REQUEST FOR BID

FOR

LIFT STATION REHAB CONSTRUCTION GROUP 3A

Bid No. 414882.71.0374

February 14, 2025

City of Memphis, Tennessee

Black & Veatch and Overland Contracting Inc. (OCI), a subsidiary of Black & Veatch, are the Program Manager and Construction Manager respectively, for the SARP10 Program for the City of Memphis.

Overland Contracting Inc.
845 Crossover Lane, Suite 120, Memphis, TN 38117

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00170 - Request for Bid

00170.1 Introduction

Sealed bids will be received at the Office of the City of Memphis Environmental Administration, Room 620, City Hall, 125 N. Main, Memphis, TN 38103, until **2:00 p.m. local time, March 27, 2025** furnishing the City of Memphis with the following:

FOR THE DIVISION OF: PUBLIC WORKS FOR THE CONSTRUCTION OF:
SARP10 Program **Lift Station Rehab Construction Group 3A**

The Sealed Bid envelope must be labeled with the project name, bidder's name, license bidder number, license expiration date, license classification. The Sealed Bid envelope must contain one (1) hardcopy of the bid and one (1) electronic CD copy of the bid.

Sealed Bids sent through the mail or other such delivery service shall be sent in such a manner so as to allow the opening of the "Mailing Container" and still have intact the sealed Bid. On the Mailing Container the sender shall state the words that a "**SEALED RESPONSE IS ENCLOSED**" and the Bid number.

Subcontractors intending to bid on this project must follow the instructions for Registration as stated in the Advertisement Legal Notice Request for Bid No. **414882.71.0374** (dated February 14, 2025). Registration information must be submitted by **March 13, 2025**.

00170.2 Program Overview

The Program consists of the management of the capital program needed to bring the City's wastewater and sewer system into compliance with federal and state regulations per the City of Memphis Wastewater Collection and Transmission System (WCTS) Condition Assessment and Rehabilitation Program Consent Decree signed on September 21, 2012, including the procurement of studies, design and construction services associated with the City of Memphis SARP10 Program.

00170.3 Scope of Work

The scope of work for this project includes rehabilitation of three (3) lift stations at various locations. Each lift station has varying amounts and types of rehabilitation needed. The work includes, but is not limited to, electrical equipment replacement, bypass tee installation, complete lift station relocation or replacement, new force main installation, wet well & drywell coating, erosion control, traffic control, and site prep & restoration.

00170.4 Bid Guarantee Requirements

Guarantee Requirements:

a) Bidder will not withdraw bid for one hundred eighty (180) calendar days after opening of bids without Purchaser's written consent.

b) If bid is accepted, bidder will enter into formal Subcontract with Purchaser, within five (5) calendar days after receipt of Subcontract documents for execution.

c) If bid is accepted, bidder will execute required 100% Performance/Payment Bond in accordance with Article 00571.4 and will obtain required insurance coverage in accordance with Article 00572.21 within ten (10) calendar days after receipt of Subcontract.

d) All bids will require a bidder's bond or certified or cashier check made payable to the Purchaser on a solvent bank in the amount of 5% of the bid. Said instrument to remain in effect and will be returned only after the Subcontract has been fully executed and secured. Additionally, the successful bidder shall execute a performance bond in an amount equal to 100% of the Subcontract sum as security for the faithful performance of the Subcontract and for the payment of labor and material furnished and incorporated into the Work. The only acceptable form of instrument for this bid bond is bound herein, Article 00672.7.

Bidder shall be liable to the Purchaser for full amount of proposal guarantee as representing damage to the Purchaser on account of default of bidder if:

a) Bid is withdrawn within one hundred eighty (180) calendar days after receipt of bids without approval by Purchaser.
b) Bidder fails to enter into contract with Purchaser and execute required Performance Bond and provide required insurance coverage within ten (10) calendar days subsequent to notice of award of the Subcontract.

**Firms desiring to submit a Bid should carefully review these instructions.
Compliance with all requirements will be solely the responsibility of the Respondent.**

00170.5 Request for Bid Definitions

Terms used in this Request for Bid documents are defined and have the meanings assigned to them as follows. The term "OCI", "Purchaser" or "Program Manager" means Overland Contracting Inc. The term "Respondent", "Firm", "Company", "Subcontractor" or "Bidder" means one who submits a Response for the purpose stated in this Solicitation Request for Bid documents. The terms "BID", "Response" or "Respondent's Response" mean all submittal documents provided by the Respondent as required by this Request for Bid. The terms "Request for Bid" or "Bid Documents" mean the documents included in this Request for Bid.

Every effort has been made to use industry-accepted terminology in this Request for Bid. Any statement in this document, which uses words such as "must", "shall", "should", "provide for" or "have/provide the capability of/for", means that compliance with the intent of the statement is mandatory and that failure by the Respondent to satisfy that intent may be cause for the Response to be rejected.

00170.6 Minority / Women Business Enterprise (M/WBE) Requirements

This section shall set forth the respondent's M/WBE Participation Plan that must be submitted and include: (1) the level and dollar amount of participation your firm anticipates to achieve in the performance of the Subcontract resulting from this RFB; (2) the type of Work to be performed by the M/WBE firms participating; and (3) the names of the M/WBE firms the Respondent plans to utilize in the performance of the Subcontract resulting from this RFB.

SARP10 DBE Participation Goal:
DBE minimum **20%**
(Vendors from the City of Memphis EBO list only)

00170.7 Clarification of Bid

Purchaser reserves the right to obtain clarification of any point in a Response or to obtain additional information as necessary to properly evaluate a particular Response. Failure to respond to such request for additional information or clarification in a timely manner may result in rejection of the Response.

00170.8 Not Used

00170.9 Responsiveness

Respondents should respond to all requirements of the Bid to the maximum extent possible and are required to clearly identify any limitations.

00170.10 Examination of Request for Bid Documents

Before submitting a Response, each Respondent must:

- Study and carefully correlate the Respondent's observations and responses with the Bid Documents.
- Notify Purchaser of all conflicts, errors and discrepancies, if any; in the Bid Document submitted.
- Review the Loss Control Manual.

Respondents by and through the submission of their Response, agree that they shall be held responsible for having therefore familiarized themselves with the nature and extent of the requirements in the Bid Documents.

00170.11 Interpretations and Addenda

If any prospective Firm is in doubt as to the true meaning of any part of the Requirements for Preparing and Submitting Bid Submittal for the requested services, they may submit a written request (verbal requests will not be accepted) for an interpretation before the Last Date for Bidder Questions; as stated in 00170.16. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addendum transmitted to each party receiving a set of such documents. Purchaser will not be responsible for any other explanations or interpretations of the proposed documents. Any requests not submitted within this time period will be deemed waived.

SUBMIT ALL QUESTIONS BY E-MAIL TO:

Attn: Jeff Old
OldJW@bv.com
Cc: Ginny Dorsey
DorseyV@bv.com
Cc: Jerry Caldwell
CaldwellJ@bv.com
(Reference: *SARP10 Program* ***Lift Station Rehab Construction Group 3A****, BID No.* ***414882.71.0374***)

All requests or questions should be clearly marked and must be received by Last Date for Bidder Questions, as stated in 00170.16. A response will be returned via addendum to all Firms along with the original question(s).

There shall be no communication between the Firm, their employees or subcontractors concerning this Bid to anyone within Black & Veatch, Overland Contracting, Allen & Hoshall, Allworld Project Management, Gresham Smith, Carter-Malone Group, or City of Memphis employee or any such person's spouse, child, parent, brother, sister, dependent or person assuming a relationship being the substantially equivalent of the above except through Bently Green – Program Director or Jerry Caldwell – Project Manager. **Failure to comply with this requirement will be grounds for disqualification.**

00170.12 Modification or Withdrawal of Bid Submittals

Responses may be modified or withdrawn by an appropriate document duly executed (in the same manner that a Response must be executed) and delivered to the place where Responses are to be submitted at any time prior to the submission deadline. A request for withdrawal or a modification must be in writing and signed by an authorized person. Evidence of such authority must accompany the request for withdrawal or modification. Withdrawal of a Response will not prejudice the rights of a Responder to submit a new Response prior to the Response deadline. After expiration of the period for receiving Responses, only Purchaser may request clarifications or additional information.

00170.13 Rejection of Responses

To the extent permitted by applicable local, state and federal laws and regulations, Purchaser reserves the right to reject any and all Responses, to waive any and all informalities not involving price, time, or changes in the Work with the successful Respondent, and the right to disregard all non-conforming, non-responsive, unbalanced or conditional Responses. Also, Purchaser reserves the right to reject a Response, in its sole discretion, if the City of Memphis believes that it would not be in its best interest to make an award to that Respondent.

Purchaser reserves the right to reject any Response if the evidence submitted by the Responder or if the investigation of such Respondent fails to satisfy Purchaser that such Respondent is properly qualified to carry out the obligations and to complete the Work contemplated therein. All Responses will be rejected if there is reason to believe that collusion exists among Respondents. Responses will be considered

irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alterations, or irregularities of any kind.

00170.14 Other Items

This Bid does not commit Purchaser to enter into a Subcontract, nor does it obligate Purchaser to pay for any costs incurred in the preparation and submission of Responses or in anticipation of a Subcontract. Costs of preparing the Bid in response to this request are solely the responsibility of the Respondent.

By responding to this solicitation, the respondent attests that no employee of Black & Veatch, Overland Contracting, Allen & Hoshall, Allworld Project Management, Gresham Smith, Carter-Malone Group, or City of Memphis employee or any such person's spouse, child, parent, brother, sister, dependent or person assuming a relationship being the substantially equivalent of the above, has an existing or pending, direct or indirect, financial interest in the respondent's business.

No Respondents to this solicitation shall discriminate against any employee or applicant for employment because of race, religion, color, sex, age, or national origin.

00170.15 Selection Process

Purchaser intends to select one Firm based on price and successful completion and approval of the OCI Registration process.

00170.16 Selection Schedule

The following schedule will be adhered to during the selection process. It is subject to change at the sole discretion of OCI.

Event	Completed By
Advertising Date	February 14, 2025
Pre-Bid Meeting	February 20, 2025
Registration Information submitted per 414882.71.0374 Advertisement	March 13, 2025
Last Date for Bidder Questions	March 13, 2025
Issue Addendum for answers to questions	March 20, 2025
Receive all Bids	March 27, 2025 by 2:00 pm local time
Public Opening	March 27, 2025 immediately following receipt of bids
Public Notice of Intent to Award	April 10, 2025
Preconstruction Meeting with Subcontractor	April 17, 2025
Tentative Notice to Proceed	April 17, 2025

00170.17 Mandatory Pre-Bid Meeting

A mandatory pre-bid meeting will be held at 10**:00 A.M** (local time) at the **Environmental Maintenance Office, 2865 Frayser Boulevard, Memphis, TN 38127** on **February 20, 2025**. Bidders are required to attend at their own cost.

00270 - Instructions to Bidders

00270.1 Bidder's Compliance with Request for Bid

Provide the information requested and any supporting information necessary to permit a complete analysis of your bid. You acknowledge that preparation and submission of a bid will be at your sole cost and that you will treat this RFB and any resulting discussions as confidential. If you do not agree to treat this RFB and associated discussions as confidential, return the complete RFB to Purchaser and delete or destroy any copies you made.

00270.2 General Bid Parameters

Provide the information requested in Section 00270 and Section 00370 in the appropriate fields of Section 00370. Complete each line of Section 00370 in its entirety and submit it with your bid in accordance with Section 00170. Do not alter Section 00370 forms in any way or deviate from the terminology used or the unit of measure indicated when completing Section 00370. Submit Section 00370 forms in their original core application software, with no embedded programming and no permissive encoding restricting access to the data provided.

00270.2.1 Bidder's Contact Information

Include contact information for your representative in Article 00370.2.1. Your representative must have the appropriate expertise and authority to negotiate on behalf of your company.

00270.2.2 Addenda to Request for Bid

In Article 00370.2.2, list all addenda received from Purchaser and indicate "Yes" to show your receipt of and incorporation of the listed addenda into the proposal.

00270.3 Bid Pricing

You must include numerical values in the applicable fields of Table 00370.3.1. Non-numerical values, such as "included" or "not applicable," are not acceptable. Purchaser will evaluate fields left blank or filled with a zero as scope included in your bid at no cost.

00270.3.1 Unit Pricing

Provide the unit prices to perform the Work in accordance with this RFB in Table 00370.3.1. A unit price is the total amount to be billed to Purchaser for a specific unit of work. Unit pricing includes all costs, overhead, profit and mark-up associated with delivering the complete unit.

00270.4 Supplemental Bid Information

00270.4.1 Company Status

In Article 00370.4.1, indicate the type of your organization’s legal entity and the state and country in which it is organized.

00270.4.2 Contractor License

If you are not licensed to perform the Work, indicate “No" in Article 00370.4.2.

00270.4.3 Not Used

00270.4.4 Bid Validity Period

Indicate "Yes" in Article 00370.4.4 if your proposal is valid for one hundred eighty calendar days after the Proposal Due Date (the "Proposal Validity Period"). Purchaser may reject your proposal without prior notice if your proposal is not valid for the full Bid Validity Period.

00270.4.5 Firm Non-Escalatable Pricing

Indicate "Yes" in Article 00370.4.5 if the proposal pricing is firm and not subject to escalation.

00270.4.6 Taxes
Tax requirements are identified in Article 00571.6. Indicate "Included" in Article 00370.4.6 if your proposal includes the tax requirements.

00270.4.7 Work at Jobsite
Identify the type of craft labor. If you plan to subcontract any of the Work, indicate “Yes” in the appropriate section of Article 00370.4.7 and complete Table 00370.4.7.

00270.5 Schedule Compliance
Indicate "Yes" in Article 00370.5 if you can meet the schedule dates included in Table 00370.5. If you indicate "No," submit an alternative summary level schedule with your proposal.

00270.6 Compliance with Request for Bid

00270.6.1 Not Used

00270.6.2 Not Used

00270.7 Bid Attachments
List any supplemental documents included in your bid in Article 00370.7.

00270.8 Declarations
Indicate "Yes" in Article 00370.8 to confirm you have familiarized yourself with the conditions affecting the Work.

00270.9 Nondiscrimination
All entities contracting with the Purchaser agree to abide by and to take affirmative action when necessary to ensure compliance with the nondiscrimination clauses set out below and agree to show proof of non-discrimination upon request and to post in conspicuous places available to all associate agents and their employees. In the event of non-compliance with nondiscrimination clauses, or with provisions of Executive Orders 11141 (age), 11246, 11375 (women), 12086 (Vietnam veterans), 11478 (federal employees), 11625 (minority business) 11701 (veterans), Title 41, Chapter 60 (handicapped) and specifically the handicapped affirmative action clause in Section 60-741.6.9 of OFCCP Rules, and any and all other federal laws prohibiting discrimination, contracts may be canceled, terminated, or suspended in whole or in part by the Purchaser.

The Bidder shall execute the specified Nondiscrimination Certificate (see Section 00672.3) agreeing that, if awarded the Subcontract, he/she shall not discriminate against any Sub-subcontractor, employee, or applicant for employment on the grounds of race, color, national origin or sex, in accordance with the citations listed in the above paragraph; and shall require the execution of such a certificate for each Sub-subcontractor prior to award of any subcontract with the further requirement that each subcontractor shall include identical requirements in any lower tier subcontracts which might in turn be made. FAILURE TO EXECUTE AND SUBMIT SUCH CERTIFICATE WITH THE BID MAY CAUSE THE BID TO BE REJECTED AS NON-CONFORMING. The successful Bidder and all Sub-subcontractors under the general contract shall maintain copies of their payrolls and all subcontracts for each weekly payroll period for the life of the construction and for a period of **SEVEN (7) YEARS** after final release and payment is made by the Purchaser to the contractor.

00270.10 Equal Business Opportunity Program (EBO)
The Bidder must complete and return the Equal Business Opportunity Program Compliance Form included in Section 00672.4 of this RFB.

00370 – Commercial Bid Form (6 pages)

00370 - Commercial Bid Form

Bidder should refer to Section 00270, Instructions to Bidders, when completing this Bid Form. Bidder shall complete this form entirely and return it with Bidder's Bid.

00370.1 Bid Submitted by	Bidder Response Column
Company Name	
Mailing Address/Number, Street	
Mailing Address/State, Zip Code	
Country	
Taxpayer ID Number (or EIN)	
Bidder's Bid Date	
Bidder's Bid No.	

00370.2 General Bid Parameters	Bidder Response Column
Bidder is providing the information defined by the articles comprising Section 00270, INSTRUCTIONS TO BIDDERS, in the corresponding fields of this Section 00370, COMMERCIAL BID FORM.	
00370.2.1 Bidder's Contact Information	
Bidder's Representative Name	
Title	
Mailing Address/Number, Street	
Mailing Address/City	
Mailing Address/State, Zip Code	
Delivery Address/Number, Street	
Delivery Address/State, Zip Code	
Country	
Email Address	
Phone Number	( ) - ( )
Mobile Phone Number	( ) - ( )
Fax Number	( ) - ( )
Business Interruption Plan	
Confirm that Bidder maintains a Business Interruption/Disaster Recovery Plan that documents how Bidder will respond to disaster or pandemic to help minimize impact - **Yes/No** If Yes, plan should be submitted with RFB.	
00370.2.2 Addenda to Request for Bid	
Bidder acknowledges receipt and inclusion of the following Addenda to the RFB - **Yes/No**	

	Addenda Number	Date Issued	Received and Incorporated

00370.3 Bid Pricing Information	Bidder Response Column
00370.3.1 Bid Prices	**See Attached Pricing Table(s) [Bidder to List Tables Used]**

00370.4 Supplemental Bid Information	Bidder Response Column
Bidder provides the following information to supplement the Bidder's bid pricing.	
00370.4.1 Company Status	
Bidder's company status is: (i.e. partnership, individual owned, joint venture, corporation, etc.)	
in State of	
in Country of	

00370.4.2 Contractor License	
Bidder certifies that it is licensed, as required, to engage in the RFB Work scope in the State/Province/Country the RFB Work is to be performed. - **Yes/No**	
1st License Title	
in State/Province of	
License Number	
2nd License Title	
in State/Province of	
License Number	

00370.4.3 Not Used

00370.4.4 Bid Validity Duration	
Bidder's bid is valid for acceptance by the Purchaser for a period of 180 days from the bid due date. - **Yes/No**	
00370.4.5 Firm Non-Escalatable Pricing	
All of Bidder's prices herein bid are firm and are non-escalatable. - **Yes/No**	
00370.4.6 Taxes	
Bidder's prices included herein are in accordance with Article 00571.6 Taxes. - **Yes/No**	
00370.4.7 Work at Jobsite	
Bidder's source of craft labor to be utilized in the performance of the Work is - **Open-Shop/Merit-shop/Union-shop**	
If applicable, identify the local union(s) used for hiring craft labor: 1st Local Union Name	
Address/Number, Street	
Address/City, State, Zip Code	
Phone	
Email	
2nd Local Union Name	
Address/Number, Street	
Address/City, State, Zip Code	
Phone	
Email	
Bidder has accounted for all Jobsite existing and controlling conditions and limitations which may affect the Work performance and the Bidder's Bid. - **Yes/No**	
Bidder proposes that it will perform all the Work at the Jobsite with its own forces. - **Yes/No**	
Bidder has indicated proposed sub-subcontracted Work in attached Table 00370.4.7. - **Yes/No**	
Bidder has provided proposed Small Business/Minority/Disadvantaged Entrepreneur Participation Plan with its bid. - **Yes/No**	

00370.5 Schedule Compliance	Bidder Response Column
Bidder agrees to meet the schedule dates indicated in the RFB documents: - **Yes/No**	
If No, Bidder has completed and submitted an attached alternative summary level schedule: - **Yes/No**	

00370.6 Compliance with Request for Bid	Bidder Response Column
NOTE: A bid based on Bidder's standard terms and conditions will not be considered.	
Bidder certifies that its bid complies with all RFB commercial and technical requirements. - **Yes/No**	

00370.7 Bid Attachments	Bidder Response Column
In addition to this Commercial Bid Form and Tables indicated herein, the Bidder's Bid contains supplemental information and details attached to this bid consisting of the following:	
(Attachment 1)	
(Attachment 2)	
(Attachment 3)	
(Attachment 4)	
(Attachment 5) (Add additional lines as needed)	

00370.8 Declarations	Bidder Response Column
The Bidder declares that it has familiarized itself with the conditions affecting the Work. The Bidder also declares that only the persons or firms interested in the bid as principal or principals are named herein; that no other persons or firms have any interest in this bid or in the Subcontract to be entered into; that this bid is made without connection with any person, company, or party likewise submitting a bid; and that it is in all respects for and in good faith, without collusion or fraud. - **Yes/No**	
If written notice of acceptance of this bid is delivered to the Bidder within "Bid Validity" days after the date set for receipt of bid, or any time thereafter before the bid validity expires, the Bidder will, within 5 days after receipt of a formal Subcontract for signature, exercise and deliver to Purchaser a signed Subcontract in the form provided by the Purchaser in accordance with the documents provided herein. - **Yes/No**	

Bidder Authorized Signature:

***must be signed, not typed**

Table 00370.3.1 - Unit Price Bid Form

Bidder should refer to Section 00270, Instructions to Bidders, when completing this Bid Form. Bidder shall complete this form entirely and return it with Bidder's Bid.

Bid Submitted by: (Company Name)

00370.3 Bid Pricing Information

00370.3.1 Unit Pricing

Bidder proposes to complete the RFB Work based on firm, fixed, unit prices (US dollars), which prices multiplied by the final Work quantities would represent the full consideration to Bidder for its complete and satisfactory performance of the Work in compliance with all the terms and conditions of the RFB Documents. The Unit Prices in this Table include the cost of all the work which is required or implied by the RFB documents or which may be inferred therefrom, and which is customarily provided in furnishing a complete and finished work item of its kind. Further, any and all alterations, modifications, and adjustments to the work item, which is reasonably foreseeable or customarily encountered in providing and installing equipment, material, and services of the work item kind, will be performed without additional compensation.

In the event of a Purchaser-approved change in the scope of Work for which a unit price from this Table is not applicable, as determined by the Purchaser, the Subcontractor shall provide a new unit price for review and acceptance by the Purchaser. Subcontractor shall provide all information requested by the Purchaser to substantiate the value of the new unit price.

00370.3.1.1 Unit Prices Breakdown — **Bidder Response Columns**

Item Number	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Extension Price
71.0374 Lift Station Rehab Construction Group 3A					
	360 North Highland				
01-01551-5.01	Traffic Control	Lump Sum	1		$ -
01-02530-6.02	8" Ductile Iron Forcemain	Linear Foot	35		$ -
01-02530-6.03	Bypass Tee Assembly	Each	1		$ -
01-02530-6.05	8" Gate Valve With Traffic Rated Valve Box	Each	1		$ -
01-02530-6.05	8" Check Valve With Traffic Rated Valve Box	Each	1		$ -
01-02530-6.06	Bypass Pumping	Lump Sum	1		$ -
01-02533-4.01	Wet Well Coating	Vertical Foot	17		$ -
01-11311	Pumps, Control Panel, Electrical Improvements, Conduit, Supports, Generator Docking Station, Transfer Switch, Level Transducer, Back Up Float Switches, Suction Elbow Assembly With Floor Stand, Sump Pump, Dry Pit Piping, Valve Replacement, Demolition, And Restoration	Lump Sum	1		$ -
	1217 Meadowlark				
02-01551-5.01	Traffic Control	Lump Sum	1		$ -
02-02530-6.02	4" Ductile Iron Forcemain	Linear Foot	35		$ -
02-02530-6.03	Bypass Tee Assembly	Each	1		$ -
02-02530-6.05	4" Gate Valve With Traffic Rated Valve Box	Each	1		$ -
02-02530-6.05	4" Check Valve With Traffic Rated Valve Box	Each	1		$ -
	4"x6" Reducer	Each	1		$ -
	Removal And Replacement Of Additional Asphalt, Full Depth, Beyond 130 Sf As Shown On Plans	Square Yard	100		$ -
02-02530-6.06	Bypass Pumping	Lump Sum	1		$ -
02-02533-4.01	Wet Well Coating	Vertical Foot	16		$ -
02-11310	Pumps, Control Panel, Electrical Improvements, Conduit, Supports, Generator Docking Station, Transfer Switch, Level Transducer, Backup Float Switches, Discharge Piping, Pipe Bracing, Guide Rails, Lift Chains, Demolition, And Restoration.	Lump Sum	1		$ -
	47 West Van Huesen				
03-02530-6.02	4" Ductile Iron Forcemain	Linear Foot	35		$ -
03-02530-6.03	Bypass Tee Assembly	Each	1		$ -
03-02530-6.05	4" Plug Valve With Valve Box	Each	1		$ -
03-02530-6.06	Bypass Pumping	Lump Sum	1		$ -
03-02533-4.01	Wet Well Coating	Vertical Foot	15		$ -
03-11311	Pumps, Control Panel, Concrete Pad, Sidewalk Improvements, Electrical Improvements, Conduit, Supports, Generator Docking Station, Transfer Switch, Level Transducer, Back Up Float Switches, Suction Elbow Assembly With Floor Stand, Sump Pump, Dry Pit Piping, Valve Replacement, Demolition, And Restoration.	Lump Sum	1		$ -
71.0374 Lift Station Rehab Construction Group 3A - Total Estimated Unit Price Value					$ -

Table 00370.4.7 - Sub-Subcontracts

Bidder should refer to Section 00270, Instructions to Bidders, when completing this Bid Form. Bidder shall complete this form entirely and return it with Bidder's Bid.

Bid Submitted by: (Company Name)

00370.4.7 Sub-Subcontracts

Bidder proposes that specific portions of the Work scope not performed by Bidder will be Sub-Subcontracted to the Sub-subcontractors indicated below. The value of each Sub-subcontract is indicated as an approximate percentage value of the total monetary value of the Bidder's Bid.

Subcontractor must obtain a safety prequalification for any Sub-subcontractor that will be performing any portion of the Work at the Jobsite, prior to their arrival at the Jobsite. Refer to the "Subcontracting" article within the terms and conditions for applicable submission information.

00370.4.7.1 Sub-Subcontracted Work

Scope of Sub-Subcontracted Work	Sub-subcontractors (Name and Address)	MBE or WBE	% of Total Work Value	Safety Information Included (Y/N)	Current EMR
% of Work performed by Bidder.	(Bidder Company Name)		100%		
(a)					
(b)					
(c)					
(d)					
(e)					
(f)					
(g)					
Total Percentage Value (Must Equal 100%)			100%		

00370.7 Schedule Compliance

00370.7.1 Construction Milestone Completion Dates and Applicable Liquidated Damages

Item	Milestone Description	Construction Milestone Completion Date	*LDs Apply?	Bidder Complies? (Yes/No)
1	Substantial Completion[1] of Work under Group 3C Subcontract	**335** calendar days after Notice to Proceed	Yes	
2	Final Completion[2] of all Work under Group 3C Subcontract	**365** calendar days after Notice to Proceed	Yes	

In accordance with Subcontract Article 00574.4 Work Hours, the Work will be completed by **TBD**.

*LD indicates that completion of the Work after the "Construction Milestone Completion Date" is subject to liquidated damages per applicable Articles of Section 00571.

*Note: Subcontractor performance will directly impact future procurements for the SARP10 Program, schedule is critical and must be maintained.

[1] Substantial Completion is defined as the date the project is sufficiently complete, in accordance with the construction contract documents, so that the owner may use the facilities for the intended purpose.

[2] Final Completion is defined as: (a) the Work is complete and complies with the requirements of this Subcontract; and (b) Subcontractor has fulfilled all its obligations under this Subcontract except obligations that survive completion of the Work.

00370.8 Schedule of Submittals

Effective Date: TBD

The following are post-award Subcontract submittals. This list is not all-inclusive. The RFB documents contain submittal requirements that are not included in this list. It will, however, remain the successful Bidder's responsibility to comply with submittal requirements whether or not the submittal is included in the following list:

Item	Reference Section	Submittal Item	Submittal Dates				Bidder Agrees? Yes/No
			Calendar Days		Event	Due Date	
00370.8.1 Commercial Submittals							
C01	None	Executed Subcontract in the form provided by the Purchaser	5	After	Receipt of Subcontract for Signature		
C02	00571	Payment Estimate Breakdown	10	After	Effective Date and Prior to First Payment with monthly updates		
C03	00571	Security Instruments	10	After	Effective Date		
C04	00572	Lien Waivers and Report of Disadvantaged Business Enterprise Participation Form		With	Each Invoice		
C05	00572	Final Lien Waivers from Subcontractor, Sub-subcontractors, and Sub-subcontractors' subcontractors and Report of Disadvantaged Business Enterprise Participation Form		With	Final Invoice		
C06	00571	Final Payment Invoice and Report of Disadvantaged Business Enterprise Participation Form	45	After	Issuance of the Notice Of Final Completion and Acceptance		
C07	00572	Contractor Licenses	14	Before	Mobilization Onsite		
C08	00572	Written Notice and Supporting Documentation, of all Claims	5	After	Occurrence of Event Giving Rise to the Claim		
C09	00572	Insurance Certificates for Purchaser Approval		Prior to	Mobilization		
C10	00572	Initial Issue Subcontractor's Work Execution Schedule	30	After	Effective Date		
C11	00571	Subcontractor Actual Man-hours Expended and Quantities Installed	Weekly	After	Mobilization Onsite		
C12	00575	Subcontractor's Daily Report	Daily	After	Mobilization Onsite		
C13	00575	Signed Daily Reports		Daily	After Mobilization Onsite		
C14	00575	Weekly Coordination Meeting Agenda Input	Weekly	Prior to	Weekly Coordination Meeting		
C15	00575	Subcontractor's Safety, Health and Accident Prevention Program		Prior to	Mobilization Onsite		
C16	00575	Subcontractor's Hazardous Waste Project Health and Safety Plan		Prior to	Mobilization Onsite		
C17	00575	Safety and Health Representative Resume		Prior to	Assignment and Mobilization		
C18	00575	Verification of meeting Hazardous Waste Requirements of 29CFR1910.120	5	Prior to	Mobilization Onsite		
C19	00575	Hazardous Materials Documentation		With	Each Hazmat Shipment		
C20	00575	Safety and Health Records	Monthly	After	Mobilization Onsite		
C21	00575	Evidence that Jobsite Personnel have Passed Drug Testing	10	Prior to	Mobilization Onsite		
C22	00575	Fall Protection Plan	5	Prior to	Starting Work Operations		
C23	00575	Chemical Hazard Communication Plan, as applicable	5	Prior to	Mobilization Onsite		
C24	00575	Substance Abuse Program	5	Prior to	Mobilization Onsite		
C25	00672.3	Certificate of Nondiscrimination for Subcontractor and Sub-subcontractors		With	Bid		
C26	00672.4	Equal Business Opportunity Program Compliance Form for Subcontractor and Sub-subcontractors		With	Bid		
C27	00672.7	Bid Bond		With	Bid		
C28	Technical	Technical Data Submittals	Weekly	After	Mobilization Onsite		Yes
Technical Submittals							
Refer to Technical Specifications for Technical Submittal requirements.							

00571 - Supplementary Terms and Conditions

00571.1 Notices and Correspondence

The parties agree to send all notices arising out of or related to this Subcontract by one of the following methods: (a) personal delivery; (b) certified mail with return receipt; (c) nationally recognized overnight mail or courier service, with delivery receipt requested; or (d) email. The parties may send routine correspondence by email or first-class mail, each without confirmation of receipt. The parties agree to address notices and correspondence as indicated in this article. Subcontractor agrees that delivery of a notice or of correspondence by Purchaser to Subcontractor's at the jobsite constitutes personal delivery.

Electronic Technical Correspondence

Addressed to Purchaser:	**Addressed to Subcontractor:**
To: Jerry Caldwell CaldwellJ@bv.com	To: [[name]] [[email address]] Cc: [[name]] [[email address]]

Non-Electronic Technical Correspondence

Addressed to Purchaser:	**Addressed to Subcontractor:**
Overland Contracting Inc. 845 Crossover Lane, Suite 120 Memphis, TN 38117 Attention: Jerry Caldwell 414882.71.0374	[[subcontractor entity]] [[street address]] [[city, state, zip code]] Attention: [[name]] 414882.71.0374

Electronic Commercial Correspondence (excluding invoices)

Addressed to Purchaser:	**Addressed to Subcontractor:**
To: Ginny Dorsey Dorsey@bv.com	To: [[name]] [[email address]] Cc: [[name]] [[email address]]

Non-Electronic Commercial Correspondence (excluding invoices)

Addressed to Purchaser:	**Addressed to Subcontractor:**
Overland Contracting Inc. 8400 Ward Parkway Kansas City, MO 64114 Attention: Ginny Dorsey 414882.71.0374	[[subcontractor entity]] [[street address]] [[city, state, zip code]] Attention: [[name]] 414882.71.0374

Electronic Invoices

Subcontractor will submit invoices via the web-based project management platform, Prolog. Invoices will be reviewed, and either approved or returned to Subcontractor for correction. The OCI Project Manager will forward invoices to Black & Veatch Accounts Payable, once they are approved.

In accordance with section 00572.4 Invoicing and Payment, each invoice must clearly show the invoice number, the complete Subcontract project number, the Purchase Order number, the Work covered by the invoice, taxes, and the billing period (if applicable).

00571.2 Not Used

00571.3 Payment Terms

The following payment terms shall apply in addition to the corresponding provisions contained in Article 00572.4 Invoicing and Payment.

The Parties will meet each month at an agreed time in order to determine the quantity of materials used and man-hours expended during the invoice period. The Parties will use the field progress measurement system to calculate that month's payment total by adding the Subcontract unit price totals based on actual Work completed.

00571.4 Security Instruments

Subcontractor shall give Purchaser separate performance and payment bonds in the format of AIA Document 312 - 2010 Performance Bond and Payment Bond, each in the amount of the Subcontract Price. Subcontractor shall submit the bonds to Purchaser by the due date specified in the Article titled "Schedule of Submittals and Applicable Liquidated Damages". The bonding company must be licensed to bond in the state in which the Project is located and must be rated "A" or better by A.M. Best and included in the Department of the Treasury's Listing of Approved Sureties (Department Circular 570).

00571.5 Liquidated Damages

00571.5.1 General

Subcontractor's failure to meet the requirements identified in this Article 00571.5 will cause Purchaser to incur harm that will be very difficult to ascertain with certainty. The Parties therefore agree the liquidated damages specified in this Article 00571.5 represent a reasonable estimate of Purchaser's harm and are not intended as a penalty. Subcontractor's obligation to pay liquidated damages for breach of one specified requirement, does not relieve Subcontractor of its obligation to pay liquidated damages for breach of another specified requirement. Subcontractor's payment of liquidated damages for breach of the specified requirement is Purchaser's sole and exclusive remedy with regard to Subcontractor's breach of that requirement, except for any other express remedies stated in the Subcontract. If Purchaser terminates the Subcontract for cause, liquidated damages will cease to accrue after the termination date and Subcontractor's remaining liability will be calculated in accordance with Article 00572.17.

00571.5.2 Not Used

00571.5.3 Construction Milestone Dates

Each construction milestone subject to liquidated damages for late completion is listed in the article titled "Construction Milestone Completion Dates and Applicable Liquidated Damages". If all portions of the Work comprising the construction milestone do not meet the Subcontract requirements on the construction milestone completion date, liquidated damages will accrue for each failure as shown below.

Beginning on the first calendar day after the specified construction milestone completion date for each construction milestone and continuing until the construction milestone is completed, delay liquidated damages will be assessed at the rate of one thousand ($1,000) dollars per calendar day.

Beginning on the thirty first calendar day after the specified milestone completion date for each milestone and continuing until the milestone is completed, delay liquidated damages will be assessed at the rate of one thousand dollars ($1,500.00) per calendar day.

00571.6 Taxes

Subcontractor shall pay all payroll and other related employment compensation taxes for Subcontractor's employees, federal, state and other taxes which may be assessed on Subcontractor's income from the Project, engineering and business license costs (collectively, the "Subcontractor Taxes"). Subcontractor shall administer and pay all sales, use, gross receipts and excise taxes (collectively, the "Project Taxes"). Subcontract price includes Subcontractor Taxes and all Project Taxes. Purchaser will not be responsible

for any additional charges related to tax that were not included as part of the Subcontract Price. Where applicable, Purchaser shall furnish to Subcontractor a certificate complying with state and local governmental laws, regulations and ordinances identifying any components of the Work to be considered exempt from the Project Taxes. Subcontractor shall cooperate with Purchaser to establish appropriate procedures and minimize the amount of such taxes to the extent reasonable and practical. Subcontractor is responsible for all property taxes on the construction equipment; Owner is responsible for property taxes on all other items incorporated into the project. Subcontractor shall notify Purchaser, and Purchaser shall have the right to review prior to Subcontractor's response to such document, of any correspondence with a federal or local taxing authority as it relates to sales and use, gross receipts, or excise taxes.

00572 - General Terms and Conditions

00572.1 Definitions

The terms below have the following definitions when used in this Subcontract:

"Applicable Laws" means all laws, statutes, regulations, codes, rules, treaties, ordinances, judgments, permits, decrees, approvals, interpretations, injunctions, writs, orders, or other legal requirements of a governmental body entitled to exercise any administrative, executive, judicial, legislative, police, regulatory or taxing power and having jurisdiction over the jobsite or performance of the Work.

"Claims" means claims, actions, suits, liabilities, demands, damages, losses, costs, expenses (including reasonable attorneys' fees), impacts to price, impacts to schedule, awards, fines and judgments, of every kind and nature.

“Consent Decree” means the negotiated plan between Owner, Department of Justice, Environmental Protection Agency, Tennessee department of Environment and Conservation, and the Tennessee Clean Water Network that requires Owner to develop and implement plans to improve its wastewater systems.

"Final Completion" means: (a) the Work is complete and complies with the requirements of this Subcontract; and (b) Subcontractor has fulfilled all its obligations under this Subcontract except obligations that survive completion of the Work.

"Indemnified Parties" means Owner and its officials, Purchaser, Purchaser’s engineer, and the parent companies, related companies, affiliated companies, subsidiaries, successors, and assigns of each, including the shareholders, officers, directors, partners, employees, and agents of each of the above firms. “Indemnified Parties” does not include Subcontractor or any Sub-subcontractor.

“Notice to Proceed” means to written notice provided by Purchaser to Subcontractor releasing Subcontractor to proceed with all or part of the Work.

"Owner" means the City of Memphis, Tennessee.

“Program Manager” means Black & Veatch Corporation or Overland Contracting Inc. (OCI).

"Purchaser" means the party so identified in the Subcontract Agreement.

"Subcontract" means the agreement between Purchaser and Subcontractor consisting of: (a) the Subcontract Agreement; (b) the documents listed in the Subcontract Agreement; (c) written Subcontract revisions; (d) attachments, appendices and exhibits to the Subcontract documents; (e) documents expressly incorporated by reference into the Subcontract; and (e) any requirements that can be reasonably inferred from any of the foregoing.

"Subcontract Agreement" means the Subcontract form executed by Purchaser and Subcontractor.

"Subcontractor" means the party so identified in the Subcontract Agreement.

"Sub-subcontractor" means any party, at any tier, having an agreement with Subcontractor or with a Sub-subcontractor, to perform a portion of the Work.

