Board of Aldermen Request for Action

MEETING DATE: 8/28/2023 **DEPARTMENT:** Public Works **AGENDA ITEM:** Res 1258 – Authorization No. 101– Stonebridge Lift Station

REQUESTED BOARD ACTION:
A motion to approve Resolution 1258, authorizing and directing the Mayor to execute Authorization No. 101 with HDR Engineering, Inc. for engineering design of the Stonebridge Lift Station in the amount of $272,260.

SUMMARY:
A long-term goal of the City of Smithville is to serve the community's wastewater collection needs and provide additional capacity to facilitate growth opportunities more efficiently. The Stonebridge and Day Care Lift Stations are at capacity and cannot accept any additional flow. Both lift stations are over 25 years old.

The City conducted a drawdown test on the existing Stonebridge Pump Station on June 29, 2023 to determine existing pumping capacity. Pump 1 operated at 11 gpm, pump 2 at 13 gpm, and both pumps running together operated at 26 gpm. Based on current conditions, each pump individually should be operating at a minimum of 72 gpm. This indicates there is an operational issue with the station impeding its pumping capacity. Potential causes may be clogged pumps, faulty seals to the discharge pipe, faulty check valves, or a restriction in the existing 4" force main. Attached is a design memo from HDR.

There are several undeveloped commercial and residential lots in this service area and the new transit facility that the school is constructing could be served by the Stonebridge lift station. This project would upsize the Stonebridge lift station and force main and eliminate the Daycare lift station and provide the capacity for build out of the area.

PREVIOUS ACTION:
Wastewater Master Plan adoption Resolution 880, February 10, 2021.

POLICY ISSUE:
Infrastructure Maintenance and growth

FINANCIAL CONSIDERATIONS:
Currently the Owens Branch gravity sewer main is in design and was anticipated to be constructed in 2024. This project is a higher priority and would be completed in 2024 and the Owens Branch project would be completed in 2025.

ATTACHMENTS:

- ☐ Ordinance
- ☒ Resolution
- ☐ Staff Report
- ☒ Other: Design memo
- ☒ Contract
- ☐ Plans
- ☐ Minutes

RESOLUTION 1258

A RESOLUTION AUTHORIZING AND DIRECTING THE MAYOR TO EXECUTE AUTHORIZATION NO. 101 WITH HDR ENGINEERING, INC. FOR ENGINEERING SERVICES FOR STONEBRIDGE LIFT STATION AND FORCE MAIN IMPROVEMENTS

WHEREAS, the Stonebridge lift station has reached capacity and has several maintenance needs; and

WHEREAS, a long-term goal of the City is to serve the community's wastewater collection needs and provide additional capacity to facilitate growth opportunities; and more efficiently; and

WHEREAS, the project will remove from service one lift station and increase the capacity of the Stonebridge lift station; and

WHEREAS, HDR Engineering Inc. has submitted Authorization No. 101 to complete the engineering design and specifications for the Stonebridge Lift Station and Force Main Improvements.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF ALDERMEN OF THE CITY OF SMITHVILLE, MISSOURI:

THAT the Mayor is hereby authorized to execute Authorization No. 101 with HDR Engineering, Inc. to complete the engineering design and specifications for the Stonebridge Lift Station and Force Main Improvements in the amount of $272,260.

PASSED AND ADOPTED by the Board of Aldermen and **APPROVED** by the Mayor of the City of Smithville, Missouri, the 28th day of August, 2023

_____
Damien Boley, Mayor

ATTEST:

