROPOSED IMPROVEMENTS.
8. REMOVE ALL FENCES AS NECESSARY FOR CONSTRUCTION AND RESTORE WITH LIKE MATERIAL TO ORIGINAL OR BETTER CONDITION.
9. ALL TRAFFICWAYS INCLUDING DRIVEWAYS, ALLEYWAYS AND SIDEWALKS SHALL REMAIN ACCESSIBLE TO RESIDENTIAL AND EMERGENCY VEHICLES DURING PROJECT DURATION.
10. ALL MATERIALS ENCOUNTERED IN EXCAVATIONS SHALL BE UNCLASSIFIED REGARDLESS OF TYPE, COMPOSITION, CHARACTER AND CONDITION THEREOF.
11. BLASTING WILL BE NOT PERMITTED IN THE PROSECUTION OF THE WORK ON THIS PROJECT.
12. ALL SURFACES (CONCRETE, ASPHALT, GRAVEL OR DIRT) AND THEIR APPURTENANCES (CURBS, CULVERTS, ETC.) DISTURBED DURING CONSTRUCTION SHALL BE REPLACED WITH LIKE MATERIALS PER PLANS AND SPECIFICATIONS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRS OF ANY DAMAGE OR RUTTING TO EXISTING PAVEMENT MADE BY CONSTRUCTION EQUIPMENT. UPON PROJECT COMPLETION, EXISTING PAVEMENT SHALL BE OF EQUAL TO OR BETTER CONDITION OF THAT IN EXISTENCE PRIOR TO BEGINNING.
14. TRAFFIC CONTROL SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE, PLACE AND MAINTAIN ALL BARRIERS (CONES, BARRELS, ETC.) AND SAFETY PERSONNEL (FLAGMEN) AS NECESSARY FOR A SAFE WORKING ENVIRONMENT.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LINE AND GRADE STAKING REQUIRED TO COMPLETE THE PROJECT.
16. CONTRACTOR SHALL, AT HIS EXPENSE, RETAIN THE SERVICES OF A PLS LICENSED IN MISSOURI, WHO SHALL BE RESPONSIBLE FOR RESTORING ANY INCIDENTALLY DAMAGED SURVEY MONUMENTS NOT SCHEDULED FOR REMOVAL AS PART OF CONSTRUCTION PROJECT. CONTRACTOR SHALL NOTIFY THE CITY OF JOPLIN OF ANY MONUMENTS DAMAGED BY AN OUTSIDE PARTY.
17. BURNING OF COMBUSTIBLE DEBRIS AND WASTE MATERIAL FROM CLEARING AND GRUBBING OPERATIONS WILL NOT BE PERMITTED ON-SITE. DISPOSE OF ALL NON-COMBUSTIBLE DEBRIS AND WASTE MATERIAL AT OFF-SITE LOCATION ARRANGED FOR BY CONTRACTOR.
18. IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
19. THE DUTY OF THE ENGINEER OR OWNER TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.
20. THE CONTRACTOR SHALL KEEP THE PROJECT NEAT AND ORDERLY AT ALL TIMES WHILE CONSTRUCTION IS TAKING PLACE. ACCESS STREETS TO THE PROJECT SHALL BE KEPT CLEAR OF MUD, DEBRIS, PAPER AND WASTE MATERIAL AT ALL TIMES. THE PROPER AMOUNT OF INSPECTION SHALL BE CALLED FOR AT THE CORRECT TIMES OR ANY AND ALL WORK MAY BE REJECTED.
21. CONTRACTOR SHALL EXERCISE CAUTION TO GUARD AGAINST THE DEGRADATION OF THE WATERS OF THE STATE DUE TO CONSTRUCTION RELATED POLLUTANTS (SILT, DEBRIS, AND PETROLEUM PRODUCTS).
22. CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITY WITH ALL UTILITY CO.'s, AT&T, COMCAST, SUDDENLINK, LIBERTY UTILITIES EMPIRE DISTRICT, MISSOURI GAS ENERGY, AND THE CITY OF NEOSHO.
23. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO OTHER EXISTING UTILITIES. IN THE EVENT ANY OTHER UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE RESPECTIVE UTILITY AND MAKE EVERY ATTEMPT TO KEEP INTERRUPTION OF SAID UTILITY SERVICE TO A MINIMUM. ALL COST ASSOCIATED WITH DAMAGE TO OTHER UTILITIES AND THEIR SUBSEQUENT REPAIRS DUE TO CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
24. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING WATER SERVICE TO ALL CUSTOMERS AT ALL TIMES DURING THE PROJECT. CONTRACTOR SHALL PLAN WORK ACCORDINGLY AND COORDINATE WORK SEQUENCE WITH CITY OF NEOSHO. CONTRACTOR SHALL PROVIDE ALL NECESSARY MATERIALS, EQUIPMENT AND LABOR TO ENSURE NO SERVICE INTERRUPTIONS.

UTILITY CONTACTS:

ELECTRIC: LIBERTY UTILITIES EMPIRE DISTRICT – CHRIS BARKER (417) 438-0370

GAS: MISSOURI GAS ENERGY/LACLEDE GROUP – KEN STEGAL (417) 626-4831

SEWER: CITY OF NEOSHO – NATE SILER (417) 451-8050

WATER: CITY OF NEOSHO – NATE SILER (417) 451-8050

CABLE: COMCAST – (888) 375-4888
SUDDENLINK COMMUNICATIONS – (417) 451-2564

PHONE: AT&T – KENNY KENWORTHY (417) 625-8092

LEGEND

	BENCHMARK OR T.B.M.
	CONTROL POINT
C	CABLE PEDESTAL
	GUY WIRE
	FIRE HYDRANT
	GAS METER
	GAS VALVE
M	MANHOLE
	LIGHT POLE
	POWER POLE
TP	TELEPHONE PEDESTAL
	TRANSFORMER
	EXISTING WATER METER
	PROPOSED WATER METER
	EXISTING WATER VALVE
	PROPOSED WATER VALVE
FL FL	EXISTING WATER-FIRE
FL FL	PROPOSED WATER-FIRE
W W	EXISTING WATERLINE
W W	PROPOSED WATERLINE
C/T	PRE
OHE	EXISTING OVERHEAD ELECTRIC
UGE	EXISTING UNDERGROUND ELECTRIC
GAS	EXISTING GAS
S S	EXISTING SEWER
SS	EXISTING STORM
TEL	EXISTING TELEPHONE
	EXISTING PROPERTY LINE
	EXISTING RIGHT OF WAY