“Substantial Completion” means the project is sufficiently complete, in accordance with the construction contract documents, so that the owner may use the facilities for the intended purpose.

"Work" means that which Subcontractor is to perform or provide under this Subcontract.

00572.2 Interpretation

00572.2.1 This Subcontract is the complete and final agreement between the parties relating to the Work. All prior or contemporaneous negotiations and agreements relating to the Work are superseded by this Subcontract. Exceptions or terms submitted by Subcontractor in the course of accepting this Subcontract are void.

00572.2.2 Provisions of this Subcontract that contemplate performance or obligations subsequent to completion or termination of the Work or contain waivers or limitations of liability will survive such completion or termination. Termination of the Work will not affect the rights and obligations that arose before termination.

00572.2.3 If any provision of this Subcontract is held to be unenforceable, the remaining provisions of this Subcontract will remain in effect.

00572.3 Subcontractor's Status

Subcontractor is an independent contractor in the performance of the Work. Subcontractor is solely responsible for the means, methods, sequences, procedures, and safety precautions used or adopted by Subcontractor and any Sub-subcontractor in the performance of the Work. Except as provided in Article 00574.2 and 00574.3, Subcontractor has sole authority and responsibility to employ, manage, discharge, and otherwise control its employees.

00572.4 Invoicing and Payment

00572.4.1 Subcontractor shall submit invoices to Purchaser with all documentation required to be submitted with the invoice. Each invoice must be itemized by the Subcontract line number. Each invoice must also clearly show the complete Subcontract project number, the Purchase Order number, the invoice number, the billing period (if applicable), the invoiced amount, retention (if applicable), and the net amount due. The final invoice must contain a copy of Purchaser's notice of Final Completion.

00572.4.2 Subcontractor agrees to provide additional itemization of the Subcontract price as Purchaser reasonably requests. If payment to Subcontractor will be on a time and material basis or a unit price basis, or if Subcontractor files a Claim under Article 00572.13, Subcontractor shall furnish Purchaser complete breakdowns and supporting information in the detail required by Purchaser to verify the accuracy of the invoiced or claimed amounts. Purchaser or Purchaser's designee may audit the aforementioned records at Purchaser's expense.

00572.4.3 Payment by Purchaser does not: (a) constitute approval or acceptance of any portion of the Work; (b) waive any of Purchaser's rights; or (c) relieve Subcontractor from responsibility or liability arising out of or related to this Subcontract. Acceptance by Subcontractor of final payment constitutes a release and waiver of all Claims by Subcontractor against Indemnified Parties.

00572.4.4 Purchaser may withhold or set-off amounts due under this Subcontract on account of Claims arising out of or related to Subcontractor's breach or reasonably anticipated breach of this Subcontract.

00572.4.5 Once Work that has undergone specified QA/QC is submitted, reviewed and approved by the Program Manager, the Subcontractor's invoice will be submitted along with the Program Manager's next invoice to the Owner. The Program Manager's invoice is typically submitted during the second week of each month for work performed during the previous month. Typical payment from the Owner to the Program Manager is anticipated to be forty-five (45) calendar days upon Owner's acceptance of invoice, and the Program Manager will cause the Purchaser to pay the Subcontractor within two weeks of Program Manager's receipt of payment from the Owner.

00572.4.6 Subcontractor agrees that all payments received by Subcontractor under this Subcontract will first be used for, and constitute trust funds for, the payment of all labor and materials used in the Work.

Purchaser may, but is not obligated to, issue joint checks to Subcontractor and a Sub-subcontractor or make payment directly to a Sub-subcontractor. Purchaser will deduct amounts paid by joint check to Subcontractor and a Sub-subcontractor or paid directly to a Sub-subcontractor from payment due Subcontractor under this Subcontract. Purchaser may also deduct a reasonable fee to cover administrative costs for such payments. Subcontractor agrees to accept the issuance of joint checks and agrees with Purchaser that neither the right to issue nor the issuance of any joint check is intended to create any contractual relationship with a third party, or any third-party beneficiary rights to payment by Purchaser.

00572.5 Schedule

Performance of the Work as scheduled under this Subcontract is of the essence. Subcontractor shall submit a Work schedule to the Purchaser at the initial preconstruction conference between the Parties. The schedule shall show the sequence of Work towards to complete the same by the required Work completion date specified hereunder. The Work schedule shall be updated and presented at each progress meeting throughout the Work progression under this Subcontract. Subcontractor shall give Purchaser written notice of any delay or anticipated delay within three calendar days after the occurrence of the event giving rise to the delay. Subcontractor's notice must identify the cause of the delay or the anticipated delay and the actions Subcontractor is undertaking to recover from or avoid the delay.

00572.6 Waivers of Lien

As a condition precedent to payment, Subcontractor shall furnish a lien waiver in the form of Article 00672.1 with each invoice except the final invoice. As a condition precedent to payment of the final invoice, Subcontractor shall furnish a lien waiver in the form of Article 00672.2 with the final invoice. If a lien is filed and Subcontractor does not remove or bond around the lien within seven calendar days after receipt of written notice from Purchaser or Owner, Purchaser or Owner may remove the lien. Subcontractor shall reimburse Purchaser or Owner, as applicable, for all costs and expenses incurred by Purchaser or Owner in removing the lien, including reasonable attorneys' fees and court costs.

00572.7 Assignment and Subcontracting

00572.7.1 Subcontractor may not assign all or part of this Subcontract voluntarily, by operation of law, or otherwise, nor may Subcontractor assign any of the money payable under this Subcontract, without obtaining Purchaser's prior written consent.

00572.7.2 Except for the supply of expendable materials and minor components or the supply of a portion of the Work for which a Sub-subcontractor is named in this Subcontract, Subcontractor may not subcontract the Work without first obtaining Purchaser's written consent. In addition, Subcontractor must obtain a safety prequalification for any Sub-subcontractor that will be performing any portion of the Work at the Jobsite, as outlined in Article 00575.9. If Subcontractor subcontracts any portion of the Work, Subcontractor remains responsible for complying with the Subcontract requirements and is liable to Purchaser for the acts and omissions of Sub-subcontractors, including their failure to comply with the requirements of this Subcontract or fulfill the obligations imposed on Subcontractor by this Subcontract, as if the acts and omissions were those of Subcontractor. Purchaser has the right to contact Sub-subcontractors to discuss their progress of the Work.

00572.8 Passage of Title, Risk of Loss, and Delivery

Subcontractor warrants that the Work (excluding Subcontractor-furnished items that are not intended to become a permanent part of the project) will be free of all liens, claims, charges, security interests, encumbrances or defects in title. Title to the Work (excluding Subcontractor-furnished items that are not intended to become a permanent part of the project) will pass to Purchaser upon the earlier of Subcontractor’s receipt of payment or delivery of the Work to the jobsite. Subcontractor retains the risk of loss of the Work until Purchaser issues the notice of Final Completion. The terms of delivery have the meanings assigned them in the 2020 edition of the Incoterms published by the International Chamber of Commerce, except as modified in this Subcontract.

00572.9 Final Completion

Subcontractor shall notify Purchaser in writing when Subcontractor believes the Work meets the requirements for Final Completion. Purchaser will inspect the Work within ten calendar days after Purchaser's receipt of Subcontractor's notice. If Purchaser identifies any defective or non-conforming Work, Subcontractor shall correct that Work in accordance with Article 00572.10. Purchaser will issue a notice that Final Completion has been achieved when the Work meets the requirements for Final Completion. Purchaser's issuance of the notice of Final Completion does not relieve Subcontractor of its obligations under this Subcontract.

00572.10 Warranty

00572.10.1 Subcontractor warrants to Purchaser and Owner that the Work: (a) will be new when delivered to the jobsite; (b) will be free from defects in design, material, and workmanship; (c) will comply with Applicable Laws; (d) will comply with the requirements of this Subcontract; and (e) will be fit for the purposes specified. Subcontractor also warrants to Purchaser and Owner that elements of the Work for which this Subcontract does not establish express standards of quality and fitness will comply with good industry practices for the specific application. Subcontractor agrees that Owner may directly enforce the warranties of this Article 00572.10.1.

00572.10.2 Subcontractor shall correct any breach of this warranty within five calendar days after Purchaser gives Subcontractor written notice of the breach. The cost of warranty work and removal or replacement of other work will be at Subcontractor's expense. Subcontractor shall work diligently and without interruption to correct the breach. In the case of emergency where, in the reasonable judgment of Purchaser, delay could result in serious loss or damage to persons or property, Purchaser may correct the defect or nonconformity at Subcontractor's expense.

00572.10.3 The warranty for the Work extends until one year after Final Completion. The warranty applies to all repairs and replacements to the same extent the warranty applies to the original Work. The warranty period for repaired Work or replacements will be extended for a period of one year after the repair or replacement is complete or until the original warranty period expires, whichever occurs later.

00572.10.4 This project is being implemented to provide services to the City of Memphis, through the City's Program Manager, for implementation of the Consent Decree executed on September 20, 2012, civil action number 2:10-cv-02083-SHM-dkv (CD). The City negotiated the Consent Decree with the United States Environmental Protection Agency and the Tennessee Department of Environment and Conservation to implement an assessment and rehabilitation program of the City's wastewater collection and transmission system. Per section II, paragraph 5 of the Consent Decree all contractors performing work required by the Consent Decree must be notified by the City that a copy of the Consent Decree is posted on the City's webpage. This article provides the required notification. The Consent Decree may be reviewed by accessing the City's webpage at:

http://www.memphistn.gov/Government/PublicWorks/ConsentDecree.aspx

This page provides a link to the Consent Decree and associated documents. An explanation of each document is also provided. Click on any link to access. Alternatively, the Consent Decree is available at:

http://www.sarp10.com/consent-decree/

00572.10.5 Subcontractor acknowledges that Owner's failure to achieve 100 percent compliance with the Consent Decree requirements may result in the imposition of penalties, costs, and other damages imposed against the Owner and Purchaser. To the extent caused by Subcontractor's failure to perform the Work in accordance with this Subcontract or to the extent caused by the negligence of Subcontractor or any Sub-subcontractor, Subcontractor agrees to pay penalties and costs incurred by Owner and Purchaser under the Consent Decree.

00572.11 Compliance with Laws

00572.11.1 Subcontractor shall comply with all Applicable Laws in effect during its performance of Work, including but not limited to the City of Memphis Prevailing Wage Ordinance, the Fair Labor Standards Act, Occupational Safety and Health Administration (OSHA), and the Americans with Disabilities Act (ADA). Subcontractor shall obtain all licenses, permits, and inspections applicable to the Work except for licenses, permits, and inspections identified in this Subcontract as Purchaser's or Owner's responsibility. Subcontractor shall also comply with the USA's Foreign Corrupt Practices Act.

00572.11.2 Purchaser and Subcontractor shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-4.3(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, national origin, protected veteran status or disability.

00572.11.3 Neither party shall engage in any conduct or activity in the performance of this Subcontract that constitutes a conflict of interest under Applicable Laws.

00572.11.4 Subcontractor shall comply with 18 U.S.C. §874, 40 U.S.C. §3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this Subcontract and any Sub-subcontracts hereunder.

00572.12 Business Practices

00572.12.1 Subcontractor shall uphold the good name and reputation of Purchaser and shall not take any action which is intended to, or which causes damage to or discredits Purchaser. Subcontractor shall not:

(a) Offer to give or agree to give any director, officer, employee or agent of any potential client a gift or consideration of any kind as an inducement or reward for: (i) doing or declining to do, or for having done or declined to do, any action in relation to obtaining or executing any contract or (ii) for showing or declining to show any favor or disfavor to any person in relation to any possible project; or

(b) Induce or attempt to induce any officer, servant, or agent of any private or public body to depart from his or her duties to his or her client or, in the case of any officer, servant or agent of a public body, his or her duties to the applicable public body, the applicable body politic, or both.

00572.12.2 Subcontractor shall not engage or employ, on a full, part-time or any other basis during the term of the Prime Agreement and for a period of one year after the termination or expiration, any professional or technical personnel who are or have been at any time during the term of the Prime Agreement in the employ of Owner without the explicit written consent of Owner.

00572.12.3 Nondiscrimination:

(a) Subcontractor certifies and agrees that all persons employed by it, its affiliates, subsidiaries, or holding companies are and will be treated equally without regard to or because of race, creed, color, religion, ancestry, national origin, sexual orientation, sex, age, condition of physical or mental handicap, marital status, or political affiliation, in compliance with all Applicable Laws. Subcontractor shall certify, at Purchaser's request that it is in full compliance with all applicable EEO rules and laws.

(b) Purchaser and Owner reserve the right to investigate any claims of illegal discrimination by Subcontractor and in the event a finding of discrimination is made and upon written notification thereof, Subcontractor shall take all necessary steps to cure and rectify such action to the reasonable satisfaction of Purchaser and Owner. Subcontractor's failure or refusal to do so shall be cause for termination of this Subcontract in accordance with the terms of this Subcontract.

00572.12.4 Purchaser is an affirmative action employer. Accordingly, the parties hereby incorporate by reference the requirements of Executive Order 11246, as amended, and the applicable regulations contained in 41 C.F.R. Parts 60-1 through 60-60; 29 U.S.C. Section 793 and the applicable regulations contained in 41 C.F.R. Part 60-741; 38 U.S.C. Section 4212 and the applicable regulations contained in 41 C.F.R. Part 60-250 and/or 60-300; and 29 C.F.R. Part 471, Appendix A to Subpart A.

00572.12.5 Subcontractor represents and warrants that it has a code of conduct or other set of compliance requirements that is at least as broad as Purchaser's Code of Conduct for Global Business Relationships (hereinafter "Code of Conduct"), or that it will comply with Purchaser's Code of Conduct in all dealings that affect Purchaser. The Code of Conduct and its amendments are expressly incorporated herein by reference and full text of the same can be found at:

https://www.bv.com/sites/default/files/reports-studies/Code-of-Conduct-for-Global-Business-Relationships

00572.13 Claims

Subcontractor must give written notice, with appropriate supporting documentation, of all Claims for extra compensation or additional time for performance of the Work within three calendar days after occurrence of the event giving rise to the Claim. Subcontractor acknowledges that failure of Subcontractor to give Purchaser notice and appropriate supporting documentation within the required time frame constitutes a waiver of all Claims arising out of or related to the event.

00572.14 Subcontract Revisions and Work Authorizations

00572.14.1 Purchaser may make additions, deletions, reductions in scope, or other changes to the Work. If a proposed change will cause a material increase or decrease in Subcontractor's cost or time for performance, Subcontractor shall so notify Purchaser in writing, accompanied by supporting documentation, within three calendar days after Subcontractor's receipt of Purchaser's notice of change. If Purchaser agrees with Subcontractor's notice, the parties will negotiate an equitable adjustment to the Subcontract price, to the schedule, or both, in accordance with the Subcontractor's fee for overhead and profit as listed in Article 00572.14.2 below. These adjustments will be reflected in a written Subcontract revision.

00572.14.2 The Subcontractor's fee for overhead and profit shall be determined as follows:

For costs incurred for labor the maximum fee shall be fifteen percent to the Subcontractor or the Sub-subcontractor performing the Work.

For costs incurred for materials and equipment the maximum fee shall be five percent to the Subcontractor or the Sub-subcontractor providing the materials and equipment.

If applicable, the Subcontractor may receive an additional fee of five percent on labor or materials and equipment performed or provided by a Sub-subcontractor, as long as the total combined fee does not exceed fifteen percent.

00572.14.3 A written Subcontract revision is required before Subcontractor is entitled to payment for the Work performed under the Work authorization. Subcontractor will bear the expense of performing any change not supported by a written Work authorization or written Subcontract revision. Purchaser will not be liable to Subcontractor for Claims arising from a decrease in the Work. No change is effective without a written Work authorization or a written Subcontract revision issued by Purchaser.

00572.15 Non-Disclosure

Subcontractor shall not make any news releases, authorize or participate in any interview concerning this Subcontract, or issue other advertising pertaining to the project or this Subcontract without the prior written approval of Purchaser. Subcontractor shall treat all information provided by Purchaser as confidential and only disclose such information as necessary to perform the Work, and will require the employees, agents, and Subcontractors who need to know to adhere to the terms of this provision.

00572.16 Suspension of Work

Purchaser may, at any time and in its sole discretion, suspend performance of all or part of the Work by written notice to Subcontractor. If the suspension is unrelated to Subcontractor's failure to comply with this Subcontract, Purchaser will adjust the schedule to reflect the reasonable delay due to the suspension and will reimburse Subcontractor for the reasonable and direct additional costs incurred by Subcontractor due solely to the suspension. Subcontractor shall promptly resume performance of all or part of the suspended Work in accordance with Purchaser's written authorization to resume the Work.

00572.17 Termination for Cause

If Subcontractor defaults in any obligation under this Subcontract and does not cure the default within ten calendar days after receipt of Purchaser's written notice identifying the default, Purchaser may terminate all or part of the Work.

00572.18 Termination Without Cause

Purchaser may, at any time and in its sole discretion, terminate all or part of the Work. Subject to Subcontractor's compliance with this Subcontract, Subcontractor will recover from Purchaser, as the complete and final settlement for the terminated Work and all related Claims, a sum equal to Subcontractor's direct cost for the terminated Work satisfactorily performed as of the effective date of termination, plus an allowance for reasonable overhead and profit on such direct cost.

00572.19 Purchaser's Remedies

00572.19.1 Purchaser may reject defective or nonconforming Work and return the rejected Work to Subcontractor, at Subcontractor's risk and expense, for repair, replacement or credit, at Purchaser's option. If Purchaser chooses to accept defective or nonconforming Work, Subcontractor shall correct the defect or nonconformity in accordance with Article 00572.19.2 However, if Purchaser chooses to accept defective or nonconforming Work without correcting it, Subcontractor and Purchaser will negotiate an equitable reduction in the Subcontract Price to account for the defect or nonconformity.

00572.19.2 If Purchaser discovers a defect or nonconformity in the Work before the Warranty Period begins, Subcontractor shall correct the defect or nonconformity within ten calendar days after Purchaser gives Subcontractor notice of the defect or nonconformity. In the case of emergency, where in the reasonable judgment of Purchaser, delay could result in serious loss or damage to persons or property or if Purchaser at its sole discretion determines that the Project schedule would be adversely affected if the correction of such defect or nonconformity is not performed before the ten day period expires, Purchaser may correct the defect or nonconformity at Subcontractor’s expense.

00572.19.3 If Subcontractor by its action or inaction indicates that it is unable or unwilling to proceed with the Work in a reasonable time or if Purchaser intends to perform any corrective work under Article 00572.10 or 00572.19.3, Purchaser may, upon written notice to Subcontractor, accomplish the Work in question by the most expeditious means available and backcharge Subcontractor for the costs incurred. Subcontractor shall sign and return the notice of backcharge within one calendar day after receipt.

00572.19.4 Subcontractor shall pay all direct costs incurred by Purchaser under Articles 00572.19.2 and 00572.19.3, including engineering, labor, material, transportation, insurance, subcontracts, tools, and equipment. Subcontractor shall also pay twenty-five percent of the direct costs incurred by Purchaser under Articles 00572.19.2 and 00572.19.3 for Purchaser's overhead and general and administrative costs. The performance of Work under this Article 00572.19 does not relieve Subcontractor of its obligations under this Subcontract including, but not limited to, warranty, liquidated damages, and indemnity.

00572.19.5 Purchaser's remedies under this Subcontract and existing at law or in equity are cumulative and may be exercised concurrently.

00572.20 Indemnity

00572.20.1 SUBCONTRACTOR AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE INDEMNIFIED PARTIES AGAINST ANY CLAIM, LOSS, DAMAGE, EXPENSE, OR LIABILITY (INCLUDING ATTORNEYS' FEES AND COSTS OF ANY SUCCESSFUL ENFORCEMENT OF THIS INDEMNITY ARTICLE) ARISING OUT OF THE PERFORMANCE OR NON-PERFORMANCE BY SUBCONTRACTOR OR ITS SUB-SUBCONTRACTORS, OR THEIR OFFICERS, EMPLOYEES, OR AGENTS.

00572.20.2 Providing that Purchaser is not in breach of its obligation to make payments to Subcontractor for the Work, Subcontractor shall indemnify, defend and hold harmless the Indemnified Parties from any claims or mechanic's liens brought against the Indemnified Parties or against the Project as a result of the failure of Subcontractor, or those for whose acts it is responsible, to pay for any services, materials, labor, equipment, taxes or other items or obligations furnished or incurred for or in connection with the Work. Within three (3) days of receiving written notice from Purchaser that such a claim or mechanic's lien has been filed, Subcontractor shall commence to take the steps necessary to discharge said claim or lien, including, if necessary, the furnishing of a mechanic's lien bond. If Subcontractor fails to do so, Purchaser will have the right to discharge the claim or lien and hold Subcontractor liable for costs and expenses incurred, including attorneys' fees.

00572.20.3 Subcontractor will immediately notify Purchaser of any claim or suit made or filed against Subcontractor or its Sub-subcontractors in which Purchaser or Owner is named as a co-defendant.

00572.20.4 Subcontractor expressly understands and agree that any insurance coverage required by this Purchase Order or otherwise provided by Subcontractor shall in no way limit Subcontractors responsibility to indemnify, defend, save and hold harmless the Indemnified Parties.

00572.21 Insurance Requirements

00572.21.1 Subcontractor shall, at its sole cost, maintain insurance as required by this Subcontract and shall impose the obligations of this Article 00572.21.1 on all Sub-subcontractors. Subcontractor shall give Purchaser ACORD insurance certificates evidencing the required coverage by the due date identified in article titled "Schedule of Submittals" and as Purchaser may request from time to time. Insurance certificates shall specifically note "City of Memphis SARP10 Program" in the notes or description area. Subcontractor shall ensure the policies:

(a) Contain a provision or endorsement that the coverage will not be cancelled, materially changed, or renewal refused unless the insurer gives at least thirty calendar days prior written notice to Purchaser.

(b) Remain in effect through the warranty period if coverage is occurrence-based and remain in effect at least one year after expiration of the warranty period if coverage is claims-based.

(c) Are primary with respect to insurance covering Indemnified Parties as additional insureds. All insurance carried by Indemnified Parties will be excess insurance.

(d) Contain a waiver of all rights of subrogation by the insurance carriers in favor of Indemnified Parties.

(e) Comply with all Applicable Laws of the jurisdiction in which any part of the Work is to be performed including, but not limited to, admitted and compulsory coverage.

(f) Are rated "A-" or better by A.M. Best's "Insurance Guide and Ratings."

00572.21.2 Subcontractor shall maintain broad form commercial general liability insurance protecting Subcontractor, and Indemnified Parties as additional insureds (using endorsements CG 20 10 and CG 20 37 or their equivalent), against claims arising out of bodily injury or property damage arising from the Work. The policy must include a cross-liability or severability of interest clause, a per project aggregate

endorsement, and coverage for personal injury liability, contractual liability, products and completed operations (covering lawsuits brought in the USA and the country of the jobsite), explosion, building collapse, and damage to underground property. The policy also must not exclude coverage for wildfire and Consultant shall provide a certificate of insurance verifying no such exclusions exist. The policy must include coverage for riggers liability if applicable to the Work. Subcontractor shall maintain policy limits of at least one million dollars for each occurrence.

00572.21.3 Subcontractor shall maintain worker's compensation insurance protecting Subcontractor against all claims under applicable worker's compensation laws, including, but not limited to, the United States Longshoremen's and Harbor Worker's Act and the Jones Act. If Subcontractor is required to maintain worker's compensation insurance in the USA, the worker's compensation insurance must contain an "all states" or "other states" endorsement. For Work performed in the USA, Subcontractor shall also maintain employer's liability insurance protecting Subcontractor against claims for injury, disease or death of employees which are not covered by the worker's compensation insurance. Subcontractor shall maintain worker's compensation policy limits as required by statute and, if applicable to this Subcontract, employer's liability policy limits of at least one million dollars for each occurrence.

00572.21.4 Subcontractor shall maintain comprehensive automobile liability insurance protecting Subcontractor, and Indemnified Parties as additional insureds, against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, whether owned, non-owned, or hired. Subcontractor shall maintain policy limits of at least one million dollars for each occurrence.

00572.21.5 Subcontractor shall maintain umbrella liability insurance that follows the form of the commercial general liability insurance, the employer's liability insurance and the automobile liability insurance. The umbrella liability insurance must protect Subcontractor, and Indemnified Parties as additional insureds, against claims in excess of the limits of the commercial general liability insurance, the employer's liability insurance, and the automobile liability insurance. Subcontractor shall maintain policy limits of at least four million dollars for each occurrence.

00572.21.6 Subcontractor is responsible for maintaining any and all property insurance on their own equipment and shall require all Sub-subcontractors to do likewise.

00572.22 Audit

Purchaser reserves the right to audit the records of Subcontractor. Accordingly, Subcontractor shall make and keep as the same accrue, full and complete records and books of accounts of revenue and income, and costs and expenses that specifically relate to performance under this Subcontract. Records and books of account, together with any or all memoranda pertaining thereto that may be kept, maintained, or possessed by Subcontractor, shall be opened to examination during regular business hours by Purchaser or its representatives for the purposes of inspecting, auditing, verifying, or copying the same or making extracts therefrom. Subcontractor shall make and keep said records and books of account for a period of seven (7) years after the completion of the contract obligations of the final payment under the Subcontract, whichever is later.

00572.23 Governing Law and Disputes

00572.23.1 Except as detailed in Article 00572.23.2, claims and disputes arising out of or related to this Subcontract will be governed by the law of the State of Tennessee, USA, excluding provisions that would apply the law of another jurisdiction. The Parties hereby elect to exclude application of the United Nations Convention on Contracts for the International Sale of Goods pursuant to Article 6 of the Convention.

00572.23.2 Subcontractor agrees to be bound by all decisions arising out of the claims and dispute resolution process set forth in the Prime Agreement to the extent: (a) the decisions relate to the Work; (b) a claim by Owner against Purchaser involves the performance of Subcontractor or the Work; or (c) a Claim of Subcontractor gives rise to a claim by Purchaser against Owner. The initiation of claim and dispute

resolution under the Prime Agreement will stay claim and dispute resolution under this Subcontract on any claim related to the claim under the Prime Agreement. The Parties shall first use their best efforts in an attempt to settle the dispute through negotiations involving themselves and their representatives.

00572.23.3 To the extent Subcontractor will be bound as set forth in Article 00572.23.2, Purchaser consents to Subcontractor's participation in such claim and dispute resolution process. Subcontractor and Purchaser will each bear their own costs associated with their participation in the claim and dispute resolution process. A Party will follow the other Party's directions regarding that other Party's Claims, unless such directions adversely affect the Party's own Claims. In that event, the Parties will agree on how to proceed. Each Party will give the other Party reasonable assistance.

00572.23.4 Disputes between Subcontractor and Purchaser not addressed in Articles 00562.27.2 and 00572.23.3, will be resolved exclusively by the courts of the State of Tennessee located in Shelby County as their jurisdiction permits. To the extent Purchaser or Subcontractor prevails against the other Party on such dispute, reasonable dispute resolution costs including attorney fees are recoverable from the losing Party.

00572.23.5 Pending resolution of any claim or dispute, and without prejudice to Subcontractor's rights, Subcontractor shall continue to perform as directed by Purchaser.

00572.24 Hazardous Conditions

00572.24.1 Subcontractor is not responsible for any Hazardous Conditions encountered in the performance of the Work at the Jobsite. Upon encountering any Hazardous Conditions, Subcontractor will stop services immediately in the affected area and duly notify Purchaser. For purposes of this Subcontract, Hazardous Conditions is defined as any materials, wastes, substances and chemicals deemed to be hazardous under any Applicable Law or the handling, storage, remediation, or disposal of which are regulated by Applicable Laws and applies to any hazardous or toxic substance, material, or condition present at the locations in which the Work is performed which was not brought onto such site or sites by Subcontractor for the exclusive benefit of Subcontractor.

00572.24.2 Subcontractor shall be obligated to resume the Work at the affected areas only after Owner’s expert provides it with written certification that (i) the Hazardous Conditions have been removed or rendered harmless and (ii) all necessary approvals have been obtained from all Governmental Authority having jurisdiction over the location.

00572.24.3 Subcontractor will be entitled, to an adjustment in its compensation and all times for performance of the Work to the extent Subcontractor cost or time of performance have been adversely impacted by the presence of Hazardous Conditions, subject to submission of appropriate documentation by Subcontractor and Subcontractor’s duty to mitigate.

00572.25 Force Majeure

00572.25.1 If Subcontractor is delayed in the performance of the Work due to acts, omissions, conditions, events, or circumstances beyond its control, the times for performance shall be reasonably extended by on a not less than day for day basis. By way of example and not of limitation, events that will entitle Subcontractor to an extension of the times for performance include without limitation acts or omissions of Owner or Purchaser, or anyone under Owner’s control (including separate contractors), Hazardous Conditions, wars, terrorism, civil unrest, actions and inactions of delay of Governmental Authorities, floods, labor disputes and unrest, unusual delay in transportation, epidemics, earthquakes, tsunami, adverse weather conditions, and acts of God.

00572.25.2 In addition to Subcontractor’s right to a time extension for those events set forth above, Subcontractor shall also be entitled to an appropriate increase in the compensation due to the impacts or delays arising from such events. Subcontractor will file all claims in accordance with Article 00572.13.

00574 – Jobsite Operations Terms and Conditions

00574.1 Subcontractor Scope of Work

Except as expressly provided in this Subcontract, Subcontractor shall furnish all materials, tools, equipment, vehicles, supplies, services, labor and supervision required to perform the Work. Unless otherwise stated in this Subcontract, the Work includes unloading, off transport, hauling, receiving, storing, maintaining, protecting, erecting, installing, cleaning, adjusting, and all other work required to make the Work ready for use.

00574.2 Safety Requirements

00574.2.1 Subcontractor shall conduct all operations under this Subcontract in a manner that avoids the risk of bodily harm and damage to property. At a minimum, Subcontractor shall comply with the requirements of this Article 00574.2, Section 00575, the Loss Control Manual, and Owner's safety requirements. Subcontractor's failure to comply with the requirements of this Article 00574.2, Section 00575, the Loss Control Manual, or Owner's safety requirements constitutes a material breach of this Subcontract.

00574.2.2 When at the jobsite, Subcontractor shall continuously inspect all Work and conduct surveys of all Work areas to identify any unsafe condition and shall immediately take adequate precautions against any unsafe condition identified. Subcontractor is solely and exclusively responsible for the discovery and correction of such conditions. Subcontractor agrees that nothing contained in this Article 00574.2, Section 00575, the Loss Control Manual, or Owner's safety requirements shifts responsibility for bodily harm or damage to property sustained resulting from violation of those provisions from Subcontractor to Owner or Purchaser. Subcontractor remains solely and exclusively responsible for compliance with all safety requirements.

00574.2.3 Subcontractor shall immediately correct any unsafe condition identified by Purchaser. If, in Purchaser's sole discretion, Subcontractor has not taken sufficient precautions for the avoidance of bodily harm and damage to property, or in response to Purchaser's identification of an unsafe condition, Purchaser may stop the Work at Subcontractor's expense or implement suitable precautions at Subcontractor's expense, or both. Purchaser's right to stop the Work and to implement suitable precautions does not impose on Purchaser a duty to exercise those rights and does not relieve Subcontractor of responsibility for damage resulting from violation of this Article 00574.2, Section 00575, the Loss Control Manual, or Owner's safety requirements.

00574.2.4 Compliance with this Article 00574.2, Section 00575, the Loss Control Manual, and Owner's safety requirements is the minimum standard required of Subcontractor. Subcontractor is responsible for examining all Work-related requirements and determining whether additional or more stringent health and safety provisions are required or appropriate for the Work. Subcontractor shall notify Purchaser promptly in writing if a charge of noncompliance with this Article 00574.2, Section 00575, the Loss Control Manual or Owner's safety requirements has been filed against Subcontractor or a Sub-subcontractor in connection with the performance of the Work.

00574.3 Labor

Subcontractor shall designate a supervisor at the jobsite who has the authority to act on behalf of and to bind Subcontractor in all matters relating to or arising out of this Subcontract. The supervisor must be fluent in English. Subcontractor agrees to replace, at no cost to Purchaser, any Sub-subcontractor or any personnel of Subcontractor or Sub-subcontractor who Purchaser reasonably requests be replaced.

00574.4 Work Hours

Typical Work days consist of a Monday through Friday schedule with a 7am start at the earliest, and a 6pm finish at the latest. Saturday Work may be permitted as necessary. Sunday Work will not be permitted, unless deemed by the Program Manager to be of a critical or emergency nature. No Work is

permitted on Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Thursday and Friday, Christmas Eve, Christmas, and New Year's Day, during the Subcontract duration.

For weekend operations, requests must be submitted in writing by Wednesdays at 5pm.

In cases where the Program Manager does not have the resources available to observe Saturday, Sunday, and/or night work, the request will be denied, and no time extension or impact will be considered.

Night Work, when deemed necessary by the Program Manager; will be permitted as requested (48-hour advanced notice required). Noise attenuated equipment for night work is required when working in residential neighborhoods.

00574.5 Protection and Restoration of Property

00574.5.1 Subcontractor shall, at its expense, protect the Work, the environment, and all other property from hazards arising out of or relating to the Work and from natural elements. Subcontractor shall, at its expense, promptly repair or remove and replace any damage or loss and, to the extent practicable, restore property affected by the Work to its original condition, as determined by Purchaser. Subcontractor is solely responsible for protection of the Work until Final Completion.

00574.5.2 At the completion of the Work, Subcontractor shall remove all Subcontractor-furnished items that are not intended to become a permanent part of the project from the jobsite and shall remove and deposit in Subcontractor-furnished waste facilities all scrap, trash, waste materials, and debris resulting from the Work. Subcontractor shall thoroughly remove all accumulations of dust, scraps, waste, oil, grease, weld spatter, insulation, paint, and other foreign substances resulting from performance of the Work and shall restore all surfaces affected by those substances.

00575 - Safety, Health and Accident Prevention

00575.1 Project Safety and Health Program

Purchaser will implement and coordinate the overall Project Safety and Health Program as defined in the Loss Control Manual which is available for inspection at http://www.sarp10.com/safety/.

00575.2 Safety, Health, and Accident Prevention Program

00575.2.1 Subcontractor shall implement and maintain a written Safety, Health and Accident Prevention Program specifically applicable to the Work. Subcontractor's Safety, Health and Accident Prevention Program must meet the requirements of Applicable Laws and adhere to the Project Safety and Health Program, if implemented by Purchaser. Subcontractor shall submit Subcontractor's Safety, Health and Accident Prevention Program for Purchaser's review at least thirty calendar days before starting Work at the jobsite. Purchaser's review does not relieve Subcontractor of Subcontractor's sole responsibility for safety and health in relation to the Work, nor does Purchaser's review limit Subcontractor's obligation to undertake any action necessary to establish and maintain safe working conditions relating to the Work at the jobsite.

00575.2.2 Purchaser may monitor Subcontractor's safety and health performance and may require changes to Subcontractor's Safety, Health and Accident Prevention Program during the performance of the Work. Purchaser's monitoring and requirement of changes does not relieve Subcontractor of Subcontractor's sole responsibility for safety and health in relation to the Work, nor does Purchaser's monitoring and requirement of changes limit Subcontractor's obligation to undertake any action necessary to establish and maintain safe working conditions relating to the Work at the jobsite.

00575.3 Hazardous Waste Project Health and Safety Plan

00575.3.1 Subcontractor understands that the Work involves hazardous substances or hazardous wastes. Subcontractor shall comply with all Applicable Laws, Owner's facility rules and regulations, and applicable guidance documents. Subcontractor shall prepare and implement a jobsite-specific Hazardous Waste Project Health and Safety Plan, based on Subcontractor's Safety, Health and Accident Prevention Program and all written programs required by Applicable Laws. Subcontractor is responsible for the completeness and accuracy of Subcontractor's Hazardous Waste Project Health and Safety Plan. Subcontractor shall submit Subcontractor's Hazardous Waste Project Health and Safety Plan to Purchaser at least thirty calendar days before starting Work at the jobsite and shall maintain a copy at the jobsite for review by Purchaser, Owner, and regulatory personnel.

00575.3.2 Before starting Work at the jobsite, Subcontractor shall submit written verification that:

(a) personnel assigned to the Work have received forty-hour health and safety training that meets the requirements of 29 CFR 1910.120(e) or 1926.65(e);

(b) the assigned field supervisor has completed eight hours of supervisor training that meets the requirements of 29 CFR 1910.120(e)(4) or 1926.65(e)(4); and

(c) personnel assigned to the Work are participating in a medical surveillance program that meets the requirements of 29 CFR 1910.120(f) or 1926.65(f).

00575.4 Protective Clothing, Equipment and Instrumentation

Subcontractor agrees to furnish special protective clothing, respiratory protective equipment, and monitoring instrumentation as required by Applicable Laws, the project's safety-related plans and programs, and Purchaser's and Owner's rules and regulations. Subcontractor shall ensure that personnel performing Work at the jobsite properly use the clothing, equipment, and instrumentation. Subcontractor shall furnish and maintain all safety equipment, including but not limited to, barriers, signs, warning lights, and guards necessary for adequate protection of persons and property.

00575.5 Safety and Health Representative

The Subcontractor shall identify a qualified person to be its representative for Environmental, Safety, Health & Security matter and make this person available as needed and requested by the Purchaser. The representative must have authority to correct unsafe conditions and to stop Work in the area of an unsafe condition. In addition, the representative shall routinely visit the jobsite.

00575.6 Safety and Health Goal

Subcontractor shall endeavor to attain the project's safety goal of zero injuries. Subcontractor shall maintain accurate accident and injury reports and shall furnish Purchaser a monthly summary of injuries and man-hours lost due to injuries by the third of each month. Subcontractor accident rates must be calculated monthly in accordance with the Bureau of Labor Statistics incident rate, frequency rate, and days away from work rate methods. If Subcontractor or Sub-subcontractor accident rates exceed the project's safety goal, Subcontractor shall take immediate corrective action, which may include, but is not limited to:

(a) Submittal of a written corrective action plan to Purchaser by Subcontractor;

(b) Additions or modifications to Subcontractor's Safety, Health and Accident Prevention Program;

(c) Removal from the jobsite of any Subcontractor or Subcontractor personnel not implementing or following the necessary safety and health measures; and

(d) Increasing the amount of Subcontractor safety and health training.

00575.7 Drug Prevention Program

As part of the Work, Subcontractor shall assist Purchaser in administering the project requirements for a drug detection and prevention program. Subcontractor agrees that all costs for drug testing and alcohol testing are included in the Subcontract price. Subcontractor must provide evidence to Purchaser that all personnel assigned to the Work at the jobsite have passed the drug test within three calendar days of completion of the test. The drug detection and prevention program will include, but will not be limited to, the following: (a) a pre-jobsite assignment test; and (b) post-jobsite assignment tests, such as reasonable suspicion tests, post-accident tests, and unannounced random drug tests of ten percent of the workforce on a monthly basis.

00575.8 Fall Protection

The OSHA Fall Protection Standard 29 CFR 1926 Subpart M shall be strictly adhered to by the Subcontractor. Fall protection is required for all of Subcontractor's Work operations one hundred percent of the time, whether climbing, traveling, or working. NO WORK OPERATION is exempt from the six (6) foot fall protection requirement.