_____
Linda Drummond, City Clerk

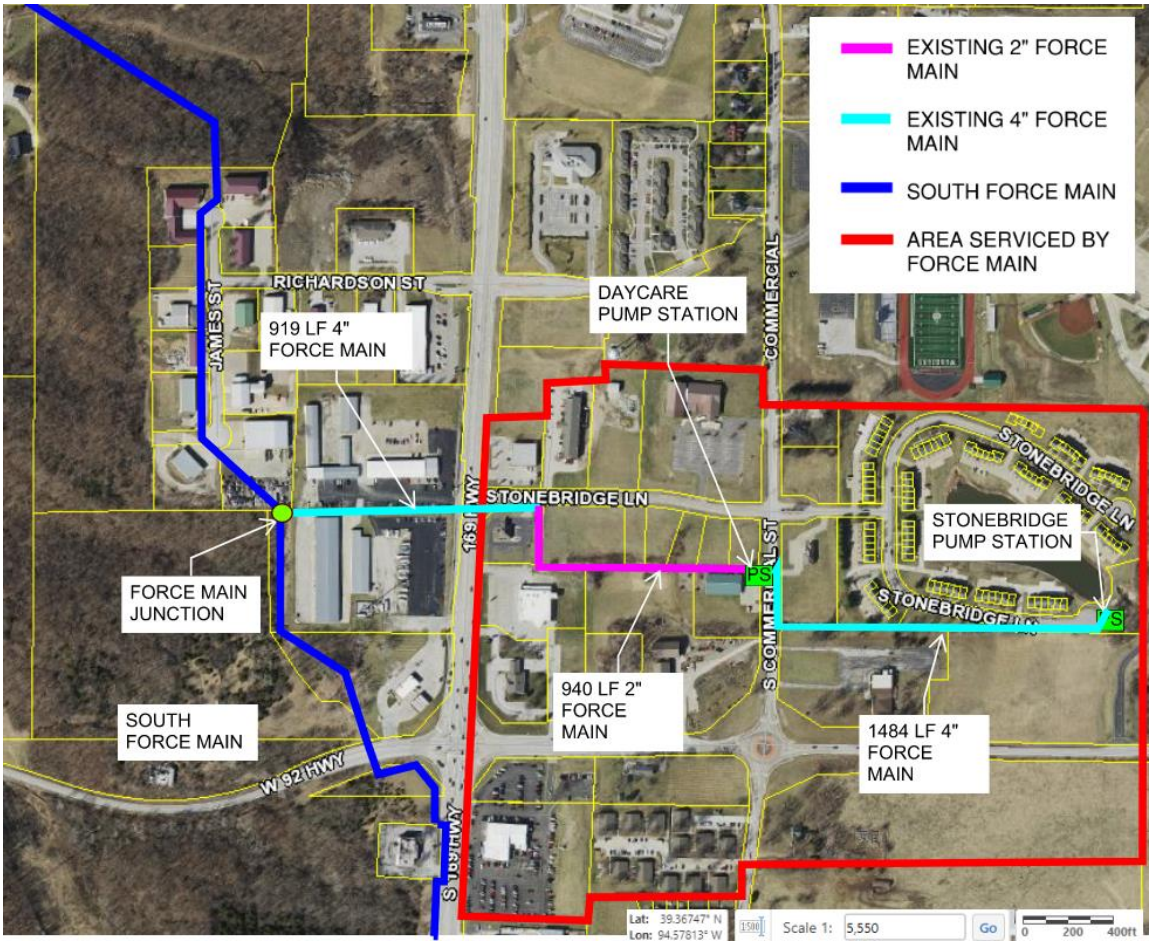
Memo

Date:	Tuesday, August 08, 2023
Project:	Stonebridge Pump Station
To:	Charles Soules, Bob Lemley, Dave Schuerger
From:	Aaron Bresette, Mitch Wiebelhaus
Subject:	Stonebridge Pump Station Capacity

Existing System

HDR has evaluated the existing Stonebridge Pump Station (PS) and capacity improvements necessary to convey increased flow as the watershed continues to develop. This includes the impact of eliminating the Daycare Pump Station and/or upsizing the existing force mains. Currently the Stonebridge PS pumps flow to a 4" force main that discharges to a gravity sewer immediately upstream from the Daycare PS. From there flow is repumped from Daycare PS via a 2" force main, which increases to 4" force main near the intersection of Stonebridge Lane and Highway 169 before ultimately connecting to the existing 8" force main west of HWY 169. See Figure 1.