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

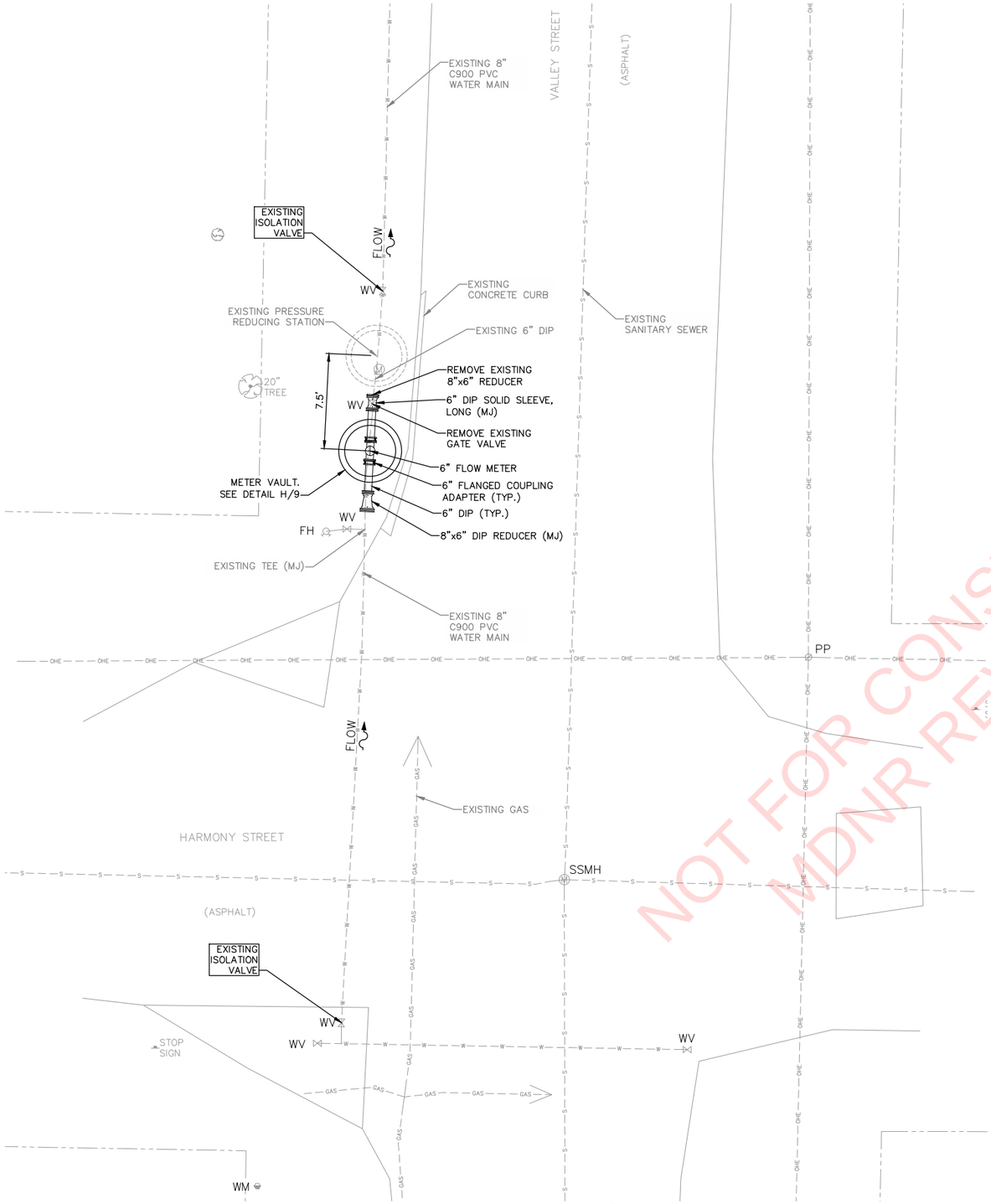
DATE	REVISION

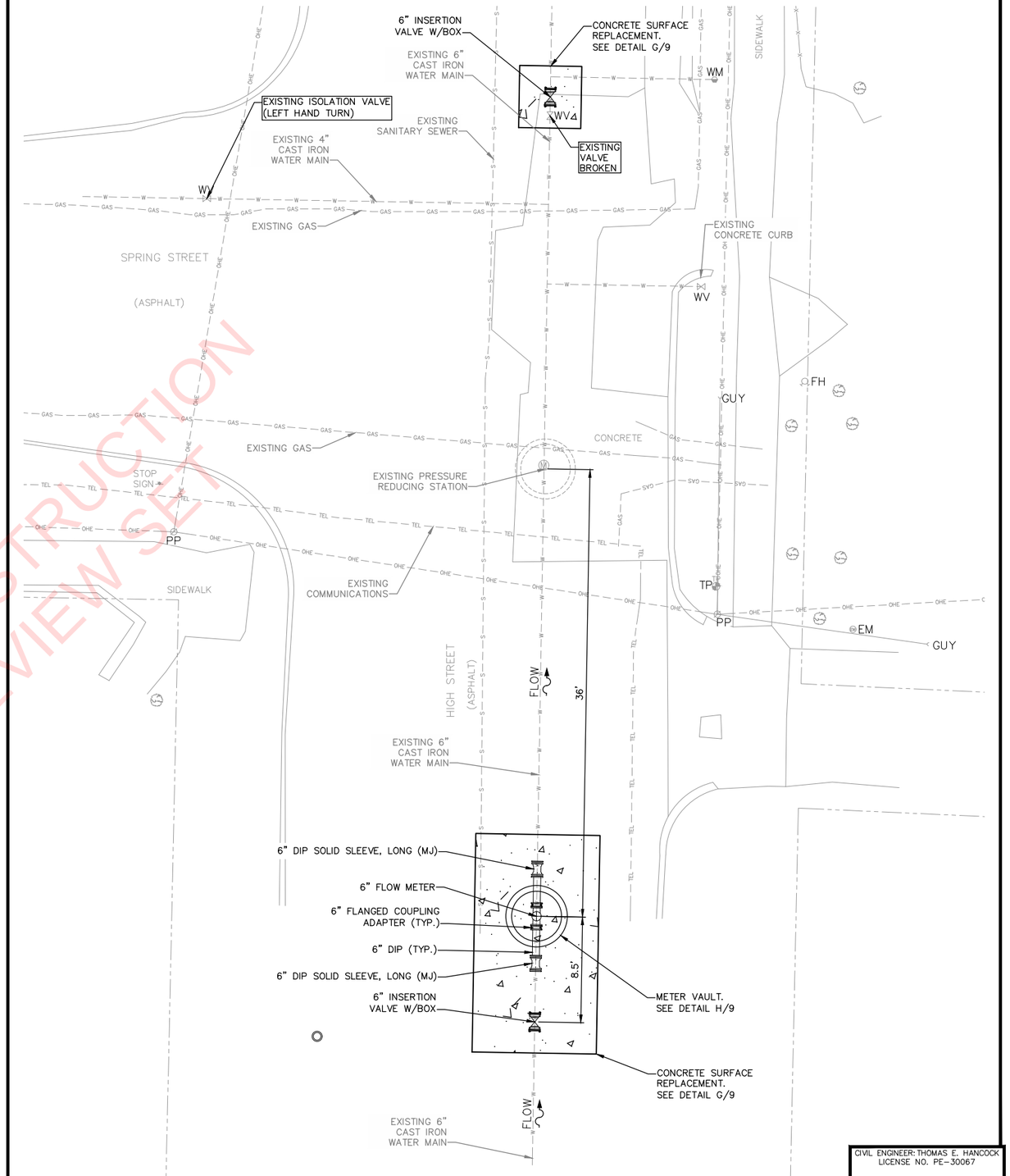
DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE:	APRIL 2021

OVERALL SITE PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 2

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\3 WATER METER A & B PLAN.DWG





ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER A & B PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 3

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

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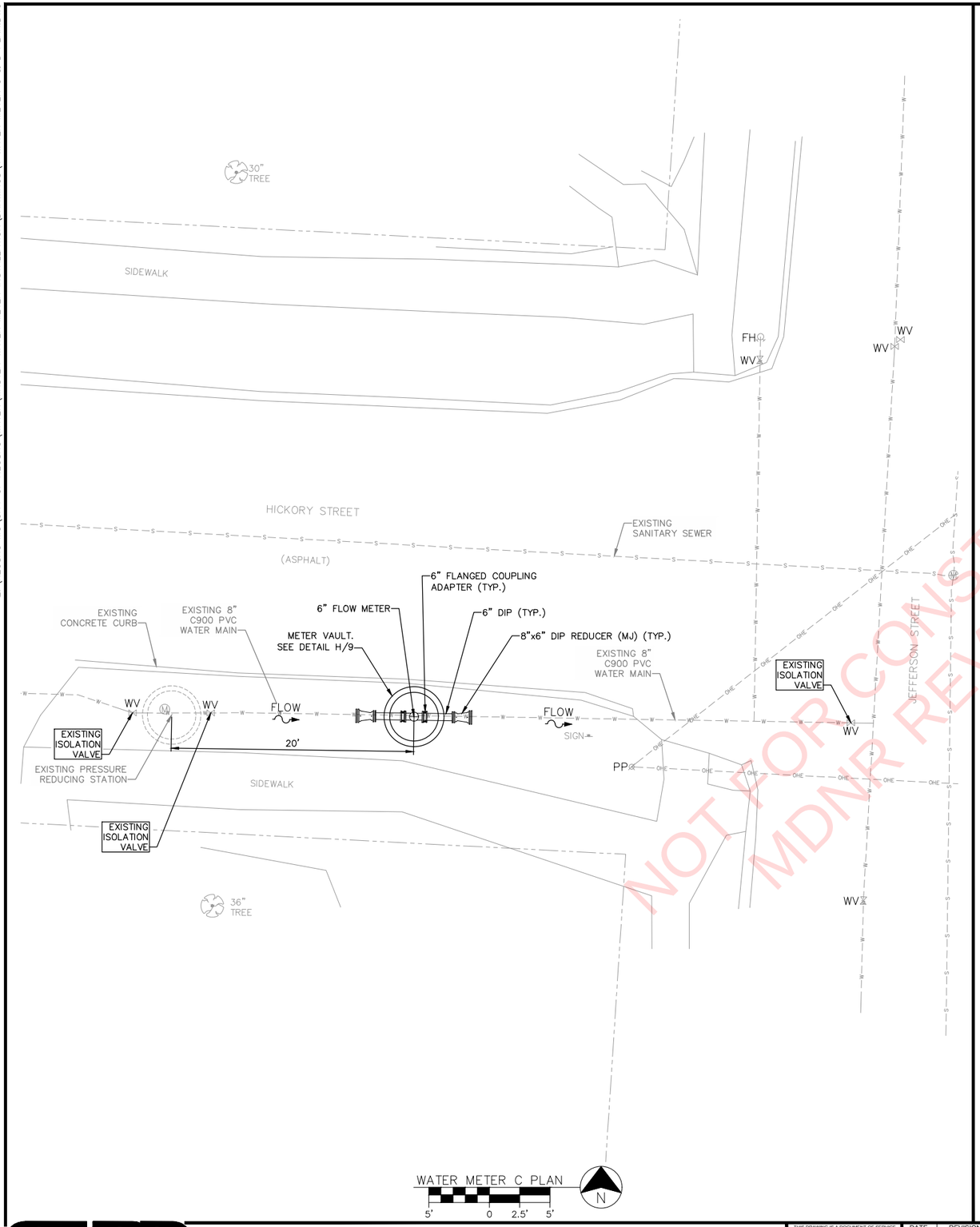

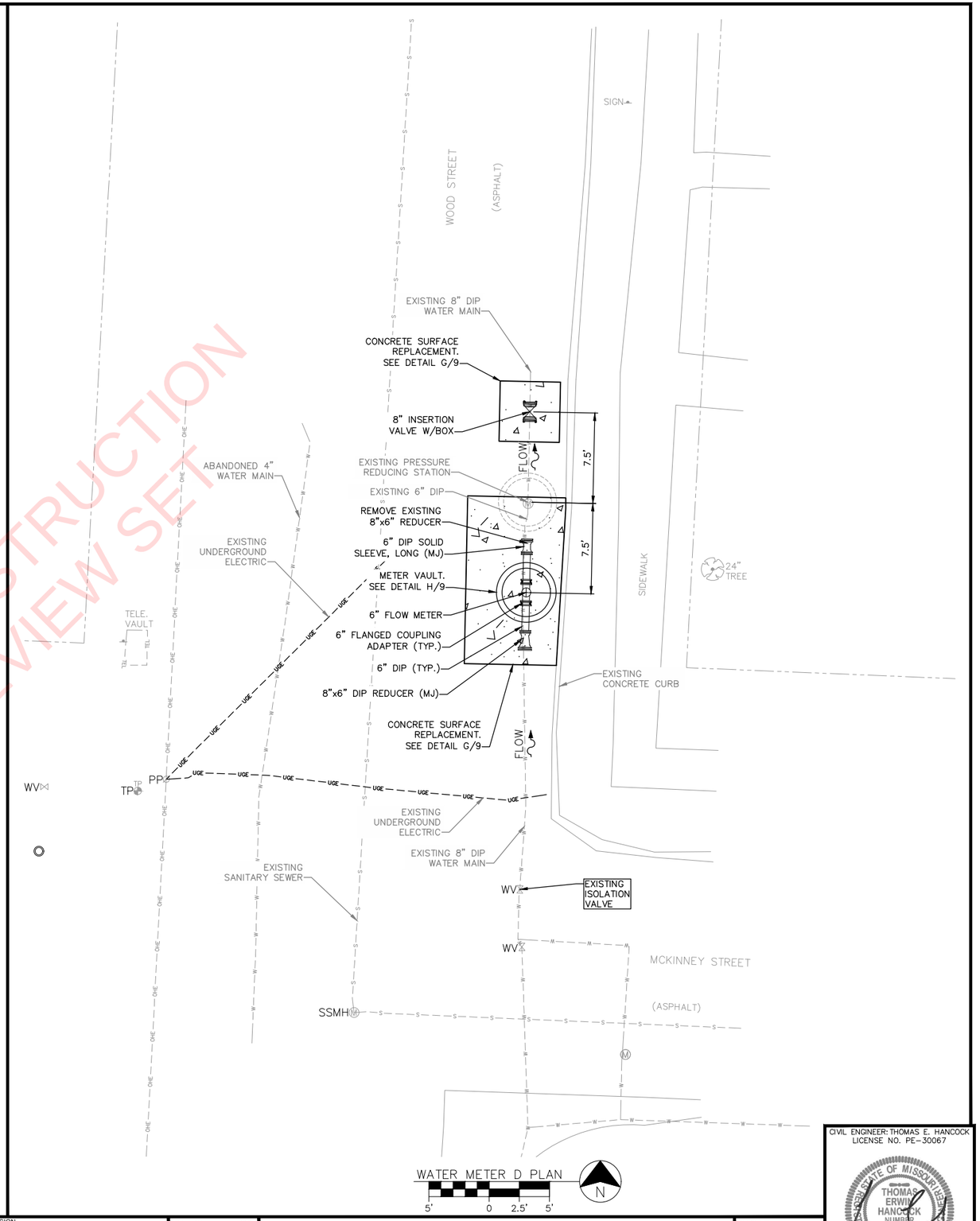

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY
MISSOURI NO. 000427

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER C & D PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 4