Prior to starting work operations requiring fall protection, Subcontractor shall submit to Purchaser a fall protection plan. The fall protection plan shall include, but not be limited to, the following:

- Name of qualified person in charge of operation.
- Description of work operation.
- List of fall exposures.
- Description of fall protection methods used to eliminate fall exposures.
- Training and enforcement methods used to ensure employee compliance with the plan.

Fall protection body harnesses, lanyards, and lifelines shall be used in accordance with OSHA Standard 1926 Subpart 502D, with the following exceptions:

- Full body harnesses shall be used in lieu of safety belts.
- Only lanyards with shock absorbers and locking type snap hooks shall be used.
- At least two lanyards shall be used to provide one hundred percent fall protection when moving around obstructions, connection points, or other similar items.

Fall protection guardrail systems shall comply with OSHA Standard 1926 Subpart 502(b) except manila, plastic, or synthetic rope shall not be used as guardrails.

00575.9 Sub-subcontractor Safety Prequalification

Prior to any Sub-subcontractor performing Work on the Jobsite the Sub-subcontractor must obtain a Sub-subcontractor safety prequalification from Purchaser. In order to obtain the safety prequalification, Subcontractor or its Sub-subcontractor shall submit to Purchaser evidence that the Sub-subcontract has an Experience Modification Rating or equivalent rating of 1.0 or less and that incident rates (Recordable Incident Rate, Loss Time Incident Rate, and Days Away/Restricted or Job Transfer rate) are below the national average during the last three years. In addition, Subcontractor or Sub-subcontractor must submit sufficient information to allow Purchaser to evaluate any Occupational Safety and Health Administration (OSHA) violations received by Sub-subcontractor within the last three years and any other documentation Purchaser may reasonably require. Purchaser's safety manager will review the submission and provide a safety prequalification if Purchaser, in its sole discretion, determines the Sub-subcontractor meets Purchaser's safety requirements. Subcontractor or its Sub-subcontractor must submit the requirements prior to Sub-subcontractor first mobilizing to the Jobsite.

00575.10 Confined Spaces

All employees entering confined spaces and all attendants for such entries including supervisors shall receive confined space entry training and emergency rescue training at a minimum of once per year.

00575.11 Third Party Medical Triage

Subcontractor shall retain the services of a third-party medical triage company that meets the following criteria:

- Must employ medical doctors that understand occupational medicine and the rules set forth by OSHA for first aid treatment of work-related injuries and illnesses
- Ability to provide virtual real-time consultation with medical doctors for injury triage, with injured worker
- Available 24 hours a day, 7 days per week, and 365 days per year

Subcontractor shall require retention of identical services for each subcontractor, with the further requirement that each lower tier subcontractor shall include identical requirements in any lower tier subcontracts, which might in turn be made.

00672 - General Conditions Attachments

00672.1 Partial Waiver and Release of Lien Rights

AFFIDAVIT AND PARTIAL WAIVER OF CLAIMS AND LIENS AND RELEASE OF RIGHTS FOR SUBCONTRACTORS

The undersigned, who is the _____ (designate title) of _____ which is the Subcontractor (designate whether subcontractor, supplier or otherwise) for the Lift Station Rehab Construction Group 3A (designate the type of work, supplies or services rendered) on the improvements constructed on the premises hereafter identified, declares that his or her contract with **Overland Contracting, Inc. (Purchaser)** is in the total amount of $_____, which includes extras and all change orders to the date hereof.

The undersigned further states that as of _____ (date) the total value of work completed, and material stored is $_____. Of this amount $_____ has been received (the receipt and sufficiency of which is hereby acknowledged by the undersigned including $_____ in payment of Payment Application or Invoice Number _____).

In consideration of the amounts and sums received, the undersigned does hereby waive and release to the **City of Memphis (Owner)** and to **Overland Contracting, Inc. (Purchaser)** any and all claims and liens and rights to liens upon the premises described below and upon improvements now thereon, and upon the monies or other considerations (due as of the date of the aforesaid payment application or invoices from the **City of Memphis (Owner)** or **Overland Contracting, Inc. (Purchaser)** or from any other person, firm or corporation), said claims and liens and rights to liens being on account of labor, services, materials, fixtures or apparatus heretofore furnished by or at the request of the undersigned. The premises as to which said claims and liens and rights to liens are hereby released are identified as follows:

Project Name: Lift Station Rehab Construction Group 3A

Address of Project:

City: Memphis County: Shelby State: TN Zip Code: _____

The undersigned further represents and warrants that he or she is duly authorized and empowered to sign and execute this waiver on his or her own behalf and on behalf of the company or business for which he or she is signing; that he or she has properly performed all work and furnished all the materials of the specified quality per plans and specifications and in a good and workmanlike manner through the date of said payment application or invoice; that he or she has paid for all the labor, materials, equipment, and services that he or she has used or supplied to the above premises through the date of said payment application or invoice; that he or she has no other outstanding and unpaid payment applications, invoices, retentions, holdbacks, chargebacks or unbilled work or materials against **Overland Contracting, Inc. (Purchaser)** as of the date of the aforementioned payment application; and that any materials which have been supplied or incorporated into the above premises were either taken from his or her fully-paid or open stock or were fully paid for and supplied as stated on the payment application or invoice.

The undersigned further agrees to reimburse and does hold harmless and fully indemnify the **City of Memphis (Owner)** and **Overland Contracting, Inc. (Purchaser)** for any losses or expenses should any such claims, lien or right to a lien be asserted (by the undersigned or by any laborer, materialman or subcontractor of the undersigned), including, without implied limitation, attorneys' fees incurred in the defense thereof.

The undersigned further accepts and acknowledges the receipt of the aforesaid sums in full accord and satisfaction for the aforementioned claims with full knowledge that the contractors, **City of Memphis (Owner)** and **Overland Contracting, Inc. (Purchaser)**, their successors and assigns, are relying thereon; and furthermore, the undersigned agrees to perform, now and in the future, each and every covenant and provision of this written contract or supplier's agreement (as the case may be) as modified or changed in writing with **Overland Contracting, Inc. (Purchaser)** or any subcontractor of **Overland Contracting, Inc. (Purchaser)** hereby acknowledging that said contract or supplier's agreement is now in full force and effect.

In addition, for and in consideration of the amounts and sums received, the undersigned hereby waives, releases and relinquishes any and all claims, rights or causes of action whatsoever arising out of or in the course of the work performed on the above-mentioned project, contract or event transpiring prior to the date hereof, excepting the right to receive payment for work performed and properly completed and retainage, if any, after the date of the above-mentioned payment application or invoices.

Signed and delivered the _____ day of _____, 20___.

Company _____

By: _____
(Printed Name)

_____
(Signature)

Title: _____

Before me, the undersigned Notary Public in and for the said County and State, personally appeared _____, and acknowledged execution of the foregoing affidavit as his or her voluntary act and deed and further stated that the facts recited are true of his or her personal knowledge.

My Commission Expires: _____

_____
Notary Public

Residence County/State: _____

00672.2 Final Waiver and Release of Lien Rights

AFFIDAVIT AND FINAL WAIVER OF CLAIMS AND LIENS AND RELEASE OF RIGHTS FOR SUBCONTRACTORS

The undersigned, who is the _____ (designate title) of _____ which is the Subcontractor (designate whether subcontractor, supplier or otherwise) for the Lift Station Rehab Construction Group 3A (designate the type of work, supplies or services rendered) on the improvements constructed on the premises hereafter identified, declares that his or her contract with **Overland Contracting, Inc. (Purchaser)** is in the total amount of $_____, which includes extras and all change orders to the date hereof.

The undersigned further states that as of _____ (date) all work on said project has been performed and completed in accordance with the plans and specifications for the project, and said work has been accomplished in accordance with the terms and conditions of his or her subcontract and those documents which, by reference, are a part of said subcontract. The total value of work completed and material stored is $_____. Of this amount $_____ has been received (the receipt and sufficiency of which is hereby acknowledged by the undersigned including $_____ in payment of Payment Application or Invoice Number _____).

In consideration of the amounts and sums received, the undersigned does hereby waive and release to the **City of Memphis (Owner)** and to **Overland Contracting, Inc. (Purchaser)** any and all claims and liens and rights to liens upon the premises described below and upon improvements now thereon, and upon the monies or other considerations (due as of the date of the aforesaid payment application or invoices from the **City of Memphis (Owner)** or **Overland Contracting, Inc. (Purchaser)** or from any other person, firm or corporation), said claims and liens and rights to liens being on account of labor, services, materials, fixtures or apparatus heretofore furnished by or at the request of the undersigned. The premises as to which said claims and liens and rights to liens are hereby released are identified as follows:

Project Name: Lift Station Rehab Construction Group 3A

Address of Project:

City: Memphis County: Shelby State: TN Zip Code: _____

The undersigned further represents and warrants that he or she is duly authorized and empowered to sign and execute this waiver on his or her own behalf and on behalf of the company or business for which he or she is signing; that he or she has properly performed all work and furnished all the materials of the specified quality per plans and specifications and in a good and workmanlike manner as required by the contract; that he or she has paid for all the labor, materials, equipment, and services that he or she has used or supplied to the above premises as required by the contract; that he or she has no other outstanding and unpaid payment applications, invoices, retentions, holdbacks, chargebacks or unbilled work or materials against **Overland Contracting, Inc. (Purchaser)**; and that any materials which have been supplied or incorporated into the above premises were either taken from his or her fully-paid or open stock or were fully paid for and supplied as stated on the payment application or invoice.

The undersigned further agrees to reimburse and does hold harmless and fully indemnify the **City of Memphis (Owner)** and **Overland Contracting, Inc. (Purchaser)** for any losses or expenses should any such claims, lien or right to a lien be asserted (by the undersigned or by any laborer, materialman or subcontractor of the undersigned), including, without implied limitation, attorneys' fees incurred in the defense thereof.

The undersigned further accepts and acknowledges the receipt of the aforesaid sums in full accord and satisfaction for the aforementioned claims with full knowledge that the contractors, **City of Memphis (Owner)** and **Overland Contracting, Inc. (Purchaser)**, their successors and assigns, are relying thereon; and furthermore, the undersigned agrees to perform, now and in the future, each and every covenant and provision of this written contract or supplier's agreement (as the case may be) as modified or changed in writing with **Overland Contracting, Inc. (Purchaser)** or any subcontractor of **Overland Contracting, Inc. (Purchaser)** hereby acknowledging that said contract or supplier's agreement is now in full force and effect.

In addition, for and in consideration of the amounts and sums received, the undersigned hereby waives, releases and relinquishes any and all claims, rights or causes of action whatsoever arising out of or in the course of the work performed on the above-mentioned project, contract or event transpiring prior to the date hereof, except retainage, if any, after the date of the above-mentioned payment application or invoices.

Signed and delivered the _____ day of _____, 20___.

Company _____

By: _____
(Printed Name)

_____
(Signature)

Title: _____

Before me, the undersigned Notary Public in and for the said County and State, personally appeared _____, and acknowledged execution of the foregoing affidavit as his or her voluntary act and deed and further stated that the facts recited are true of his or her personal knowledge.

My Commission Expires: _____

_____
Notary Public

Residence County/State: _____

00672.3 Certificate of Nondiscrimination

As Bidder, Contractor, or Subcontractor on Purchaser's Contract, **Lift Station Rehab Construction Group 3A**

The undersigned states that it does not discriminate against any subcontractor, employee, or applicant for employment on the grounds of race, color, national origin or sex and, if awarded a contract for this project, agrees in performance of work:

1. Not to discriminate against any subcontractor, employee, or applicant for employment on the grounds of race, color, national original or sex;

2. To maintain payrolls of laborers and mechanics employed on this contract until seven (7) years after final release and final payment by the City;

3. To require a similar certificate to be executed by each subcontractor at the time a subcontract is executed under the contract with the requirement that such subcontractor agrees to require a similar certificate of requirement on any lower tiers of subcontracts.

4. To conform to federal law, state statutes, executive orders, and local ordinances identified and listed under Non-discrimination.

_____
Subcontractor's Name

_____
Date

_____
Signature

_____
Printed or Typed Name and Title

THIS FORM MUST BE SUBMITTED WITH THE BID OR THE BID MAY BE CONSIDERED NON-CONFORMING.

00672.4 Equal Business Opportunity Program

This form must be submitted with Bidder's bid. Failure to execute and submit this document with Bidder's bid may cause the Bid to be rejected as non-conforming. In addition, each Sub-Subcontractor must execute the form.

This Subcontract will be subject to the requirements of the City of Memphis Ordinance #5384 which establishes the Equal Business Opportunity ("EBO") Program. It is up to the Respondent to ensure that all requirements of this ordinance are met. The Ordinance may be accessed on the City's website at www.memphistn.gov under "Business – Contract Compliance". The intent of the EBO Program is to increase the participation of locally owned minority and women owned business enterprises ("M/WBE").

SARP10 DBE Participation Goal:
DBE minimum **20%**
(Vendors from the City of Memphis EBO list only)

Participation Plan
The Participation Plan must include: (1) level and dollar amount of participation your firm anticipates achieving in the performance of contract resulting from this RFB; (2) the type of work to be performed by the M/WBE participation; and (3) the names of the M/WBE and/or DBE firm(s) the Respondent plans to utilize in the performance of the contract resulting from this RFB.

Eligible M/WBE and/or DBE Firms
To qualify as a M/WBE firm, per the requirements of City of Memphis Ordinance #5384, a firm must be included on the City of Memphis EBO list of certified M/WBE firms.

A list of the City's eligible M/WBE firms may be requested from Purchaser as a guide only. If a Bidder desires to utilize an M/WBE firm not included on the list, it is the Bidder's responsibility to confirm that the desired firm is certified by the City of Memphis. Such confirmation must be obtained from the City's Contract Compliance Office, in writing, before the bid/response due date. Requests for verification must be submitted to the City's Contract Compliance Office listed below:

Ken Moody
City of Memphis, Contract Compliance Office
125 North Main Street, Suite 546
Memphis, TN 38103
Phone: (901) 576-6210
Fax: (901) 576-6560
Email: ken.moody@memphistn.gov

MINORITY/WOMEN BUSINESS ENTERPRISE COMPLIANCE FORM

SUBCONTRACT TITLE: Lift Station Rehab Construction Group 3A

Project Participation Goal: DBE minimum **20%**

The following sections must be completed by Bidder. A certified subcontractor or supplier is defined as a firm from the list of certified firms provided with this specification.

_____
Bidder's Name

Section A - If the Bidder is a certified firm, so indicate here with a check mark.

_____ MBE _____ WBE _____ DBE

Section B - Identify below those certified firms that will be employed as subcontractors or suppliers on this Project. By submitting this Proposal, the Bidder commits to the use of the firms listed below.

$ = Show the dollar value of the subcontract to be awarded to this firm

% = Show the percentage this subcontract is of your base Proposal

M/WBE = Show by inserting an M or W whether the subcontractor is an MBE or WBE

$	%	M/WBE	DBE	CERTIFIED SUBCONTRACTOR NAME, ADDRESS, TEL #

$ _____ **%** _____ **=** ***Total M/WBE and/or DBE***

THIS FORM MUST BE SUBMITTED WITH THE PROPOSAL OR THE PROPOSAL MAY BE CONSIDERED NON-CONFORMING

00672.5 Report of Disadvantaged Business Enterprise Participation Form (1 page)

PROJECT NUMBER: 414882.71.0374

SUBCONTRACTOR'S REPORT OF DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

Project Name: Lift Station Rehab Construction Group 3A Month of ____________, 2025

General Contractor: ____________

Contact Person: ____________ Telephone: ____________

Address: ____________ Email: ____________

Amount of Subcontract: $ ____________ MBE %: ____________ WBE %: ____________

DBE Information: Circle Either MBE or WBE and Complete Form.

MBE / WBE Firm Name: ____________ Contact Person: ____________

Date of Award: ____________ Contract Value: $ ____________

Completed to Date: $ ____________ Paid to Date: $ ____________

Work Description: ____________ Telephone: ____________

Amount Invoiced This Period: $ ____________ Email: ____________

MBE / WBE Firm Name: ____________ Contact Person: ____________

Date of Award: ____________ Contract Value: $ ____________

Completed to Date: $ ____________ Paid to Date: $ ____________

Work Description: ____________ Telephone: ____________

Amount Invoiced This Period: $ ____________ Email: ____________

MBE / WBE Firm Name: ____________ Contact Person: ____________

Date of Award: ____________ Contract Value: $ ____________

Completed to Date: $ ____________ Paid to Date: $ ____________

Work Description: ____________ Telephone: ____________

Amount Invoiced This Period: $ ____________ Email: ____________

MBE / WBE Firm Name: ____________ Contact Person: ____________

Date of Award: ____________ Contract Value: $ ____________

Completed to Date: $ ____________ Paid to Date: $ ____________

Work Description: ____________ Telephone: ____________

Amount Invoiced This Period: $ ____________ Email: ____________

Attach additional pages as required.

General Contractor's Signature: ____________ Date: ____________

00672.6 Not Used

00672.7 Bid Bond

Know all men by these presents, that we, the undersigned,
_____ as

Principal, and _____ as surety,

Hereby held and firmly bound unto _____ as Owner on the sum of _____ for the payment of which, well and truly to be made, We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this _____ day of _____, 2025.

This condition of the above obligation is such that whereas the principal has submitted to the Purchaser a certain bid, attached hereto and hereby made a part of hereof to enter into a contract in writing for the construction of:

SARP 10 Program 414882.71.0374 Lift Station Rehab Construction Group 3A

Now therefore,

A) If said bid shall be rejected, or in the alternative,

B) If said bid shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said bid), required insurance certificates, and shall furnish a Bond for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bond,

Then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall, in no event, exceed the amount of this obligation as herein stated.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extension of the time within which the Purchaser may accept such bid; and said surety does hereby waive notice of any such extension.

In witness whereof, the principal and the surety hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year set forth above.

CONTRACTOR	**SURETY**
Contractor's Company Name	Surety Name
Signature (principal)	By: Attorney in Fact - Signature
Printed or Typed Name and Title	Printed or Typed Name and Title

00672.8 Schedule Impact Due to Weather

Program Manager will determine Contractor's entitlement to an extension of the Contract Time as a result of weather delays, based on the data included in Tables 1 and 2. Extensions of time will be granted at the discretion of the Program Manager for circumstances not covered by the flow chart.

The following rules apply to any analysis for weather related delays to this Project. Weather delay days may be awarded if the first two rules are met. Additional days may be awarded if conditions in Rule 3 are met for unusually heavy precipitation independent of Rules 1 and 2.

Rule 1: The average monthly precipitation amount must have been exceeded.

If the total amount of actual precipitation in a month exceeds the average for that month shown in Table 1, the first test has been met. Go to rule number 2. (Precipitation is defined as the quantity of water deposited by rain, hail, sleet, or snow.)

Rule 2: The number of days in a month with actual precipitation greater than the threshold amount shown in Table 2 has been exceeded.

The numbers of days with actual precipitation greater than the threshold amounts shown in Table 2 are eligible for award as weather delays days. Additional days may be awarded for unusually heavy precipitation independent of meeting the rules above.

Rule 3: Unusually heavy precipitation has occurred.

Precipitation greater than one inch in a single day may be justification for an additional day, time extension for each precipitation day. This rule may be applied singly but not in addition with any other rule.

National Weather Service Data for
Memphis International Airport – Years 2009-2019

Table 1

Average Precipitation by Month (In Inches)											
Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
3.66	5.26	5.75	6.30	5.84	4.59	4.74	3.75	2.61	3.85	4.55	5.05

Table 2

Average Number of Days with Precipitation Greater than 0.25 Inches											
Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4	5	6	6	6	4	4	4	2	4	5	6

Any weather-related extension of Contract time shall be non-compensable. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather days is less than expected, shall contribute to the project float and shall not affect the Contract Times. Application for a weather-related extension of time shall be submitted to the Program Manager and shall state the extension requested and be supported by the relevant weather data.

00672.9 SARP10 Safety Guidelines

Black & Veatch
Memphis SARP10 Safety Guidelines

Anyone working for the SARP10 Program must comply with these basic safety requirements, except where their individual employer's safety requirements are more stringent. It is the employer's responsibility to ensure that their employees are informed of the Project safety policies and that they work in compliance with the Program safety policies.

Black & Veatch is committed to the safety and health of all employees, subcontractors, vendors and visitors. In our effort to minimize hazards and provide the safest worksite possible, we expect all workers on the Program to know and practice the following safe work rules as a minimum. The following rules are not all inclusive.

Noncompliance with the Rules We Live By will result in removal from the Program.

Rules We Live By

- **Confined Spaces** - Comply with all requirements of Confined Space Entry permits and DO NOT enter a confined space without a permit.
- **Fall Protection** - Comply with the Fall Protection procedures when working above the applicable working height. Always use 100 percent of the fall protection techniques when tying off. Note: An open manhole is a fall exposure and must be protected.
- **Lock Out Tag Out (LOTO)** - Follow all Lock Out/Tag Out procedures at all times.
- **Trench and Excavation** - Do not start any excavation activities without a Trench & Excavation permit and comply with all requirements. Excavations must be properly sloped, shored or shielded before entering, and proper access/egress must be in place.
- **Drugs and Alcohol** - Drugs and alcohol have NO place in the work environment. Do NOT come to work if you are under the influence of illegal drugs or alcohol.
- **You** - Make a difference today. Don't walk by any unsafe situation and be a Safety Leader.

PPE Requirements

- Safety glasses with side shields, ANSI Z87.1 approved are mandatory on the worksite.
- Hard hats, ANSI Z89.1 approved, with no modifications or deformities are mandatory on the worksite.
- Good quality, over the ankle, work boots with safety toes (steel toe) are required. Sneakers of any kind are prohibited.
- High visibility work vests with reflective markings shall be worn in all construction areas. Must be ANSI Class II specification as and be fluorescent (orange or lime green)
- You are the person most responsible for your safety. Observe and obey all signs and barricades.

General Safety and Health Requirements

- 100% fall protection is required when working on unprotected surfaces at or above 6 feet. Full body harnesses and shock absorbing lanyards with double locking hooks are the only acceptable method of personnel fall protection.
- DO NOT use the top two steps of a step ladder or the top three steps of a straight ladder. Use the 3-point rule (both feet / one hand or two hands / one foot) when using ladders.
- When on site, be aware of moving vehicles and equipment. Before traveling in front of or behind pieces of equipment make eye contact with the operator and wait for an indication to proceed. Spotters are required at all times.
- DO NOT cross a red barricade without permission from the owner of that barricade.
- Immediately correct safety hazards if within your authority. If you cannot make the correction report it to your supervisor. Unresolved hazards or conditions not corrected by the previous methods must be brought to the attention of the Site Project Manager.
- Immediately report injuries, fires, spills, near misses, accidents or unsafe conditions or practices to the Safety Department.
- Pay attention to barricades, signs and announcements.

00770 – Loss Control Manual

The Loss Control Manual is available for viewing on the SARP10 website:

http://www.sarp10.com/safety/

Contact Tom Gilmer, Safety Manager for additional information:

GilmerTR@bv.com

(913) 458-4207

Technical Specifications

PLEASE NOTE: The drawings in this RFB package have been compressed to reduce the overall PDF file size. Full resolution files will be available for viewing and/or downloading on the SARP10 website.

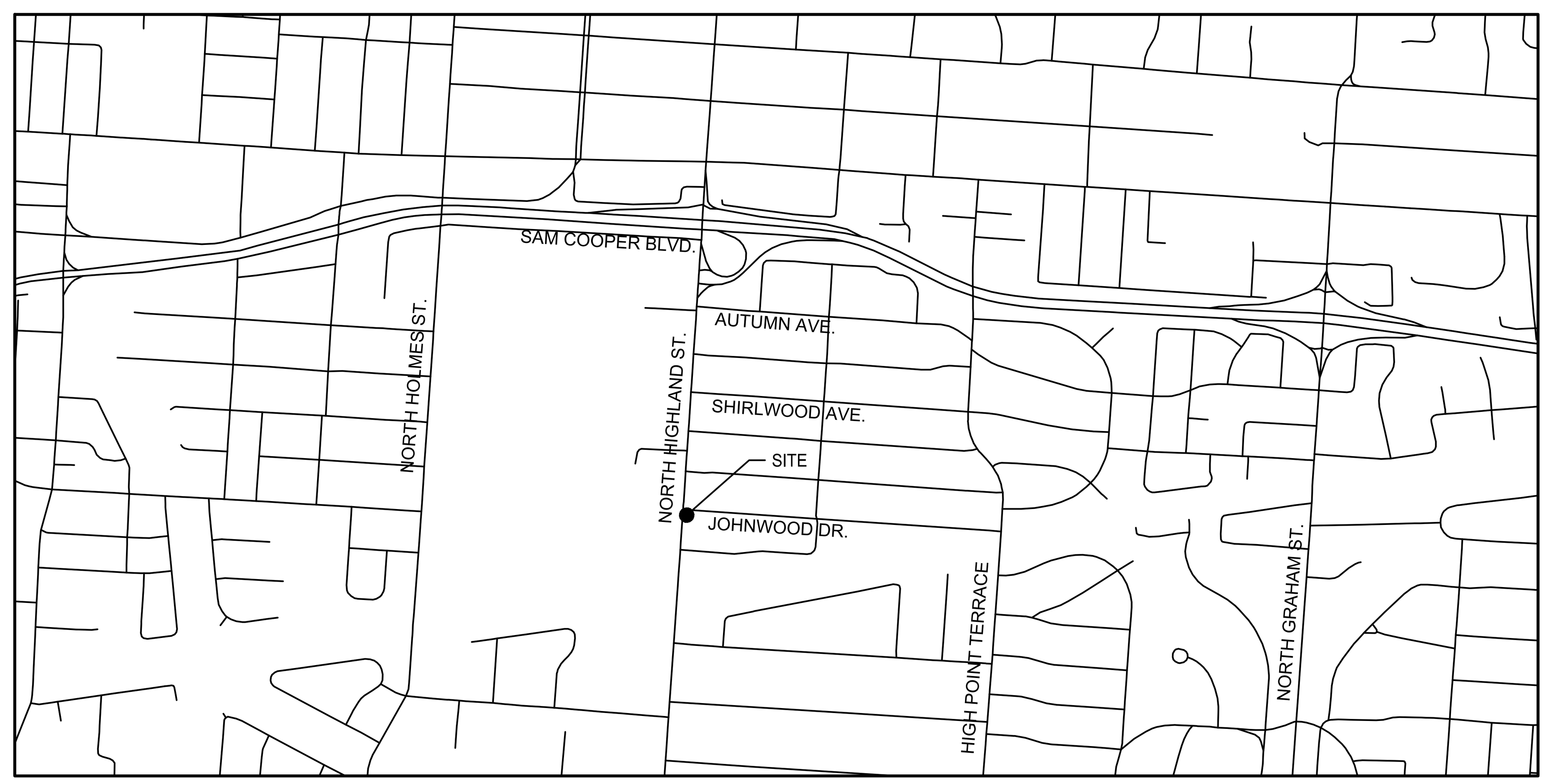
LIFT STATION IMPROVEMENTS

For

360 NORTH HIGHLAND

SEWER ASSESSMENT & REHABILITATION PROGRAM (SARP 10)
CITY OF MEMPHIS, TN

CONSTRUCTION DRAWINGS
AUGUST 5, 2024



VICINITY MAP
SCALE: 1" = 1000'

A2H ENGINEERS ARCHITECTS PLANNERS

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Highland Project\G0.0 - COVER.dwg
Wed, 21 Aug 2024 - 4:45pm
PLOT SCALE: 1"=1' LATEST REV.:

GENERAL NOTES

1. ALL DESIGN, CONSTRUCTION AND MATERIAL SHALL BE IN COMPLIANCE WITH THE SEWER ASSESSMENT AND REHABILITATION PROGRAM (SARP10) AND CITY OF MEMPHIS CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. THE CONTRACTOR SHALL NOT ENTER UPON, WORK UPON NOR CAUSE DAMAGE TO ANY ADJACENT PROPERTIES WITHOUT PRIOR PERMISSION FROM SAID PROPERTY OWNER.
3. GRADING AND DRAINAGE: FINISH GRADE SHALL BE SLOPED FOR POSITIVE DRAINAGE.
4. PROPERTY LINES SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION. GRADING, CLEARING, AND THE ERECTION OR REMOVAL OF FENCES ALONG PROPERTY LINES SHALL BE FULLY COORDINATED WITH ADJACENT PROPERTY OWNERS.
5. ALL GRADING WORK SHALL BE PERFORMED IN SUCH A MANNER THAT ADJACENT PROPERTIES ARE NOT DAMAGED OR ADVERSELY AFFECTED.
6. THE LOCATION OF ALL EXISTING UTILITIES SHALL BE PROPERLY VERIFIED PRIOR TO CONSTRUCTION. ALL WORK SHALL BE PERFORMED IN A MANNER TO ENSURE THAT EXISTING UTILITIES ARE NOT INTERFERED WITH OR DISRUPTED.
7. THE CONTRACTOR IS TO INSTALL EROSION AND SEDIMENT CONTROL SYSTEMS AND STRUCTURES AS NECESSARY TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
8. CONTRACTOR IS RESPONSIBLE FOR AND SHALL PAY FOR ALL SURVEY LAYOUT AND STAKING.

CITY OF MEMPHIS TYPICAL CONSTRUCTION NOTES

1. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY ALL THE SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE UTILITY COMPANY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES AND/OR UNDERGROUND STRUCTURES PRIOR TO THE INITIATION OF ANY CONSTRUCTION. CONTRACTOR SHALL ALSO ASSUME FULL RESPONSIBILITY FOR DAMAGE TO ANY UTILITIES ENCOUNTERED WITHIN CONSTRUCTION PERIMETERS. FOR SITE LOCATIONS OF EXISTING UTILITIES INVOLVING M.L.G.&W., SOUTH CENTRAL BELL, AND/OR TEXAS GAS COMPANY, PLEASE CALL 1-800-351-1111. FOR SEWER SERVICE LOCATIONS, CALL 901-636-8025.
2. CONTRACTOR SHALL ENSURE UNINTERRUPTED SEWER SERVICE ON EXISTING SEWER AND SERVICE CONNECTIONS BY PROVIDING AMPLE TEMPORARY WASTEWATER PUMPING AND/OR BYPASSING.
3. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
4. CONTRACTOR SHALL NOTIFY THE SARP10 CONSTRUCTION MANAGER A MINIMUM OF 24 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.
5. ALL AREAS IN CUT OR FILL WHERE VEGETATION HAS BEEN REMOVED SHALL BE SEEDED, MULCHED, FERTILIZED, AND/OR SODDED AS REQUIRED TO PREVENT EROSION.
6. THE CONTRACTOR SHALL VERIFY EXISTING DATA AND REPORT ANY SIGNIFICANT DISCREPANCIES TO THE ENGINEER.
7. ALL SANITARY SEWER TO BE CONSTRUCTED AS PER CITY OF MEMPHIS STANDARD CONSTRUCTION SPECIFICATIONS. SANITARY SEWER SERVICE CONNECTIONS TO BE INSTALLED AS PER CITY OF MEMPHIS STANDARD SST-16.
8. ALL SEWER MANHOLE LIDS IN OPEN AREAS ARE TO BE CONSTRUCTED 1.5' ABOVE PROPOSED GRADE. IN BACKYARDS, MANHOLE LIDS ARE TO BE 1.5' ABOVE INITIAL GRADE, 0.5' ABOVE FINAL GRADE.
9. ALL SANITARY SEWER, INCLUDING SERVICE CONNECTIONS, WHICH HAS LESS THAN 1.5' CLEARANCE (OUTSIDE OF PIPES) WITH DRAINAGE OR IN FILLED AREAS SHALL BE CLASS 50 D.I.P. OR CONCRETE ENCASED, 10' MINIMUM BOTH SIDES OF CROSSING. ALL DUCTILE IRON PIPE (D.I.P.) SHALL BE POLYETHYLENE LINED OR SHALL BE TREATED WITH PROTECTO 401 OR APPROVED EQUIVALENT.
10. THE CITY OF MEMPHIS SHALL HAVE INGRESS/EGRESS RIGHTS TO USE PRIVATE DRIVES AND YARDS FOR THE PURPOSE OF MAINTAINING ALL PUBLIC SEWER LINES AND SHALL BEAR NO RESPONSIBILITY FOR THE MAINTENANCE OF SAID PRIVATE DRIVES AND YARDS.
11. NO TREES, SHRUBS, PERMANENT STRUCTURES, OR OTHER UTILITIES (EXCEPT FOR CROSSINGS) WILL BE ALLOWED WITHIN SANITARY SEWER EASEMENT. NO OTHER UTILITIES OR SERVICES MAY OCCUPY SANITARY SEWER EASEMENTS IN PRIVATE DRIVES AND YARDS EXCEPT FOR CROSSINGS.
12. ALL SANITARY SEWER MANHOLES IN REVERSE CROWN STREETS, ALLEYS, OR DRIVES (PUBLIC OR PRIVATE) SHALL BE PROVIDED WITH GASKETS AND PLUGS FOR PICK HOLES TO PREVENT DRAINAGE INFLOW INTO SEWER SYSTEM.
13. THE CONTRACTOR SHALL PROVIDE ADEQUATE AND EFFECTIVE EROSION CONTROL AS NECESSARY TO PREVENT ANY SILTATION INTO EXISTING DRAINAGE SYSTEM AND/OR ADJACENT PROPERTIES.

DEMOLITION NOTES

1. ALL PUMPS, MOTORS, ETC. REMOVED SHALL BE RETURNED TO MEMPHIS WTCS DEPARTMENT. CONTACT JAMES GREENLEE @ 901-626-0237

B1 GENERAL NOTES
NTS

SEWER CONSTRUCTION NOTES

1. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY ALL OF SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE UTILITY COMPANY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES AND/OR UNDERGROUND STRUCTURES PRIOR TO THE INITIATION OF ANY CONSTRUCTION. CONTRACTOR SHALL ALSO ASSUME FULL RESPONSIBILITY FOR DAMAGE TO ANY UTILITIES ENCOUNTERED WITHIN CONSTRUCTION PERIMETERS. FOR SITE LOCATIONS OF EXISTING UTILITIES INVOLVING M.L.G.& W., SOUTH CENTRAL BELL, TEXAS GAS COMPANY, AND/OR CITY OF MEMPHIS SEWER, PLEASE CALL 811.
2. CONTRACTOR SHALL ENSURE UNINTERRUPTED SEWER SERVICE ON EXISTING SEWER AND SERVICE CONNECTIONS BY PROVIDING AMPLE TEMPORARY WASTEWATER PUMPING AND/OR BYPASSING.
3. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
4. CONTRACTOR SHALL NOTIFY THE CITY OF MEMPHIS CONSTRUCTION INSPECTION OFFICE AT 636-2462 A MINIMUM OF 24 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.
5. ALL AREAS IN CUT OR FILL WHERE VEGETATION HAS BEEN REMOVED SHALL BE SEEDED, MULCHED, FERTILIZED, AND/OR SODDED AS REQUIRED TO PREVENT EROSION.
6. THE CONTRACTOR SHALL VERIFY EXISTING DATA AND REPORT ANY SIGNIFICANT DISCREPANCIES TO THE ENGINEER.
7. ALL SANITARY SEWER TO BE CONSTRUCTED AS PER CITY OF MEMPHIS STANDARD CONSTRUCTION SPECIFICATIONS. SANITARY SEWER SERVICE CONNECTIONS TO BE INSTALLED AS PER CITY OF MEMPHIS STANDARD SST-16.
8. ALL SEWER MANHOLE LIDS IN OPEN AREAS ARE TO BE CONSTRUCTED 1.5' ABOVE PROPOSED GRADE. IN BACKYARDS, MANHOLE LIDS ARE TO BE 1.5' ABOVE INITIAL GRADE, 0.5' ABOVE FINAL GRADE.
9. ALL SANITARY SEWER, INCLUDING SERVICE CONNECTIONS, WHICH HAS LESS THAN 1.5' CLEARANCE (OUTSIDE OF PIPES) WITH DRAINAGE OR IN FILLED AREAS SHALL BE CLASS 50 D.I.P. OR CONCRETE ENCASED, 10' MINIMUM BOTH SIDES OF CROSSING. ALL DUCTILE IRON PIPE (D.I.P.) SHALL BE POLYETHYLENE LINED OR SHALL BE TREATED WITH PROTECTO 401 OR APPROVED EQUIVALENT.
10. THE CITY OF MEMPHIS SHALL HAVE INGRESS/EGRESS RIGHTS TO USE PRIVATE DRIVES AND YARDS FOR THE PURPOSE OF MAINTAINING ALL PUBLIC SEWER LINES AND SHALL BEAR NO RESPONSIBILITY FOR THE MAINTENANCE OF SAID PRIVATE DRIVES AND YARDS.
11. NO TREES, SHRUBS, PERMANENT STRUCTURES OR OTHER UTILITIES (EXCEPT FOR CROSSINGS) WILL BE ALLOWED WITHIN SANITARY SEWER EASEMENT. NO OTHER UTILITIES OR SERVICES MAY OCCUPY SANITARY SEWER EASEMENTS IN PRIVATE DRIVES AND YARDS EXCEPT FOR CROSSINGS.
12. ALL SANITARY SEWER MANHOLES IN REVERSE CROWN STREETS, ALLEYS, OR DRIVES (PUBLIC OR PRIVATE) SHALL BE PROVIDED WITH GASKETS AND PLUGS FOR PICK HOLES TO PREVENT DRAINAGE INFLOW INTO SEWER SYSTEM.
13. THE CONTRACTOR SHALL PROVIDE ADEQUATE AND EFFECTIVE EROSION CONTROL AS NECESSARY TO PREVENT ANY SILTATION INTO EXISTING DRAINAGE SYSTEM AND/OR ADJACENT PROPERTIES.
14. MANHOLES LOCATED WITHIN THE 100-YEAR FLOODPLAIN SHOULD EXTEND A MINIMUM OF 12" (1'-0") ABOVE THE 100-YEAR FLOOD LEVEL IRREGARDLESS OF WHETHER THE MANHOLE IS ON RESIDENTIAL, COMMERCIAL, OR RURAL PROPERTY. A MANHOLE LOCATED WITHIN THE 100-YEAR FLOOD PLAIN MUST HAVE A SEALED COVER AND VENT STACK IF IT EXTENDS LESS THAN THE MINIMUM 12" ABOVE THE100-YEAR FLOOD LEVEL. WITHIN THIS ALTERNATIVE THE VENT STACKS COULD BE LIMITED TO EVERY OTHER MANHOLE IF LOCATED WITHIN A RESIDENTIAL AREA.
15. LOCATIONS OF EXISTING UTILITIES SHOWN WITHIN THESE PLANS ARE APPROXIMATE AND MAY BE NOT ALL-INCLUSIVE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITY COMPANIES TO DETERMINE EXACT LOCATION OF ALL UTILITIES.
16. THE CONTRACTOR WILL PROVIDE ALL NECESSARY PROTECTIVE MEASURES TO SAFEGUARD EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION OF THIS PROJECT. IN THE EVENT THAT SPECIAL EQUIPMENT IS REQUIRED TO WORK OVER AND AROUND THE UTILITIES, THE CONTRACTOR WILL BE REQUIRED TO FURNISH SUCH EQUIPMENT. THE COST OF PROTECTING UTILITIES FROM DAMAGE AND FURNISHING SPECIAL EQUIPMENT WILL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF CONSTRUCTION.
17. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR CONTACTING ALL AFFECTED UTILITIES PRIOR TO SUBMITTING HIS BID, IN ORDER TO DETERMINE THE EXTENT TO WHICH UTILITY RELOCATIONS AND/OR ADJUSTMENTS WILL HAVE UPON THE SCHEDULE OF THE WORK FOR THE PROJECT. SOME UTILITY FACILITIES MAY NEED TO BE ADJUSTED CONCURRENTLY WITH THE CONTRACTOR'S OPERATIONS, WHILE SOME WORK MAY BE REQUIRED "AROUND" UTILITY FACILITIES THAT WILL REMAIN IN PLACE. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACTOR WILL RECEIVE NO ADDITIONAL COMPENSATION FOR ANY DELAYS OR INCONVENIENCE CAUSED BY THE UTILITY ADJUSTMENTS.
18. THE CONTRACTOR SHALL NOTIFY EACH INDIVIDUAL UTILITY OWNER OF HIS PLAN OF OPERATION IN THE AREA OF THE UTILITIES. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL CONTACT THE UTILITY OWNERS AND REQUEST THEM TO PROPERLY LOCATE THEIR RESPECTIVE UTILITY ON THE GROUND. THIS NOTIFICATION SHALL BE GIVEN AT LEAST THREE (3) BUSINESS DAYS PRIOR TO COMMENCEMENT OF OPERATIONS AROUND THE UTILITY.