Figure 1 – Existing Area Wastewater System



The City conducted a drawdown test on the existing Stonebridge Pump Station on June 29, 2023 to determine existing pumping capacity. Pump 1 operated at 11 gpm, pump 2 at 13 gpm, and both pumps running together operated at 26 gpm. Based on current conditions, each pump individually should be operating at a minimum of 72 gpm. This indicates there is an operational issue with the station impeding its pumping capacity. Potential causes may be clogged pumps, faulty seals to the discharge pipe, faulty check valves, or a restriction in the existing 4" force main. Further investigation is recommended to determine the cause of the low pumping rates.

Flow Projections

Wastewater flow from existing and potential development within the service area was calculated using MDNR design guidelines. The current peak flow in the watershed is 183 gallons per minute (gpm). Commercial, high use commercial and medium-density residential uses were assumed to calculate flow for future development. This resulted in a future anticipated peak flow of 340 gpm. Summary of design calculations are shown as follows.

Existing Development:

- Residential – 144 units x 2.7 persons per unit x 100 gppd x PF 4.02 = 159,809 gallons per day (gpd) = 110 gpm
- Hotel – 55 units x 3 patrons per unit x 40 gppd x PF 4.18 = 27,570 gpd = 19 gpm
- Commercial – 10 units x 200 gpd/1000 sq ft x 6579 sf avg x PF 4 = 52,635 gpd = 37 gpm
- Fast food – 1 unit x 3 gppd x 1000 patrons per day x PF 3.80 = 11,400 gpd = 7.9 gpm
- Churches – 2 units x 8 gppd x 200 patrons per day x PF 4.15 = 13,274 gpd = 9.2 gpm

Total Current Flow – 183 gpm

Proposed Development:

- Kozak's – 1000 patrons per day x 6 gpd PF 3.80 = 22,800 gpd = 16 gpm
- Future high use commercial – 1 units x 3 gppd x 1000 patrons per day x PF 3.80 = 11,400 gpd = 7.9 gpm
- Future commercial – 5 units x 200 gpd/1000 sq ft x 2700 sq ft avg x PF 4 = 10,800 gpd = 7.5 gpm
- Future medium density residential – 84 units x 2.7 persons per unit x 100 gppd x PF 4.13 = 94,948 gpd = 65.9 gpm
- Bus barn – 86,400 gpd = 60 gpm

Total Proposed Flow – 157 gpm

Total flow (existing plus proposed) = 340 gpm

Figure 2 summarizes anticipated peak flow projections for each parcel within the watershed in gallons per minute.

Figure 2 - Projected Wastewater Peak Flows

System Upgrade Analysis

Neither the existing Daycare nor Stonebridge pump stations have capacity to convey increased flow from anticipated future development in the watershed. Rather than upgrading and maintaining both pump stations, eliminating the Daycare PS and conveying the flow by gravity sewer to a new larger Stonebridge PS was evaluated. The existing Daycare and Stonebridge pump stations would be decommissioned, and replaced with a new larger Stonebridge pump station constructed adjacent to the existing PS.

Increased flow to Stonebridge PS results in a velocity of 8.3 fps through the current 4” force main, necessitating upsize to a 6” force main. Rather than follow the current force main route west to the force main junction, it is recommended to divert the route north to the gravity main on Richardson Street, eliminating the need to cross Highway 169. Following this route with a 6” force main results in a velocity of 4.1 fps and a TDH of 99 feet. The optimum pipe size and pump hydraulics should be further evaluated during detailed design.