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

04-06-2021

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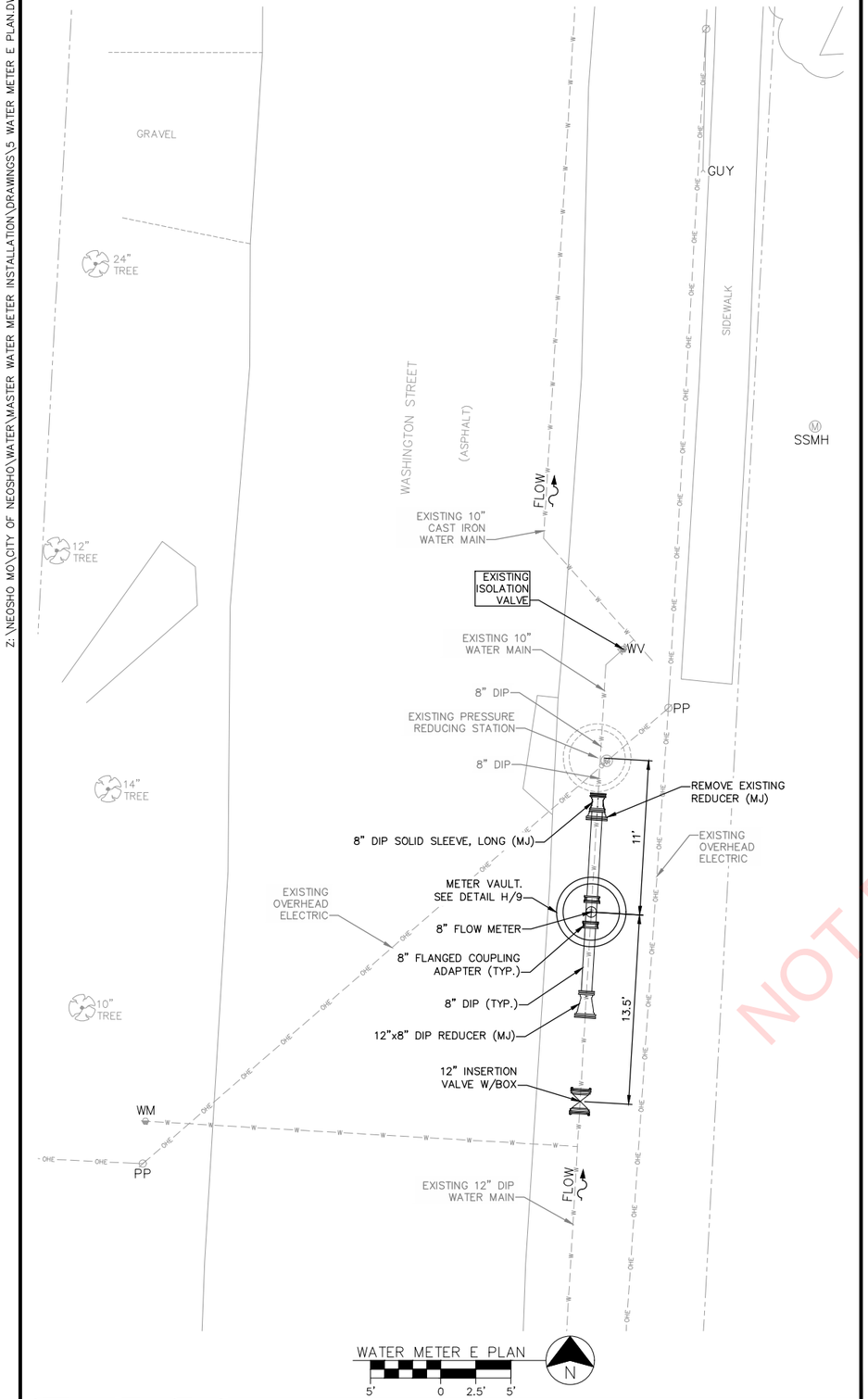


METER F OMITTED FROM PROJECT

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

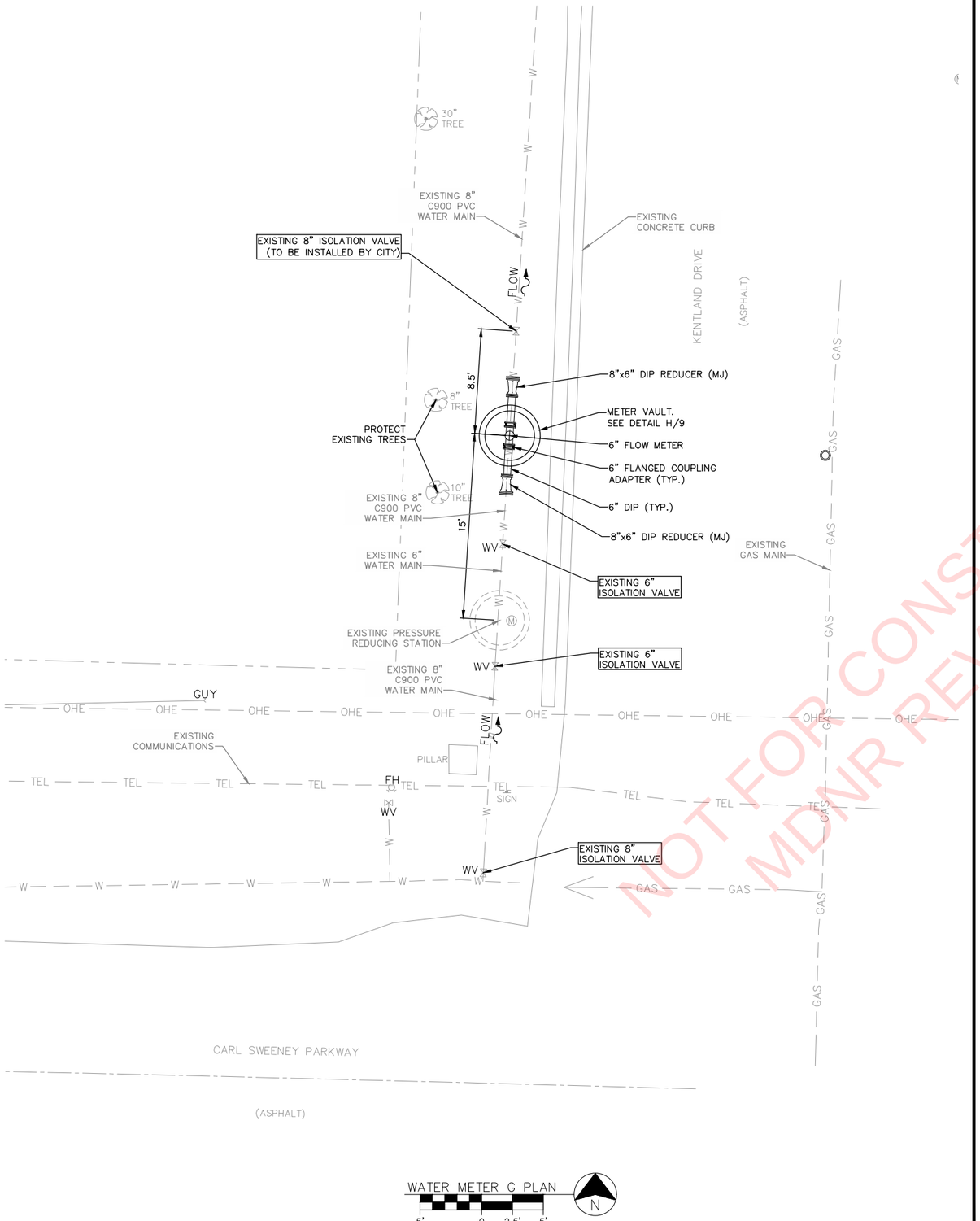
WATER METER E PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 5

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

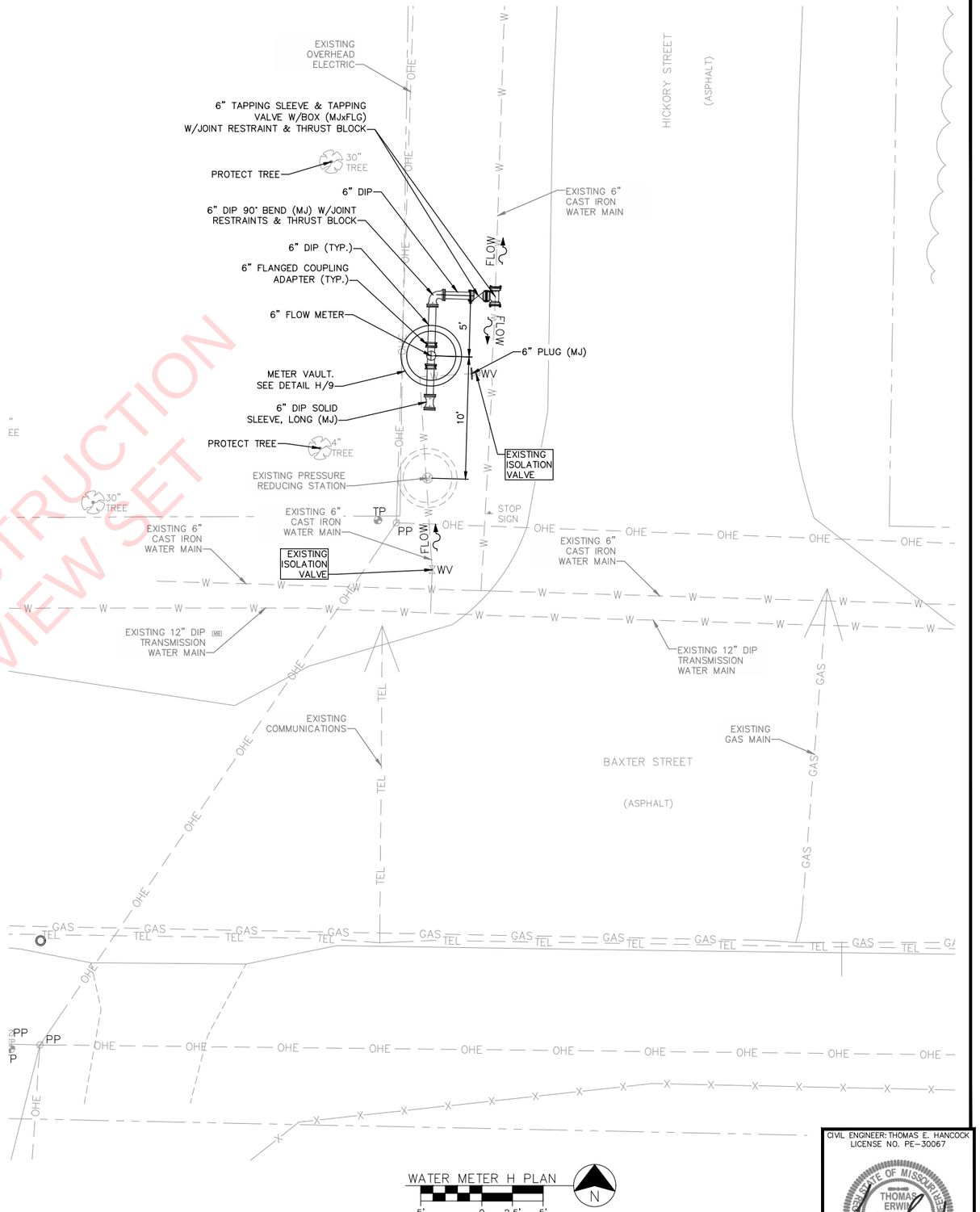
Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\6 WATER METER G & H PLAN.DWG