B3 SEWER CONSTRUCTION NOTES
NTS

CIVIL	
Sheet Number	Sheet Name
G0.0	COVER
C0.0	GENERAL NOTES
C2.0	SITE PLAN
C6.0	LIFT STATION EXISTING CONDITIONS
C6.1	LIFT STATION SECTION
C7.0	TRAFFIC CONTROL PLAN
C7.1	TRAFFIC CONTROL PLAN
C10.0	LIFT STATION DETAILS
E1.0	ELECTRICAL SITE PLAN

C1 SHEET INDEX
NTS

SYMBOL LEGEND
IRON PIN
STORM CLEANOUT
SINGLE POLE SIGN
FIRE HYDRANT
WATER VALVE
MANHOLE
ELECTRIC METER
ELECTRIC BOX
POWER POLE
SEWER CLEAN OUT
WATER METER
LIGHT POLE w/ CONC BASE
POWER POLE W/LIGHT
BOLLARD
TELEPHONE JUNCTION BOX
TELEPHONE MANHOLE
GAS METER
CATCH BASIN
6-72 INLET
SPOT ELEV
GAS VALVE
SANITARY SEWER MANHOLE
WIRE ANCHOR
FIRE DEPARTMENT CONNECTION
AUTO SPEAKER
PEDESTRAIN LIGHT
BACKFLOW PREVENTER
ROOFDRAIN/DOWNSPOUT

D1 SYMBOL LEGEND
NTS

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0290F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

A2H
ENGINEERS · ARCHITECTS · PLANNERS
3009 Davies Plantation Road, Lakeland, TN 38002
901.372.0404, www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS		
ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK, REGISTERED ENGINEER, AGRICULTURE COMMERCE, No. 106024, STATE OF TENNESSEE
8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: WS04-2
SHEET __ OF __

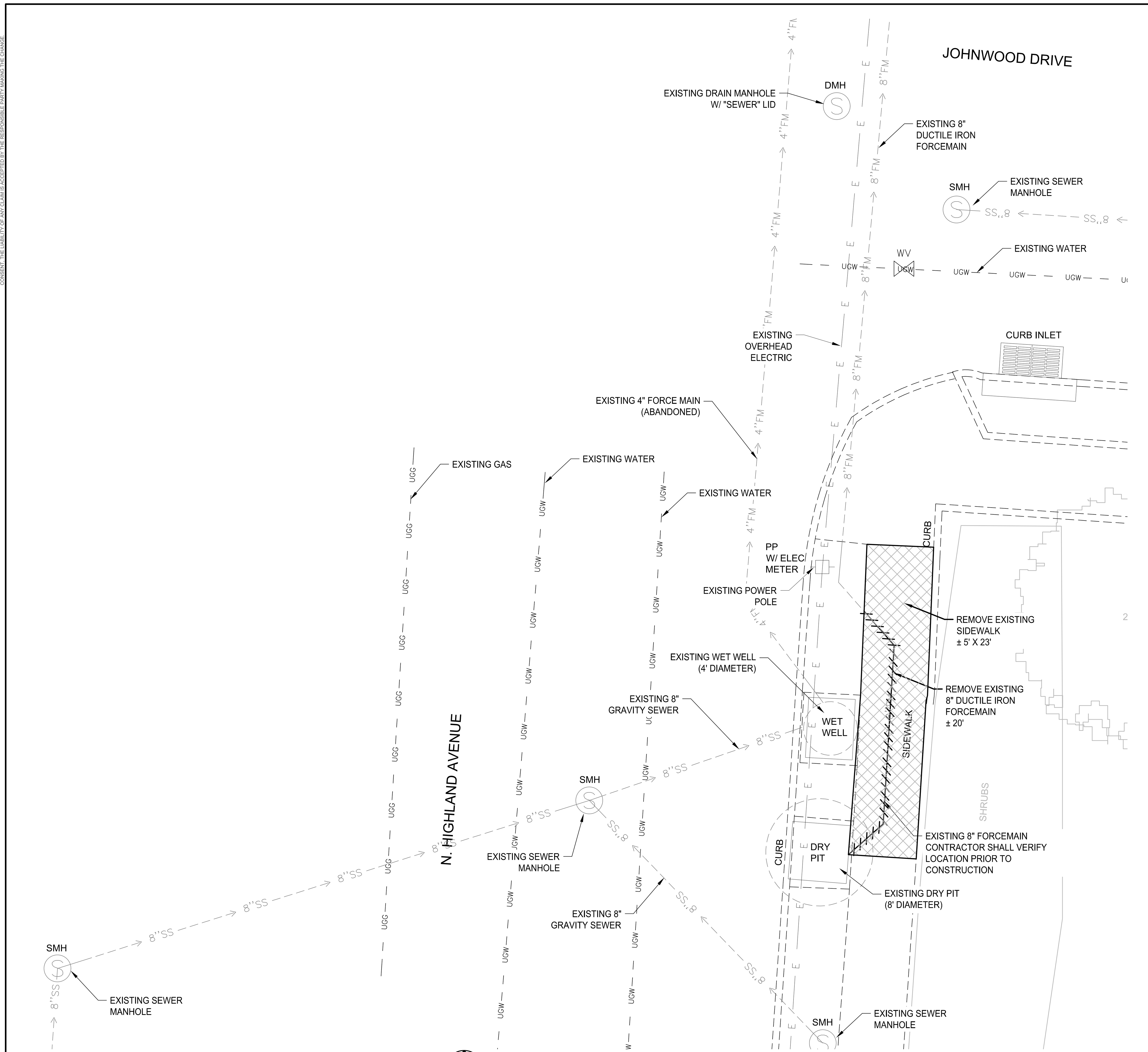
DWG NO. C0.0

DIVISION OF ENGINEERING
GENERAL NOTES
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

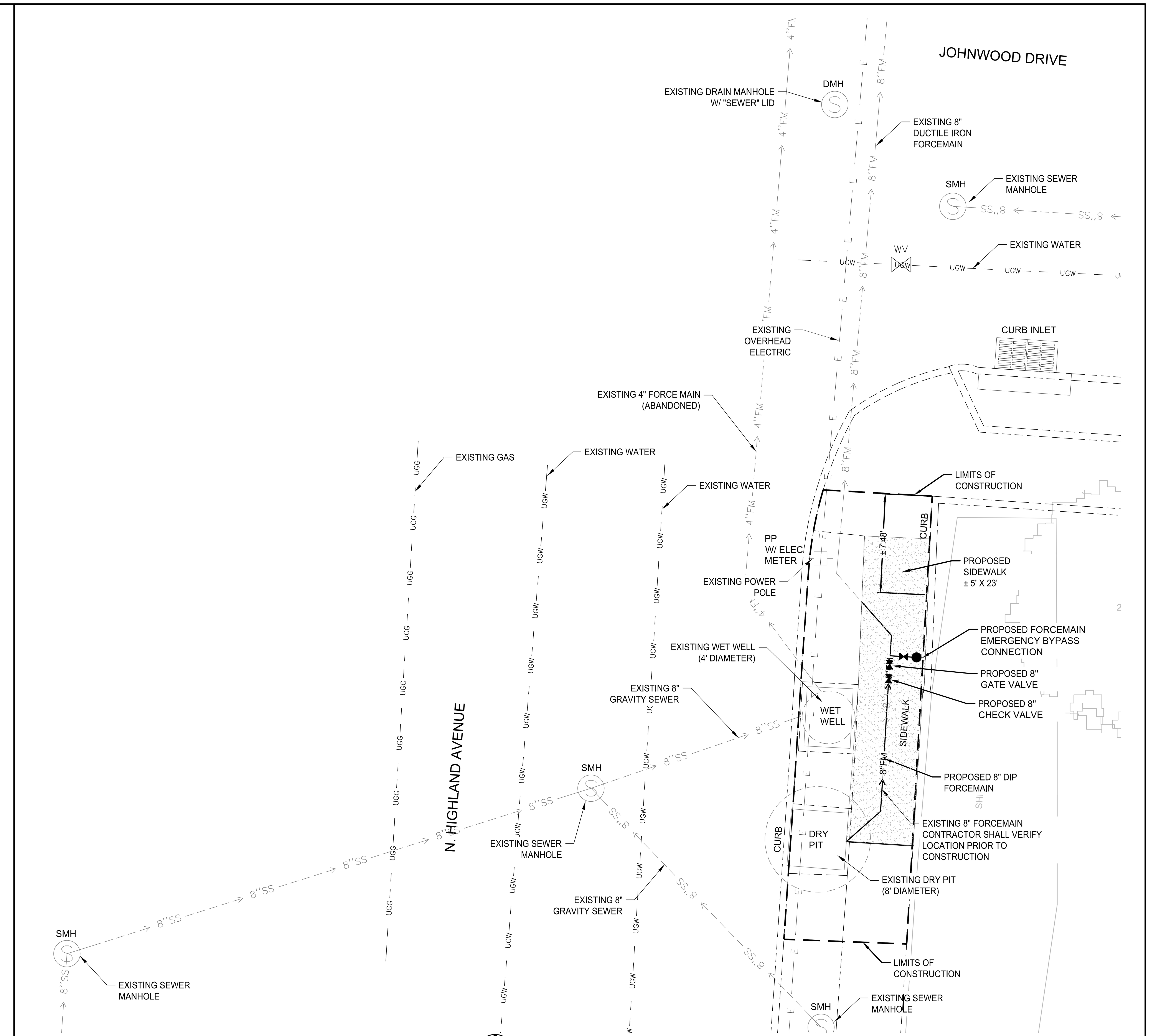
SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER ______ DATE ______

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Highland Project\C0.0 - NOTES.dwg
Wed, 21 Aug 2024 - 4:45pm



C1 — DEMO PLAN
1" = 5'



C4 — SITE PLAN
NTS

APPROVED FOR CONSTRUCTION

THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE CITY OF MEMPHIS DIVISION OF ENGINEERING UNDER AUTHORITY DELEGATED BY THE **TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF WATER POLLUTION CONTROL.** IT IS HEREBY APPROVED FOR CONSTRUCTION BY THE CITY ENGINEER AS EVIDENCED BY HIS SIGNATURE IN THE TITLE BLOCK BELOW.

APPROVAL EXPIRES 1 YEAR FROM APPROVAL DATE BELOW. THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE CITY ENGINEER THAT THE APPROVED FACILITIES WILL REACH THE DESIRED GOALS.

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0290F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

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Lakeland, TN 38002
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www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — AGRICULTURE COMMERCE — No. 106024 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

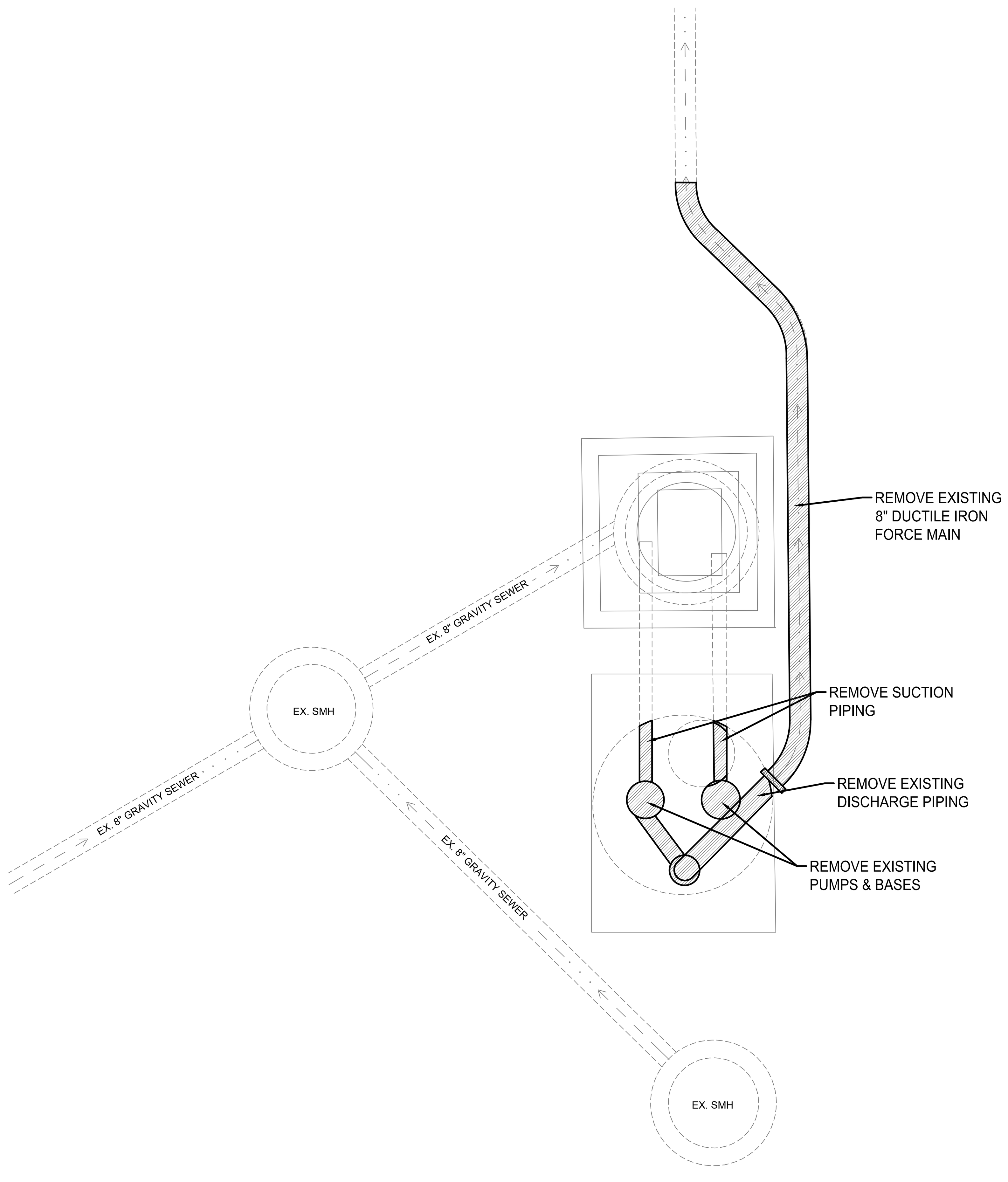
SEWER BASIN ID: WS04-2
SHEET __ OF __

DWG NO.
C2.0

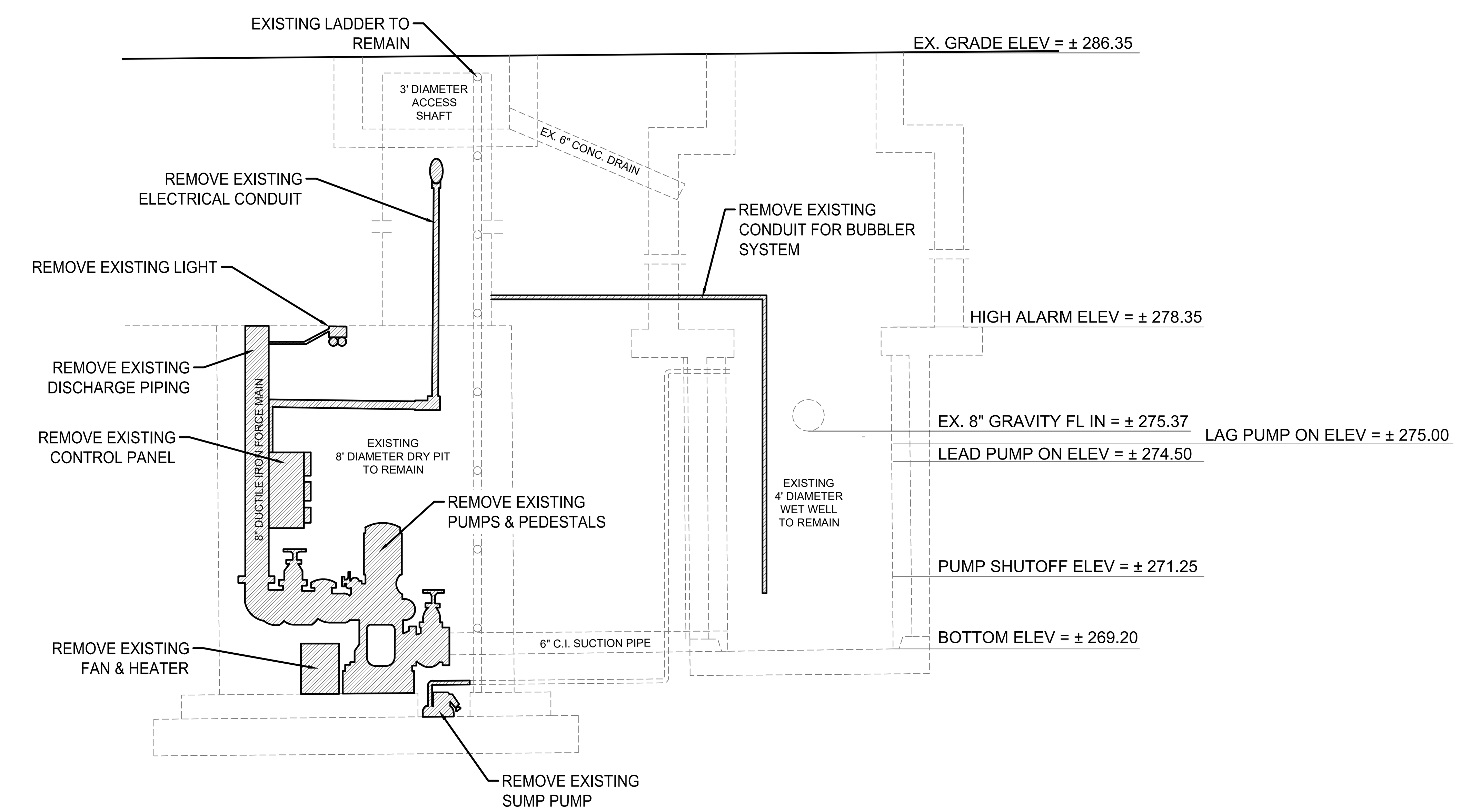
DIVISION OF ENGINEERING
SITE PLAN
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE



LIFT STATION PLAN VIEW



LIFT STATION ELEVATION

D1 NTS — LIFT STATION DEMO PLAN — NORTH

RECORD DRAWINGS PROVIDED BY THE CITY OF MEMPHIS
TITLED : HIGHLAND HEIGHTS SEWER DISTRICT
JOHNSONWOOD PUMPING STATION
(SHEET 2 OF 2)
DATED: 05-17-68

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

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REVISIONS

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JAIME M. BOSTICK — REGISTERED ENGINEER — AGRICULTURE COMMERCE — No. 106024 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

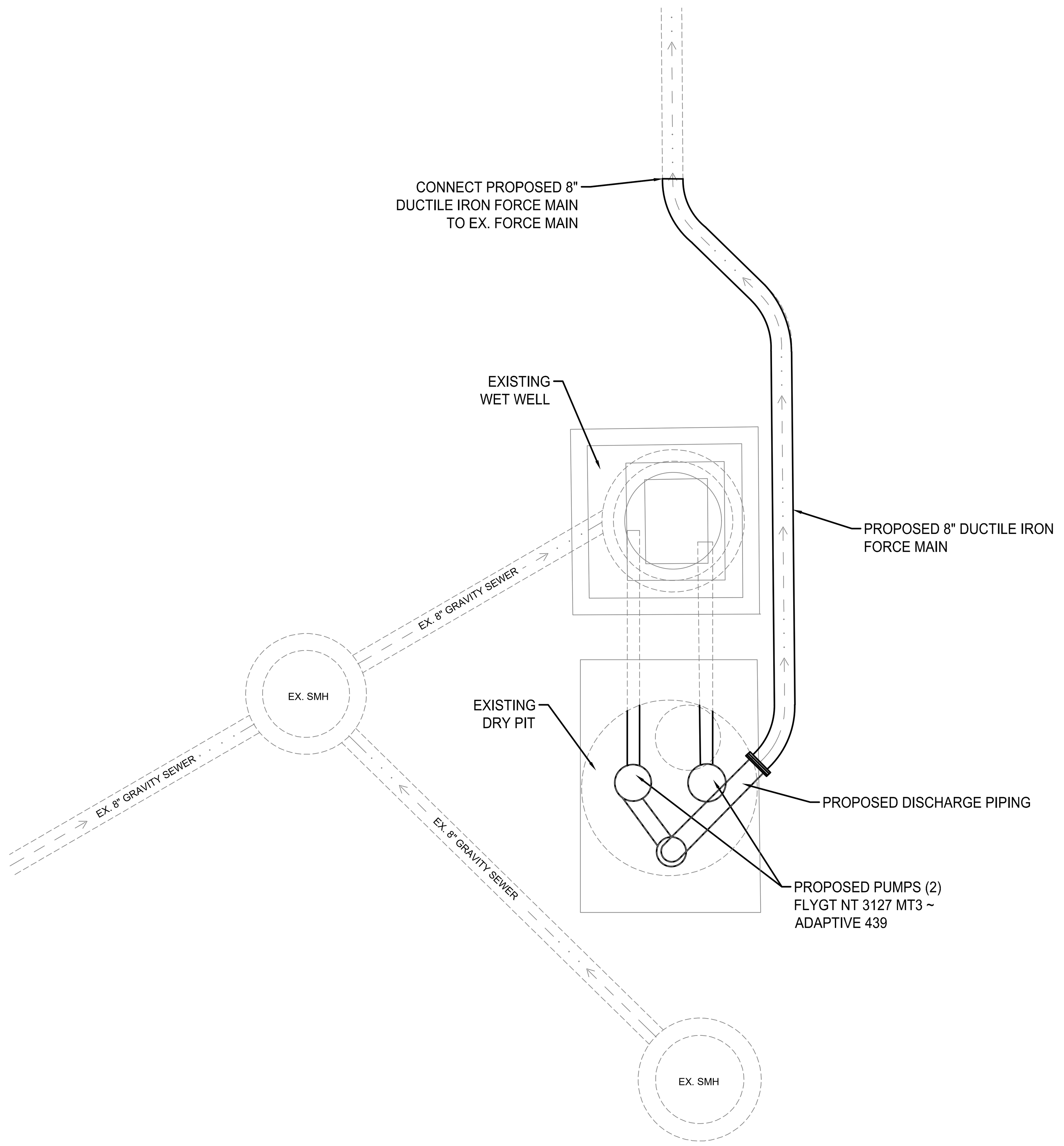
SEWER BASIN ID: WS04-2
SHEET __ OF __

DWG NO. C6.0

DIVISION OF ENGINEERING
LIFT STATION EXISTING CONDITIONS
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

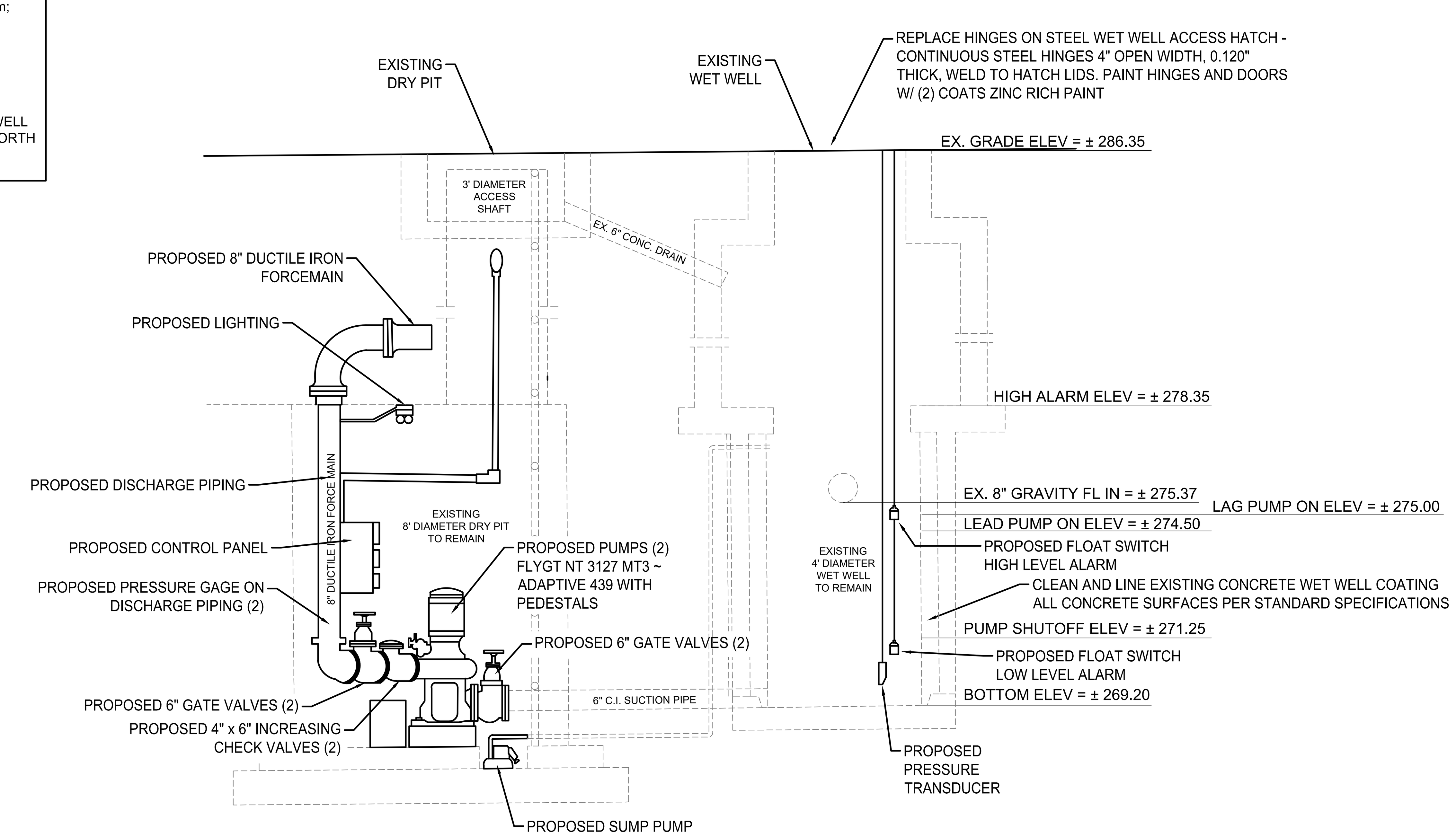
SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE



LIFT STATION PLAN VIEW

NOTES:
1. PROPOSED PUMPS SHALL BE:
   FLYGT NT 3127 MT3 ~ ADAPTIVE 439 (OR APPROVED EQUAL)
   MOTOR NUMBER N3127.070 21-12-4AL-D; 7.5 hp; 1760 rpm;
   3 PHASE; 240V; 60HZ
   515 GPM @ 36' OF HEAD
2. EXISTING BUBBLER SYSTEM SHALL BE REMOVED AND REPLACED WITH PRESSURE TRANSDUCERS AND EMERGENCY HIGH WATER ALARM FLOATS.
3. ALL PROPOSED PIPING TO BE DIP
4. EXISTING ELEVATIONS AT TOP AND BOTTOM OF WET WELL TAKEN FROM "FINAL ASSESSMENT REPORT FOR 360 NORTH HIGHLAND " DATED OCTOBER 29, 2018. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.



LIFT STATION ELEVATION

D1	LIFT STATION ELEVATION
NTS	

APPROVED FOR CONSTRUCTION

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BM #304 HIGHLAND ST. & MIMOSA AVE.
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CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — AGRICULTURE COMMERCE — No. 106024 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: WS04-2
SHEET __ OF __

DWG NO. **C6.1**

DIVISION OF ENGINEERING
LIFT STATION ELEVATION
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER ____ DATE ____

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Highland Project\C6.0 - PUMP STATION PLAN.dwg
Wed, 21 Aug 2024 - 4:45pm

A1 TRAFFIC CONTROL PLAN
1" = 40'

1. SEE SECTION 6F.03, SIGN PLACEMENT, OF THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR INFORMATION ON PLACEMENT AND MOUNTING OF SIGNS.
2. SIGNS SHOWN ON THIS PLAN ARE TO WARN TRAFFIC ABOUT THE CONSTRUCTION. OTHER TRAFFIC CONTROL DEVICES MAY BE REQUIRED DURING VARIOUS PHASES OF CONSTRUCTION.
3. NOTHING IN THIS PLAN IS INTENDED TO SUPERSEDE OR RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF INSTALLING THE APPROPRIATE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE CURRENT STATE OF TENNESSEE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."
4. CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE CITY OF MEMPHIS CONSTRUCTION DEPARTMENT (901-636-2462) AND TRAFFIC ENGINEERING DEPARTMENT (901-636-6710) A MINIMUM OF 24 HOURS PRIOR TO COMMENCING CONSTRUCTION OR IMPLEMENTATION A TRAFFIC CONTROL PLAN. ALL TRAFFIC CONTROL DEVICES MUST BE IN PLACE BEFORE CONSTRUCTION ACTIVITY BEGINS.
5. SIZES OF ALL SIGNS SHALL COMPLY WITH THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
6. ALL TRAFFIC CONTROL DEVICES AND THEIR INSTALLATION SHALL MEET THE STANDARD PRESCRIBED IN THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SHALL COMPLY WITH STATE OF TENNESSEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SECTION 712 TEMPORARY TRAFFIC CONTROL.
7. ACCESS TO ADJACENT PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
8. SIDE STREETS, DRIVEWAY ACCESS, AND BICYCLING AND PEDESTRIAN WAYS (ADA) SHALL BE MAINTAINED AT ALL TIMES.
9. THE CONTRACTOR SHALL NOT BE PERMITTED TO PARK ANY VEHICLES OR CONSTRUCTION EQUIPMENT, DURING PERIODS OF INACTIVITY, WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF THE EDGE OF PAVEMENT WHICHEVER IS LESS, WHEN THE LANE IS OPEN TO TRAFFIC, UNLESS PROTECTED BY GUARDRAIL, BRIDGE RAIL, AND/OR BARRIERS INSTALLED FOR OTHER PURPOSES. PRIVATELY OWNED VEHICLES SHALL NOT BE ALLOWED TO BE PARKED WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF AN OPEN TRAFFIC LANE WHICHEVER IS LESS, AT ANY TIME UNLESS PROTECTED AS DESCRIBED ABOVE.
10. THE CONTRACTOR SHALL USE PLASTIC DRUMS WITH TYPE "A" WARNING LIGHTS TO SEPARATE TRAFFIC FROM THE CONSTRUCTION AREA.
11. THE CONTRACTOR SHALL COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN SIGNS OR DEVICES DURING CONSTRUCTION AND THEY SHALL REMAIN COVERED DURING CONSTRUCTION AND UNTIL SUCH TIME THAT NO CONFLICT EXISTS.
12. TWO-WAY TRAFFIC SHALL BE MAINTAINED ON NORTH HIGHLAND STREET AT ALL TIMES
13. DURING CONSTRUCTION, TWO 10' TRAFFIC LANES AND ONE 5' BIKE LANE SHALL REMAIN OPEN TO NORTHBOUND TRAFFIC AT ALL TIMES, AND TWO 10' TRAFFIC LANES AND ONE 5' BIKE LANE SHALL REMAIN OPEN TO SOUTHBOUND TRAFFIC AT ALL TIMES.
14. ONLY ONE PHASE OF THE TRAFFIC CONTROL PLAN SHALL BE ACTIVE AT ANY ONE TIME.
15. ALL TEMPORARY OR PERMANENT TRAVELED SURFACE SHALL BE INSPECTED DAILY BY THE CONTRACTOR (INCLUDING WEEKENDS) AND NECESSARY PATCHING OR RE-FINISHING PERFORMED.
16. MARKINGS SHALL BE MAINTAINED IN LONG-TERM STATIONARY WORK AREAS AND SHALL MATCH AND MEET THE MARKINGS IN PLACE AT BOTH ENDS OF THE WORK AREA.
17. LANE LINES SHOULD BE PLACED, REPLACED, ORE DELINEATED WHERE APPROPRIATE BEFORE THE ROADWAY IS OPENED TO TRAFFIC.
18. CONTRACTOR SHALL CONTACT THE CITY OF MEMPHIS SIGNAL SHOP AT (901-528-2844) FOR LOCATION OF SIGNAL CONDUIT AND WIRES.
19. THE APPROPRIATE TRAFFIC CONTROL SHALL BE INSTALLED AT THE INCEPTION OF EACH STAGE OF CONSTRUCTION AND SHALL BE PROPERLY MAINTAINED AND/OR OPERATED DURING THE TIME SUCH SPECIAL CONDITIONS EXIST. THEY SHALL REMAIN IN PLACE ONLY AS LONG AS THEY ARE NEEDED AND SHALL BE IMMEDIATELY REMOVED THEREAFTER.
20. OBLITERATED MARKINGS SHALL BE UNIDENTIFIABLE AS PAVEMENT MARKINGS UNDER DAY OR NIGHT, WET OR DRY CONDITIONS. OVERLAYING EXISTING STRIPES WITH BLACK PAINT OR ASPHALT DOES NOT MEET THE REQUIREMENTS OF COVERING, REMOVAL, OR OBLITERATION; HOWEVER, THE USE OF REMOVABLE, NONREFLECTIVE, PREFORMED TAPE IS PERMITTED WHERE MARKINGS NEED TO BE COVERED TEMPORARILY.
21. EXISTING STRIPING THAT CONFLICTS WITH THE TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING CONSTRUCTION. WHEN CONSTRUCTION IS COMPLETE THE EXISTING STRIPING SHALL BE RETURNED TO ITS ORIGINAL STATE.
22. ALL TRAFFIC CONTROL SIGNS SHALL MEET THE MINIMUM RETROREFLECTIVITY LEVELS SPECIFIED IN THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
23. ALL TEMPORARY STRIPING SHALL BE PREFORMED TAPE.
25. THE CONTRACTOR IS PROHIBITED FROM CLOSING THE EXISTING SIDEWALK OUTSIDE THE AREA INDICATED ON THIS PLAN AT ANY TIME DURING THIS PROJECT. IF ANY ADDITIONAL SIDEWALK CLOSURE IS NEEDED, A REVISED TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO AND APPROVED BY THE CITY ENGINEER'S OFFICE.
26. THE CONTRACTOR SHALL NOTIFY MEMPHIS AREA TRANSIT AUTHORITY (MATA) AT (901-722-7100) A MINIMUM OF 48 HOURS PRIOR TO IMPLEMENTING A TRAFFIC CONTROL PLAN.