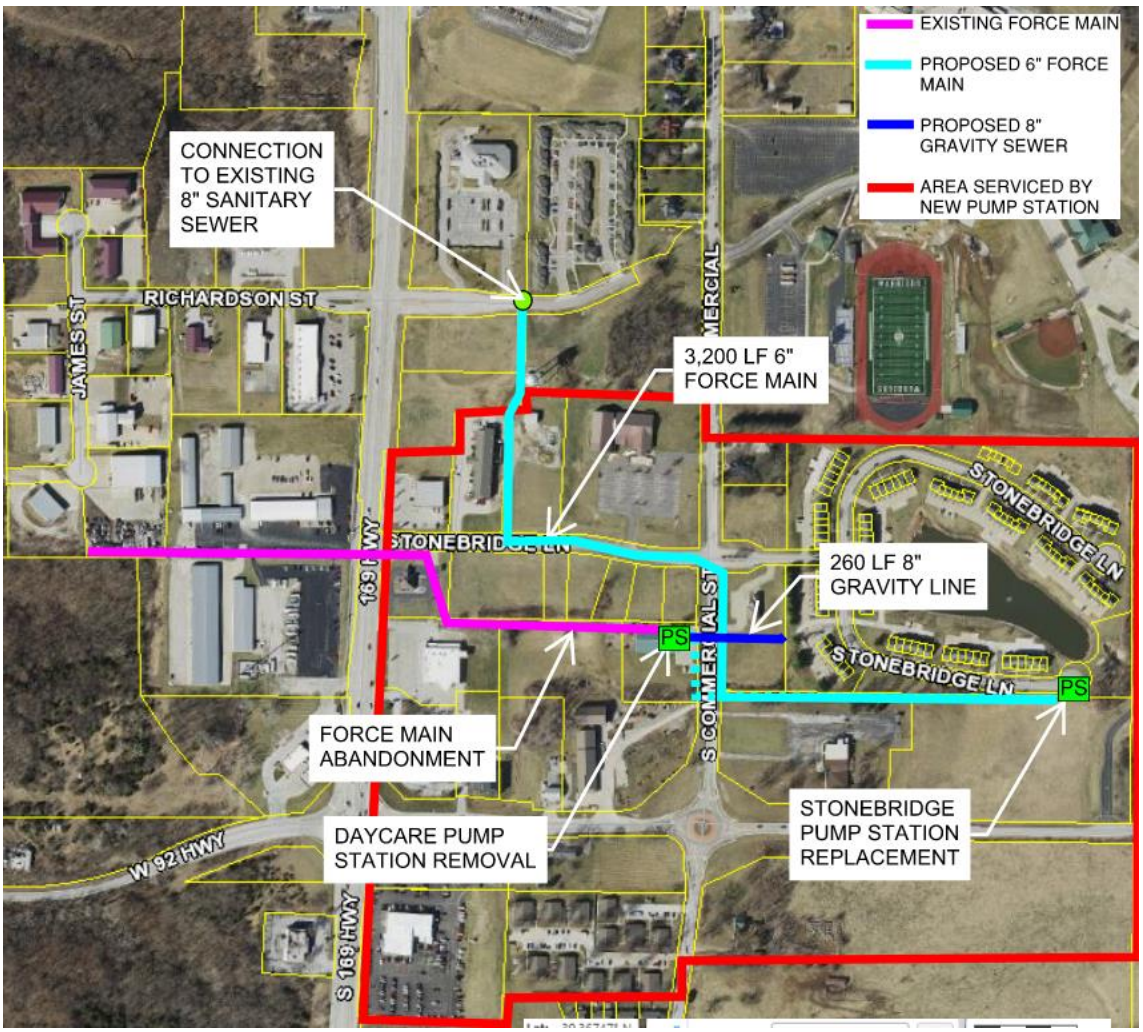
A budgetary estimate of probable construction cost was prepared for a new Stonebridge pump station and upsizing the 4” force main to 6” diameter and is summarized below. Figure 3 presents a conceptual depiction of these improvements.