WATER METER G PLAN

5' 0 2.5' 5'

N



WATER METER H PLAN

5' 0 2.5' 5'

N

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER G & H PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

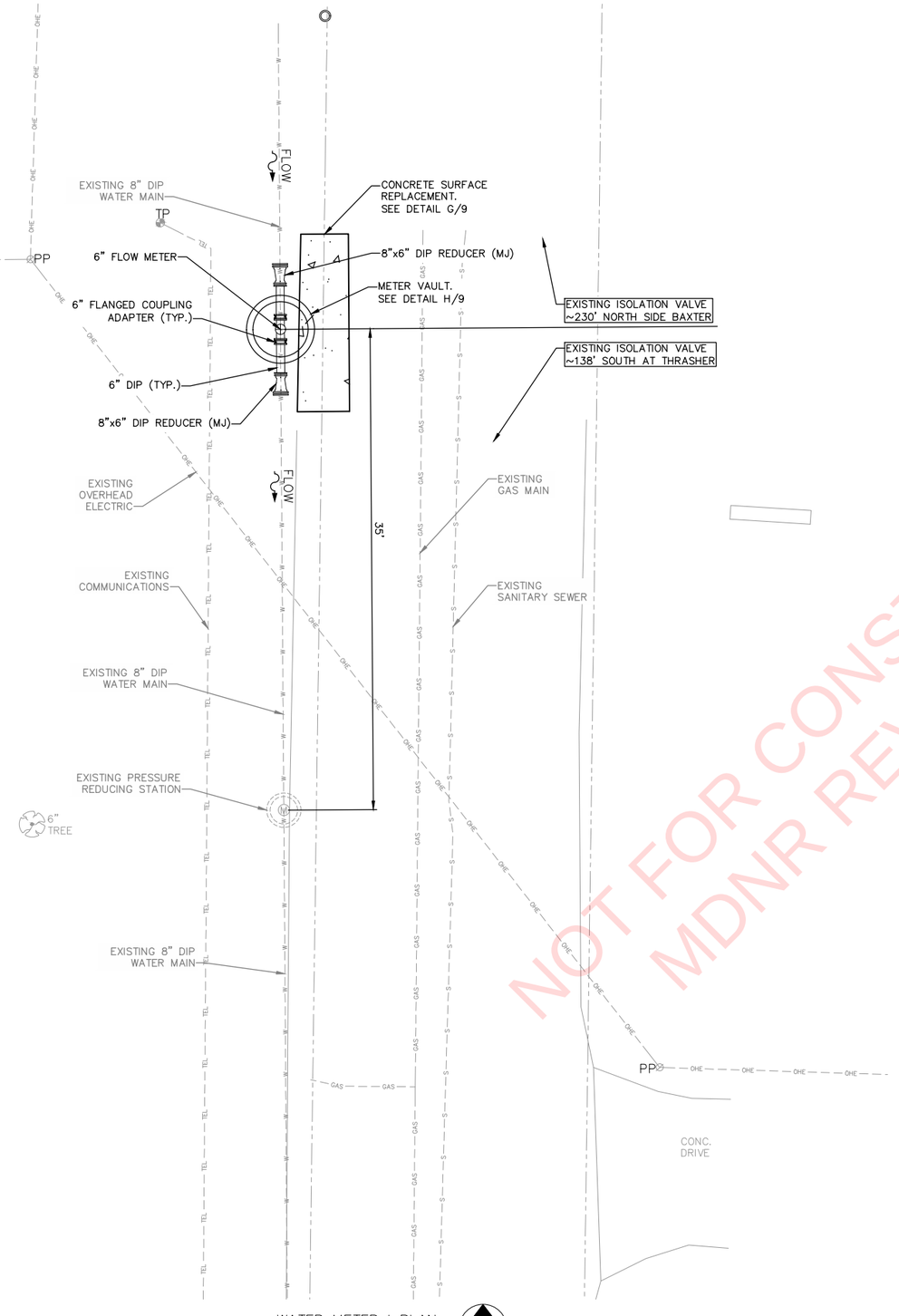
DWG. NO. 6

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\7 WATER METER I PLAN.DWG



WATER METER I PLAN

5' 0 2.5' 5'

N

METER J OMITTED FROM PROJECT

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

WATER METER I PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

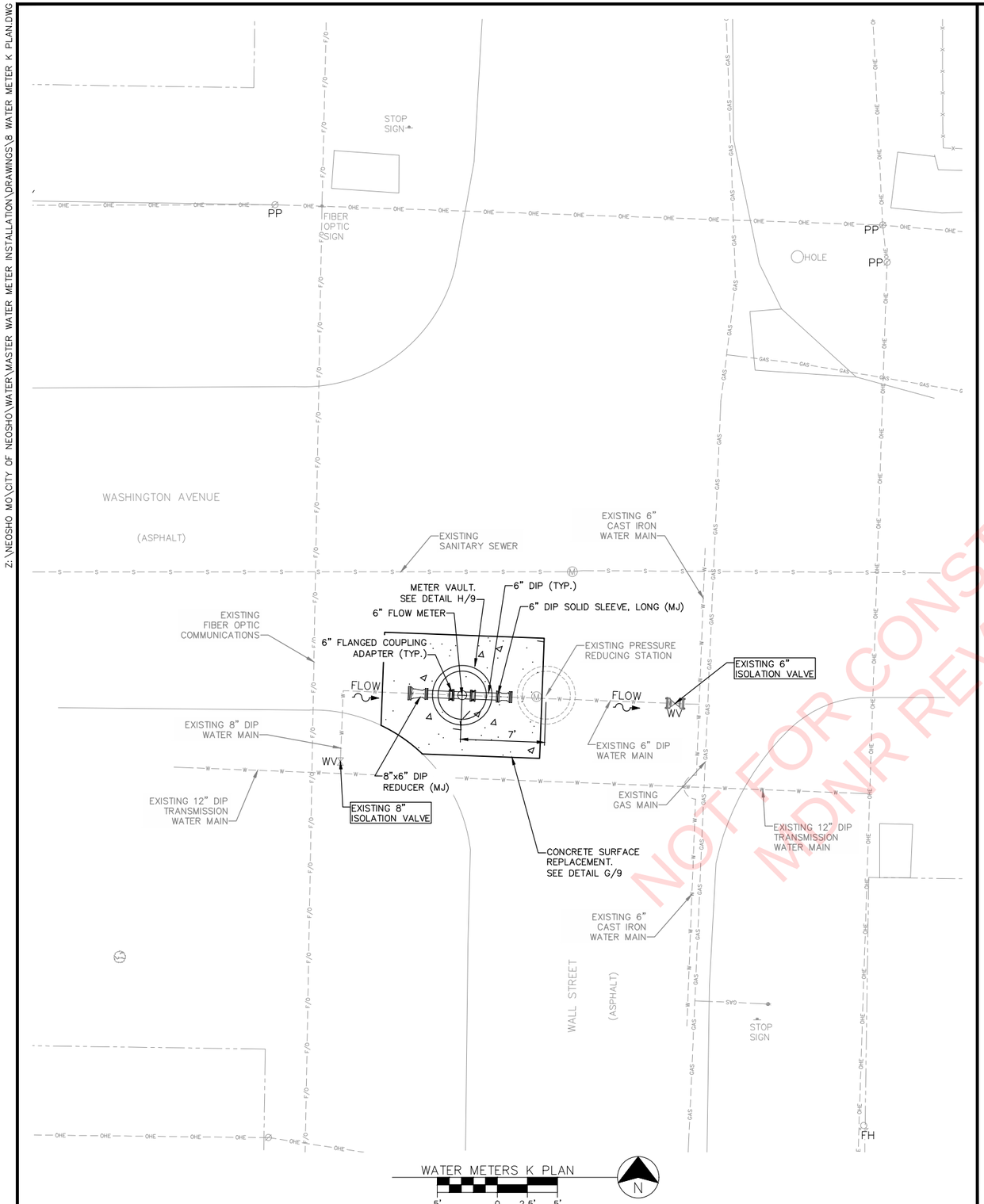
DWG. NO. 7

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

Z:\NEOSHO MO\CITY OF NEOSHO\WATER\MASTER WATER METER INSTALLATION\DRAWINGS\8 WATER METER K PLAN.DWG



ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY:	CSJ
CKD. BY:	JTB
APPD. BY:	TEH
DATE :	APRIL 2021

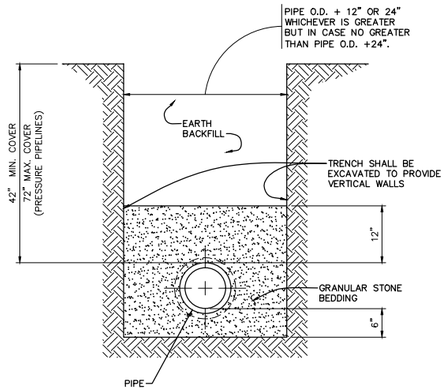
WATER METER K PLAN
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 8

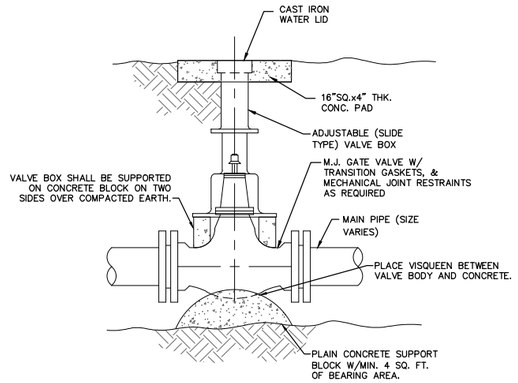
CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE–30067

STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER

04-06-2021

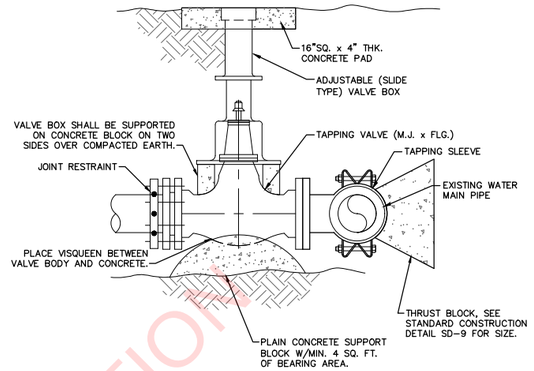


STANDARD TRENCH & BEDDING DETAILS (SD-2)
NTS
A 9

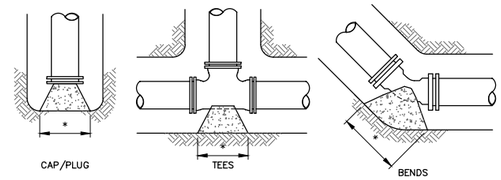


GATE VALVE INSTALLATION (SD-4)
NTS
B 9

NOTE:
CONTRACTOR SHALL FIELD VERIFY TYPE & SIZE OF EXISTING PIPES TO BE TAPPED



TAPPING SLEEVE & VALVE INSTALLATION (SD-5)
NTS
C 9



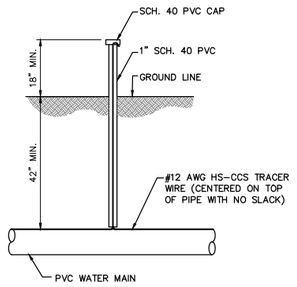
* SEE THRUST BLOCK SIZING TABLE

CONCRETE THRUST BLOCK SIZING

PIPE SIZE (IN)	*MINIMUM AREA OF BEARING ON UNDISTURBED SOIL (SF)				
	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES, PLUGS, CAPS, & HYDRANTS
4 & 6	3	2	1	1	3
8	6	3	2	1	4
10	9	5	3	2	6
12	12	7	4	2	9
14	17	9	5	3	12
16	22	12	6	3	16

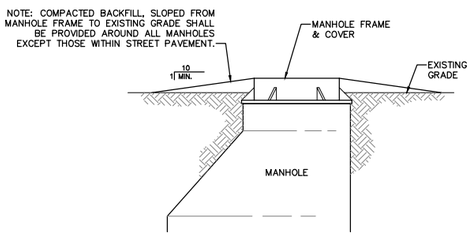
AREAS ARE BASED ON A WORKING PRESSURE OF 150 P.S.I. AND A SOIL RESISTANCE OF 2000 POUNDS PER SQUARE FOOT.

THRUST BLOCK DETAIL (SD-9)
NTS
D 9

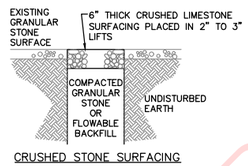


NOTES:
1. DETECTION WIRE RISERS SHALL BE INSTALLED AS REQUIRED TO PROVIDE A RISER SPACING, INCLUDING THOSE AT GATE VALVES, FLUSH STATIONS, AND FIRE HYDRANTS, NOT EXCEEDING 1000 FEET.
2. THE CITY PREFERS NO SPLICES. IF NECESSARY, USE RIGID FITTINGS OR WATERPROOF CONNECTORS SPECIFICALLY DESIGNED FOR DIRECT BURIAL AS DIRECTED BY MANUFACTURER.
3. DETECTION WIRE SHALL BE LOOPED ON OUTSIDE OF VALVE BOX AND ENTER 6" BELOW THE LID.

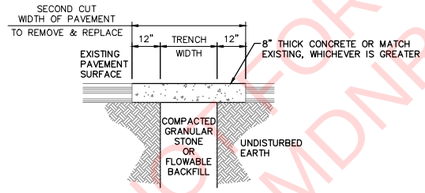
DETECTION WIRE RISER DETAIL (SD-14)
NTS
E 9



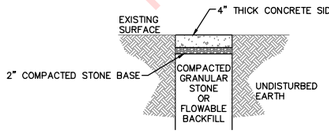
MANHOLE GRADING DETAIL (SD-15)
NTS
F 9



CRUSHED STONE SURFACING



ASPHALT AND CONCRETE SURFACING



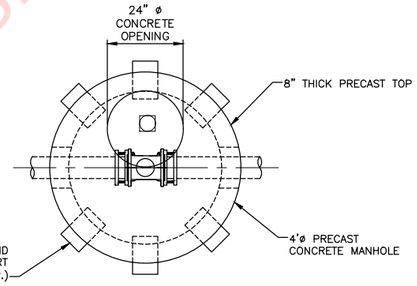
SIDEWALK REPLACEMENT

NOTES

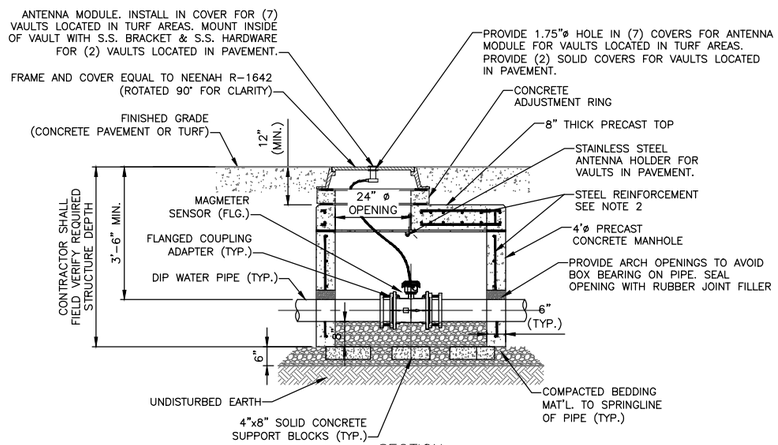
PAVEMENT SHALL BE REMOVED AT THE TRENCH WIDTH AFTER THE FIRST CUT WITHOUT DAMAGE TO ADJACENT PAVEMENT.

AFTER TRENCH IS PROPERLY BACKFILLED, PAVEMENT SHALL BE CUT AND REMOVED AN ADDITIONAL 12" ON EACH SIDE OF THE FIRST SAW CUT, AS SHOWN. THE SECOND CUT SHALL BE SAWN TO FULL DEPTH OF THE EXISTING SURFACE.

PAVEMENT REPLACEMENT DETAIL (SD-21)
NTS
G 9



TOP



SECTION

METER VAULT DETAIL
NTS
H 9

VALVE VAULT NOTES:

1. STRUCTURAL DESIGN AND STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM C890 SHALL BE PROVIDED BY PRECASTER.
2. PRECAST VALVE VAULT & TOP SHALL BE DESIGNED FOR HS-20 LOADING.
3. PRECAST MANHOLE SHALL CONFORM TO ASTM C478.
4. PROVIDE DIAGONAL BARS ON FOURS SIDES OF MANWAY OPENING.
5. FRAME & SECTION JOINTS SHALL BE SET ON CONSEAL BUTYL RUBBER SEALANT.
6. SUBMIT SHOP DRAWINGS AND SEALED DESIGN CALCULATIONS FOR ALL STRUCTURES & COMPONENTS TO CIVIL ENGINEER PRIOR TO CONSTRUCTION.
7. ALL JOINTS, ADJUSTMENT RINGS, TOP SLABS & FRAMES SHALL BE SET ON JOINT SEALER EQUAL TO CONSEAL BUTYL RUBBER SEALANT.
8. REPAIR ALL LIFTING HOLES WITH NON-SHRINK GROUT
9. ALL EXPOSED EDGES SHALL HAVE A 3/4" CHAMFER.
10. PROVIDE COPOLYMER POLYPROPYLENE PLASTIC STEEL REINFORCED MANHOLE STEPS ALIGNED WITH OPENING.

ALLGEIER, MARTIN and ASSOCIATES, INC.
CONSULTING ENGINEERS and SURVEYORS
7231 EAST 24th STREET JOPLIN, MISSOURI 64804 (417) 680 - 7200

CERTIFICATE OF AUTHORITY MISSOURI NO. 000427

DATE	REVISION

DWN. BY: CSJ
CKD. BY: JTB
APPD. BY: TEH
DATE: APRIL 2021

DETAILS
MASTER WATER METER INSTALLATION
CITY OF NEOSHO

DWG. NO. 9

CIVIL ENGINEER: THOMAS E. HANCOCK
LICENSE NO. PE-30067
STATE OF MISSOURI
THOMAS ERWIN HANCOCK
NUMBER E-30067
REGISTERED PROFESSIONAL ENGINEER
04-06-2021

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

April 14, 2021

Nate Siler
Neosho PWS
203 East Main Street
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000042-21

Dear Nate Siler:

Enclosed is approval on plans and specifications for nine master water meter installations to serve the Neosho PWS, of Newton County, Missouri.

Please be advised this facility may be required to obtain other permits from the Missouri Department of Natural Resources. It is your responsibility to ensure that any and all necessary permits for this facility have been obtained.

NOTE: You, as the applicant, should be aware that you will need to obtain final construction approval from the Department for this project, once it has been constructed and completed. In order to do this, you will need to have your engineer complete the enclosed "Statement of Work Completed" form, or online at https://dnr.mo.gov/forms/780-2825-f.pdf. This may require you to make additional arrangements with your engineer to provide this service to you. Once your engineer has completed this form for you, you should return it to this office. We will then make arrangements with our regional office staff to conduct a final inspection and issue a final construction approval.

If you were adversely affected by this decision, you may be entitled to pursue an appeal before the Administrative Hearing Commission (AHC). To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal must be directed to: Administrative Hearing Commission, United States Post Office Building, Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102. Phone: 573-751-2422, fax: 573-751-5018, and website: www.oa.mo.gov/ahc.

If you have any questions concerning this construction permit approval or if you need any further assistance, please contact Diane Muenks by phone at 573-751-5924, or contact the engineer by email at megan.torrence@dnr.mo.gov, or email me at maher.jaafari@dnr.mo.gov.

You may also request to set up an appointment referred to as a Compliance Assistance Visit (CAV). CAVs will assist with understanding regulatory requirements, help with achieving and maintaining compliance, and provide a continuing resource for technical assistance. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at: http://dnr.mo.gov/cav/compliance.htm. The online CAV request can be found at http://dnr.mo.gov/cav/compliance.htm. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

MJ:mtm

Enclosure

c: Alleger, Martin and Associates
Southwest Regional Office

DEPARTMENT OF NATURAL RESOURCES OF MISSOURI

APPROVAL ON PLANS AND SPECIFICATIONS FOR MASTER WATER METER INSTALLTION

Neosho PWS
Newton County, Missouri

Review Number 5000042-21

INTRODUCTION

Detailed plans and specifications dated April 6 2021, for master water meter installations to serve the Neosho PWS, in Newton County, Missouri were submitted for review and approval by Allgeier, Martin and Associates, of Joplin, Missouri.