ADVISORY SPEED SHALL BE 35 MPH
EXISTING TRAFFIC LANE WIDTH = 10'
EXISTING BIKE LANE WIDTH = 5'
LANE SHIFT TAPER LENGTH = 150'
DURATION OF TRAFFIC CONTROL = 4 WEEKS
ALL STRIPING SHOWN IS TEMPORARY

D1 TRAFFIC CONTROL NOTES PHASE 1 OF 1
NTS

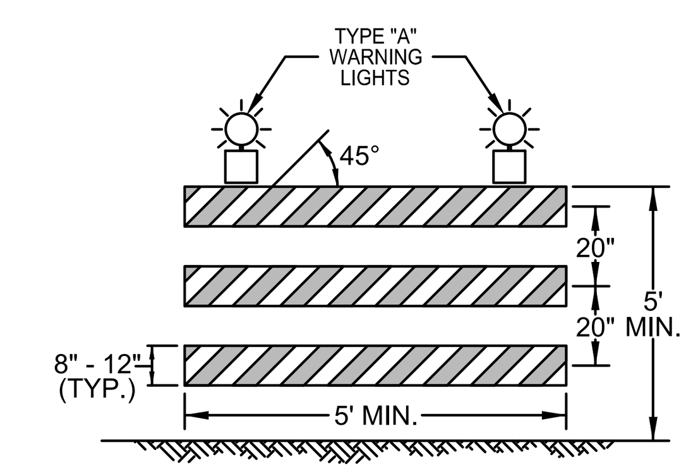
NORTH

GRAPHIC SCALE: 1" = 40'
40 0 40

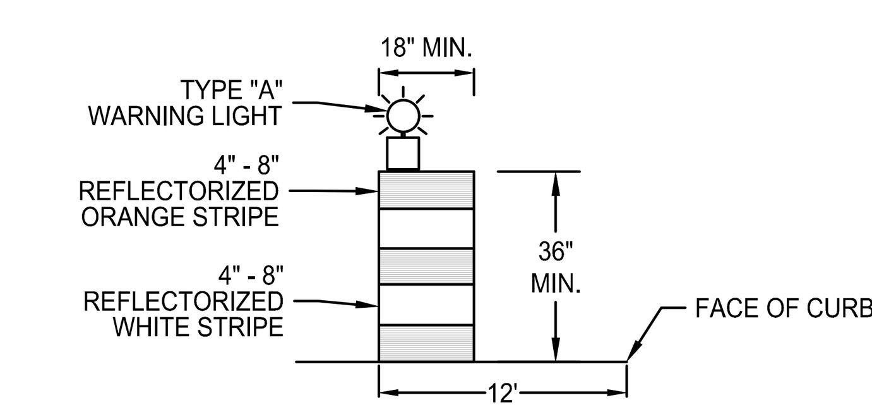
- CHANNELIZING DRUM WITH TYPE "A" LIGHTS
- TYPE III BARRICADE WITH TYPE "A" LIGHTS
- TUBULAR MARKERS
- TEMPORARY BIKE LANE MARKER
- TEMPORARY STRAIGHT ARROWS
- ACTIVE WORK ZONE

SSW - TEMPORARY SINGLE SOLID WHITE
SSY - TEMPORARY SINGLE SOLID YELLOW
DSY - TEMPORARY DOUBLE SOLID YELLOW

C3 LEGEND
NTS



C4 TYPE III BARRICADE
NTS



C5 CHANNELIZING DRUM
NTS

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

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A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK
REGISTERED ENGINEER
AGRICULTURE COMMERCE
No. 106024
STATE OF TENNESSEE
8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

PROJECT DURATION = 4 WEEKS
DESIGN SPEED = 35 MPH

SEWER BASIN ID: WS04-2
SHEET 1 OF 2

DWG NO.
C7.0

DIVISION OF ENGINEERING
TRAFFIC CONTROL PLAN
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Temp Traffic Control_SJ21117.02 - TTCP - Highland.dwg
Wed, 21 Aug 2024 - 4:45pm

A1 — TRAFFIC CONTROL PLAN
1" = 20'

1. SEE SECTION 6F.03, SIGN PLACEMENT, OF THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR INFORMATION ON PLACEMENT AND MOUNTING OF SIGNS.
2. SIGNS SHOWN ON THIS PLAN ARE TO WARN TRAFFIC ABOUT THE CONSTRUCTION. OTHER TRAFFIC CONTROL DEVICES MAY BE REQUIRED DURING VARIOUS PHASES OF CONSTRUCTION.
3. NOTHING IN THIS PLAN IS INTENDED TO SUPERSEDE OR RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF INSTALLING THE APPROPRIATE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE CURRENT STATE OF TENNESSEE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."
4. CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE CITY OF MEMPHIS CONSTRUCTION DEPARTMENT (901-636-2462) AND TRAFFIC ENGINEERING DEPARTMENT (901-636-6710) A MINIMUM OF 24 HOURS PRIOR TO COMMENCING CONSTRUCTION OR IMPLEMENTATION A TRAFFIC CONTROL PLAN. ALL TRAFFIC CONTROL DEVICES MUST BE IN PLACE BEFORE CONSTRUCTION ACTIVITY BEGINS.
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7. ACCESS TO ADJACENT PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
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ADVISORY SPEED SHALL BE 35 MPH
EXISTING TRAFFIC LANE WIDTH = 10'
EXISTING BIKE LANE WIDTH = 5'
LANE SHIFT TAPER LENGTH = 150'
DURATION OF TRAFFIC CONTROL = 4 WEEKS
ALL STRIPING SHOWN IS TEMPORARY

D1 — TRAFFIC CONTROL NOTES PHASE 1 OF 1
NTS

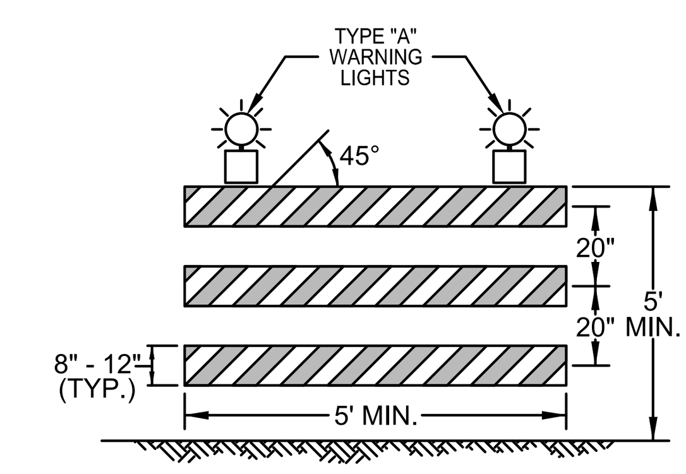
NORTH — GRAPHIC SCALE: 1" = 20' (20, 0, 20)

C3 LEGEND
NTS

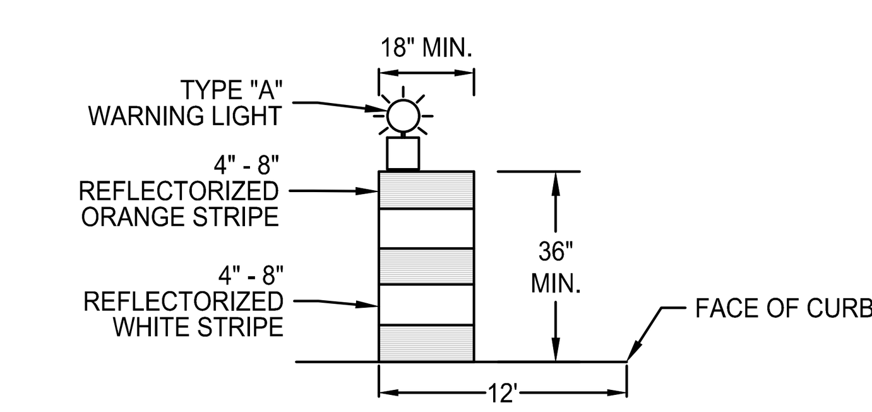
- CHANNELIZING DRUM WITH TYPE "A" LIGHTS
- TYPE III BARRICADE WITH TYPE "A" LIGHTS
- TUBULAR MARKERS
- TEMPORARY BIKE LANE MARKER
- TEMPORARY STRAIGHT ARROWS
- ACTIVE WORK ZONE

SSW - TEMPORARY SINGLE SOLID WHITE
SSY - TEMPORARY SINGLE SOLID YELLOW
DSY - TEMPORARY DOUBLE SOLID YELLOW

C4 TYPE III BARRICADE
NTS



C5 CHANNELIZING DRUM
NTS



BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0290F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

A2H
ENGINEERS · ARCHITECTS · PLANNERS
3009 Davies Plantation Road, Lakeland, TN 38002 — 901.372.0404 — www.A2H.com

CONSTRUCTION DOCUMENTS

REVISIONS		
ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — No. 106024 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

PROJECT DURATION = 4 WEEKS
DESIGN SPEED = 35 MPH

SEWER BASIN ID: WS04-2
SHEET 2 OF 2

DWG NO. **C7.1**

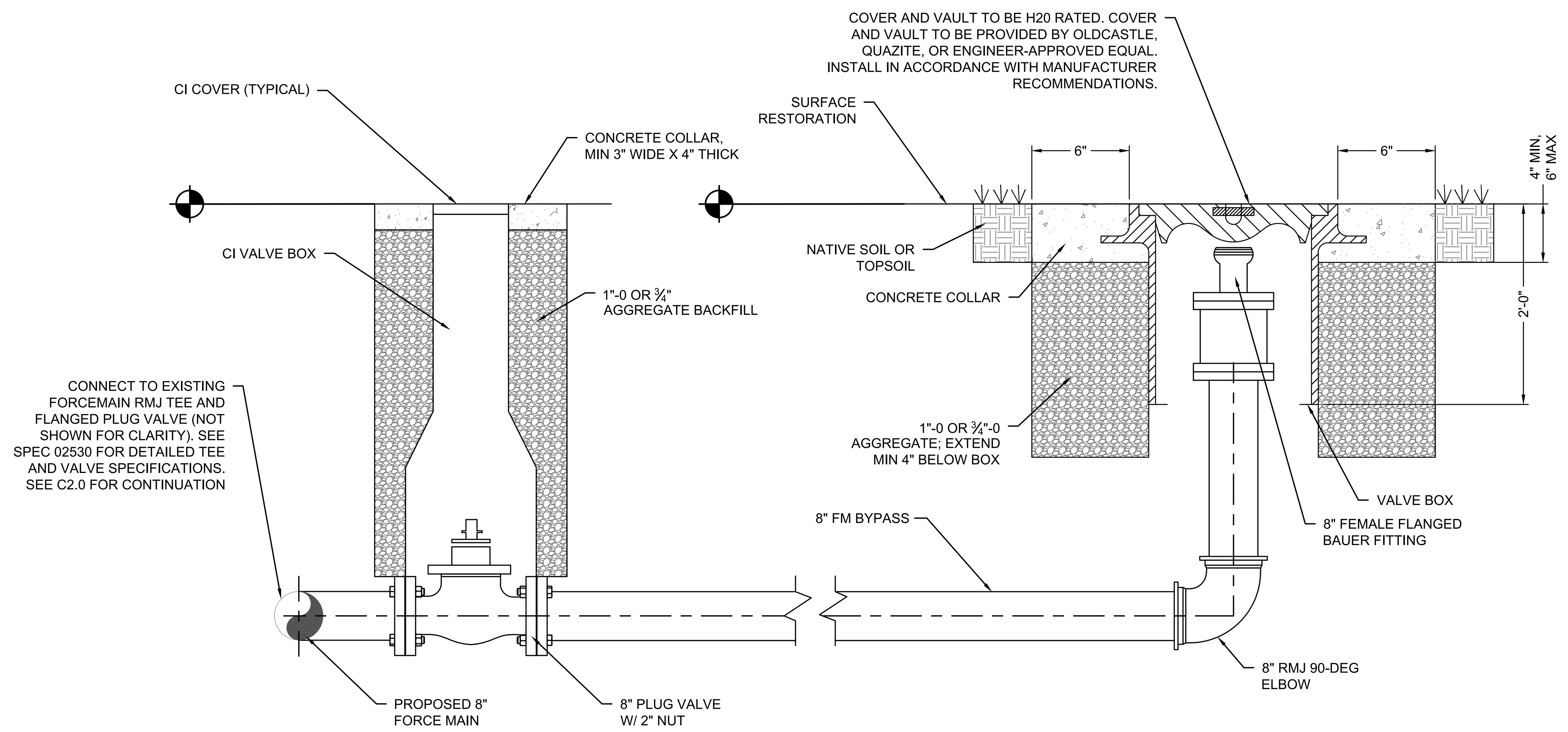
DIVISION OF ENGINEERING
TRAFFIC CONTROL PLAN
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC — DATE: 08/2021 — PROJECT: 21117.02
DESIGN BY: A2H, INC — DATE: 09/2022 — SCALE: AS NOTED
REVIEWED BY:

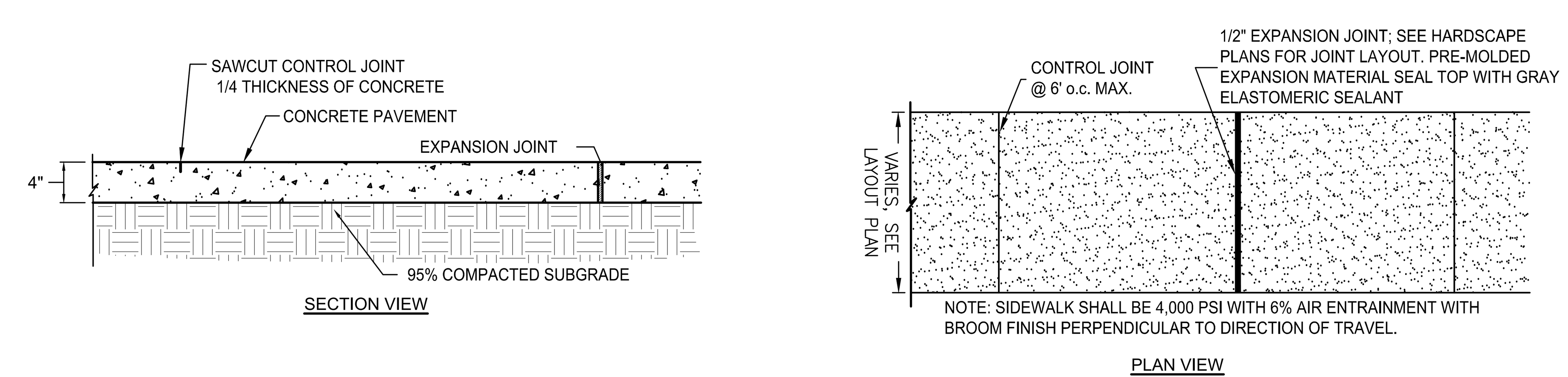
CITY ENGINEER — DATE

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Temp Traffic Control_SJ21117.02 - TTCP - Highland.dwg
Wed, 21 Aug 2024 - 4:45pm

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Highland Project\C10.0 - DETAILS.dwg
Wed, 21 Aug 2024 - 4:45pm



B1 FORCE MAIN EMERGENCY BYPASS CONNECTION
NTS



C1 CONCRETE SIDEWALK
NTS

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

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3009 Davies Plantation Road
Lakeland, TN 38002
901.372.0404
www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — STATE OF TENNESSEE — No. 106024 — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

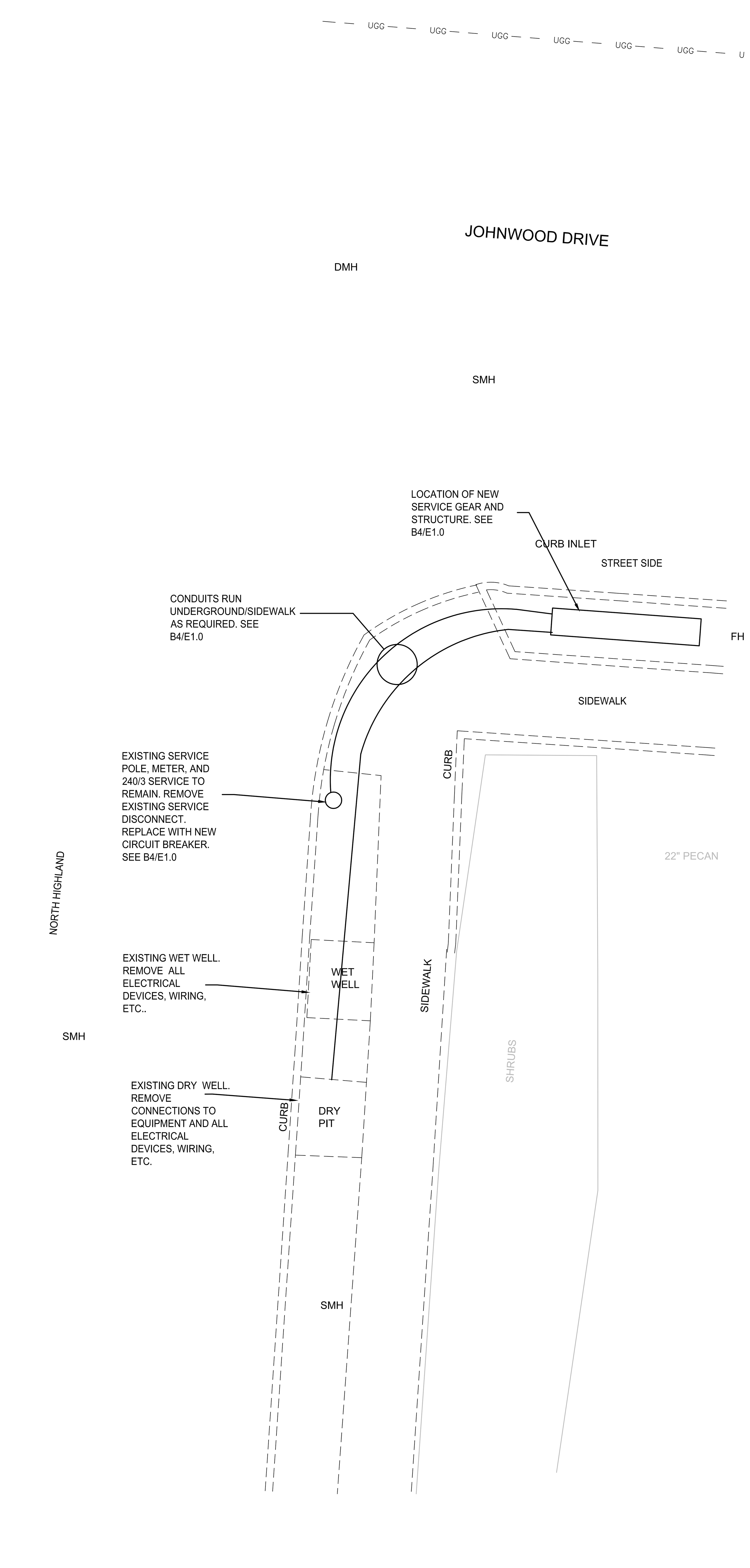
SEWER BASIN ID: WS04-2
SHEET __ OF __

DWG NO.
C10.0

DIVISION OF ENGINEERING
LIFT STATION DETAILS
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE



D1 ELECTRICAL SITE PLAN
1" = 5'

ELECTRICAL GENERAL NOTES:

1. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALSNECESSARY FOR A COMPLETE AND FULLY OPERATIONAL ELECTRICAL SYSTEM/INSTALLATION.

2. MATERIALS AND INSTALLATION SHALL COMPLY WITH ALL CODES, LAWS, AND ORDINANCES OF FEDERAL, STATE, AND LOCAL GOVERNING BODIES HAVING JURISDICTION.

3. ALL MATERIALS AND EQUIPMENT SHALL BE LISTED AND/OR LABELED BY U.L., ETL, CSA, OR ANOTHER RECOGNIZED TESTING LABORATORY.

4. THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS, INSPECTIONS, GOVERNMENTAL FEES, TAXES AND LICENSES NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF ALL ELECTRICAL WORK.

5. ALL FEES ASSESED BY MEMPHIS LIGHT, GAS, AND WATER DIVISION IN CONNECTION WITH THE NEW SERVICE WILL E PAID BY THE OWNER DIRECTLY TO MLGW.

6. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO GOVERNMENTAL AGENCIES, UTILITY COMPANIES, AND LOCAL CODE OFFICIALS, SHOP DRAWINGS AND/OR INSTALLATION DETAILS WHICH ARE REQUIRED BY THESE AGENCIES FOR THEIR APPROVAL.

7. THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER IN WRITING OF ANY MATERIALS OR APPARATUS BELIEVED TO BE INADEQUATE, UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES, RULES, OR REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.

8. ALL NEW ELECTRICAL WORK OR MODIFICATIONS TO EXISTING ELECTRICAL DISTRIBUTION PANELS, PANELBOARDS, ETC. SHALL BE INSTALLED AS INDICATED ON THE ELECTRICAL CONSTRUCTION DOCUMENTS. CONTRACTOR . SHALL SUBMIT SHOP DRAWINGS OF ALL EQUIPMENT TO BE INSTALLED INDICATING ELEVATIONS, AND ALL DIMENSIONS FOR APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION. CODE REQUIRED CLEARANCES IN FRONT OF ALL ELECTRICAL EQUIPMENT SHALL BE MAINTAINED AT ALL TIMES.

9. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE CONTRACT DOCUMENTS, MAKE A SCHEDULED ARRANGEMENT WITH THE PROJECT MANAGER TO VISIT THE SITE, AND THOROUGHLY BECOME FAMILIAR WITH LOCAL CONDITIONS RELATING TO THE WORK. FAILURE TO DO SO WILL NOT RELIEVE THE CONTRACTOR OF THE OBLIGATIONS OF THE CONTRACT.

10. THE CONTRACTOR SHALL PROVIDE TEMPORARY POWER AND WIRING FOR THE PERFORMANCE OF ALL TRADES, FOR THE ENTIRE PERIOD OF CONSTRUCTION AND SHALL REMOVE ALL TEMPORARY WIRING AT THE COMPLETION OF CONSTRUCTION. ALL COSTS FOR ESTABLISHING AND REMOVING TEMPORARY POWER SHALL BE INCLUDED IN BID.

11. THE EXISTING ELECTRICAL SYSTEMS ARE TO REMAIN IN SERVICE TO PROVIDE FOR THE OWNER'S EXISTING FUNCTIONS. SHOULD IT BECOME NECESSARY TO SHUT-DOWN ANY SYSTEM OR PORTION OF A SYSTEM, APPROVAL IN WRITING MUST BE OBTAINED FROM THE PROJECT MANAGER AND SHALL BE ONLY FOR THE PERIOD AND TIME AGREED UPON. THE BID IS TO INCLUDE THE COST OF ANY TEMPORARY WIRING AND PREMIUM TIME REQUIRED FOR THE SHUTDOWN. EXISTING ELECTRICAL WORK TO BE DEMOLISHED SHALL BE COORDINATED TO ALLOW MINIMUM DOWN-TIME OF THE STATION.

12. ALL MATERIALS AND EQUIPMENT SHALL BE ERECTED, INSTALLED, TOOLED, CONNECTED, CLEANED, ADJUSTED, TESTED, CONDITIONED, AND PLACED IN SERVICE IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS AND RECOMMENDATIONS.

13. ALL CUTTING, DRILLING, AND PATCHING OF MASONRY, DRYWALL, CONCRETE, STEEL, OR IRON WORK BELONGING TO THE SITE SHALL BE DONE BY THIS CONTRACTOR IN ORDER THAT WORK MAY BE PROPERLY INSTALLED. UNDER NO CONDITIONS MAY STRUCTURAL WORK BE CUT, EXCEPT AT THE DIRECTION OF THE ENGINEER OR THEIR REPRESENTATIVE. ALL PENETRATIONS SHALL BE SEALED WITH APPROVED MATERIAL.

14. SHOP DRAWINGS SHALL INCLUDE MANUFACTURER'S NAMES, CATALOG NUMBERS, CUTS, DIAGRAMS, AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND REVIEW THE EQUIPMENT.

15. CONTRACTOR SHALL PROVIDE "AS-BUILT" DOCUMENTATION AND HARD COPY REPRODUCIBLE DRAWINGS AT THE COMPLETION OF THE PROJECT AND SUBMIT TO THE ARCHITECT AND THE ENGINEER. AS-BUILT DRAWINGS SHALL INDICATE EXACT CIRCUIT NUMBERS, LOCATIONS OF ALL DEVICES, CEILING FIXTURES, AND RACEWAY FOR LIGHTING, TELECOMMUNICATIONS AND POWER DISTRIBUTION SYSTEMS AS INSTALLED.

16. ALL MATERIAL, EQUIPMENT, WIRING DEVICES, ETC. SHALL BE NEW AND OF COMMERCIAL GRADE UNLESS SPECIFICALLY INDICATED AS EXISTING TO BE REUSED ON DRAWINGS.

17. EXCEPT AS NOTED OTHERWISE, ALL WORK REQUIRED FOR THE ELECTRICAL INSTALLATION AS SHOWN ON DRAWINGS SHALL INCLUDE ALL LABOR, INSTALLATION METHODS, EQUIPMENT, AND MATERIALS AND SHALL BE IN STRICT COMPLIANCE WITH ALL BUILDING STANDARDS.

18. PROVIDE A COMPLETE METAL RACEWAY SYSTEM, FITTINGS AND ENCLOSURES FOR ALL ELECTRICAL WIRING SYSTEMS TO BE INSTALLED FOR THE PROJECT.

19. MINIMUM CONDUIT SIZE SHALL BE 3/4 INCH. ALL CONDUIT SHALL BE GALVANIZED RIGID STEEL WITH APPROPRIATE FITTINGS AND CAST BOXES WHERE REQUIRED.

20. WIRE NUMBER 8 AND SMALLER FOR USE IN INTERIOR DRY LOCATIONS SHALL BE TYPE THWN THERMOPLASTIC 600 VOLT INSULATED COPPER CONDUCTORS. FEEDERS AND POWER WIRING NUMBER 6 AND LARGER SHALL BE TYPE THW 600 VOLT INSULATED COPPER. WIRE WHICH IS INSTALLED IN RACEWAY IN MOIST OR DAMP LOCATIONS SHALL BE THW, 600 VOLT INSULATED COPPER CONDUCTORS. NO WIRE SMALLER THAN NUMBER 12 AWG SHALL BE USED FOR LIGHTING OR POWER.

24. THE CONTRACTOR SHALL PROVIDE A NEW TYPEWRITTEN PANEL DIRECTORY FOR EACH PANEL AT THE COMPLETION OF THE PROJECT. EACH CIRCUIT BREAKER SHALL BE LABELLED TO IDENTIFY LOAD TYPE AND LOCATION.

25. PERFORM ALL WORK OF A DEMOLITION NATURE THAT MAY BE REQUIRED OR NECESSARY FOR THE FULL AND COMPLETE EXECUTION OF THE WORK, WHETHER EXPLICITLY SHOWN AND/OR SPECIFIED OR NOT. EXACT EXTENT OF DEMOLITION WILL NOT BE FULLY INDICATED BY DRAWINGS. DETERMINE THE NATURE AND EXTENT OF DEMOLITION THAT WILL BE NECESSARY BY COMPARING THE CONTRACT DOCUMENTS WITH ARCHITECTURAL AND DEMOLITION DRAWINGS TO EXISTING CONDITIONS. ELECTRICAL EQUIPMENT WHICH WILL NOT BE REUSED SHALL BE TURNED OVER TO THE OWNER OR REMOVED FROM THE PREMISES AS DETERMINED BY THE PROJECT MANAGER.

26. ANY EXISTING ELECTRICAL MATERIAL AND EQUIPMENT WHICH INTERFERES WITH THE NEW WORK SHALL BE REMOVED OR RELOCATED BY THE CONTRACTOR. VERIFY REMOVAL AND NEW LOCATION OF EQUIPMENT WITH THE PROJECT MANAGER AND THE ARCHITECT/ENGINEER PRIOR TO WORK.

27. VERIFY CLEARANCES FOR ALL NEW OR EXISTING RELOCATED ELECTRICAL WORK BEFORE PROCEEDING WITH CONSTRUCTION. COORDINATE USAGE OF AVAILABLE SPACE WITH ALL TRADES. IN THE EVENT OF CONFLICTS, NOTIFY THE ARCHITECT AND ENGINEER BEFORE PROCEEDING WITH THE WORK.

28. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THESE DRAWINGS. WHERE MORE STRINGENT REQUIREMENTS THAN THOSE DESCRIBED HEREIN OR AS SET FORTH UNDER CODES, LAWS, AND ORDINANCES OF FEDERAL, STATE, AND LOCAL GOVERNING BODIES HAVING JURISDICTION, THOSE GREATER REQUIREMENTS SHALL BE ADHERED TO.

29. EXISTING CONDITIONS OF ALL EXISTING BUILDING EQUIPMENT, DEVICES, FIXTURES, AND SYSTEMS THAT REQUIRE REWIRING, REUSE, RELOCATION, OR REFURBISHING AS PER DRAWINGS AND SPECIFICATIONS SHALL BE FIELD VERIFIED BY THE E.C. PRIOR TO COMMENCEMENT OF ANY WORK TO BE COMPLETELY OPERATIONAL. E.C. SHALL SUBMIT A WRITTEN STATEMENT AND ITEMIZED LISTING OF ALL EXISTING CONDITIONS OF THE FOLLOWING, ALTHOUGH NOT LIMITED TO THOSE LISTED:

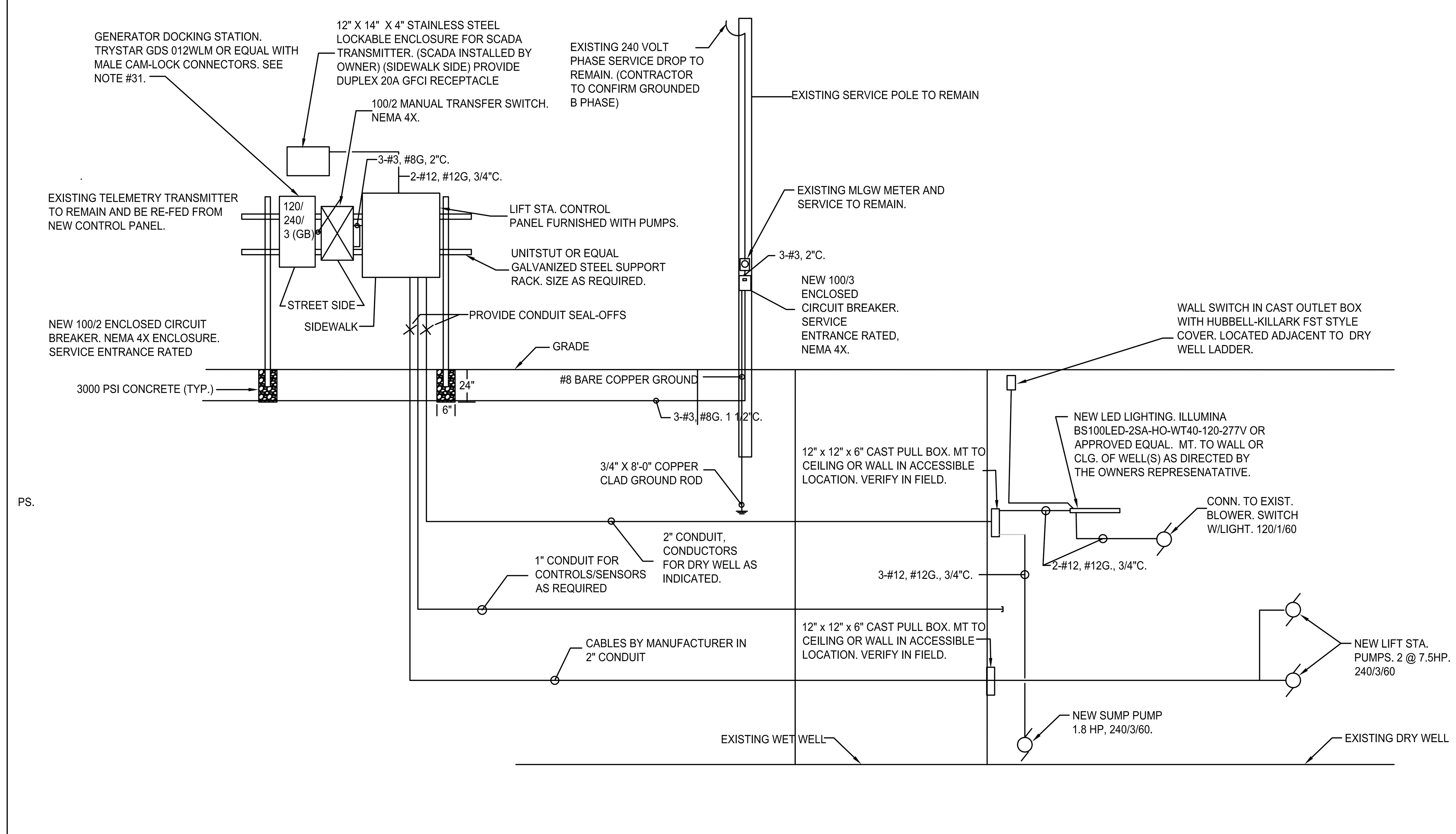
THE WRITTEN STATEMENT SHALL BE SUBMITTED TO THE PROJECT MGR. PRIOR TO WORK. IN THE EVENT THAT THE CONTRACTOR COMMENCES WORK WITHOUT SUBMITTAL, THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY AND COST TO MAINTAIN THE ABOVE IN GOOD WORKING ORDER AND CONDITION.

30. CONTRACTOR SHALL REFER TO CIVIL ENGINEERING DRAWINGS FOR EXACT LOCATIONS OF ALL NEW EQUIPMENT.

31. GENERATOR CONNECTION BOX SHALL BE PROVIDED WITH ENGRAVED IDENTIFICATION PLAQUE (RED/WHITE LETTERS) WITH VOLTAGE AND PHASE CONFIGURATION OF STATION AS INDICATED. LETTERS TO BE 3" IN HEIGHT. NAMEPLATE SCREWED TO BOX USING STAINLESS STEEL SCREWS.

D3 ELECTRICAL GENERAL NOTES
NTS

PS.



B4 ELECTRICAL RISER DIAGRAM
NTS

BM #304 HIGHLAND ST. & MIMOSA AVE.
CITY MONUMENT IS LOCATED ON THE NE COR., AT BACK OF S/WALK P.I.
301.08

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Lakeland, TN 38002
901.372.0404
www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

STEPHEN ... STATE OF TENNESSEE ... AGRICULTURE COMMERCE No. 107605
8/5/2024

SEWER BASIN ID: WS04-2
SHEET ___ OF ___

DWG NO.
E1.0

DIVISION OF ENGINEERING
ELECTRICAL SITE PLAN
LOCATION: 360 NORTH HIGHLAND
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 09/2022 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

jaime
\\2021\21117.02\2 Civil\Projdwgs\Meadowlark Project\G0.0 - COVER.dwg
Mon, 05 Aug 2024 - 11:32am
PLOT SCALE: 1"=1' LATEST REV.:

LIFT STATION IMPROVEMENTS
For
1217 MEADOWLARK

SEWER ASSESSMENT & REHABILITATION PROGRAM (SARP 10)
CITY OF MEMPHIS, TN

CONSTRUCTION DRAWINGS
AUGUST 5, 2024

VICINITY MAP
SCALE: 1" = 1000'

A2H ENGINEERS ARCHITECTS PLANNERS

GENERAL NOTES

1. ALL DESIGN, CONSTRUCTION AND MATERIAL SHALL BE IN COMPLIANCE WITH THE SEWER ASSESSMENT AND REHABILITATION PROGRAM (SARP10) AND CITY OF MEMPHIS CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. THE CONTRACTOR SHALL NOT ENTER UPON, WORK UPON NOR CAUSE DAMAGE TO ANY ADJACENT PROPERTIES WITHOUT PRIOR PERMISSION FROM SAID PROPERTY OWNER.
3. GRADING AND DRAINAGE: FINISH GRADE SHALL BE SLOPED FOR POSITIVE DRAINAGE.
4. PROPERTY LINES SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION. GRADING, CLEARING, AND THE ERECTION OR REMOVAL OF FENCES ALONG PROPERTY LINES SHALL BE FULLY COORDINATED WITH ADJACENT PROPERTY OWNERS.
5. ALL GRADING WORK SHALL BE PERFORMED IN SUCH A MANNER THAT ADJACENT PROPERTIES ARE NOT DAMAGED OR ADVERSELY AFFECTED.
6. THE LOCATION OF ALL EXISTING UTILITIES SHALL BE PROPERLY VERIFIED PRIOR TO CONSTRUCTION. ALL WORK SHALL BE PERFORMED IN A MANNER TO ENSURE THAT EXISTING UTILITIES ARE NOT INTERFERED WITH OR DISRUPTED.
7. THE CONTRACTOR IS TO INSTALL EROSION AND SEDIMENT CONTROL SYSTEMS AND STRUCTURES AS NECESSARY TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
8. CONTRACTOR IS RESPONSIBLE FOR AND SHALL PAY FOR ALL SURVEY LAYOUT AND STAKING.

CITY OF MEMPHIS TYPICAL CONSTRUCTION NOTES

1. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY ALL THE SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE UTILITY COMPANY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES AND/OR UNDERGROUND STRUCTURES PRIOR TO THE INITIATION OF ANY CONSTRUCTION. CONTRACTOR SHALL ALSO ASSUME FULL RESPONSIBILITY FOR DAMAGE TO ANY UTILITIES ENCOUNTERED WITHIN CONSTRUCTION PERIMETERS. FOR SITE LOCATIONS OF EXISTING UTILITIES INVOLVING M.L.G.&W., SOUTH CENTRAL BELL, AND/OR TEXAS GAS COMPANY, PLEASE CALL 1-800-351-1111. FOR SEWER SERVICE LOCATIONS, CALL 901-636-8025.
2. CONTRACTOR SHALL ENSURE UNINTERRUPTED SEWER SERVICE ON EXISTING SEWER AND SERVICE CONNECTIONS BY PROVIDING AMPLE TEMPORARY WASTEWATER PUMPING AND/OR BYPASSING.
3. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
4. CONTRACTOR SHALL NOTIFY THE SARP10 CONSTRUCTION MANAGER A MINIMUM OF 24 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.
5. ALL AREAS IN CUT OR FILL WHERE VEGETATION HAS BEEN REMOVED SHALL BE SEEDED, MULCHED, FERTILIZED, AND/OR SODDED AS REQUIRED TO PREVENT EROSION.
6. THE CONTRACTOR SHALL VERIFY EXISTING DATA AND REPORT ANY SIGNIFICANT DISCREPANCIES TO THE ENGINEER.
7. ALL SANITARY SEWER TO BE CONSTRUCTED AS PER CITY OF MEMPHIS STANDARD CONSTRUCTION SPECIFICATIONS. SANITARY SEWER SERVICE CONNECTIONS TO BE INSTALLED AS PER CITY OF MEMPHIS STANDARD SST-16.
8. ALL SEWER MANHOLE LIDS IN OPEN AREAS ARE TO BE CONSTRUCTED 1.5' ABOVE PROPOSED GRADE. IN BACKYARDS, MANHOLE LIDS ARE TO BE 1.5' ABOVE INITIAL GRADE, 0.5' ABOVE FINAL GRADE.
9. ALL SANITARY SEWER, INCLUDING SERVICE CONNECTIONS, WHICH HAS LESS THAN 1.5' CLEARANCE (OUTSIDE OF PIPES) WITH DRAINAGE OR IN FILLED AREAS SHALL BE CLASS 50 D.I.P. OR CONCRETE ENCASED, 10' MINIMUM BOTH SIDES OF CROSSING. ALL DUCTILE IRON PIPE (D.I.P.) SHALL BE POLYETHYLENE LINED OR SHALL BE TREATED WITH PROTECTO 401 OR APPROVED EQUIVALENT.
10. THE CITY OF MEMPHIS SHALL HAVE INGRESS/EGRESS RIGHTS TO USE PRIVATE DRIVES AND YARDS FOR THE PURPOSE OF MAINTAINING ALL PUBLIC SEWER LINES AND SHALL BEAR NO RESPONSIBILITY FOR THE MAINTENANCE OF SAID PRIVATE DRIVES AND YARDS.
11. NO TREES, SHRUBS, PERMANENT STRUCTURES, OR OTHER UTILITIES (EXCEPT FOR CROSSINGS) WILL BE ALLOWED WITHIN SANITARY SEWER EASEMENT. NO OTHER UTILITIES OR SERVICES MAY OCCUPY SANITARY SEWER EASEMENTS IN PRIVATE DRIVES AND YARDS EXCEPT FOR CROSSINGS.
12. ALL SANITARY SEWER MANHOLES IN REVERSE CROWN STREETS, ALLEYS, OR DRIVES (PUBLIC OR PRIVATE) SHALL BE PROVIDED WITH GASKETS AND PLUGS FOR PICK HOLES TO PREVENT DRAINAGE INFLOW INTO SEWER SYSTEM.
13. THE CONTRACTOR SHALL PROVIDE ADEQUATE AND EFFECTIVE EROSION CONTROL AS NECESSARY TO PREVENT ANY SILTATION INTO EXISTING DRAINAGE SYSTEM AND/OR ADJACENT PROPERTIES.