Engineer's Opinion of Probable Construction Costs

Replace Existing Pump Station and 4-inch FM with 6-inch FM from Commercial Ave to Gravity Main

Item	Description	Quantity	Unit	Unit Cost	Extension
1	Pump Station	1	EA	$700,000	$700,000
2	Pump Station Abandonment	2	EA	$20,000	$40,000
3	6-inch Force Main	3,200	LF	$45	$144,000
4	8-inch Gravity Sewer	260	LF	$90	$23,400
5	Sanitary Sewer Manhole, 4' dia.	2	EA	$6,000	$12,000
				Sub Total	$919,400
				30% Contingency	$276,000
				Total Construction	$1,195,400
				Engineering	$270,000
				Total Project	$1,465,400

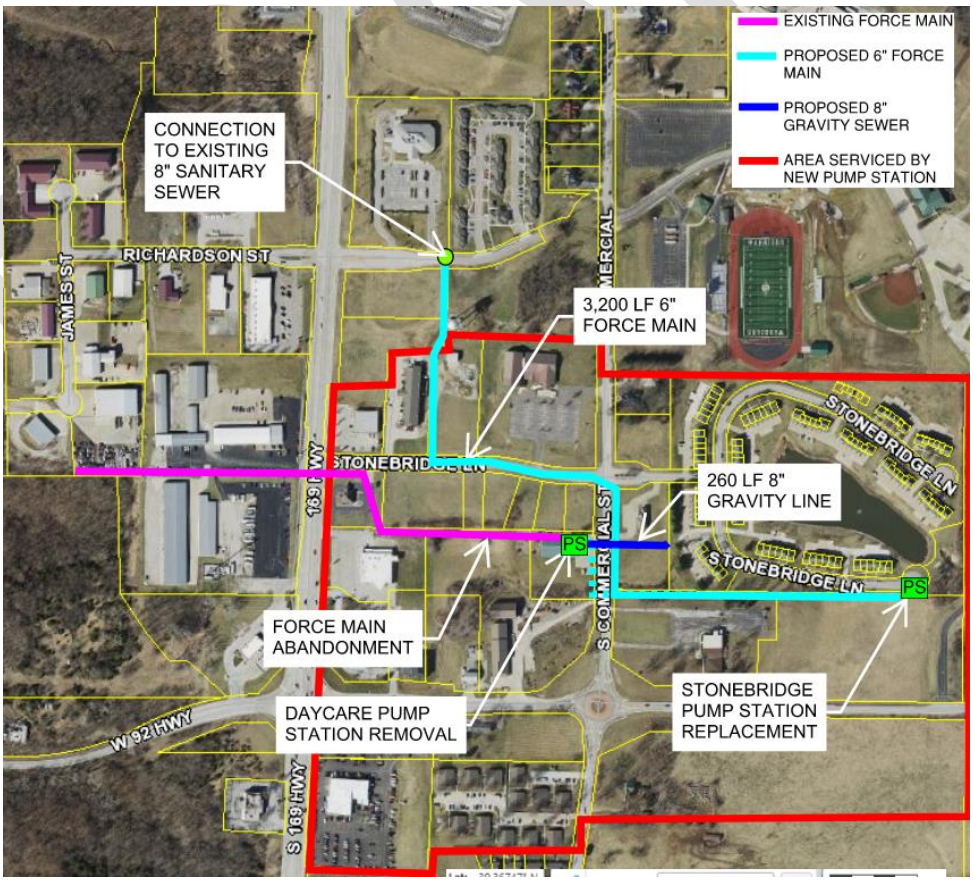
Figure 3 – Recommended Improvements



AUTHORIZATION NO. 101
TO
AGREEMENT BETWEEN
CITY OF SMITHVILLE, MISSOURI
AND
HDR ENGINEERING, INC. (FORMALLY E.T. ARCHER CORPORATION)
FOR
PROFESSIONAL ENGINEERING SERVICES

STONEBRIDGE SANITARY SEWER IMPROVEMENTS

In accordance with Section 1.A. of the December 18, 2003 Agreement, the ENGINEER is hereby authorized to assist the City with the topographic survey, preparation of construction documents, bidding assistance, and construction administration for Stonebridge Pump Station (PS) replacement, along with approximately 3,200 linear feet of 6-inch sanitary force main and 260 linear feet of 8" sewer gravity line. The existing Daycare and Stonebridge pump stations will be decommissioned and replaced with a new Stonebridge PS adjacent to the existing PS. The new 6" force main from the new pump station will connect to the existing 8" sanitary sewer line on the north side of Richardson Street, approximately 440 feet east of the intersection with 169 HWY. This force main from the new pump station will run parallel to the existing force main to Commercial St. Then, it will extend northward along Commercial St to Stonebridge Ln where it turns westward to a point where it will extend northward to Richardson Street, as shown below.