BRIEF DESCRIPTION

In general, these plans and specifications provide for installation of nine master water meters next to existing pressure reducing valves throughout the distribution system. Each of the water meters will be installed in a below ground concrete vault with the necessary valves, fittings, piping, and other appurtenances conforming to American Water Works Association standards as per detailed plans and specifications. Before being placed in serve, the waterlines will be pressure tested, flushed, disinfected, and sampled for bacteriological analysis.

Megan Torrence

Megan Torrence
Drinking Water Infrastructure Permits and Engineering Section

APPROVAL TO CONSTRUCT

The engineering plans and specifications described above were examined as to sanitary features of design which may affect the operation of the sanitary works, including size, capacities of the units, and factors which may affect the efficiency and ease of operation. Approval as regards these points is hereby given.

Approval is given with the understanding that final inspection and approval of the completed work shall be made by the Department of Natural Resources before same is accepted and placed in operation. If construction is not commenced two (2) years after the date of issue or there is a halt in construction of more than two years, the approval to construct will be void unless an extension of time has been granted by the department.

In the examination of plans and specifications, the Department of Natural Resources, Public Drinking Water Program does not examine the structural features of design or efficiency of mechanical equipment. This approval does not include approval of these features.

The Department of Natural Resources, Public Drinking Water Program reserves the right to withdraw the approval of plans and specifications at any time it is found that additional treatment or alterations are necessary to assure reasonable operating efficiency and to afford adequate protection to public health.

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Dru Buntin, Director

NOV 0 3 2021

David Kennedy
Neosho PWS
203 East Main Street
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000059-20

Dear David Kennedy:

The Missouri Department of Natural Resources' Public Drinking Water Branch, Infrastructure Permits and Engineering Section has reviewed your request for a treatment credit of at least 99.99 percent (4-log) cryptosporidium (crypto) removal in order to comply with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) for the Neosho PWS Treatment Plant.

The LT2 rule requires surface water plants to monitor their source water for crypto. The results of the source water monitoring determine in which Bin classification a water treatment plant will be placed. Neosho PWS was placed in Bin 2. For conventional filtration plants, this Bin 2 classification requires an additional 1.0 log removal of crypto, or 4.0 log total crypto removal. Neosho PWS must achieve this additional level of log removal by January 31, 2022.

Neosho PWS has selected the Combined Filter Performance and Individual Filter Performance toolbox options from the '*Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual'* for obtaining additional log removal credit. Systems using conventional filtration treatment may obtain 0.5 log credit if the combined filter effluent (CFE) turbidity measurements, taken at 4-hour intervals, for any month are less than or equal to 0.15 Nephelometric turbidity unit (NTU) in at least 95 percent of the measurements. Systems can obtain an additional 0.5 log credit if the individual filter effluent (IFE) turbidity is less than or equal to 0.15 NTU in at least 95 percent of the values recorded, taken at least every 15 minutes, at each filter and no individual filter has a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

Therefore, Neosho PWS will receive an additional 1.0 log crypto removal or 4-log total crypto removal each month they submit the following information within 10 days following the month in which the monitoring was conducted:

1. Monthly verification of CFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.
2. Monthly verification of IFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 15 minute IFE measurements taken each month in each filter.
3. Monthly verification no individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.

A modified disinfection and turbidity monthly monitoring report form is included. Please begin using this form starting with your December 2021 report, which is due by January 10, 2022. If you do not agree with this start date, please contact me by November 30, 2021. If no objection is made to the start date of December 2021 for reporting the enhanced treatment credit, the Department will assume concurrence. If you have any questions about the monthly monitoring requirements or if you would like an electronic copy of the new disinfection and turbidity monitoring report, you may contact Scott Weckenborg at 573-526 -1124, or via email at scott.weckenborg@dnr.mo.gov.

In order to verify compliance, we request that you submit actual CFE turbidity measurements taken at least every 4 hours and IFE turbidity measurements taken at least every 15 minutes. The data should be submitted in an Excel spreadsheet and emailed to alan.moreau@dnr.mo.gov. Data should not be reported during backwash, filter-to-waste, or any time water is not being produced for consumption. This data is requested for the first six months of compliance, at which point we will reevaluate to determine if it is still needed.

To meet the requirements for this toolbox option, turbidimeter maintenance is critical. Turbidimeter maintenance should include frequent calibration by the manufacturer's methods as well as frequent verification, in order to measure accurately in the low turbidity ranges. The following maintenance and calibration activity for turbidimeters is recommended:

Maintenance and Calibration Activities for On-line Turbidimeters	
Activity	**Recommended Frequency**
Inspect for cleanliness	Weekly
Verify sample flow rate	Weekly
Verify calibration with primary standard, secondary standard or by comparison with bench-top	Weekly on CFE turbidimeter and monthly on all IFE turbidimeters*
Clean and calibrate with primary standard	Quarterly
Replace lamp	Annually

*Clean and recalibrate with primary standard if verification indicates greater than a +/- 10 percent deviation from secondary standard.

Maintenance and Calibration Activities for Bench Top Turbidimeters	
Activity	**Recommended Frequency**
Inspect for cleanliness of bulbs and lenses	Regularly, such as monthly or quarterly
Verify calibration with secondary standard	Daily*
Clean and calibrate with primary standard	Quarterly
Replace lamp	Annually or according to manufacturer's recommendations

*Clean and recalibrate with primary standard if verification indicates greater than a +/- 10 percent deviation from secondary standard.

Please note that a treatment technique violation will be issued each month any of the above requirements are not met. We strongly encourage you to consider other LT2 toolbox options either for compliance or as a backup option that can be implemented if you are unable to consistently meet the stringent requirements for CFE and IFE performance.

Should you have any questions or if you need further assistance please contact Diane Muenks by phone at 573 751-5924, or email me at maher.jaafari@dnr.mo.com. We may also be reached by mail at Department of Natural Resources, Public Drinking Water Branch, Infrastructure Permits and Engineering, 1101 Riverside Drive, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

MJ:mtm

c: Allgeier, Martin and Associates, Inc.
Ken Brady, Neosho PWS
Southwest Regional Office
Monitoring Section, PDWB

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Dru Buntin, Director

NOV 0 3 2021

David Kennedy
Neosho PWS
203 East Main Street
Neosho, MO 64850

RE: Neosho PWS, MO5010560, Newton County, Review Number 5000059-20

Dear David Kennedy:

The Missouri Department of Natural Resources' Public Drinking Water Branch, Infrastructure Permits and Engineering Section has reviewed your request for a treatment credit of at least 99.99 percent (4-log) cryptosporidium (crypto) removal in order to comply with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) for the Neosho PWS Treatment Plant.

The LT2 rule requires surface water plants to monitor their source water for crypto. The results of the source water monitoring determine in which Bin classification a water treatment plant will be placed. Neosho PWS was placed in Bin 2. For conventional filtration plants, this Bin 2 classification requires an additional 1.0 log removal of crypto, or 4.0 log total crypto removal. Neosho PWS must achieve this additional level of log removal by January 31, 2022.

Neosho PWS has selected the Combined Filter Performance and Individual Filter Performance toolbox options from the '*Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual'* for obtaining additional log removal credit. Systems using conventional filtration treatment may obtain 0.5 log credit if the combined filter effluent (CFE) turbidity measurements, taken at 4-hour intervals, for any month are less than or equal to 0.15 Nephelometric turbidity unit (NTU) in at least 95 percent of the measurements. Systems can obtain an additional 0.5 log credit if the individual filter effluent (IFE) turbidity is less than or equal to 0.15 NTU in at least 95 percent of the values recorded, taken at least every 15 minutes, at each filter and no individual filter has a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

Therefore, Neosho PWS will receive an additional 1.0 log crypto removal or 4-log total crypto removal each month they submit the following information within 10 days following the month in which the monitoring was conducted:

1. Monthly verification of CFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.
2. Monthly verification of IFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 15 minute IFE measurements taken each month in each filter.
3. Monthly verification no individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.

A modified disinfection and turbidity monthly monitoring report form is included. Please begin using this form starting with your December 2021 report, which is due by January 10, 2022. If you do not agree with this start date, please contact me by November 30, 2021. If no objection is made to the start date of December 2021 for reporting the enhanced treatment credit, the Department will assume concurrence. If you have any questions about the monthly monitoring requirements or if you would like an electronic copy of the new disinfection and turbidity monitoring report, you may contact Scott Weckenborg at 573-526 -1124, or via email at scott.weckenborg@dnr.mo.gov.

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Maintenance and Calibration Activities for On-line Turbidimeters	
Activity	**Recommended Frequency**
Inspect for cleanliness	Weekly
Verify sample flow rate	Weekly
Verify calibration with primary standard, secondary standard or by comparison with bench-top	Weekly on CFE turbidimeter and monthly on all IFE turbidimeters*
Clean and calibrate with primary standard	Quarterly
Replace lamp	Annually

*Clean and recalibrate with primary standard if verification indicates greater than a +/- 10 percent deviation from secondary standard.

Maintenance and Calibration Activities for Bench Top Turbidimeters	
Activity	**Recommended Frequency**
Inspect for cleanliness of bulbs and lenses	Regularly, such as monthly or quarterly
Verify calibration with secondary standard	Daily*
Clean and calibrate with primary standard	Quarterly
Replace lamp	Annually or according to manufacturer's recommendations

*Clean and recalibrate with primary standard if verification indicates greater than a +/- 10 percent deviation from secondary standard.

Please note that a treatment technique violation will be issued each month any of the above requirements are not met. We strongly encourage you to consider other LT2 toolbox options either for compliance or as a backup option that can be implemented if you are unable to consistently meet the stringent requirements for CFE and IFE performance.

Should you have any questions or if you need further assistance please contact Diane Muenks by phone at 573 751-5924, or email me at maher.jaafari@dnr.mo.com. We may also be reached by mail at Department of Natural Resources, Public Drinking Water Branch, Infrastructure Permits and Engineering, 1101 Riverside Drive, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

Maher Jaafari, Ph.D., P.E.
Infrastructure Permits and Engineering Section Chief
Public Drinking Water Branch

MJ:mtm

c: Allgeier, Martin and Associates, Inc.
Ken Brady, Neosho PWS
Southwest Regional Office
Monitoring Section, PDWB

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

May 31, 2022

Larry Lane
The Greens Subdivision
12302 Maple Dr
Neosho, MO 64850

Re: Neosho PWS, PWS ID #MO5010560, Review #50552234-14/5000090-14

Dear Larry Lane:

Enclosed is the Report of Final Construction Approval of the Neosho water system extension serving The Greens Subdivision in Newton County.

This report is believed to be self-explanatory. Please direct your attention to the comments and recommendations, which are more thoroughly discussed within the report.

Unless otherwise requested within the report, all correspondence and questions should be directed to Michael Grose of this office by calling 417-891-4300, by email at Michael.Grose@dnr.mo.gov, or via mail at the Southwest Regional Office, 2040 West Woodland, Springfield, MO 65807-5912.