DEMOLITION NOTES

1. ALL PUMPS, MOTORS, ETC. REMOVED SHALL BE RETURNED TO MEMPHIS WTCS DEPARTMENT. CONTACT JAMES GREENLEE @ 901-626-0237

B1 GENERAL NOTES
NTS

SEWER CONSTRUCTION NOTES

1. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY ALL OF SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE UTILITY COMPANY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES AND/OR UNDERGROUND STRUCTURES PRIOR TO THE INITIATION OF ANY CONSTRUCTION. CONTRACTOR SHALL ALSO ASSUME FULL RESPONSIBILITY FOR DAMAGE TO ANY UTILITIES ENCOUNTERED WITHIN CONSTRUCTION PERIMETERS. FOR SITE LOCATIONS OF EXISTING UTILITIES INVOLVING M.L.G.& W., SOUTH CENTRAL BELL, TEXAS GAS COMPANY, AND/OR CITY OF MEMPHIS SEWER, PLEASE CALL 811.
2. CONTRACTOR SHALL ENSURE UNINTERRUPTED SEWER SERVICE ON EXISTING SEWER AND SERVICE CONNECTIONS BY PROVIDING AMPLE TEMPORARY WASTEWATER PUMPING AND/OR BYPASSING.
3. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
4. CONTRACTOR SHALL NOTIFY THE CITY OF MEMPHIS CONSTRUCTION INSPECTION OFFICE AT 636-2462 A MINIMUM OF 24 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.
5. ALL AREAS IN CUT OR FILL WHERE VEGETATION HAS BEEN REMOVED SHALL BE SEEDED, MULCHED, FERTILIZED, AND/OR SODDED AS REQUIRED TO PREVENT EROSION.
6. THE CONTRACTOR SHALL VERIFY EXISTING DATA AND REPORT ANY SIGNIFICANT DISCREPANCIES TO THE ENGINEER.
7. ALL SANITARY SEWER TO BE CONSTRUCTED AS PER CITY OF MEMPHIS STANDARD CONSTRUCTION SPECIFICATIONS. SANITARY SEWER SERVICE CONNECTIONS TO BE INSTALLED AS PER CITY OF MEMPHIS STANDARD SST-16.
8. ALL SEWER MANHOLE LIDS IN OPEN AREAS ARE TO BE CONSTRUCTED 1.5' ABOVE PROPOSED GRADE. IN BACKYARDS, MANHOLE LIDS ARE TO BE 1.5' ABOVE INITIAL GRADE, 0.5' ABOVE FINAL GRADE.
9. ALL SANITARY SEWER, INCLUDING SERVICE CONNECTIONS, WHICH HAS LESS THAN 1.5' CLEARANCE (OUTSIDE OF PIPES) WITH DRAINAGE OR IN FILLED AREAS SHALL BE CLASS 50 D.I.P. OR CONCRETE ENCASED, 10' MINIMUM BOTH SIDES OF CROSSING. ALL DUCTILE IRON PIPE (D.I.P.) SHALL BE POLYETHYLENE LINED OR SHALL BE TREATED WITH PROTECTO 401 OR APPROVED EQUIVALENT.
10. THE CITY OF MEMPHIS SHALL HAVE INGRESS/EGRESS RIGHTS TO USE PRIVATE DRIVES AND YARDS FOR THE PURPOSE OF MAINTAINING ALL PUBLIC SEWER LINES AND SHALL BEAR NO RESPONSIBILITY FOR THE MAINTENANCE OF SAID PRIVATE DRIVES AND YARDS.
11. NO TREES, SHRUBS, PERMANENT STRUCTURES OR OTHER UTILITIES (EXCEPT FOR CROSSINGS) WILL BE ALLOWED WITHIN SANITARY SEWER EASEMENT. NO OTHER UTILITIES OR SERVICES MAY OCCUPY SANITARY SEWER EASEMENTS IN PRIVATE DRIVES AND YARDS EXCEPT FOR CROSSINGS.
12. ALL SANITARY SEWER MANHOLES IN REVERSE CROWN STREETS, ALLEYS, OR DRIVES (PUBLIC OR PRIVATE) SHALL BE PROVIDED WITH GASKETS AND PLUGS FOR PICK HOLES TO PREVENT DRAINAGE INFLOW INTO SEWER SYSTEM.
13. THE CONTRACTOR SHALL PROVIDE ADEQUATE AND EFFECTIVE EROSION CONTROL AS NECESSARY TO PREVENT ANY SILTATION INTO EXISTING DRAINAGE SYSTEM AND/OR ADJACENT PROPERTIES.
14. MANHOLES LOCATED WITHIN THE 100-YEAR FLOODPLAIN SHOULD EXTEND A MINIMUM OF 12" (1'-0") ABOVE THE 100-YEAR FLOOD LEVEL IRREGARDLESS OF WHETHER THE MANHOLE IS ON RESIDENTIAL, COMMERCIAL, OR RURAL PROPERTY. A MANHOLE LOCATED WITHIN THE 100-YEAR FLOOD PLAIN MUST HAVE A SEALED COVER AND VENT STACK IF IT EXTENDS LESS THAN THE MINIMUM 12" ABOVE THE100-YEAR FLOOD LEVEL. WITHIN THIS ALTERNATIVE THE VENT STACKS COULD BE LIMITED TO EVERY OTHER MANHOLE IF LOCATED WITHIN A RESIDENTIAL AREA.
15. LOCATIONS OF EXISTING UTILITIES SHOWN WITHIN THESE PLANS ARE APPROXIMATE AND MAY BE NOT ALL-INCLUSIVE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITY COMPANIES TO DETERMINE EXACT LOCATION OF ALL UTILITIES.
16. THE CONTRACTOR WILL PROVIDE ALL NECESSARY PROTECTIVE MEASURES TO SAFEGUARD EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION OF THIS PROJECT. IN THE EVENT THAT SPECIAL EQUIPMENT IS REQUIRED TO WORK OVER AND AROUND THE UTILITIES. THE CONTRACTOR WILL BE REQUIRED TO FURNISH SUCH EQUIPMENT. THE COST OF PROTECTING UTILITIES FROM DAMAGE AND FURNISHING SPECIAL EQUIPMENT WILL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF CONSTRUCTION.
17. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR CONTACTING ALL AFFECTED UTILITIES PRIOR TO SUBMITTING HIS BID, IN ORDER TO DETERMINE THE EXTENT TO WHICH UTILITY RELOCATIONS AND/OR ADJUSTMENTS WILL HAVE UPON THE SCHEDULE OF THE WORK FOR THE PROJECT. SOME UTILITY FACILITIES MAY NEED TO BE ADJUSTED CONCURRENTLY WITH THE CONTRACTOR'S OPERATIONS, WHILE SOME WORK MAY BE REQUIRED "AROUND" UTILITY FACILITIES THAT WILL REMAIN IN PLACE. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACTOR WILL RECEIVE NO ADDITIONAL COMPENSATION FOR ANY DELAYS OR INCONVENIENCE CAUSED BY THE UTILITY ADJUSTMENTS.
18. THE CONTRACTOR SHALL NOTIFY EACH INDIVIDUAL UTILITY OWNER OF HIS PLAN OF OPERATION IN THE AREA OF THE UTILITIES. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL CONTACT THE UTILITY OWNERS AND REQUEST THEM TO PROPERLY LOCATE THEIR RESPECTIVE UTILITY ON THE GROUND. THIS NOTIFICATION SHALL BE GIVEN AT LEAST THREE (3) BUSINESS DAYS PRIOR TO COMMENCEMENT OF OPERATIONS AROUND THE UTILITY.

B3 SEWER CONSTRUCTION NOTES
NTS

CIVIL	
Sheet Number	Sheet Name
G0.0	COVER
C0.0	GENERAL NOTES
C2.0	SITE PLAN
C6.0	LIFT STATION EXISTING CONDITIONS
C6.1	LIFT STATION SECTION
C7.0	TRAFFIC CONTROL PLAN
C7.1	TRAFFIC CONTROL PLAN
C10.0	LIFT STATION DETAILS
E1.0	ELECTRICAL SITE PLAN

C1 SHEET INDEX
NTS

SYMBOL LEGEND
IRON PIN
STORM CLEANOUT
SINGLE POLE SIGN
FIRE HYDRANT
WATER VALVE
MANHOLE
ELECTRIC METER
ELECTRIC BOX
POWER POLE
SEWER CLEAN OUT
WATER METER
LIGHT POLE w/ CONC BASE
POWER POLE W/LIGHT
BOLLARD
TELEPHONE JUNCTION BOX
TELEPHONE MANHOLE
GAS METER
CATCH BASIN
6-72 INLET
SPOT ELEV
GAS VALVE
SANITARY SEWER MANHOLE
WIRE ANCHOR
FIRE DEPARTMENT CONNECTION
AUTO SPEAKER
PEDESTRAIN LIGHT
BACKFLOW PREVENTER
ROOFDRAIN/DOWNSPOUT

D1 SYMBOL LEGEND
NTS

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0420F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

A2H
ENGINEERS • ARCHITECTS • PLANNERS
3009 Davies Plantation Road
Lakeland, TN 38002
901.372.0404
www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS		
ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK
REGISTERED ENGINEER
AGRICULTURE COMMERCE
No. 106024
STATE OF TENNESSEE
8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: NS05
SHEET ___ OF ___

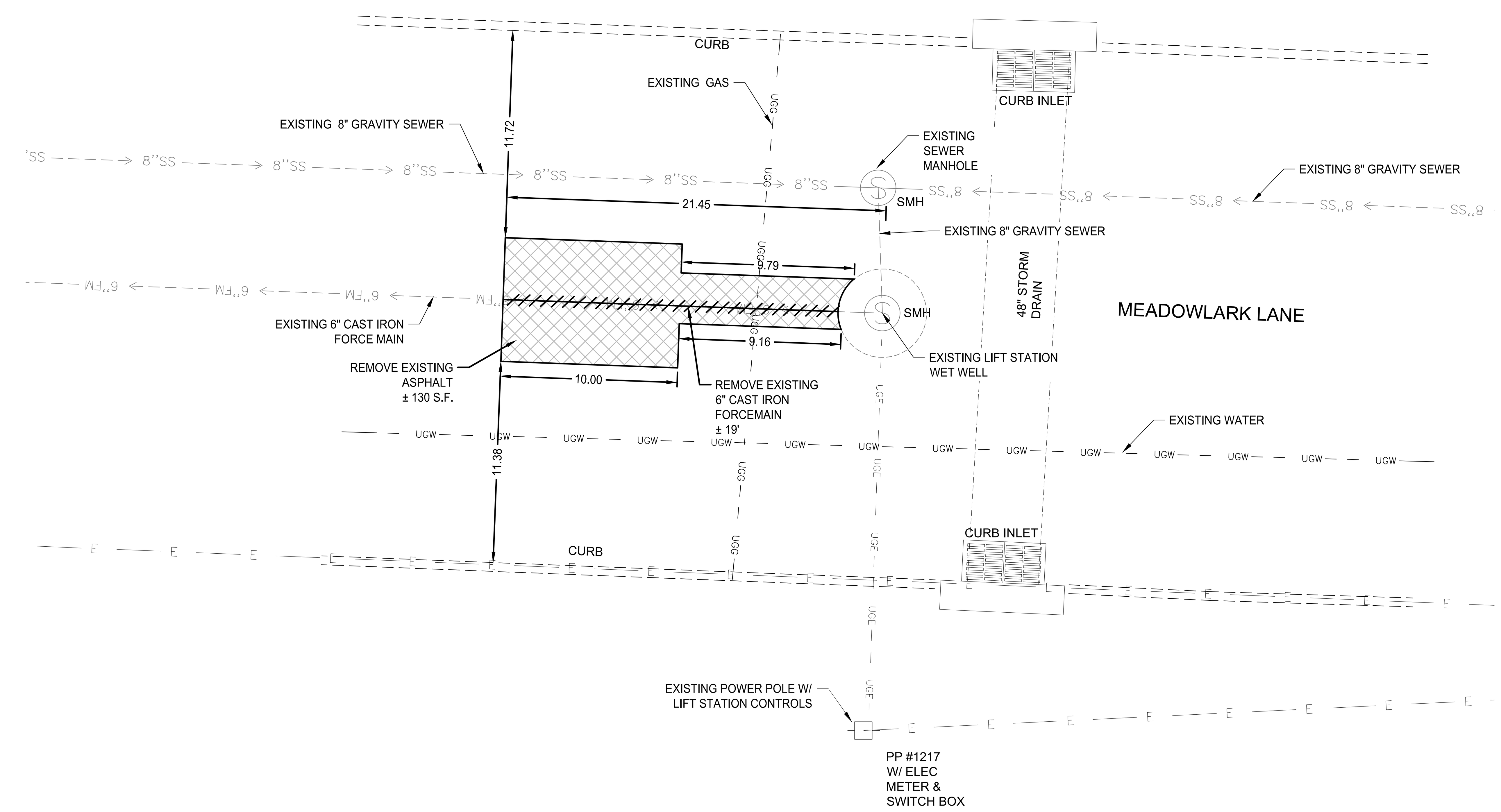
DWG NO.
C0.0

DIVISION OF ENGINEERING
GENERAL NOTES
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Meadowlark Project\C0.0 - NOTES.dwg
Mon, 05 Aug 2024 - 11:32am



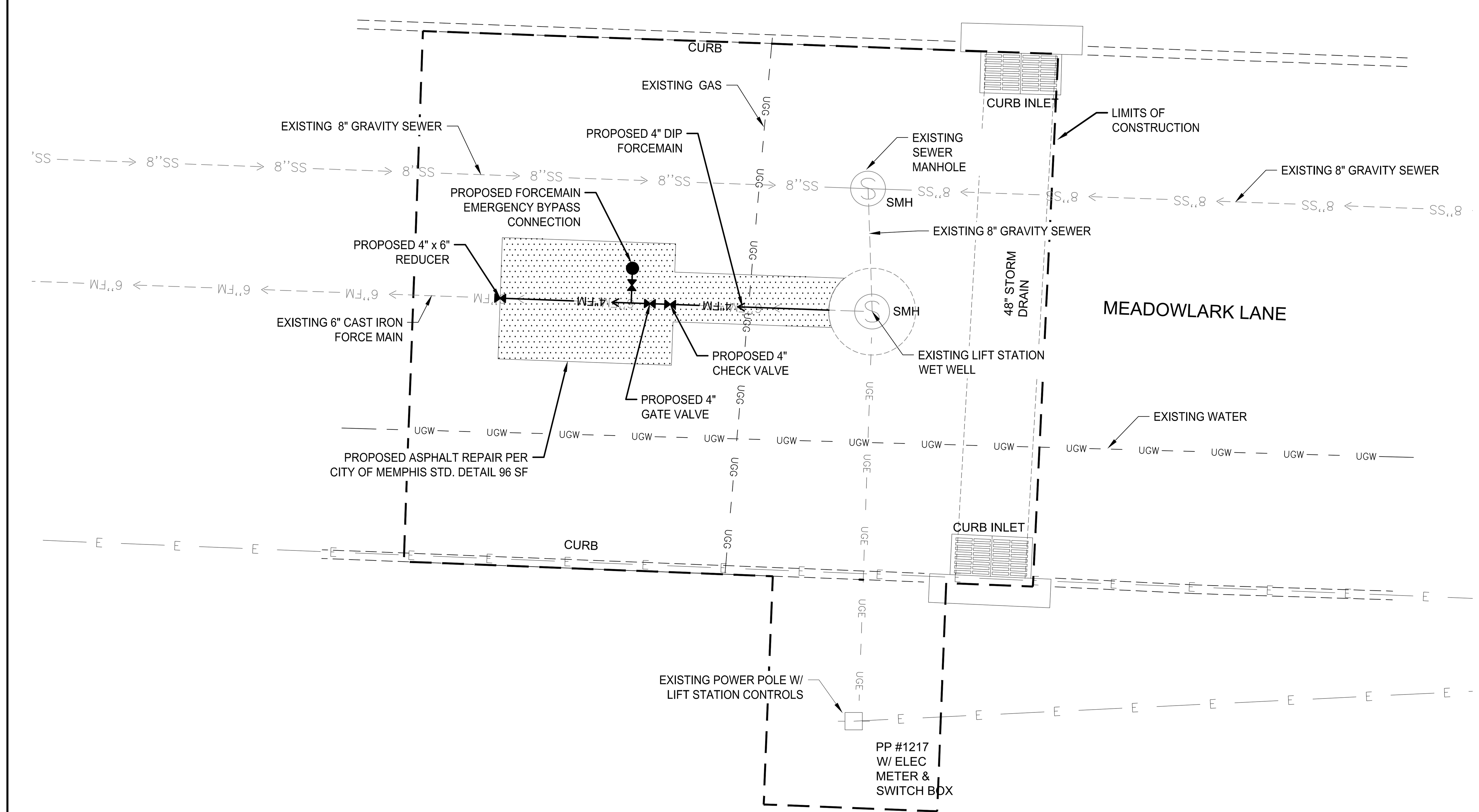
C1 EXISTING CONDITION

1" = 5'

NORTH

GRAPHIC SCALE: 1" = 5'

5 0 5



C4 SITE PLAN

NTS

NORTH

GRAPHIC SCALE: 1" = 5'

5 0 5

APPROVED FOR CONSTRUCTION

THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE CITY OF MEMPHIS DIVISION OF ENGINEERING UNDER AUTHORITY DELEGATED BY THE **TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF WATER POLLUTION CONTROL.** IT IS HEREBY APPROVED FOR CONSTRUCTION BY THE CITY ENGINEER AS EVIDENCED BY HIS SIGNATURE IN THE TITLE BLOCK BELOW.

APPROVAL EXPIRES 1 YEAR FROM APPROVAL DATE BELOW. THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE CITY ENGINEER THAT THE APPROVED FACILITIES WILL REACH THE DESIRED GOALS.

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0420F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

A2H
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3009 Davies Plantation Road
Lakeland, TN 38002
901.372.0404
www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK
REGISTERED ENGINEER
AGRICULTURE COMMERCE
No. 106024
STATE OF TENNESSEE
8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

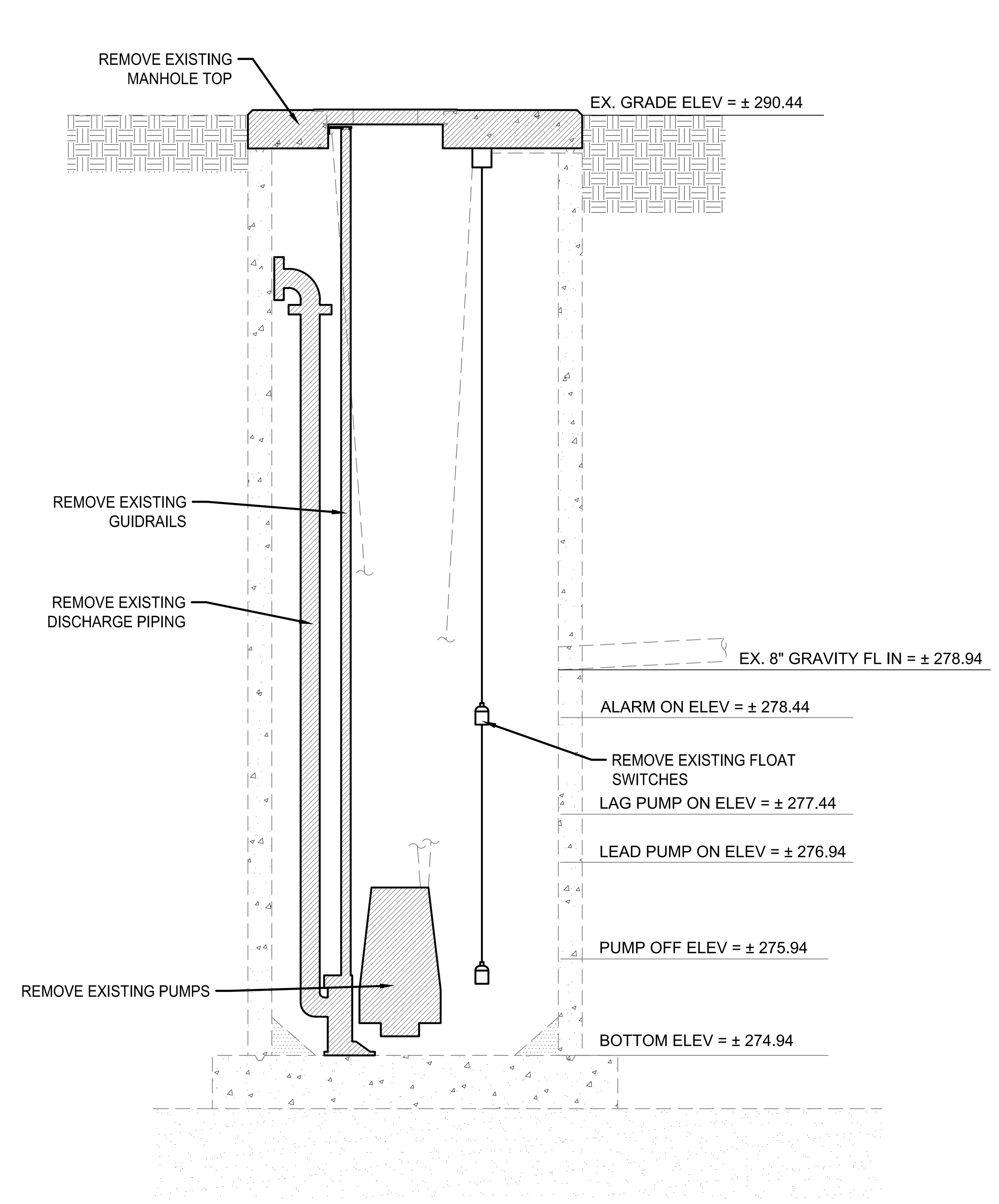
SEWER BASIN ID: NS05
SHEET __ OF __

DWG NO.
C2.0

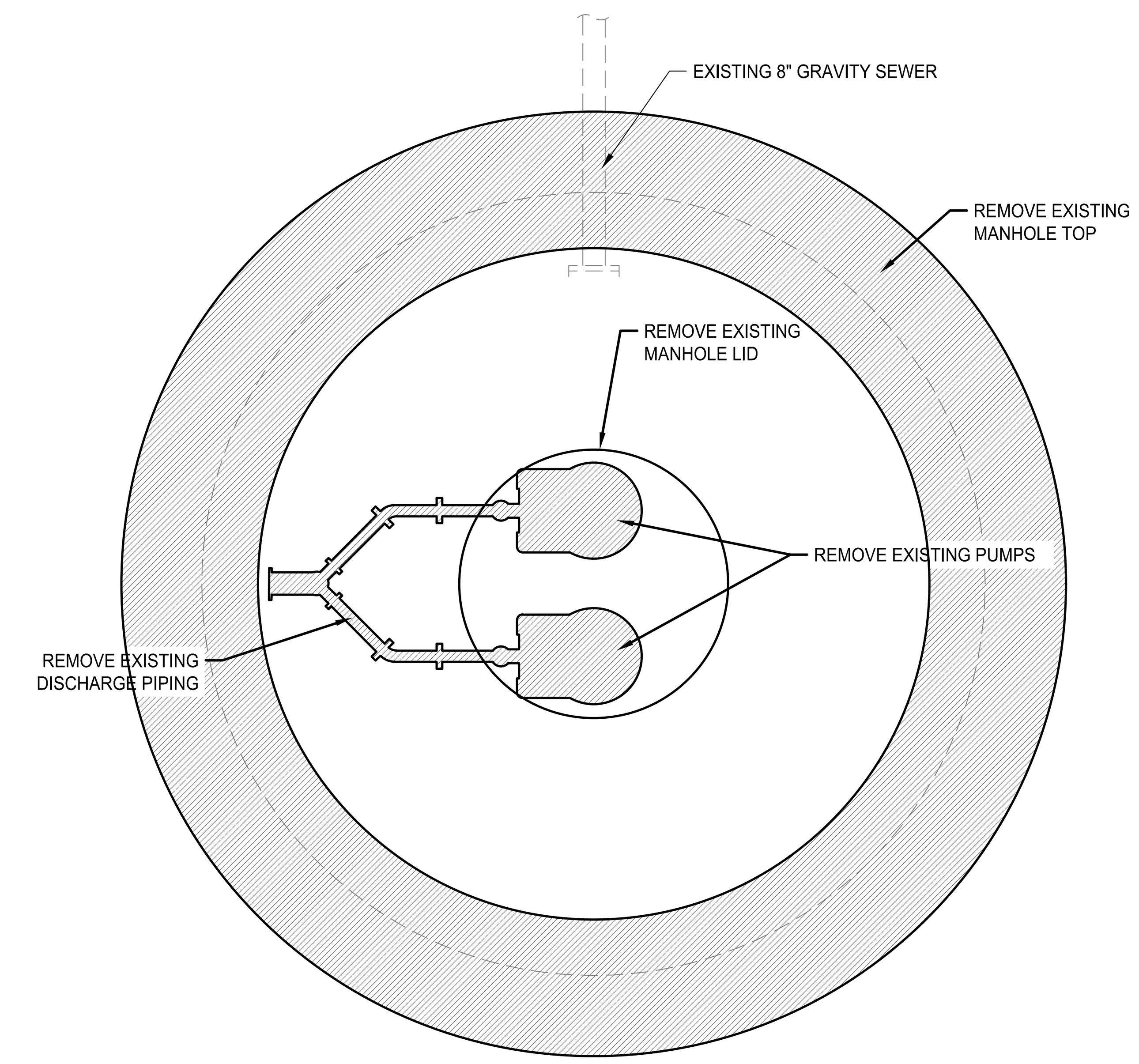
DIVISION OF ENGINEERING
SITE PLAN
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE



LIFT STATION ELEVATION



LIFT STATION PLAN

D1
NTS

LIFT STATION DEMO PLAN

NORTH

RECORD DRAWINGS PROVIDED BY THE CITY OF MEMPHIS

TITLED : MEADOWLARK DR. PLAN AND PROFILE
FROM MEADOWLARK DR. TO WHITE OAK DR.
SHEET 1 OF 1
DATED: 04-10-58

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0420F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

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CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK, REGISTERED ENGINEER, STATE OF TENNESSEE, No. 106023 — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: NS05
SHEET __ OF __

DWG NO.
C6.0

DIVISION OF ENGINEERING
LIFT STATION EXISTING CONDITIONS
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

jaime
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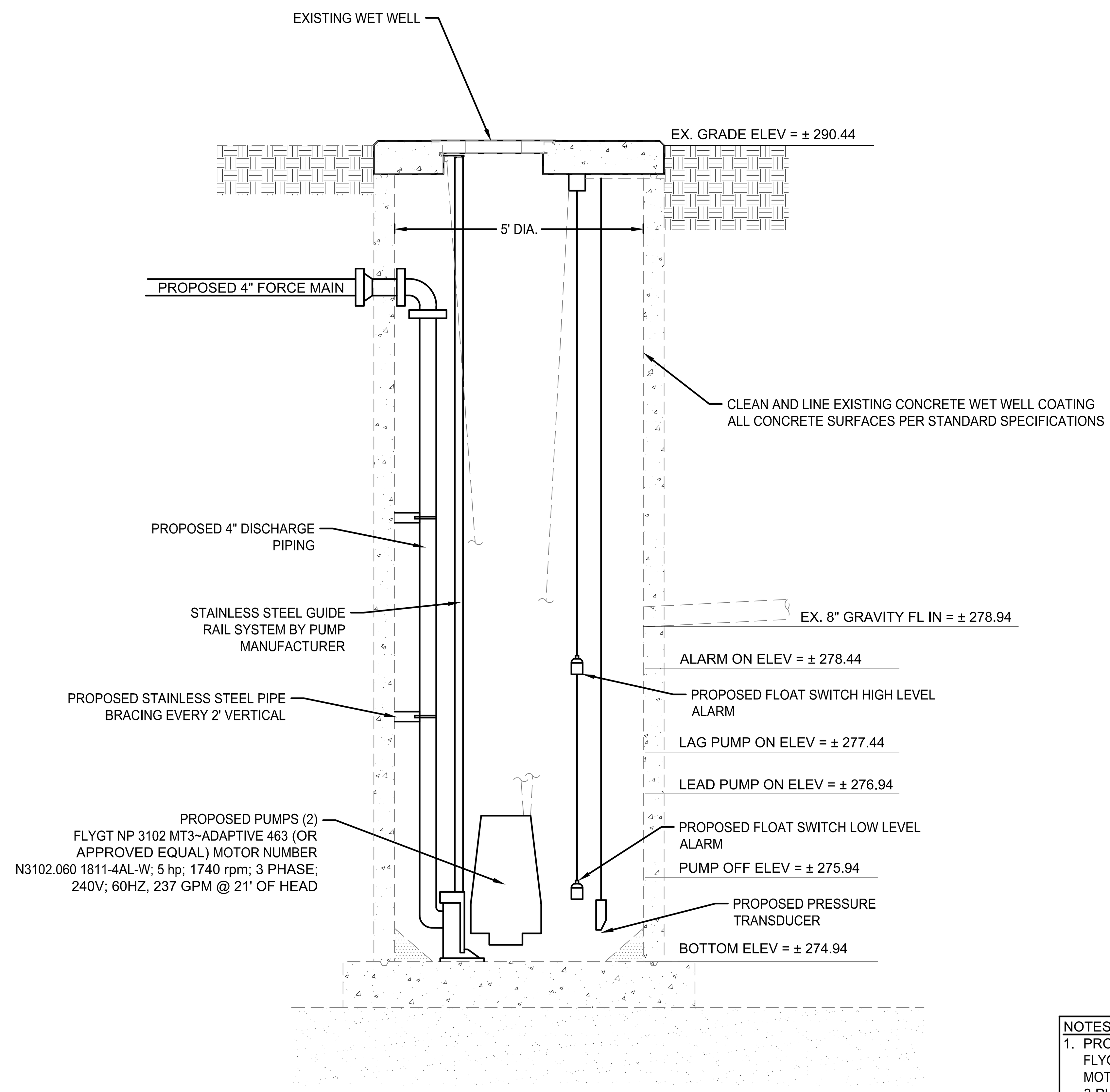
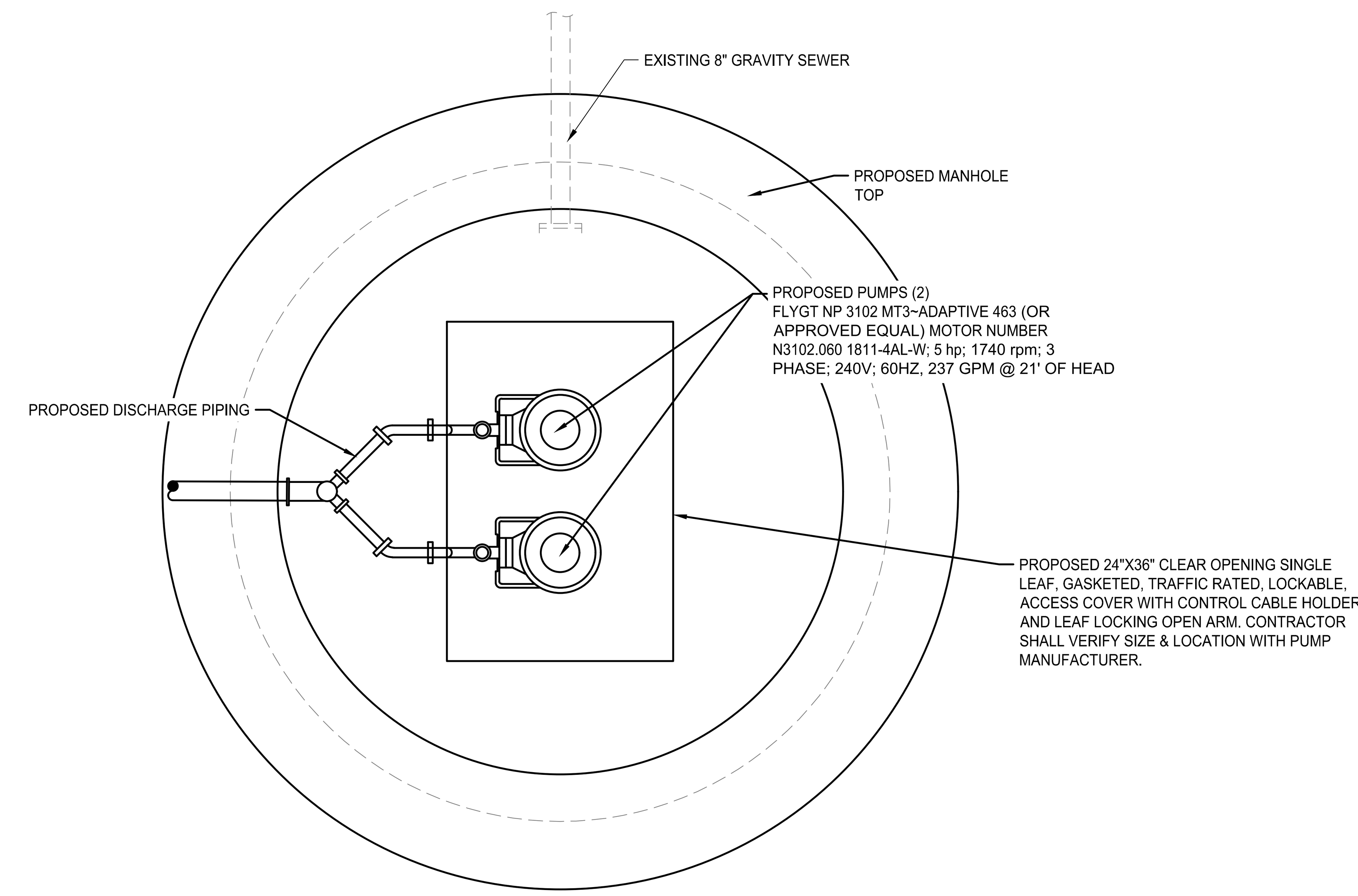
Mon, 05 Aug 2024 - 11:32am



LIFT STATION ELEVATION



LIFT STATION PLAN

NOTES:
1. PROPOSED PUMPS SHALL BE:
   FLYGT NP 3102 MT3~ADAPTIVE 463 (OR APPROVED EQUAL)
   MOTOR NUMBER N3102.060 1811-4AL-W; 5 hp; 1740 rpm;
   3 PHASE; 240V; 60HZ
   237 GPM @ 21' OF HEAD
2. EXISTING FLOAT SYSTEM SHALL BE REMOVED AND REPLACED WITH PRESSURE TRANSDUCERS OR FLOATS.
3. ALL PROPOSED PIPING TO BE DIP
4. EXISTING ELEVATIONS AT TOP AND BOTTOM OF WET WELL TAKEN FROM "1217 MEADOWLARK LANE LIFT STATION ASSESSMENT REPORT" DATED SEPTEMBER 20, 2016. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.

APPROVED FOR CONSTRUCTION

THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE CITY OF MEMPHIS DIVISION OF ENGINEERING UNDER AUTHORITY DELEGATED BY THE **TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF WATER POLLUTION CONTROL.** IT IS HEREBY APPROVED FOR CONSTRUCTION BY THE CITY ENGINEER AS EVIDENCED BY HIS SIGNATURE IN THE TITLE BLOCK BELOW.

APPROVAL EXPIRES 1 YEAR FROM APPROVAL DATE BELOW. THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE CITY ENGINEER THAT THE APPROVED FACILITIES WILL REACH THE DESIRED GOALS.

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD. CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE. 298.81

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D1 | NTS — LIFT STATION ELEVATION

NORTH

A2H
ENGINEERS · ARCHITECTS · PLANNERS
3009 Davies Plantation Road, Lakeland, TN 38002 — 901.372.0404 — www.A2H.com

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — No. 106023 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: NS05
SHEET __ OF __

DWG NO. C6.1

DIVISION OF ENGINEERING
LIFT STATION ELEVATION
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

B1 DAYTIME TRAFFIC CONTROL PLAN

1" = 30'

NORTH

GRAPHIC SCALE: 1" = 30'
30 0 30

1. SEE SECTION 6F.03, SIGN PLACEMENT, OF THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR INFORMATION ON PLACEMENT AND MOUNTING OF SIGNS.
2. SIGNS SHOWN ON THIS PLAN ARE TO WARN TRAFFIC ABOUT THE CONSTRUCTION. OTHER TRAFFIC CONTROL DEVICES MAY BE REQUIRED DURING VARIOUS PHASES OF CONSTRUCTION.
3. NOTHING IN THIS PLAN IS INTENDED TO SUPERSEDE OR RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF INSTALLING THE APPROPRIATE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE CURRENT STATE OF TENNESSEE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."
4. CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE CITY OF MEMPHIS CONSTRUCTION DEPARTMENT (901-636-2462) AND TRAFFIC ENGINEERING DEPARTMENT (901-636-6710) A MINIMUM OF 24 HOURS PRIOR TO COMMENCING CONSTRUCTION OR IMPLEMENTATION A TRAFFIC CONTROL PLAN. ALL TRAFFIC CONTROL DEVICES MUST BE IN PLACE BEFORE CONSTRUCTION ACTIVITY BEGINS.
5. SIZES OF ALL SIGNS SHALL COMPLY WITH THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
6. ALL TRAFFIC CONTROL DEVICES AND THEIR INSTALLATION SHALL MEET THE STANDARD PRESCRIBED IN THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SHALL COMPLY WITH STATE OF TENNESSEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SECTION 712 TEMPORARY TRAFFIC CONTROL.
7. ACCESS TO ADJACENT PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
8. SIDE STREETS, DRIVEWAY ACCESS, AND BICYCLING AND PEDESTRIAN WAYS SHALL BE MAINTAINED AT ALL TIMES.
9. THE CONTRACTOR SHALL NOT BE PERMITTED TO PARK ANY VEHICLES OR CONSTRUCTION EQUIPMENT, DURING PERIODS OF INACTIVITY, WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF THE EDGE OF PAVEMENT WHICHEVER IS LESS, WHEN THE LANE IS OPEN TO TRAFFIC, UNLESS PROTECTED BY GUARDRAIL, BRIDGE RAIL, AND/OR BARRIERS INSTALLED FOR OTHER PURPOSES. PRIVATELY OWNED VEHICLES SHALL NOT BE ALLOWED TO BE PARKED WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF AN OPEN TRAFFIC LANE WHICHEVER IS LESS, AT ANY TIME UNLESS PROTECTED AS DESCRIBED ABOVE.
10. THE CONTRACTOR SHALL USE PLASTIC DRUMS WITH TYPE "A" WARNING LIGHTS TO SEPARATE TRAFFIC FROM THE CONSTRUCTION AREA.
11. THE CONTRACTOR SHALL COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN SIGNS OR DEVICES DURING CONSTRUCTION AND THEY SHALL REMAIN COVERED DURING CONSTRUCTION AND UNTIL SUCH TIME THAT NO CONFLICT EXISTS.
12. DURING CONSTRUCTION, ONE 10' TRAFFIC LANE SHALL REMAIN OPEN AT ALL TIMES.
13. ONLY ONE PHASE OF THE TRAFFIC CONTROL PLAN SHALL BE ACTIVE AT ANY ONE TIME.
14. ALL TEMPORARY OR PERMANENT TRAVELED SURFACE SHALL BE INSPECTED DAILY BY THE CONTRACTOR (INCLUDING WEEKENDS) AND NECESSARY PATCHING OR RE-FINISHING PERFORMED.
15. WORK WITHIN THE ROADWAY SHALL BE CONDUCTED BETWEEN 9:00 A.M. AND 4:00 P.M. AND THE ROADWAY SHALL BE COMPLETELY OPEN TO TRAFFIC AT ALL OTHER TIMES AND ALL INAPPROPRIATE SIGNS SHALL BE COVERED OR REMOVED.
16. CONTRACTOR SHALL CONTACT ALL APPROPRIATE AGENCIES BEFORE CLOSING ANY ROADWAYS.
17. CONTRACTOR SHALL CONTACT THE CITY OF MEMPHIS SIGNAL SHOP AT (901-528-2844) FOR LOCATION OF SIGNAL CONDUIT AND WIRES.
18. THE APPROPRIATE TRAFFIC CONTROL SHALL BE INSTALLED AT THE INCEPTION OF EACH STAGE OF CONSTRUCTION AND SHALL BE PROPERLY MAINTAINED AND/OR OPERATED DURING THE TIME SUCH SPECIAL CONDITIONS EXIST. THEY SHALL REMAIN IN PLACE ONLY AS LONG AS THEY ARE NEEDED AND SHALL BE IMMEDIATELY REMOVED THEREAFTER.
19. AT NO TIME SHALL ONE LANE SECTION BE LEFT OPEN UNATTENDED. WHERE TWO FLAGGERS ARE REQUIRED AND IN CIRCUMSTANCES WHERE ONLY ONE LANE OF TRAFFIC IS OPEN AND THERE IS NO CLEAR LINE OF SIGHT FROM ONE END OF THE CONSTRUCTION AREA TO THE OTHER, THE CONTRACTOR SHALL PROVIDE RADIO COMMUNICATION OR OTHER APPROPRIATE MEANS OF ESTABLISHING CONTROL OF TRAFFIC.
20. ANYTIME FLAGGER IS NOT PRESENT TO CONTROL TRAFFIC, TWO TRAFFIC LANES MUST BE OPEN TO MAINTAIN TWO-WAY TRAFFIC AND ALL INAPPROPRIATE SIGNS SHALL BE COVERED OR REMOVED.
21. ALL FLAGGERS SHALL BE EQUIPPED WITH A STOP/SLOW PADDLE.
22. EXISTING STRIPING THAT CONFLICTS WITH THE TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING CONSTRUCTION. WHEN CONSTRUCTION IS COMPLETE THE EXISTING STRIPING SHALL BE COVERED OR REMOVED DURING CONSTRUCTION.
23. ALL TRAFFIC CONTROL SIGNS SHALL MEET THE MINIMUM RETROREFLECTIVITY LEVELS SPECIFIED IN THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
24. ALL TEMPORARY STRIPING SHALL BE PREFORMED TAPE.
25. THE CONTRACTOR IS PROHIBITED FROM CLOSING THE EXISTING SIDEWALK AT ANYTIME DURING THIS PROJECT. IF A SIDEWALK CLOSURE IS NEEDED, A REVISED TRAFFIC CONTROL PLAN SHALL BE SUBMITTED AND APPROVED BY THE CITY ENGINEER'S OFFICE.
26. ANY CLOSURE OF THE RIGHT OF WAY SHALL BE TIME LIMITED TO THE ACTIVE CONSTRUCTION. CONTINUOUS UNWARRANTED CLOSURE OF THE RIGHT OF WAY SHALL NOT BE ALLOWED FOR THE DURATION OF THE PROJECT. THE DEVELOPER SHALL PROVIDE ON THE TRAFFIC CONTROL PLAN, THE TIME NEEDED PER PHASE TO COMPLETE THAT PORTION OF THE WORK. TIME LIMITS WILL BEGIN ON THE DAY OF CLOSURE AND WILL BE MONITORED BY THE ENGINEERING CONSTRUCTION INSPECTORS (901-636-2462) ON THE JOB.