The decommissioned Daycare PS will be converted into a junction structure and a new gravity sanitary sewer will be extended to an existing sewer located 260 feet east of the Daycare PS as shown above.

The Scope of Services will more specifically include the following project improvements & tasks.

SCOPE OF SERVICES

Task 1. Topographic Survey

1. Project research, preparation, and management - Research and compile relevant previous topographic surveys and background data and incorporated into this project.
2. Safety plan coordination and review
3. Control and benchmark survey - Establish and/or identify survey control points and project benchmarks.
4. Topographic and utility survey - Obtain topographic survey within the project boundary. This will also include staking the existing force main based on the as-built drawings.
5. Utility Coordination/meetings - Coordination with utilities for locates and survey of utilities.
6. Boundary Survey - Develop property boundary survey from right of way to right of way and/or building faces. Research existing property lines based on County deeds and tax mapping.
7. Base mapping – Convert topographic field survey information into AutoCAD Civil 3D format.
8. Easement descriptions - Obtain Guaranteed Title Reports (GTR), create easement descriptions and exhibits for up to 7 properties.
9. Easement staking for acquisitions – HDR will provide staking for the proposed easements to define the project for property owners, appraisers, and the City.

Task 1 Deliverables: Easement descriptions and field staking.

Task 2. Preliminary Design

1. Internal Safety Plan and QA/QC Review – Internal Safety Plan and perform project approach and resource review.
2. Alignment walkthrough - HDR will provide conceptual alignment and conduct a walkthrough of the project with the City. This will confirm the proper alignment for the topographic survey and design. The City will coordinate with owners for access to private property.
3. Utility Coordination – HDR will initiate conversations with utilities about the project with the conceptual alignment. HDR will determine if utility improvements are intended in the project vicinity.
4. Pump Station Design Conditions – HDR will recommend design criteria for the Stonebridge PS near-term and long-term conditions and evaluate potential phasing alternates for the pump station to convey design flows as the service area develops. Additionally, HDR will assess the feasibility of repurposing the old sanitary pump equipment from the Smith‘s Fork pump station for the Stonebridge project. Factors such

as operational viability, compatibility with the new site, and necessary refurbishments will be considered.

5. Geotechnical investigations - HDR will retain a subconsultant to perform 6 soil bores proposed manholes and pump station locations to determine bedrock and groundwater conditions. Five (5) soil borings will be conducted along the force main alignment at depth of 10 feet or until auger refusal. An additional bore will be performed at the new location of the Stonebridge pump station, reaching a depth of 20 feet with rock coring. HDR will provide staking for the geotechnical bore locations.
6. Preliminary plans – HDR will develop preliminary design plans for the sewer alignment under the direction of City Staff. The Preliminary Design Plans will be based on the topographic survey developed in Task 1. These plans will include preliminary layout and survey control, sewer alignments plan and profiles, pump station layouts, and easement limits.
7. Conditionate with vendors/suppliers – HDR will coordinate with pump vendors and evaluate preliminary recommended pump selections for design conditions. HDR will inquire on lead times of pump station and pipe equipment/materials.
8. Technical specifications - HDR will prepare a preliminary technical specification in conformance with City and MDNR standards.
9. Preliminary cost estimate - HDR will prepare a preliminary itemized opinion of probable construction costs, AACE Class 3.
10. Basis of Design Memo– HDR will prepare a design technical memorandum documenting pump stations pre-design, along with gravity sewer and force main pre-design activities.
11. Client Meeting (1 included) - HDR will attend one meeting with the City to review the preliminary documents.
12. Easement exhibits to City – HDR will prepare easement exhibits and descriptions for the City.
13. Project Management – Perform project management, invoicing, scheduling, and cost control for the project.