Sincerely,

SOUTHWEST REGIONAL OFFICE

Mark Rader, Chief
Drinking Water Section

MDR/mgr

Enclosure

c: Public Drinking Water Infrastructure Permits and Engineering Section
Gredell Engineering
David Kennedy, City of Neosho

145.pdwp.mo5010560.NeoshoPWS.x.2022.05.31.fin.505223414.mjg

Carbon Copy Address Attachment

- Include information for each individual identified in the carbon copy line that is not a MDNR staff member in one of the groups below.
- All DEQ Program staff will receive documents via the exchange drive.
- All SWRO and other MDNR staff will receive documents via email.
- All Basecamp groups will receive documents via Basecamp (technical staff responsibility once final .pdf received). Note that technical staff copying a basecamp group will also carbon copy themselves.

Physical (mailing) Addresses:

Gredell Engineering
1505 E High St
Jefferson City, MO 65101

Email Addresses: (for those that have indicated this is the preferred method of receipt)

David Kennedy, Neosho
D.Kennedy@Neoshomo.org

FAX Numbers: (for those that have indicated this is the preferred method of receipt)

Missouri Department of Natural Resources
Southwest Regional Office/Public Drinking Water Branch
Report of Final Approval of Construction
Neosho PWS
The Greens Subdivision Water Main Extension
Newton County, Missouri
Public Water System Id Number MO5010560
Review Number 5052234-14/5000080-14
May 31, 2022

Introduction

On May 24, 2022, a final inspection for approval of construction was made of these improvements by Michael Grose of the Missouri Department of Natural Resources Southwest Regional Office. The purpose of the inspection was to determine if construction is in accordance with the approved engineering report, plans, specifications, and *Approval to Construct*. The project is described below and the following comments are provided.

Project Description as Approved

The approved plans and specifications for this project include the construction of approximately 2,742 lineal feet of eight-inch C900 PVC water mains, valves, fittings and hydrants. Before being placed into service, the waterlines will be pressure tested, flushed, disinfected, and sampled for bacteriological analysis.

The *Approval to Construct* was originally issued to Larry Lane on June 9, 2015.

Project as Constructed

No *Statement of Work Completed* was received by this office.

Final Approval of Construction

A *Final Approval* of construction essentially acts as the permit to operate the described facilities. It is important that you consult with your project engineer to verify design compliance for the constructed facilities to ensure conformance with the approved plans and specifications. The waterlines should have been pressure tested, flushed, disinfected and sampled for bacteriological analysis, and the results and engineering certification submitted with the *Statement of Work Completed* form prior to requesting final approval of construction as required by regulations. Based on our observations, however, it appears that the project was constructed according to the *Approval to Construct*, and final approval of the completed project is hereby granted.

This *Final Approval* may be invalid if, upon further review by the Department, construction is nonconforming to the approved plans and specifications.

Signatures

SUBMITTED BY:

Michael J. Grose, EIT
Drinking Water Engineering and
Technical Assistance Unit
Southwest Regional Office

REVIEWED BY:

Clinton J. Finn, P.E.
Drinking Water Engineering and
Technical Assistance Unit
Southwest Regional Office

Attachments
Photograph Addendum (1)

FINAL APPROVAL

The completed water supply facilities described above were examined as to features of construction that may affect the operation of the facilities, including size, capacities of various units, and features that may affect the efficiency and ease of operation. As far as could be determined, the completed facilities are constructed essentially according to the approved plans, and final approval of the completed project is hereby granted.

In the final inspection of the facilities, the Department of Natural Resources does not examine structural features or the efficiency of mechanical equipment. This final approval does not include approval of these features.

The Department reserves the right to withdraw the approval of the water supply facilities at any time they are found to be operating unsatisfactorily. Also, the Department reserves the right to require alterations, additional treatment or changed methods of operation as deemed necessary to place the facilities in satisfactory condition.

MO 780-1234 (8-90)

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY

PHOTOGRAPH ADDENDUM

REGIONAL OFFICE
Southwest Regional Office

GENERAL INFORMATION

FACILITY	PROGRAM
Neosho PWS	Drinking Water Program
ACTIVITY (INSPECTION, INVESTIGATION, ETC.)	DATE OF ACTIVITY
Final Inspection	May 24, 2022

PHOTOGRAPH# 1
DATE TAKEN: May 24, 2022
BY: Mike Grose
DESCRIPTION: Fire hydrant and isolation valve at Station 6+00.

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

May 31, 2022

Larry Lane
The Greens Subdivision
12302 Maple Dr
Neosho, MO 64850

Re: Neosho PWS, PWS ID #MO5010560, Review #50552234-14/5000090-14

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Sincerely,

SOUTHWEST REGIONAL OFFICE

Mark Rader, Chief
Drinking Water Section

MDR/mgr

Enclosure

c: Public Drinking Water Infrastructure Permits and Engineering Section
Gredell Engineering
David Kennedy, City of Neosho

145.pdwp.mo5010560.NeoshoPWS.x.2022.05.31.fin.505223414.mjg

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David Kennedy, Neosho
D.Kennedy@Neoshomo.org

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Missouri Department of Natural Resources
Southwest Regional Office/Public Drinking Water Branch
Report of Final Approval of Construction
Neosho PWS
The Greens Subdivision Water Main Extension
Newton County, Missouri
Public Water System Id Number MO5010560
Review Number 5052234-14/5000080-14
May 31, 2022

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Signatures

SUBMITTED BY:

Michael J. Grose, EIT
Drinking Water Engineering and
Technical Assistance Unit
Southwest Regional Office

REVIEWED BY:

Clinton J. Finn, P.E.
Drinking Water Engineering and
Technical Assistance Unit
Southwest Regional Office

Attachments
Photograph Addendum (1)

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MO 780-1234 (8-90)

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY

PHOTOGRAPH ADDENDUM

REGIONAL OFFICE
Southwest Regional Office

GENERAL INFORMATION

FACILITY	PROGRAM
Neosho PWS	Drinking Water Program
ACTIVITY (INSPECTION, INVESTIGATION, ETC.)	DATE OF ACTIVITY
Final Inspection	May 24, 2022

PHOTOGRAPH# 1
DATE TAKEN: May 24, 2022
BY: Mike Grose
DESCRIPTION: Fire hydrant and isolation valve at Station 6+00.

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

November 18, 2022

David Kennedy, City Administrator
City of Neosho
203 E Main Street
Neosho, MO 64850

Dear David Kennedy:

Over the past several months, staff from the Missouri Department of Natural Resources have been investigating potential sources for increased fish mortality at the Neosho National Fish Hatchery through the presence of potential contaminants at Hearell Spring. During these investigations, the Department has observed and documented detectable levels of chlorine as well as Disinfection By-Products (DBPs). Upon discovery of these compounds, the Department has been in contact with the City of Neosho and has requested that the City assess the integrity of the public water supply system within close proximity of Hearell Spring.

Through these assessments, the City has disclosed that there have been numerous locations of identified water loss within the system . Through on-site evaluations by the City, only one of the identified locations was found to have a significant leak with the potential to cause impacts to subsurface waters of the state.

On October 19, 2022, the Department collected samples for analysis of volatile organic compounds and screened for Total Residual Chlorine. Samples collected were from the City drinking water system through a faucet at the hatchery, the head of the hatchery raceways, Hearell Spring and Elm Spring. Analysis of those samples document continued elevated levels of chlorine as well as the presence of DBPs in Hearell Spring. Please find the enclosed analytical results.

The City is not authorized to discharge chlorinated drinking water from an unpermitted location within the City's drinking water distribution system in such a way as to cause pollution or is likely to cause pollution to waters of the state, and is a violation of the Missouri Clean Water Commission Regulation 10 CSR 20-6.010, and Missouri Clean Water Law 644.051.2 RSMo. In accordance with 10 CSR 20-7.031(5) Water Quality Standards Table A1 total residual chlorine for cold water aquatic habitat is 2 ug/L. The October 19, 2022 chlorine sample levels from Hearell Spring were measured at 210 ug/L, indicating an exceedance of the water quality standard.

The Department appreciates the current efforts the City has put forth in evaluating the distribution system. The City's actions demonstrate a recognition of our mutual goal of providing a quality life for Missouri's citizens through environmental compliance.

However, the City must continue to take further action to reduce the number and severity of discharges from the City's water distribution system.

By December 15, 2022, please provide a written summary of the ongoing evaluation of the drinking water system, including an estimation of water loss both prior to and following any recent system corrections. This summary shall include all locations and findings of corrected deficiencies, including a per-site estimated volume in loss reduction. In addition, the City must develop and provide for a systematic approach for continued system evaluations and reduction in water loss with specific and measurable milestones. The City will provide ongoing updates to the Department's Southwest Regional Office either in writing or via email to the address indicated.

The Department appreciates your voluntary efforts to comply with the laws of Missouri and your continued efforts to work with us to improve the protection of Missouri citizens and our natural resources.

If you should have any questions or would like to schedule a time to meet in person, please contact Randall Willoughby by calling 417-891-4300, by email at SWRO@dnr.mo.gov, or via mail at Southwest Regional Office, 2040 W. Woodland, Springfield, Missouri 65807-5912.

Sincerely,

SOUTHWEST REGIONAL OFFICE

Randall Willoughby, CHMM
Water Pollution Section Chief

RDW/rwr

c: Nate Siler, Public Works Director, City of Neosho
John Hoke, Chief - Water Pollution Control Branch

Enclosure – Sample Results

mo5010560-neosho-20221118-ltr-newton-cw
no-permit-neosho-20221118-ltr-newton-cw

Carbon Copy Address Attachment
Include each individual identified in the carbon copy line that is not a MDNR staff member in one of the groups below.