THIS TRAFFIC CONTROL PLAN FOR DAYTIME USE ONLY. FOR NIGHT TIME TRAFFIC CONTROL PLAN, SEE PAGE C7.1.

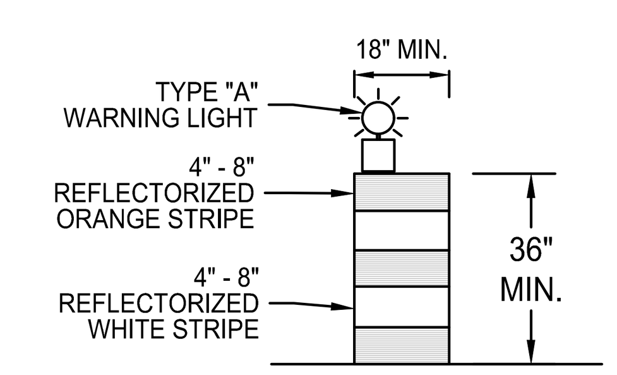
D1 TRAFFIC CONTROL PLAN NOTES PHASE 1 OF 1

NTS

- WORK ZONE
- BUFFER ZONE
- SIGN
- 36" DRUM w/ TYPE "A" WARNING LIGHTS
- FLAGGER

C3 LEGEND

NTS



C5 CHANNELIZING DRUM

NTS

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

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3009 Davies Plantation Road
Lakeland, TN 38002
901.372.0404
www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK
REGISTERED ENGINEER
AGRICULTURE COMMERCE
No. 106025
STATE OF TENNESSEE
8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

PROJECT DURATION = 4 WEEKS
DESIGN SPEED = 30 MPH

SEWER BASIN ID: NS05
SHEET 1 OF 2

DWG NO. C7.0

DIVISION OF ENGINEERING
TRAFFIC CONTROL PLAN
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER ____ DATE ____

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Temp Traffic Control_SJ\21117.02 - TTCP - Meadowlark.dwg
Mon, 05 Aug 2024 - 11:32am

B1 — 1" = 30'

NIGHTTIME TRAFFIC CONTROL PLAN

NORTH — GRAPHIC SCALE: 1" = 30' (30, 0, 30)

D1 — NTS

TRAFFIC CONTROL PLAN NOTES PHASE 1 OF 1

1. SEE SECTION 6F.03, SIGN PLACEMENT, OF THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR INFORMATION ON PLACEMENT AND MOUNTING OF SIGNS.
2. SIGNS SHOWN ON THIS PLAN ARE TO WARN TRAFFIC ABOUT THE CONSTRUCTION. OTHER TRAFFIC CONTROL DEVICES MAY BE REQUIRED DURING VARIOUS PHASES OF CONSTRUCTION.
3. NOTHING IN THIS PLAN IS INTENDED TO SUPERSEDE OR RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF INSTALLING THE APPROPRIATE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE CURRENT STATE OF TENNESSEE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."
4. CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE CITY OF MEMPHIS CONSTRUCTION DEPARTMENT (901-636-2462) AND TRAFFIC ENGINEERING DEPARTMENT (901-636-6710) A MINIMUM OF 24 HOURS PRIOR TO COMMENCING CONSTRUCTION OR IMPLEMENTATION A TRAFFIC CONTROL PLAN. ALL TRAFFIC CONTROL DEVICES MUST BE IN PLACE BEFORE CONSTRUCTION ACTIVITY BEGINS.
5. SIZES OF ALL SIGNS SHALL COMPLY WITH THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
6. ALL TRAFFIC CONTROL DEVICES AND THEIR INSTALLATION SHALL MEET THE STANDARD PRESCRIBED IN THE STATE OF TENNESSEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SHALL COMPLY WITH STATE OF TENNESSEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SECTION 712 TEMPORARY TRAFFIC CONTROL.
7. ACCESS TO ADJACENT PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
8. SIDE STREETS, DRIVEWAY ACCESS, AND BICYCLING AND PEDESTRIAN WAYS SHALL BE MAINTAINED AT ALL TIMES.
9. THE CONTRACTOR SHALL NOT BE PERMITTED TO PARK ANY VEHICLES OR CONSTRUCTION EQUIPMENT, DURING PERIODS OF INACTIVITY, WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF THE EDGE OF PAVEMENT WHICHEVER IS LESS, WHEN THE LANE IS OPEN TO TRAFFIC, UNLESS PROTECTED BY GUARDRAIL, BRIDGE RAIL, AND/OR BARRIERS INSTALLED FOR OTHER PURPOSES. PRIVATELY OWNED VEHICLES SHALL NOT BE ALLOWED TO BE PARKED WITHIN THE RIGHT-OF-WAY OR WITHIN THIRTY (30) FEET OF AN OPEN TRAFFIC LANE WHICHEVER IS LESS, AT ANY TIME UNLESS PROTECTED AS DESCRIBED ABOVE.
10. THE CONTRACTOR SHALL USE PLASTIC DRUMS WITH TYPE "A" WARNING LIGHTS TO SEPARATE TRAFFIC FROM THE CONSTRUCTION AREA.
11. THE CONTRACTOR SHALL COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN SIGNS OR DEVICES DURING CONSTRUCTION AND THEY SHALL REMAIN COVERED DURING CONSTRUCTION AND UNTIL SUCH TIME THAT NO CONFLICT EXISTS.
12. DURING CONSTRUCTION, ONE 10' TRAFFIC LANE SHALL REMAIN OPEN AT ALL TIMES.
13. ONLY ONE PHASE OF THE TRAFFIC CONTROL PLAN SHALL BE ACTIVE AT ANY ONE TIME.
14. ALL TEMPORARY OR PERMANENT TRAVELED SURFACE SHALL BE INSPECTED DAILY BY THE CONTRACTOR (INCLUDING WEEKENDS) AND NECESSARY PATCHING OR RE-FINISHING PERFORMED.
15. WORK WITHIN THE ROADWAY SHALL BE CONDUCTED BETWEEN 9:00 A.M. AND 4:00 P.M. AND THE ROADWAY SHALL BE COMPLETELY OPEN TO TRAFFIC AT ALL OTHER TIMES AND ALL INAPPROPRIATE SIGNS SHALL BE COVERED OR REMOVED.
16. CONTRACTOR SHALL CONTACT ALL APPROPRIATE AGENCIES BEFORE CLOSING ANY ROADWAYS.
17. CONTRACTOR SHALL CONTACT THE CITY OF MEMPHIS SIGNAL SHOP AT (901-528-2844) FOR LOCATION OF SIGNAL CONDUIT AND WIRES.
18. THE APPROPRIATE TRAFFIC CONTROL SHALL BE INSTALLED AT THE INCEPTION OF EACH STAGE OF CONSTRUCTION AND SHALL BE PROPERLY MAINTAINED AND/OR OPERATED DURING THE TIME SUCH SPECIAL CONDITIONS EXIST. THEY SHALL REMAIN IN PLACE ONLY AS LONG AS THEY ARE NEEDED AND SHALL BE IMMEDIATELY REMOVED THEREAFTER.
19. AT NO TIME SHALL ONE LANE SECTION BE LEFT OPEN UNATTENDED. WHERE TWO FLAGGERS ARE REQUIRED AND IN CIRCUMSTANCES WHERE ONLY ONE LANE OF TRAFFIC IS OPEN AND THERE IS NO CLEAR LINE OF SIGHT FROM ONE END OF THE CONSTRUCTION AREA TO THE OTHER, THE CONTRACTOR SHALL PROVIDE RADIO COMMUNICATION OR OTHER APPROPRIATE MEANS OF ESTABLISHING CONTROL OF TRAFFIC.
20. ANYTIME FLAGGER IS NOT PRESENT TO CONTROL TRAFFIC, TWO TRAFFIC LANES MUST BE OPEN TO MAINTAIN TWO-WAY TRAFFIC AND ALL INAPPROPRIATE SIGNS SHALL BE COVERED OR REMOVED.
21. ALL FLAGGERS SHALL BE EQUIPPED WITH A STOP/SLOW PADDLE.
22. EXISTING STRIPING THAT CONFLICTS WITH THE TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING CONSTRUCTION. WHEN CONSTRUCTION IS COMPLETE THE EXISTING STRIPING SHALL BE COVERED OR REMOVED DURING CONSTRUCTION.
23. ALL TRAFFIC CONTROL SIGNS SHALL MEET THE MINIMUM RETROREFLECTIVITY LEVELS SPECIFIED IN THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
24. ALL TEMPORARY STRIPING SHALL BE PREFORMED TAPE.
25. THE CONTRACTOR IS PROHIBITED FROM CLOSING THE EXISTING SIDEWALK AT ANYTIME DURING THIS PROJECT. IF A SIDEWALK CLOSURE IS NEEDED, A REVISED TRAFFIC CONTROL PLAN SHALL BE SUBMITTED AND APPROVED BY THE CITY ENGINEER'S OFFICE.
26. ANY CLOSURE OF THE RIGHT OF WAY SHALL BE TIME LIMITED TO THE ACTIVE CONSTRUCTION. CONTINUOUS UNWARRANTED CLOSURE OF THE RIGHT OF WAY SHALL NOT BE ALLOWED FOR THE DURATION OF THE PROJECT. THE DEVELOPER SHALL PROVIDE ON THE TRAFFIC CONTROL PLAN, THE TIME NEEDED PER PHASE TO COMPLETE THAT PORTION OF THE WORK. TIME LIMITS WILL BEGIN ON THE DAY OF CLOSURE AND WILL BE MONITORED BY THE ENGINEERING CONSTRUCTION INSPECTORS (901-636-2462) ON THE JOB.

THIS TRAFFIC CONTROL PLAN FOR NIGHT TIME USE ONLY. FOR DAYTIME TRAFFIC CONTROL PLAN, SEE PAGE C7.0.

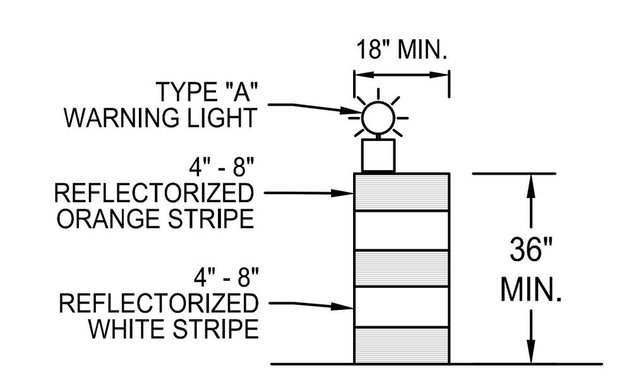
C3 — NTS

LEGEND

- WORK ZONE
- BUFFER ZONE
- SIGN
- 36" DRUM w/ TYPE "A" WARNING LIGHTS
- FLAGGER

C5 — NTS

CHANNELIZING DRUM



BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

THE PROJECT AREA IS LOCATED IN ZONE X AREA PER FLOOD INSURANCE RATE MAP 47157C0420F, DATED SEPTEMBER 28, 2007. AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

A2H
ENGINEERS · ARCHITECTS · PLANNERS
3009 Davies Plantation Road, Lakeland, TN 38002
901.372.0404
www.A2H.com

CONSTRUCTION DOCUMENTS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK — REGISTERED ENGINEER — AGRICULTURE COMMERCE — No. 106024 — STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

PROJECT DURATION = 4 WEEKS
DESIGN SPEED = 30 MPH

SEWER BASIN ID: NS05
SHEET 2 OF 2

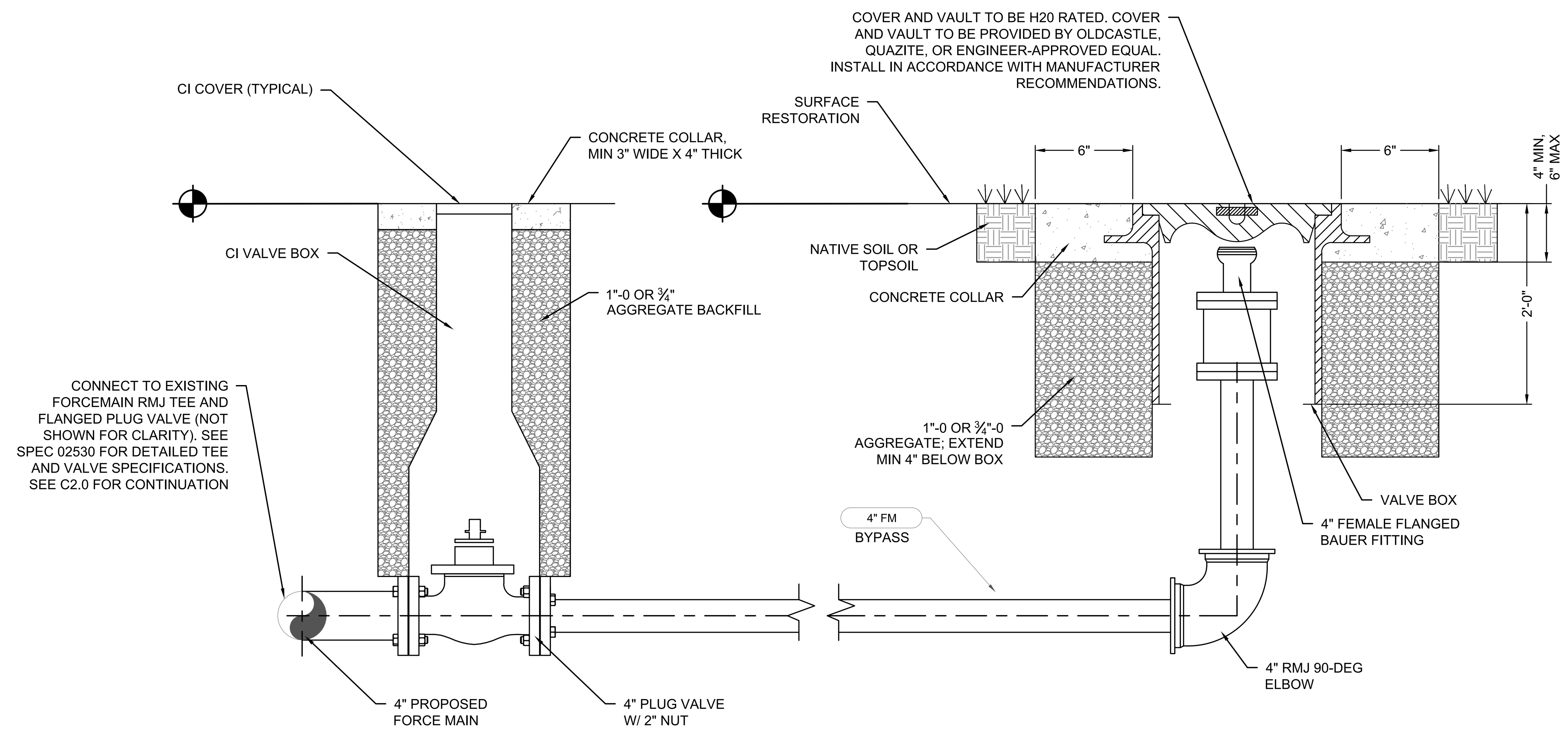
DWG NO. C7.1

DIVISION OF ENGINEERING
TRAFFIC CONTROL PLAN
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC — DATE: 08/2021 — PROJECT: 21117.02
DESIGN BY: A2H, INC — DATE: 05/2024 — SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER — DATE

jaime
I:\2021\21117.02\2 Civil\Projdwgs\Temp Traffic Control_SJ21117.02 - TTCP - Meadowlark.dwg
Mon, 05 Aug 2024 - 11:32am



B1 FORCE MAIN EMERGENCY BYPASS CONNECTION
NTS

BM #196 ELVIS PRESLEY BLVD. & McCLURE RD.
CITY MONUMENT IS LOCATED ON THE SW COR., AT B/CURB ER ON ELVIS PRESLEY SIDE.
298.81

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A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

JAIME M. BOSTICK, REGISTERED ENGINEER, No. 106024, STATE OF TENNESSEE — 8/5/24

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

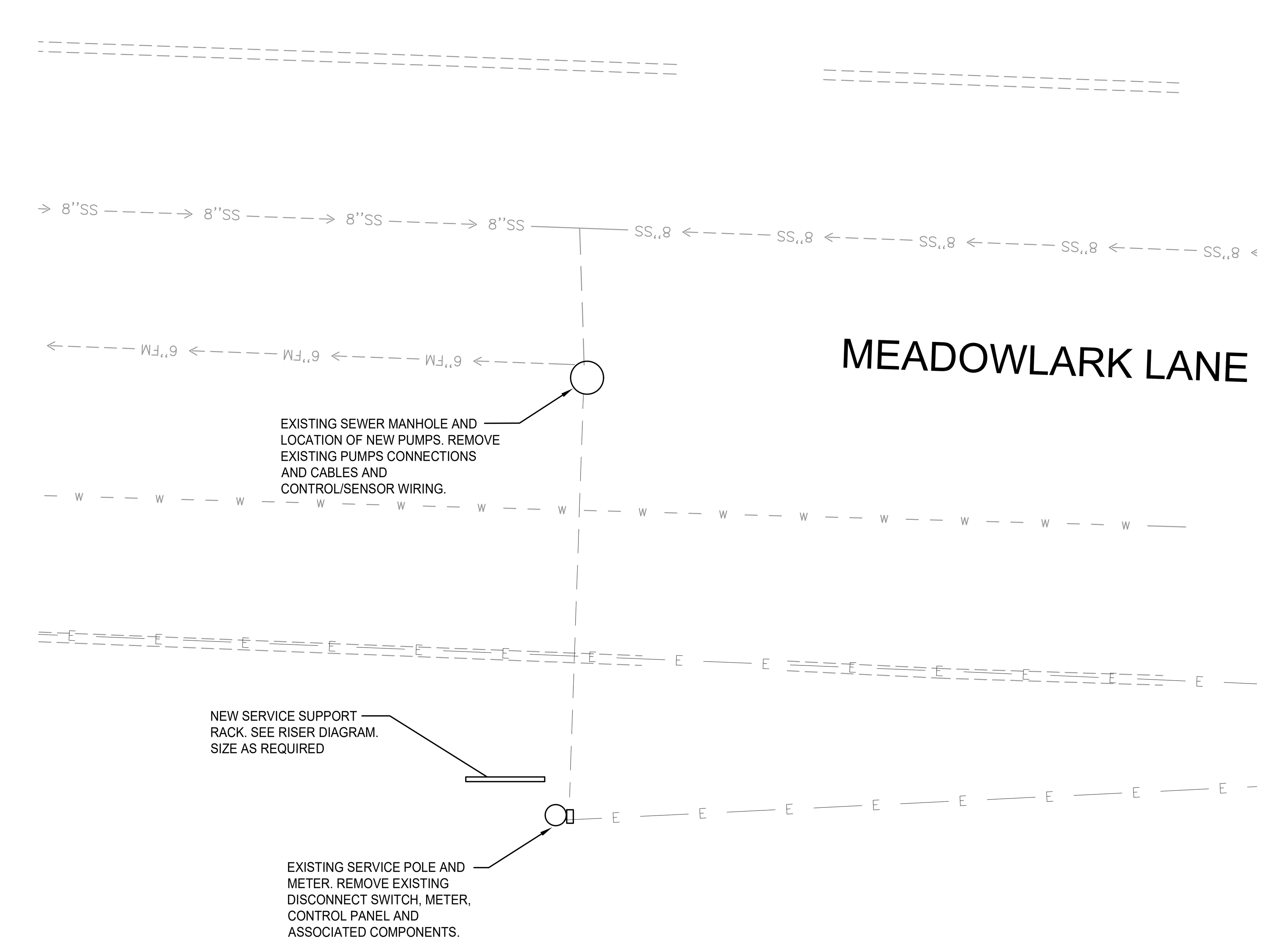
SEWER BASIN ID: NS05
SHEET __ OF __

DWG NO.
C10.0

DIVISION OF ENGINEERING
LIFT STATION DETAILS
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 05/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

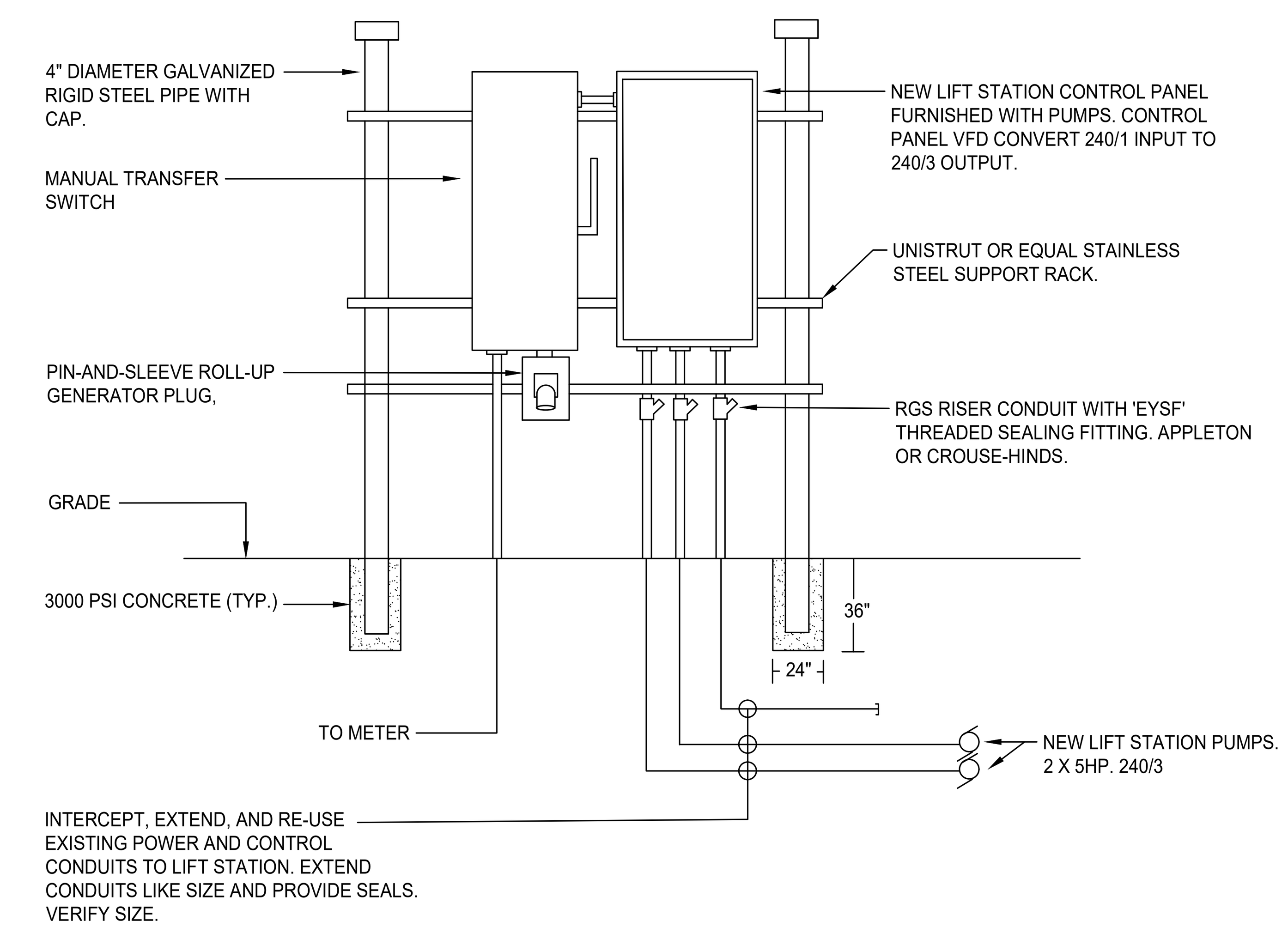


D1 | 1" = 5'

ELECTRICAL SITE PLAN

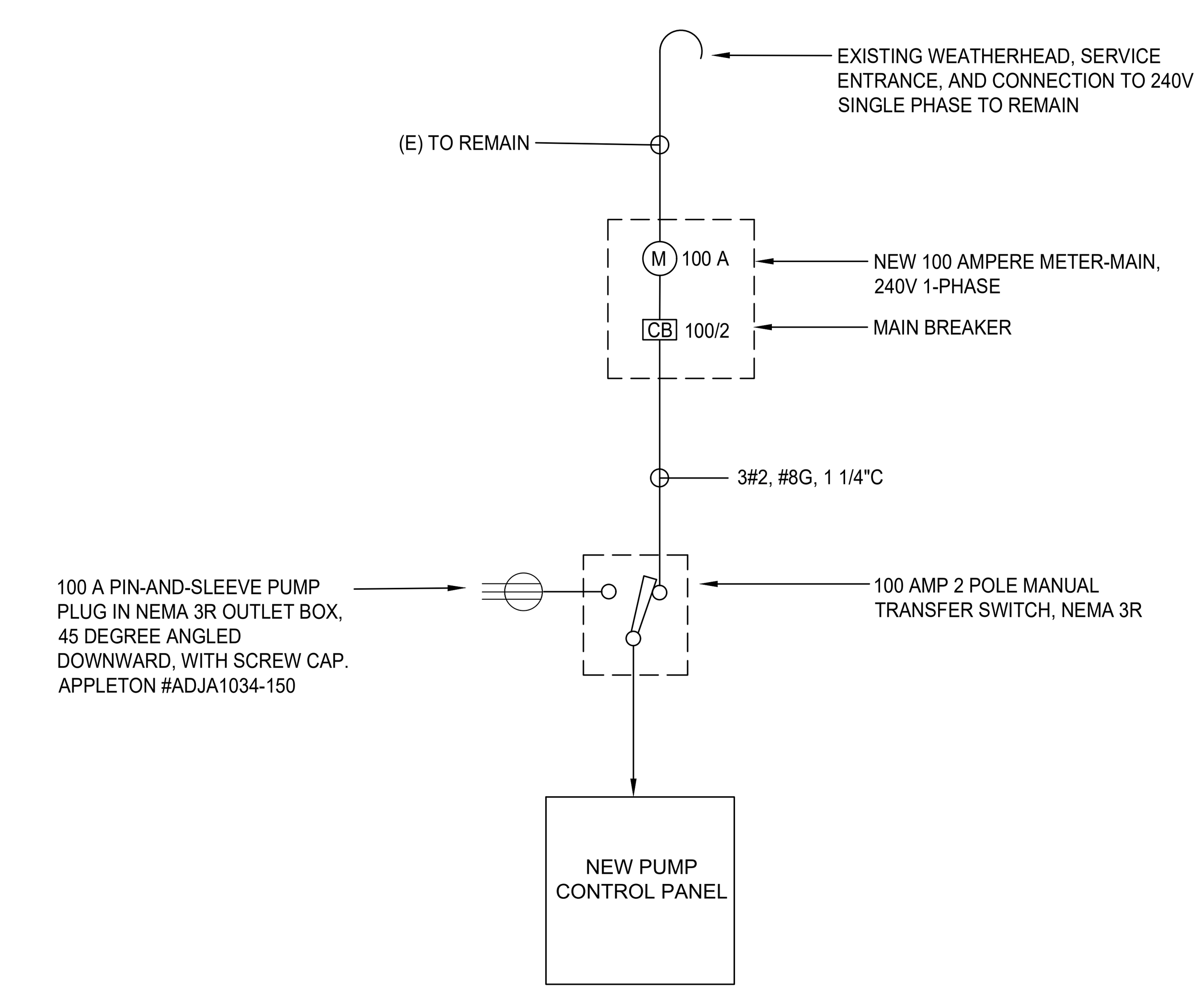
NORTH

GRAPHIC SCALE: 1" = 5'
5 0 5



B4 | 1/2" = 1'-0"

EQUIPMENT ELEVATION



C4 | NTS

ONE LINE DIAGRAM

ELECTRICAL GENERAL NOTES:

1. PROVIDE LABOR AND MATERIALS NECESSARY FOR A COMPLETE AND FULLY OPERATIONAL ELECTRICAL SYSTEM/INSTALLATION.
2. MATERIALS AND INSTALLATION SHALL COMPLY WITH ALL CODES, LAWS, AND ORDINANCES OF FEDERAL, STATE, AND LOCAL GOVERNING BODIES HAVING JURISDICTION.
3. ALL MATERIALS AND EQUIPMENT SHALL BE LISTED AND/OR LABELED BY U.L., ETL, CSA, OR ANOTHER RECOGNIZED TESTING LABORATORY.
4. SECURE AND PAY FOR ALL PERMITS, INSPECTIONS, GOVERNMENTAL FEES, TAXES AND LICENSES NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF ALL ELECTRICAL WORK.
5. FEES ASSESED BY MEMPHIS LIGHT, GAS, AND WATER DIVISION IN CONNECTION WITH THE NEW SERVICE WILL E PAID BY THE OWNER DIRECTLY TO MLGW.
6. PREPARE AND SUBMIT TO GOVERNMENTAL AGENCIES, UTILITY COMPANIES, AND LOCAL CODE OFFICIALS, SHOP DRAWINGS AND/OR INSTALLATION DETAILS WHICH ARE REQUIRED BY THESE AGENCIES FOR THEIR APPROVAL.
7. THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER IN WRITING OF ANY MATERIALS OR APPARATUS BELIEVED TO BE INADEQUATE, UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES, RULES, OR REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.
8. ALL NEW ELECTRICAL WORK OR MODIFICATIONS TO EXISTING ELECTRICAL DISTRIBUTION PANELS, PANELBOARDS, ETC. SHALL BE INSTALLED AS INDICATED ON THE ELECTRICAL CONSTRUCTION DOCUMENTS. CONTRACTOR .
9. CAREFULLY EXAMINE THE CONTRACT DOCUMENTS, MAKE A SCHEDULED ARRANGEMENT WITH THE PROJECT MANAGER TO VISIT THE SITE, AND THOROUGHLY BECOME FAMILIAR WITH LOCAL CONDITIONS RELATING TO THE WORK. FAILURE TO DO SO WILL NOT RELIEVE THE CONTRACTOR OF THE OBLIGATIONS OF THE CONTRACT.
10. PROVIDE TEMPORARY POWER AND WIRING FOR THE PERFORMANCE OF ALL TRADES, FOR THE ENTIRE PERIOD OF CONSTRUCTION AND SHALL REMOVE ALL TEMPORARY WIRING AT THE COMPLETION OF CONSTRUCTION. ALL COSTS FOR ESTABLISHING AND REMOVING TEMPORARY POWER SHALL BE INCLUDED IN BID.
11. THE EXISTING ELECTRICAL SYSTEMS ARE TO REMAIN IN SERVICE TO PROVIDE FOR THE OWNER'S EXISTING FUNCTIONS. SHOULD IT BECOME NECESSARY TO SHUT-DOWN ANY SYSTEM OR PORTION OF A SYSTEM, APPROVAL IN WRITING MUST BE OBTAINED FROM THE PROJECT MANAGER AND SHALL BE ONLY FOR THE PERIOD AND TIME AGREED UPON. THE BID IS TO INCLUDE THE COST OF ANY TEMPORARY WIRING AND PREMIUM TIME REQUIRED FOR THE SHUTDOWN. EXISTING ELECTRICAL WORK TO BE DEMOLISHED SHALL BE COORDINATED TO ALLOW MINIMUM DOWN-TIME OF THE STATION.
12. MATERIALS AND EQUIPMENT SHALL BE ERECTED, INSTALLED, TOOLED, CONNECTED, CLEANED, ADJUSTED, TESTED, CONDITIONED, AND PLACED IN SERVICE IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS AND RECOMMENDATIONS.
13. CUTTING, DRILLING, AND PATCHING OF MASONRY, DRYWALL, CONCRETE, STEEL, OR IRON WORK BELONGING TO THE SITE SHALL BE DONE BY THIS CONTRACTOR IN ORDER THAT WORK MAY BE PROPERLY INSTALLED. UNDER NO CONDITIONS MAY STRUCTURAL WORK BE CUT, EXCEPT AT THE DIRECTION OF THE ENGINEER OR THEIR REPRESENTATIVE. ALL PENETRATIONS SHALL BE SEALED WITH APPROVED MATERIAL.
14. EQUIPMENT SUBMITTALS SHALL INCLUDE MANUFACTURER'S NAMES, CATALOG NUMBERS, CUTS, DIAGRAMS, AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND REVIEW THE EQUIPMENT.
15. PROVIDE "AS-BUILT" DOCUMENTATION AND HARD COPY REPRODUCIBLE DRAWINGS AT THE COMPLETION OF THE PROJECT AND SUBMIT TO THE ARCHITECT AND THE ENGINEER. AS-BUILT DRAWINGS SHALL INDICATE EXACT CIRCUIT NUMBERS, LOCATIONS OF ALL DEVICES, CEILING FIXTURES, AND RACEWAY FOR LIGHTING, TELECOMMUNICATIONS AND POWER DISTRIBUTION SYSTEMS AS INSTALLED.
16. MATERIAL, EQUIPMENT, WIRING DEVICES, ETC. SHALL BE NEW AND OF COMMERCIAL GRADE UNLESS SPECIFICALLY INDICATED AS EXISTING TO BE REUSED ON DRAWINGS.
17. EXCEPT AS NOTED OTHERWISE, ALL WORK REQUIRED FOR THE ELECTRICAL INSTALLATION AS SHOWN ON DRAWINGS SHALL INCLUDE ALL LABOR, INSTALLATION METHODS, EQUIPMENT, AND MATERIALS AND SHALL BE IN STRICT COMPLIANCE WITH ALL BUILDING STANDARDS.
18. PROVIDE A COMPLETE METAL RACEWAY SYSTEM, FITTINGS AND ENCLOSURES FOR ALL ELECTRICAL WIRING SYSTEMS TO BE INSTALLED FOR THE PROJECT.
19. MINIMUM CONDUIT SIZE SHALL BE 3/4 INCH. ALL CONDUIT SHALL BE GALVANIZED RIGID STEEL WITH APPROPRIATE FITTINGS AND CAST BOXES WHERE REQUIRED.
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26. ANY EXISTING ELECTRICAL MATERIAL AND EQUIPMENT WHICH INTERFERES WITH THE NEW WORK SHALL BE REMOVED OR RELOCATED BY THE CONTRACTOR. VERIFY REMOVAL AND NEW LOCATION OF EQUIPMENT WITH THE PROJECT MANAGER AND THE ARCHITECT/ENGINEER PRIOR TO WORK.
27. VERIFY CLEARANCES FOR ALL NEW OR EXISTING RELOCATED ELECTRICAL WORK BEFORE PROCEEDING WITH CONSTRUCTION. COORDINATE USAGE OF AVAILABLE SPACE WITH ALL TRADES. IN THE EVENT OF CONFLICTS, NOTIFY THE ARCHITECT AND ENGINEER BEFORE PROCEEDING WITH THE WORK.
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   THE WRITTEN STATEMENT SHALL BE SUBMITTED TO THE PROJECT MGR. PRIOR TO WORK. IN THE EVENT THAT THE CONTRACTOR COMMENCES WORK WITHOUT SUBMITTAL, THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY AND COST TO MAINTAIN THE ABOVE IN GOOD WORKING ORDER AND CONDITION.
30. REFER TO CIVIL ENGINEERING DRAWINGS FOR EXACT LOCATIONS OF ALL NEW EQUIPMENT.