Task 2 Deliverables: Preliminary Engineering Report, Preliminary Plans, Preliminary Technical Specification, easement exhibits, and Geotechnical Report.

Task 3. Final Design

1. Utility Coordination – HDR will continue conversations with utilities about the project. HDR will determine if utility improvements are intended in the project vicinity.
2. Final plans – HDR will develop final design plans for the pump station, force main and sewer line under the direction of City Staff. These plans will include title sheet, an electrical and structural layout of the pump station, sewer line plan and profiles, layout and survey control, erosion control, traffic control, restoration plans, and standard details.
3. Technical and project specifications - HDR will prepare the final design project manual and project specific technical specifications.
4. Cost estimate – HDR will final revise the itemized opinion of probable construction costs, AACE Class 2.
5. Internal QC review - HDR will perform an internal quality control review on the final plans, project manual, and cost estimate.

6. Engineering Report – HDR will prepare a final engineering report to be sent to Missouri Department of Natural Resources (MDNR) for review.
7. Construction permit to MDNR – HDR will submit a sewer line construction permit to MDNR.
8. Stormwater Permitting- Coordinate and prepare land disturbance erosion & sediment control (E&S) plans, NPDES stormwater permit application, and stormwater pollution prevention plan (SWPPP)
9. Client Meeting (1 included) - HDR will attend one meeting with the City to review the final documents.
10. Project Management – Perform project management, invoicing, scheduling, and cost control for the project.

Task 3 Deliverables: Engineering report, Construction plans and specifications, MDNR construction permit, Construction cost estimate.

Task 4. Bidding Phase

1. Prepare bid package - HDR will assist Owner in advertising by submitting electronic copies of the bidding documents to Drexel Technologies, Inc. Plan Room.
2. Pre-bid conference - HDR will assist the City in conducting a pre-bid conference.
3. Bidder's questions – HDR will address bidders questions.
4. Prepare addenda – HDR will issue up to two (2) addenda to clarify, correct, or modify the Bidding Documents.
5. Bid Opening – HDR will attend the bid opening, prepare Bid tabulations, and assist Owner in evaluating Bids or proposals and provide a bid award recommendation to the City
6. Bid award – After Acceptance from the City, HDR will notify the contractor of the bid award and notice to proceed and create conformed to bid drawings and Project Manual.

Task 4 Deliverables: Project advertisement, bid tab and recommendation, and conformed to bid Contract Documents

Task 5. Construction Phase

1. Pre-construction conference – HDR shall prepare an agenda and participate in a pre-construction conference prior to commencement of Work at the Site.
2. Submittal Reviews – HDR shall review up to twenty (25) Shop Drawings and Samples and other data which Contractor is required to submit, but only for conformance with the information given in the Contract Documents and compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such reviews and approvals or other action will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions and programs incident thereto.
3. Address RFI's - HDR shall issue up to five (5) necessary clarifications and interpretations of the Contract Documents to the orderly completion of Contractor's work. Such clarifications and interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents. Engineer may issue Field Orders authorizing minor variations in the Work from the requirements of the Contract Documents.