Email Addresses: (for those that have indicated this is the preferred method of receipt)

Nate Siler, City of Neosho – nsiler@neoshomo.org

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

Results of Sample Analyses

Job/Project Code: NPPEREN1
LDPR Code: FEINS
Water Pollution Control Branch
FEINS - Inspection Sampling

Report Date: 10/31/2022

Order ID: WO221020010

ADS-NRKEMPV-217

Lindsay Boyd
1101 RIVERSIDE DR
JEFFERSON CITY MO 65101

Sample:2221592

Site: Neosho National Fish Hatchery
Site Number: Unpermitted
Sample Location and Type: Tank Room Kitchen Faucet

Customer #: 22000555
County: Newton

Collected 10/19/22 11:10 by Russell Reel (SWRO)

Public Drinking Water Supply; Grab

Sample Comment: Dechlorinated sample. Free Cl= 1.39

Analyte	Result	Qualifier(s)
Analysis: 524.2 - Volatile Organic Compounds by EPA 524.2		
1,1,1-Trichloroethane	<0.5 µg/L	02; ND
1,1,2-Trichloroethane	<0.5 µg/L	02; ND
1,1-Dichloroethene	<0.5 µg/L	02; ND
1,2,4-Trichlorobenzene	<0.5 µg/L	02; ND
1,2-Dibromo-3-Chloropropane	<0.5 µg/L	02; ND
1,2-Dibromoethane (EDB)	<0.1 µg/L	02; ND
1,2-Dichlorobenzene	<0.5 µg/L	02; ND
1,2-Dichloroethane	<0.5 µg/L	02; ND
1,2-Dichloropropane	<0.5 µg/L	02; ND
1,4-Dichlorobenzene	<0.5 µg/L	02; ND
Benzene	<0.5 µg/L	02; ND
Bromodichloromethane	8.35 µg/L	02
Bromoform	<0.5 µg/L	02; ND
Carbon Tetrachloride	<0.5 µg/L	02; ND
Chlorobenzene	<0.5 µg/L	02; ND
Chloroform	21.3 µg/L	02
cis-1,2-Dichloroethene	<0.5 µg/L	02; ND
Dibromochloromethane	2.39 µg/L	02
Ethylbenzene	<0.5 µg/L	02; ND
m&p-Xylenes	<1 µg/L	02; ND
Methyl tert-Butyl Ether (MTBE)	<1 µg/L	02; ND
Methylene Chloride	<0.5 µg/L	02; ND
o-Xylene	<0.5 µg/L	02; ND
Styrene	<0.5 µg/L	02; ND
Tetrachloroethylene (PCE)	<0.5 µg/L	02; ND
Toluene	<0.5 µg/L	02; ND
Total Xylenes	<0.5 µg/L	02; ND
trans-1,2-Dichloroethene	<0.5 µg/L	02; ND
Trichloroethylene (TCE)	<0.5 µg/L	02; ND
Vinyl Chloride	<0.5 µg/L	02; ND
Analysis: Field Dissolved Oxygen by Standard Methods 4500-O-G		
Dissolved Oxygen (field)	7.95 mg/L	
Analysis: Field pH by EPA 150.1		

Analyte	Result	Qualifier(s)
pH (field)	6.6 pH	

Analysis: Field Temperature by EPA 170.1

Temperature (field)	18.4 °C

Analysis: Field Total Residual Chlorine by Field Dependent

Total Residual Chlorine (field)	1.83 mg/L

Sample:2221593

Site: Neosho National Fish Hatchery
Site Number: Unpermitted
Sample Location and Type: Head of Raceway

Customer #: 22000554
County: Newton

Collected 10/19/22 11:35 by Russell Reel (SWRO)

Nonpotable Water; Grab

Sample Comment: Free Cl= 0.03

Analyte	Result	Qualifier(s)
Analysis: 524.2 – Volatile Organic Compounds by EPA 524.2		
1,1,1-Trichloroethane	<0.5 µg/L	ND
1,1,2-Trichloroethane	<0.5 µg/L	ND
1,1-Dichloroethene	<0.5 µg/L	ND
1,2,4-Trichlorobenzene	<0.5 µg/L	ND
1,2-Dibromo-3-Chloropropane	<0.5 µg/L	ND
1,2-Dibromoethane (EDB)	<0.1 µg/L	ND
1,2-Dichlorobenzene	<0.5 µg/L	ND
1,2-Dichloroethane	<0.5 µg/L	ND
1,2-Dichloropropane	<0.5 µg/L	ND
1,4-Dichlorobenzene	<0.5 µg/L	ND
Benzene	<0.5 µg/L	ND
Bromodichloromethane	<0.5 µg/L	ND
Bromoform	<0.5 µg/L	ND
Carbon Tetrachloride	<0.5 µg/L	ND
Chlorobenzene	<0.5 µg/L	ND
Chloroform	<0.5 µg/L	ND
cis-1,2-Dichloroethene	<0.5 µg/L	ND
Dibromochloromethane	<0.5 µg/L	ND
Ethylbenzene	<0.5 µg/L	ND
m&p-Xylenes	<1 µg/L	ND
Methyl tert-Butyl Ether (MTBE)	<1 µg/L	ND
Methylene Chloride	<0.5 µg/L	ND
o-Xylene	<0.5 µg/L	ND
Styrene	<0.5 µg/L	ND
Tetrachloroethylene (PCE)	<0.5 µg/L	ND
Toluene	<0.5 µg/L	ND
Total Xylenes	<0.5 µg/L	ND
trans-1,2-Dichloroethene	<0.5 µg/L	ND
Trichloroethylene (TCE)	<0.5 µg/L	ND
Vinyl Chloride	<0.5 µg/L	ND

Analysis: Field Dissolved Oxygen by Standard Methods 4500-O-G

Dissolved Oxygen (field)	8.99 mg/L

Analysis: Field pH by EPA 150.1

pH (field)	6.6 pH

Analysis: Field Temperature by EPA 170.1

Temperature (field)	16.0 °C

Analysis: Field Total Residual Chlorine by Field Dependent

Total Residual Chlorine (field)	0.05 mg/L

Sample:2221594

Site: Neosho National Fish Hatchery
Site Number: Unpermitted
Sample Location and Type: Hearell Spring Box

Customer #: 22000553
County: Newton

Collected 10/19/22 11:51 by Russell Reel (SWRO)

Nonpotable Water; Grab

Sample Comment: Dechlorinated sample. Free Cl= 0.12

Analyte	Result	Qualifier(s)
Analysis: 524.2 - Volatile Organic Compounds by EPA 524.2		
1,1,1-Trichloroethane	<0.5 µg/L	02; ND
1,1,2-Trichloroethane	<0.5 µg/L	02; ND
1,1-Dichloroethene	<0.5 µg/L	02; ND
1,2,4-Trichlorobenzene	<0.5 µg/L	02; ND
1,2-Dibromo-3-Chloropropane	<0.5 µg/L	02; ND
1,2-Dibromoethane (EDB)	<0.1 µg/L	02; ND
1,2-Dichlorobenzene	<0.5 µg/L	02; ND
1,2-Dichloroethane	<0.5 µg/L	02; ND
1,2-Dichloropropane	<0.5 µg/L	02; ND
1,4-Dichlorobenzene	<0.5 µg/L	02; ND
Benzene	<0.5 µg/L	02; ND
Bromodichloromethane	1.03 µg/L	02
Bromoform	1.15 µg/L	02
Carbon Tetrachloride	<0.5 µg/L	02; ND
Chlorobenzene	<0.5 µg/L	02; ND
Chloroform	3.42 µg/L	02
cis-1,2-Dichloroethene	<0.5 µg/L	02; ND
Dibromochloromethane	1.39 µg/L	02
Ethylbenzene	<0.5 µg/L	02; ND
m&p-Xylenes	<1 µg/L	02; ND
Methyl tert-Butyl Ether (MTBE)	<1 µg/L	02; ND
Methylene Chloride	<0.5 µg/L	02; ND
o-Xylene	<0.5 µg/L	02; ND
Styrene	<0.5 µg/L	02; ND
Tetrachloroethylene (PCE)	<0.5 µg/L	02; ND
Toluene	<0.5 µg/L	02; ND
Total Xylenes	<0.5 µg/L	02; ND
trans-1,2-Dichloroethene	<0.5 µg/L	02; ND
Trichloroethylene (TCE)	<0.5 µg/L	02; ND
Vinyl Chloride	<0.5 µg/L	02; ND
Analysis: Field Dissolved Oxygen by Standard Methods 4500-O-G		
Dissolved Oxygen (field)	9.01 mg/L	
Analysis: Field pH by EPA 150.1		
pH (field)	6.6 pH	
Analysis: Field Temperature by EPA 170.1		
Temperature (field)	16.2 °C	
Analysis: Field Total Residual Chlorine by Field Dependent		
Total Residual Chlorine (field)	0.21 mg/L	

Sample:2221595

Site: Neosho National Fish Hatchery
Site Number: Unpermitted
Sample Location and Type: Elm Spring Box

Customer #: 22000552
County: Newton

Collected 10/19/22 12:34 by Russell Reel (SWRO)

Nonpotable Water; Grab

Sample Comment: Free Cl= 0.0

Analyte	Result	Qualifier(s)
Analysis: 524.2 – Volatile Organic Compounds by EPA 524.2		
1,1,1-Trichloroethane	<0.5 µg/L	02; ND
1,1,2-Trichloroethane	<0.5 µg/L	02; ND
1,1-Dichloroethene	<0.5 µg/L	02; ND
1,2,4-Trichlorobenzene	<0.5 µg/L	02; ND
1,2-Dibromo-3-Chloropropane	<0.5 µg/L	02; ND
1,2-Dibromoethane (EDB)	<0.1 µg/L	02; ND
1,2-Dichlorobenzene	<0.5 µg/L	02; ND
1,2-Dichloroethane	<0.5 µg/L	02; ND
1,2-Dichloropropane	<0.5 µg/L	02; ND
1,4-Dichlorobenzene	<0.5 µg/L	02; ND
Benzene	<0.5 µg/L	02; ND
Bromodichloromethane	<0.5 µg/L	02; ND
Bromoform	<0.5 µg/L	02; ND
Carbon Tetrachloride	<0.5 µg/L	02; ND
Chlorobenzene	<0.5 µg/L	02; ND
Chloroform	<0.5 µg/L	02; ND
cis-1,2-Dichloroethene	<0.5 µg/L	02; ND
Dibromochloromethane	<0.5 µg/L	02; ND
Ethylbenzene	<0.5 µg/L	02; ND
m&p-Xylenes	<1 µg/L	02; ND
Methyl tert-Butyl Ether (MTBE)	<1 µg/L	02; ND
Methylene Chloride	<0.5 µg/L	02; ND
o-Xylene	<0.5 µg/L	02; ND
Styrene	<0.5 µg/L	02; ND
Tetrachloroethylene (PCE)	<0.5 µg/L	02; ND
Toluene	<0.5 µg/L	02; ND
Total Xylenes	<0.5 µg/L	02; ND
trans-1,2-Dichloroethene	<0.5 µg/L	02; ND
Trichloroethylene (TCE)	<0.5 µg/L	02; ND
Vinyl Chloride	<0.5 µg/L	02; ND
Analysis: Field Dissolved Oxygen by Standard Methods 4500-O-G		
Dissolved Oxygen (field)	9.57 mg/L	
Analysis: Field pH by EPA 150.1		
pH (field)	6.2 pH	
Analysis: Field Temperature by EPA 170.1		
Temperature (field)	12.7 ℃	
Analysis: Field Total Residual Chlorine by Field Dependent		
Total Residual Chlorine (field)	0.05 mg/L	

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Richard Kirsch
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Data qualifiers used in this report:

02	Improper preservation
ND	Not detected at reported value

Units used in this report:

℃	degrees Celsius
µg/L	micrograms per liter
mg/L	milligrams per liter
pH	pH units