4. Issue Change Orders - HDR shall recommend Change Orders and Work Change Directives to Owner, and prepare up to three (3) Change Orders/Work Change Directives.
5. Review payment applications - Based on HDR's observations as an experienced and qualified design professional and on review of Applications for Payment and accompanying supporting documentation, HDR will recommend the amount the Contractor be paid on up to ten (10) applications. Such recommendations of payment will be in writing and will constitute from information provided to HDR that the Contractor's Work has progressed to the point indicated, the quality of such Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion and to the results of subsequent tests called for in the Contract Documents), and the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is HDR's responsibility to observe Contractor's Work. In the case of unit price work, HDR's recommendations of payment will include final determinations of quantities and classifications of Contractor's Work (subject to subsequent adjustments allowed by the Contract Documents).
6. Monthly progress meetings - HDR shall attend up to ten (10) construction progress meetings with Owner and Contractor. Assuming five (5) meetings in-person five (5) meetings virtual.
7. Engineer site visits - In connection with observations of Contractor's Work while it is in progress and coordination with City Staff, HDR may make up to three (3) visits to the Site to observe as an experienced and qualified design professional the progress and quality of Contractor's executed Work. Such visits and observations by HDR are not intended to be exhaustive or to extend to each aspect of Contractor's Work in progress or to involve detailed inspections of Contractor's Work in progress beyond the responsibilities specifically assigned to HDR in this Agreement and the Contract Documents, but rather are to be limited to spot checking, selective sampling, and similar methods of general observation of the Work based on HDR's exercise of professional judgment as assisted by the Resident Project Representative. HDR will check with City Staff documentation. Based on information obtained during such visits and observations, HDR will determine in general if the Work is proceeding in accordance with the Contract Documents, and HDR shall keep Owner informed of the progress of the Work.
8. Substantial completion walk through and punch list - HDR shall conduct a substantial completion walk through to determine if the completed Work of Contractor is acceptable. HDR will provide a punch list of items needed for the contractor to meet substation completion if necessary.
9. Final walk through and documentation - HDR shall conduct a final walk through to determine if the completed Work of Contractor is acceptable so that HDR may recommend, in writing, final payment to Contractor. Accompanying the recommendation for final payment, HDR shall also provide a notice that the Work is acceptable to HDR's knowledge and information, and based on the extent of the services provided by HDR under this Agreement.
10. Record drawing completion - HDR shall prepare a set of construction record drawings based upon records kept by Contractor and City's Resident Project Representative during Construction. These drawings will be provided to the Owner in electronic PDF format.

11. Project Management – Perform project management, invoicing, scheduling, and cost control for the project.

    Task 5 Deliverables: Submittal reviews, change orders, pay app reviews, substantial completion punch list, final completion documentation, and record drawings

Project Assumption

1. The City will coordinate with owners of private property to provide access for consultant's and subconsultant's staff.
2. HDR will provide easement conveyance documents to the City. The City will negotiate and obtain the easements and appraisals as needed.
3. The City will provide construction observation and will review results of testing during construction.
4. The project will only be bid one time.
5. City will reimburse HDR for anticipated permit fees required for construction including construction permit and land disturbance.
6. Required connection will be designed to the existing 8" gravity sewers. No other upgrades are anticipated for the existing 8" sewer line, i.e. manholes, pipe upsizing and/or lining for this project.

Fee

The CITY shall compensate ENGINEER for the Stone Bridge Pump station, Sanitary sewer, and Force main. in an amount not to exceed $272,260.00.

Task 1 – Topographic Survey	$49,120
Task 2 – Preliminary Design	$81,710
Task 3 – Final Design	$74,310
Task 4 – Bidding Phase	$15,020
Task 5 – Construction Phase	$52,100
	Total $272,260

Project Schedule

08/16/23	Anticipated Notice to Proceed
10/23	Topographic survey
12/23	Preliminary Plans to the City
01/24	Easement Descriptions to City
02/24	Final Plans to the City
02/24	Construction permit to MDNR
03/24	Issue for Bid
04/24	Bid Opening
02/25	Construction Substantial Completion (300 days for construction)

This AUTHORIZATION shall be binding on the parties hereto only after it has been duly executed and approved by the CITY and ENGINEER.
IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this AGREEMENT in duplicate on the respective dates indicated below.

CITY: SMITHVILLE, MISSOURI

By: _____

_____
Type or Print Name

Title _____

Date _____

ENGINEER: HDR Engineering, Inc.

By: _____

Cory Imhoff, P.E.
Type or Print Name

Title Sr. Vice President

Date _____