C5 | NTS

ELECTRICAL GENERAL NOTES

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CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

8/5/2024

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: NS05

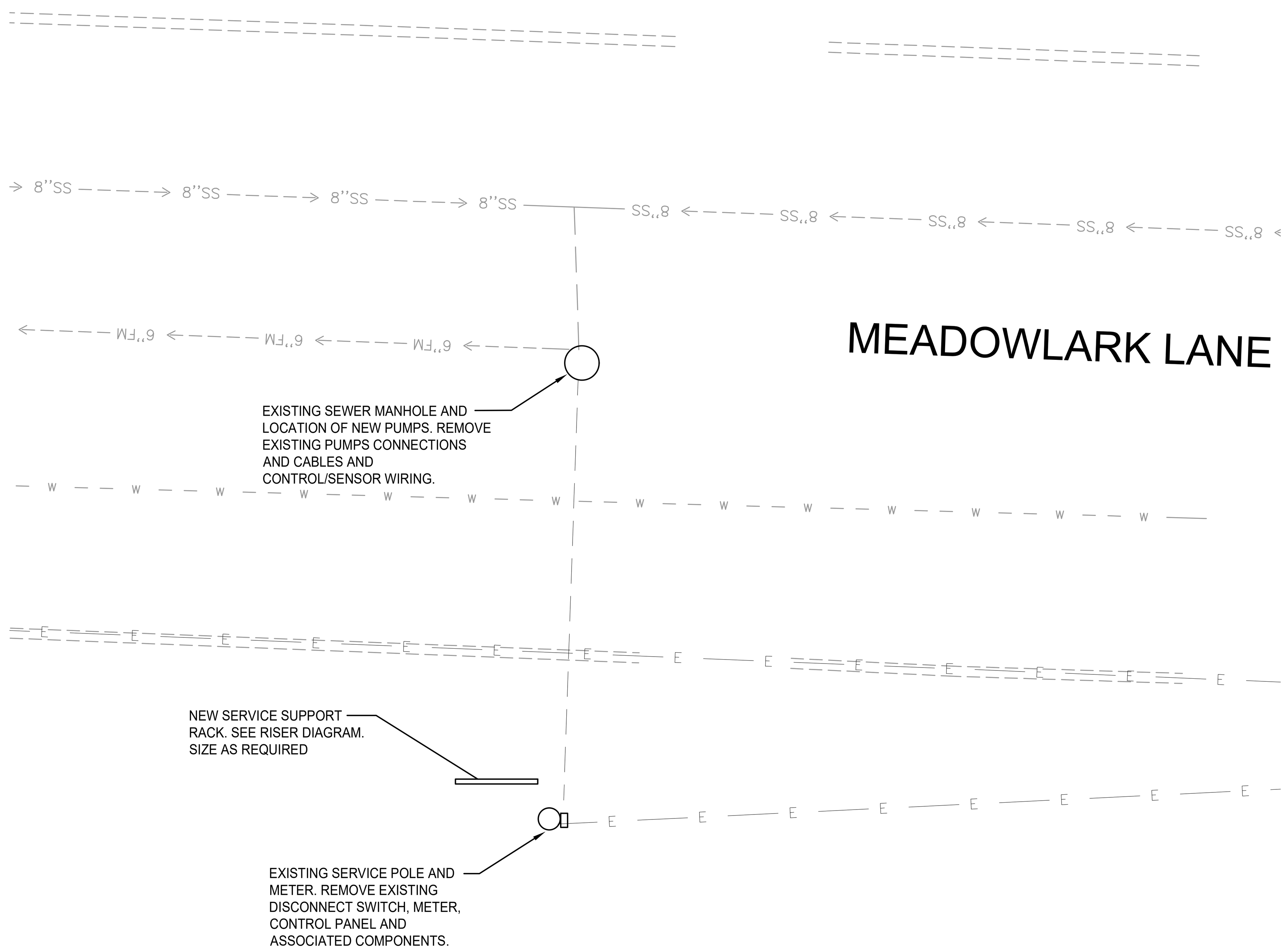
DWG NO. E1.0

DIVISION OF ENGINEERING
ELECTRICAL SITE PLAN

LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

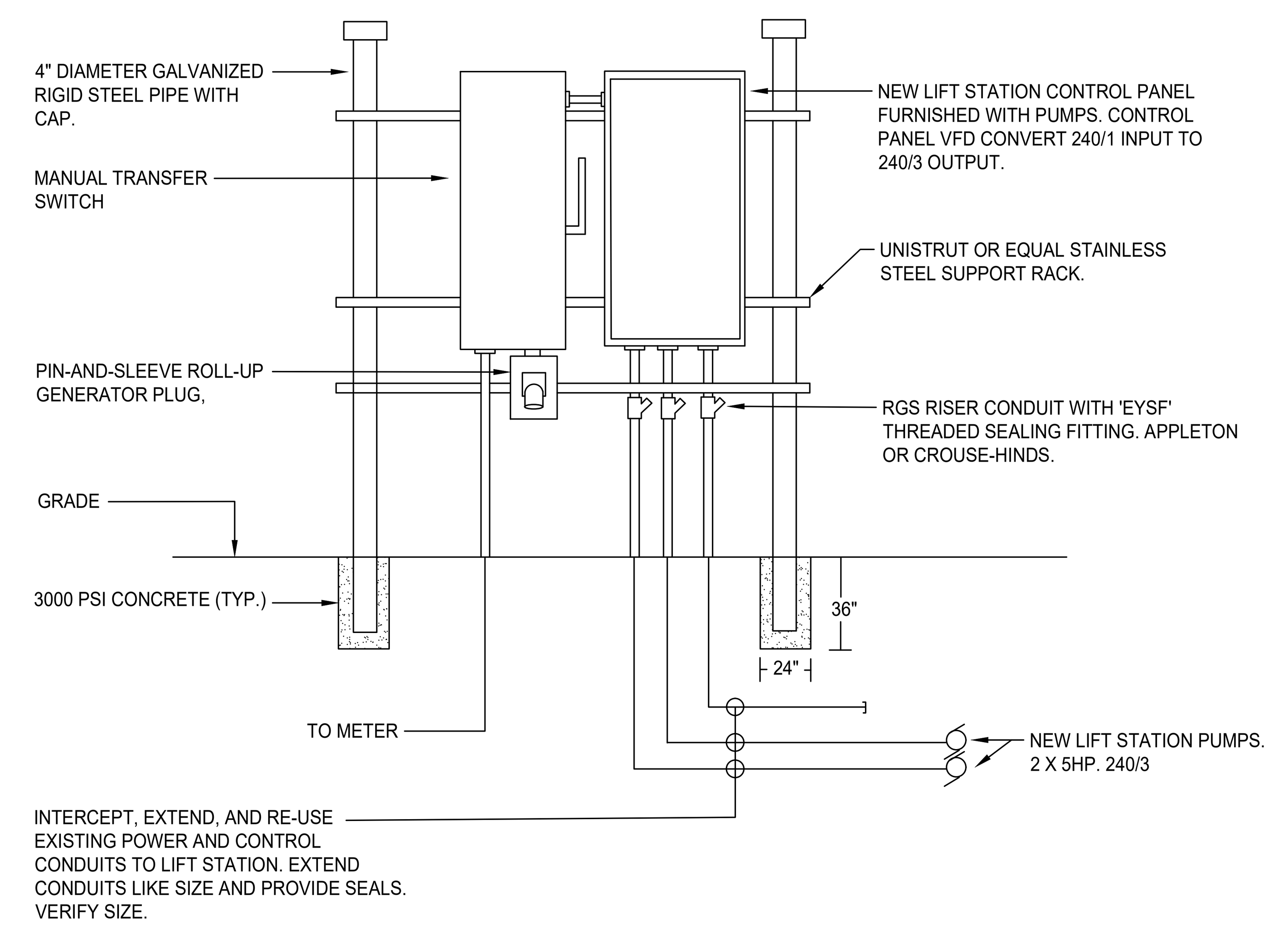
SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 06/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

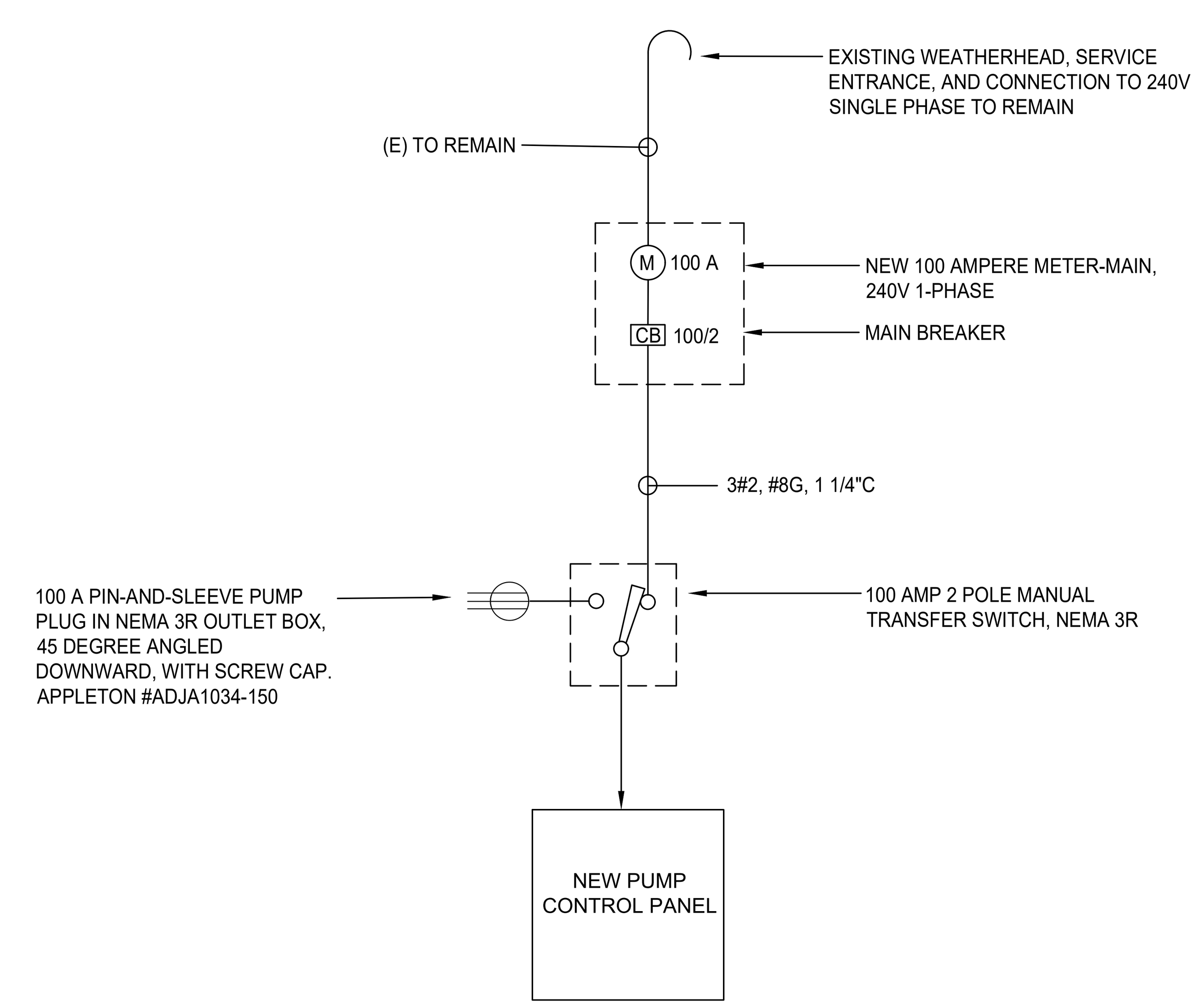


D1 ELECTRICAL SITE PLAN
1" = 5'

NORTH
GRAPHIC SCALE: 1" = 5'
5 0 5



B4 EQUIPMENT ELEVATION
1/2" = 1'-0"



C4 ONE LINE DIAGRAM
NTS

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C5 ELECTRICAL GENERAL NOTES
NTS

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CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

8/5/2024

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

SEWER BASIN ID: NS05

DWG NO.
E1.0

DIVISION OF ENGINEERING
ELECTRICAL SITE PLAN
LOCATION: 1217 MEADOWLARK LANE
MEMPHIS, TENNESSEE

SURVEY: A2H, INC DATE: 08/2021 PROJECT: 21117.02
DESIGN BY: A2H, INC DATE: 06/2024 SCALE: AS NOTED
REVIEWED BY:

CITY ENGINEER DATE

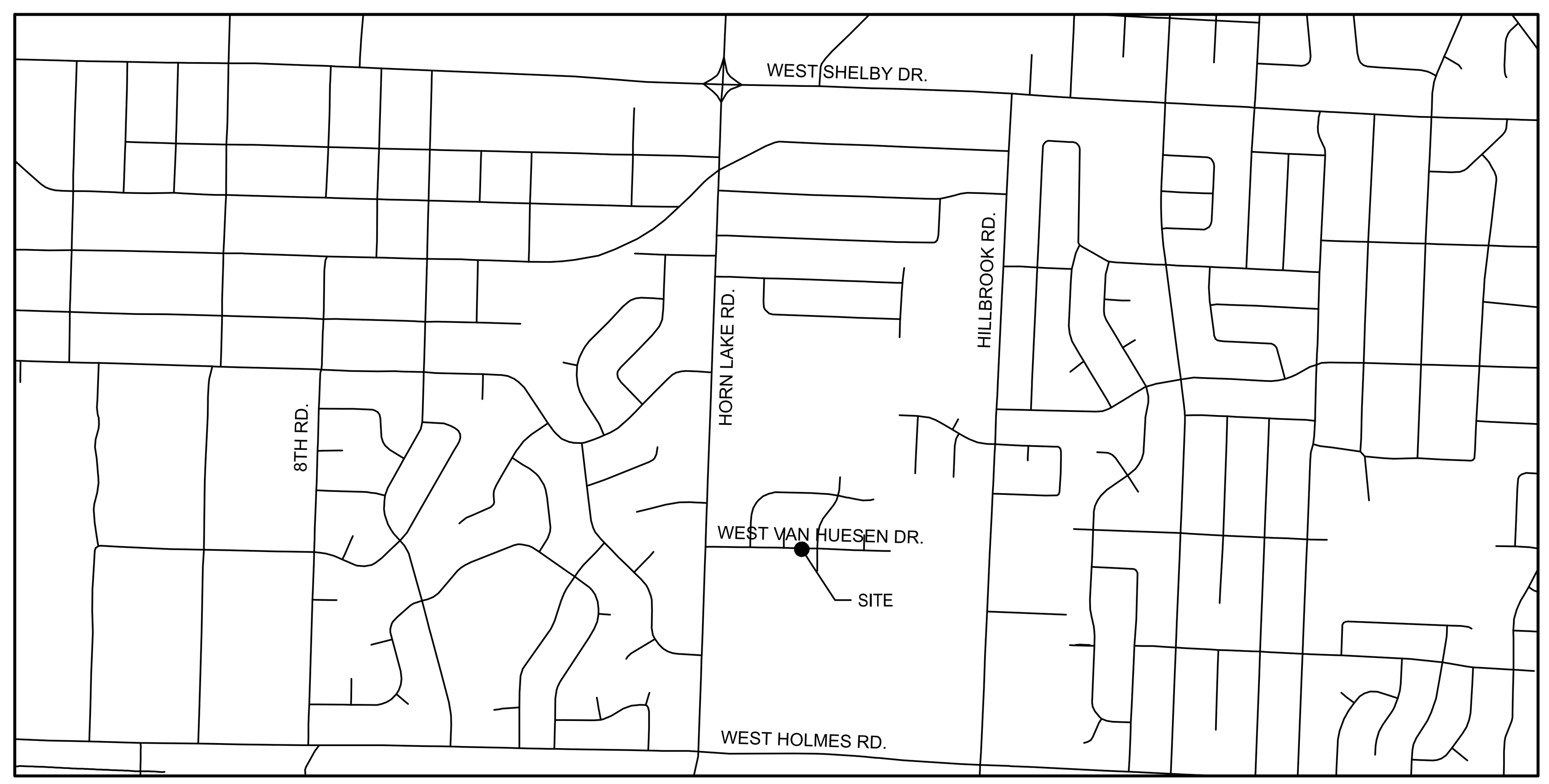
LIFT STATION IMPROVEMENTS

For

47 WEST VAN HUESEN

SEWER ASSESSMENT & REHABILITATION PROGRAM (SARP 10)
CITY OF MEMPHIS, TN

CONSTRUCTION DRAWINGS
AUGUST 5, 2024



VICINITY MAP
SCALE: 1" = 1000'

A2H ENGINEERS ARCHITECTS PLANNERS

jaime
I:\2021\21117.02\2 Civil\Projdwgs\West Van Huesen Project\G0.0 - COVER.dwg
Wed, 21 Aug 2024 - 4:38pm
PLOT SCALE: 1"=1' LATEST REV.:

SANITARY SEWER NOTES;

1. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY ALL OF SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE UTILITY COMPANY TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES AND/OR UNDERGROUND STRUCTURES PRIOR TO THE INITIATION OF ANY CONSTRUCTION. CONTRACTOR SHALL ALSO ASSUME FULL RESPONSIBILITY FOR LOCATION OF EXISTING UTILITIES INVOLVING MLG&W, SOUTH CENTRAL BELL, AND/OR TEXAS GAS COMPANY, PLEASE CALL 1-800-351-1111. FOR SEWER SERVICE LOCATIONS, CALL 901-529-8025.
2. CONTRACTOR SHALL ENSURE UNINTERRUPTED SEWER SERVICE ON EXISTING SEWER AND SERVICE CONNECTIONS BY PROVIDING AMPLE TEMPORARY WASTEWATER PUMPING AND /OR BYPASSING.
3. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
4. CONTRACTOR SHALL NOTIFY THE CITY OF MEMPHIS CONSTRUCTION INSPECTION OFFICE AT 636-2462 A MINIMUM OF 24 HOURS PRIOR TO BEGINNING ANY CONSTRUCTION.
5. ALL AREAS IN CUT OR FILL WHERE VEGETATION HAS BEEN REMOVED SHALL BE SEEDED, MULCHED, FERTILIZED, AND /OR SODDED AS REQUIRED TO PREVENT EROSION.
6. THE CONTRACTOR SHALL VERIFY EXISTING DATA AND REPORT ANY SIGNIFICANT DISCREPANCIES TO THE ENGINEER.
7. ALL SANITARY SEWER TO BE CONSTRUCTED AS PER CITY OF MEMPHIS STANDARDS CONSTRUCTION SPECIFICATIONS. SANITARY SEWER CONNECTIONS TO BE INSTALLED AS PER CITY OF MEMPHIS STANDARD SST-16.
8. ALL SEWER MANHOLE LIDS IN OPEN AREAS ARE TO BE CONSTRUCTED 1.5' ABOVE PROPOSED GRADE; IN BACKYARDS, MANHOLE LIDS ARE TO BE 1.5' ABOVE INITIAL GRADE, 0.5' ABOVE FINAL GRADE.
9. ALL SANITARY SEWER, INCLUDING SERVICE CONNECTIONS, WHICH HAS LESS THAN 1.5 CLEARANCE (OUTSIDE OF PIPES) WITH DRAINAGE OR IN FILLED AREAS SHALL BE CLASS 50 D.I.P. OR CONCRETE ENCASED, 10' BOTH SIDES OF CROSSING. ALL DUCTILE IRON PIPE SHALL BE POLYETHYLENE LINED OR SHALL BE TREATED WITH PROTECTO 401 OR APPROVED EQUIVALENT.
10. THE CITY OF MEMPHIS SHALL HAVE INGRESS/EGRESS RIGHTS TO USE PRIVATE YARDS FOR THE PURPOSE OF MAINTAINING ALL PUBLIC SEWER LINES AND SHALL BEAR NO RESPONSIBILITY FOR THE MAINTENANCE OF SAID PRIVATE DRIVES AND YARDS.
11. NO TREES, SHRUBS, PERMANENT STRUCTURES OR OTHER UTILITIES (EXCEPT FOR CROSSINGS) WILL BE ALLOWED WITHIN SANITARY SEWER EASEMENT. NO OTHER UTILITIES OR SERVICES MAY OCCUPY SANITARY SEWER EASEMENTS IN PRIVATE DRIVE AND YARDS EXCEPT FOR CROSSINGS.
12. ALL SANITARY SEWER MANHOLES IN REVERSE CROWN STREETS, ALLEYS OR DRIVES (PUBLIC OR PRIVATE) SHALL BE PROVIDED WITH GASKETS AND PLUGS FOR "PICK HOLES" TO PREVENT DRAINAGE INFLOW INTO SEWER SYSTEM.
13. THE CONTRACTOR SHALL PROVIDE ADEQUATE AND EFFECTIVE EROSION CONTROL AS NECESSARY TO PREVENT ANY SITUATION INTO EXISTING DRAINAGE SYSTEM AND /OR ADJACENT PROPERTIES.
14. THE CONTRACTOR SHALL MAINTAIN SAFE INGRESS AND EGRESS FOR ADJACENT PROPERTIES DURING CONSTRUCTION. ALL WORK SHALL BE PERFORMED IN A SUCH MANNER THAT ADJACENT PROPERTIES ARE NOT DAMAGED OR ADVERSELY AFFECTED.
15. THE CONTRACTOR SHALL REMOVE EXISTING PAVEMENT TO CLEAN, STRAIGHT LINE PARALLEL AND PERPENDICULAR TO THE FLOW OF TRAFFIC.
16. THE CONTRACTOR SHALL REPAIR FULL LANE WIDTH. CONSTRUCTION PATCHES WITH ANGLED SIDES AND/OR IRREGULAR SHAPE SHALL BE AVOIDED.
17. THE CONTRACTOR SHALL BE RESPONSIBLE TO APPLY A TACK COAT TO ALL EDGES OF THE EXISTING ASPHALT BEFORE PLACING NEW PAVEMENT AND ALL JOINTS BETWEEN EXISTING AND NEW PAVEMENT SHALL BE SEALED WITH ASPHALT TACK COAT OR RUBBERIZED MATERIAL.

DEMOLITION NOTES;

1. THE CONTRACTOR SHALL REMOVE ALL UNDERGROUND UTILITIES AND ANY OTHER ITEMS IN ACCORDANCE WITH THE TDEC AND THE TECHNICAL SPECIFICATIONS. THE CONTRACTOR SHALL STRICTLY FOLLOW ALL CITY, STATE, AND FEDERAL GUIDELINES FOR REMOVAL AND DISPOSAL OF THESE FACILITIES.
2. ALL BUILDING, CONCRETE, ASPHALT PAVEMENT, AND GRANULAR SUBBASE SHALL BE REMOVED REMOVED FULL DEPTH PER THE DIRECTION OF THE GEOTECHNICAL ENGINEER. ALL SHALL BE DISPOSED IN ACCORDANCE WITH ALL CITY, STATE AND FEDERAL REGULATIONS.
3. CONTRACTOR SHALL REMOVE & REPAIR PAVEMENT AS REQUIRED FOR UTILITY CONSTRUCTION INCLUDING BUT NOT LIMITED TO : IRRIGATION SLEEVES, SITE LIGHTNING CONDUITS, WATER LINES, SANITARY SEWER LINES, STORM DRAINAGE LINES, ETC. CONTRACTOR HAS AN OPTION TO BORE CONDUITS.
4. PRIOR TO COMMENCING ANY UTILITY WORK, CONTRACTOR SHALL NOTIFY ANY SURROUNDING PROPERTY OWNERS WHO MAY EXPERIENCE A DISRUPTION IN SERVICE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MODIFYING ANY EXISTING IRRIGATION SYSTEM TO ACCOMMODATE PARTS OF THAT EXISTING SYSTEM THAT ARE REMOVED, ABANDONED OR DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL ALSO MODIFY ANY EXISTING IRRIGATION SYSTEM TO ACCOMMODATE NEW AREAS OF LANDSCAPING. ANY IRRIGATION SLEEVES SHALL BE INSTALLED PRIOR TO PAVING AND BACKFILLED PROPERLY BY THE SITE CONTRACTOR.
6. THE CONTRACTOR SHALL ENSURE ADEQUATE ACCESS IS PROVIDED DURING ALL PHASES OF CONSTRUCTION. COORDINATE WITH THE PROJECT MANAGER.
7. WHEN REMOVING UTILITIES, CONTRACTOR SHALL GROUT AND SEAL ANY STRUCTURES THAT ARE TO REMAIN PER LOCAL REGULATIONS.
8. UTILITIES SHOWN ARE LOCATED BY FIELD SURVEY AND RECORD DRAWINGS. ADDITIONAL UNDERGROUND UTILITIES WILL BE ENCOUNTERED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REMOVE ANY INACTIVE STRUCTURE & ALERT ENGINEER OF ANY ACTIVE, UNMAPPED STRUCTURES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION OF UTILITY DEMOLITION & RELOCATION.
10. CONTRACTOR SHALL NOT INTERRUPT DRAINAGE FROM ADJACENT PROPERTIES AND PUBLIC RIGHT-OF-WAYS.
11. ALL PUMPS, MOTORS, ETC REMOVED SHALL BE RETURNED TO MEMPHIS WTCS DEPARTMENT. CONTACT JAMES GREENLEE @ 901-636-0237

GENERAL NOTES:

1. AT ALL CROSSINGS OF EXISTING UTILITIES, THE CONTRACTOR SHALL FIELD LOCATE BY POST HOLING OR OTHER APPROPRIATE METHODS, THE HORIZONTAL AND VERTICAL LOCATION ALL EXISTING UTILITIES.
2. ALL SEWER TRENCHES SHALL BE PROPERLY BACKFIELD AT THE END OF EACH WORK DAY.
3. ALL DISTURBED AREAS SHALL BE SEEDED (WITH A SEASONAL MIX) AND COVERED WITH STRAW AT THE END OF EACH WEEK (AT A MINIMUM) OR MORE FREQUENTLY, AS CONDITIONS DICTATE, IN ADDITION TO EROSION CONTROLS REFERENCED ON PLANS.
4. ALL DISTURBED LAWN AREAS SHALL BE SODDED. MATCH EXISTING SOD TYPE.
5. CONTRACTOR IS FULLY RESPONSIBLE FOR DAMAGES OF EXISTING UTILITIES, AND PUBLIC/PRIVATE INFRASTRUCTURE AND PROPERTY.

EROSION CONTROL NOTES:

1. CONSTRUCTION ENTRANCES (TO THE OFFICE OR LAY DOWN AREA, AND TO WORK AREAS) TO BE A MINIMUM 6" DEPTH T.D.O.T. NO. 1 OR NO. 2 STONE.
2. INSTALL WATTLES OR SILT FENCE AS DICTATED ON THE EROSION CONTROL PLANS. SEE DETAILS FOR MORE INFORMATION.
3. ALL STOCK PILE AREAS TO BE PROTECTED BY A COMBINATION OF WATTLES AND SILT FENCE.
4. INSTALL INLET PROTECTION DEVICES AT STORM INLETS PRIOR TO CONSTRUCTION. SEE PLANS FOR LOCATIONS.
5. ALL NEWLY CUT OR FILL AREAS LACKING ADEQUATE VEGETATION SHALL BE FERTILIZED, MULCHED, SEEDED, AND /OR SODDED TO EFFECTIVELY CONTROL EROSION.
6. A SPECIFIC INDIVIDUAL SHALL BE DESIGNATED TO BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROLS ON EACH PROJECT SITE.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SOIL EROSION CONTROL MEASURES AS NOTED ON THE PLANS AND AS REQUESTED BY THE OWNER DURING THE CONSTRUCTION, AND AS NECESSARY TO PREVENT THE SEDIMENT FROM LEAVING THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SATISFYING THE REQUIREMENTS OF THE STATE OF TENNESSEE EROSION & SEDIMENT CONTROL HANDBOOK. ALL SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE CONTRACT SO AS TO PREVENT ANY SEDIMENTATION FROM WASHING OFF THE SITE ONTO ADJACENT PROPERTY OR PUBLIC RIGHTS-OF-WAY. SEDIMENT FENCE SHALL BE INSTALLED AS DIRECTED. THE CONTRACTOR SHALL MAINTAIN A LOG OF ALL MAINTENANCE ACTIVITIES FOR THE EROSION ELEMENTS AS REQUIRED BY THE STATE OF TENNESSEE DEPARTMENT OF WATER POLLUTION CONTROL.
8. A COPY OF THE EROSION CONTROL PLAN MUST BE AVAILABLE ON SITE FOR THE DWPC INSPECTOR ON REQUEST.
9. EROSION AND SEDIMENT CONTROL MEASURES MUST BE IN PLACE AND FUNCTIONAL BEFORE EARTH MOVING OPERATIONS BEGIN, AND MUST BE CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. TEMPORARY MEASURES MAY BE REMOVED AT THE BEGINNING OF THE WORK DAY, BUT MUST BE REPLACED AT THE END OF THE WORK DAY OR PRIOR TO RAINFALL EVENTS.
10. ALL CONTROL MEASURES SHALL BE CHECKED AND STATE REQUIREMENTS FOR MAINTENANCE AND REPAIRS SHALL BE MADE AS NECESSARY. DURING PROLONGED RAINFALL, DAILY CHECKING AND REPAIRING IS NECESSARY. THE PERMITTEE SHALL MAINTAIN RECORDS OF INSPECTION CHECKS, MAINTENANCE, AND REPAIRS.
11. THIS PLAN HAS BEEN REVIEWED AND APPEARS TO BE ADEQUATE. IF SEWER PIPE INSTALLATION BY BORE DOES NOT PROVIDE FOR EFFECTIVE SEDIMENT CONTROL AND EROSION PROTECTION, ADDITIONAL MEASURES WILL BE REQUIRED.
12. IF PUMPING IS REQUIRED, SEDIMENT LADEN WATER IS NOT TO BE DISCHARGED INTO THE STORM DRAIN OR THE STREET.

REVISIONS

DATE	DESCRIPTIONS	APPROVED

BRADLEY J. DAVIS — REGISTERED ENGINEER — AGRICULTURAL — STATE OF TENNESSEE
08-05-24

47 WEST VAN HUESEN DR LIFT STATION

DEVELOPER: SARP 10

ENGINEER: ABES ENGINEERING

G1.00

SHEET 1 OF 1

DIVISION OF ENGINEERING

GENERAL NOTES

47 WEST VAN HUESEN DRIVE

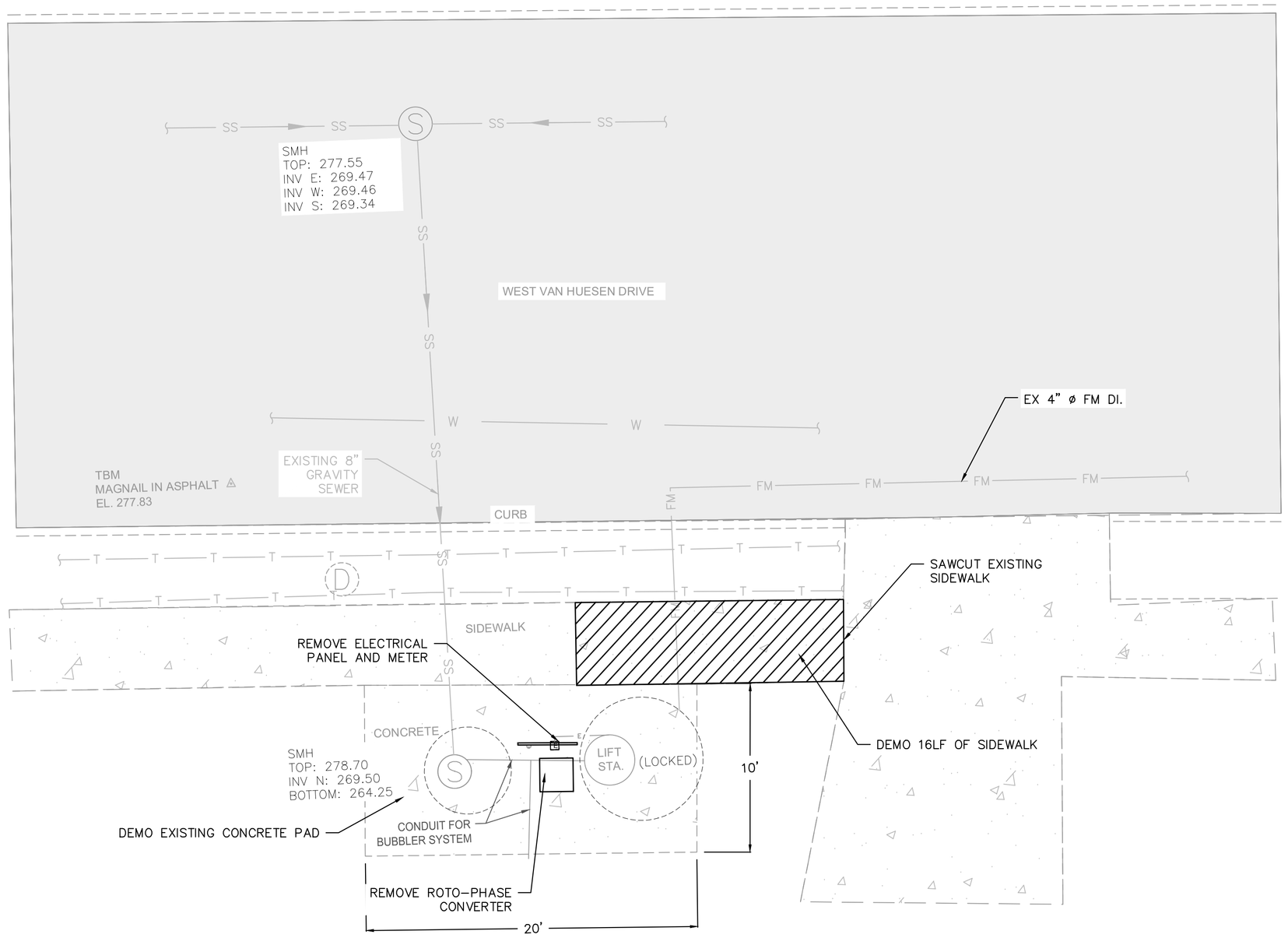
MEMPHIS, TENNESSEE

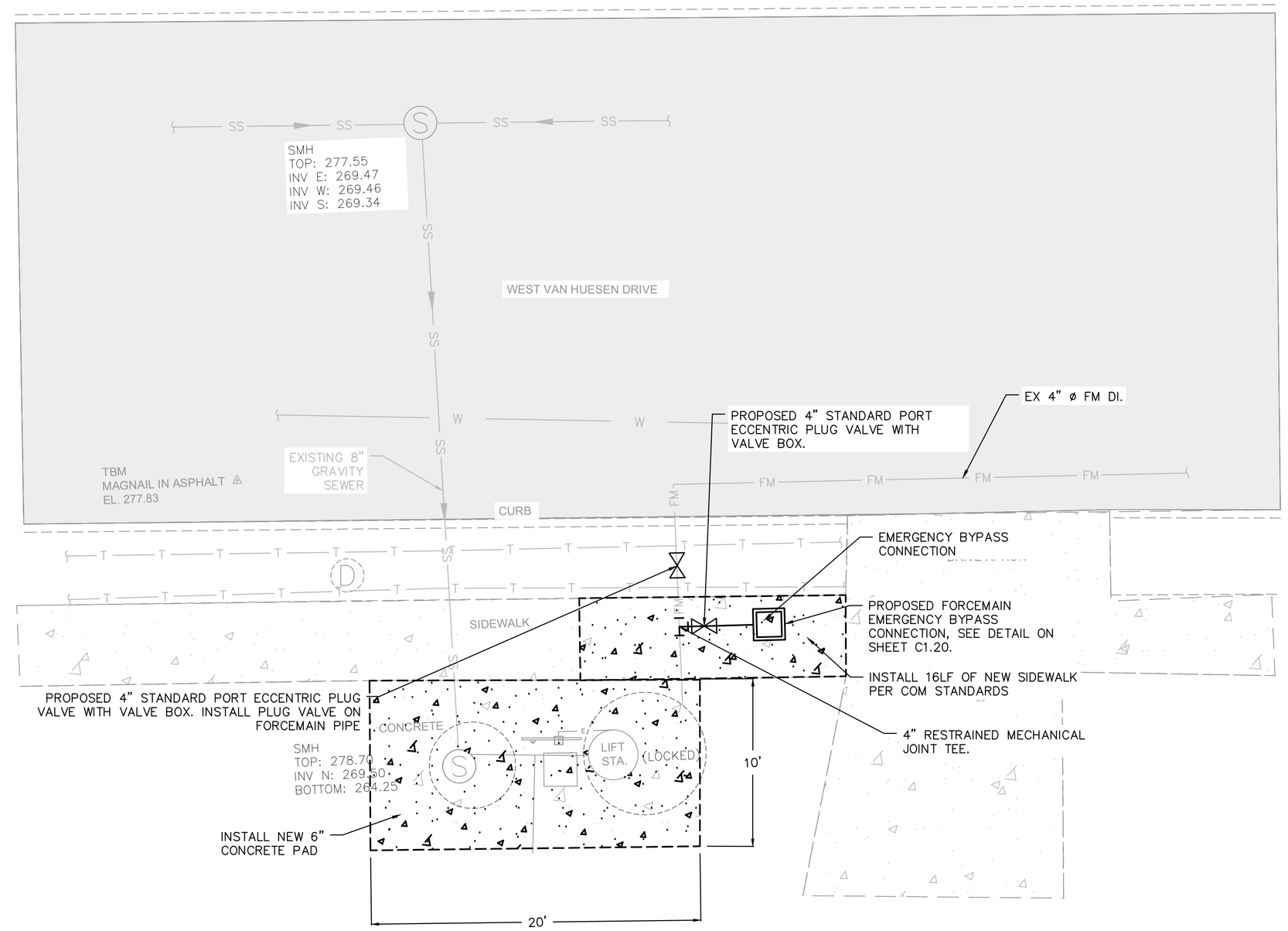
SURVEY BY: A2H, Inc. DATE: Aug-21 PROJECT NO:PN 290-21-001 47

DESIGN BY: BRAD DAVIS, P.E. DATE: Sep-22 SCALE: NTS

REVIEWED

DEPUTY CIVIL ENGINEER DATE CITY ENGINEER DATE





LEGEND

EXISTING

- E — ELECTRIC CONDUIT
- (S) — SEWER MANHOLE
- CONTROL POINT
- FM — FORCE MAIN
- OHE — OVERHEAD ELECTRIC
- X — X — FENCE
- SS — SANITARY LINE
- (D) — STORM MANHOLE
- W — WATER LINE
- T — TELEPHONE LINE
- CONCRETE
- ASPHALT

PROPOSED

- CONCRETE

DEMOLITION

- SAWCUT

EXISTING SITE PLAN

PROPOSED SITE PLAN

0 5 10

SCALE: 1" = 5'

EXISTING FORCEMAIN:

CONTRACTOR TO LOCATE AND VERIFY EXISTING FORCE MAIN ROUTING AT START OF CONSTRUCTION AND NOTIFY ENGINEER OF ANY ISSUES

SPECIAL FLOOD HAZARD STATEMENT:

THIS IS TO CERTIFY THAT BY GRAPHIC DETERMINATION THE ABOVE PLATTED PROPERTY IS NOT IN A SPECIAL FLOOD HAZARD AREA (SFHA) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD. THE SUBJECT PROPERTY IS SHOWN IN A FEMA ZONE X (NO SHADING ON FEMA MAP): AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN ACCORDING TO THE FEMA/FIRM MAP NUMBER 47157C0415F WITH AN EFFECTIVE DATE OF SEPTEMBER 28, 2007.

PROJECT BENCHMARKS

CITY BENCHMARK:

BM #330 HORN LAKE RD. & HOLMES RD.
CITY MONUMENT IS LOCATED ON THE NW COR., AT B/CURB ER ON HORN LAKE SIDE, AT S. END OF 6-72 INLET.
268.72

SITE TBM:

MAGNAIL – SEE PLAN ABOVE

NOTE: BEFORE THE BEGINNING OF CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE SITE DATUM WITH ALL SITE TBMS AND IMMEDIATELY REPORT IN WRITING ANY DISCREPANCIES TO THE ENGINEER.

APPROVED FOR CONSTRUCTION:

THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE CITY OF MEMPHIS DIVISION OF ENGINEERING UNDER AUTHORITY DELEGATED BY THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF WATER POLLUTION CONTROL. IT IS HEREBY APPROVED FOR CONSTRUCTION BY THE CITY ENGINEER AS EVIDENCED BY HIS SIGNATURE IN THE TITLE BLOCK BELOW.

APPROVAL EXPIRES 1 YEAR FROM APPROVAL DATE BELOW, THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE CITY ENGINEER THAT THE APPROVED FACILITIES WILL REACH THE DESIRED GOALS.

REVISIONS		
DATE	DESCRIPTIONS	APPROVED

BRADLEY DAVIS — REGISTERED ENGINEER — AGRICULTURE — ENVIRONMENT — STATE OF TENNESSEE

08-05-24

47 WEST VAN HUESEN DR LIFT STATION

DEVELOPER: SARP 10

ENGINEER: ABES ENGINEERING

C1.00

SHEET 1 OF 3

DIVISION OF ENGINEERING

EXISTING AND PROPOSED SITE PLAN

47 WEST VAN HUESEN DRIVE

MEMPHIS, TENNESSEE

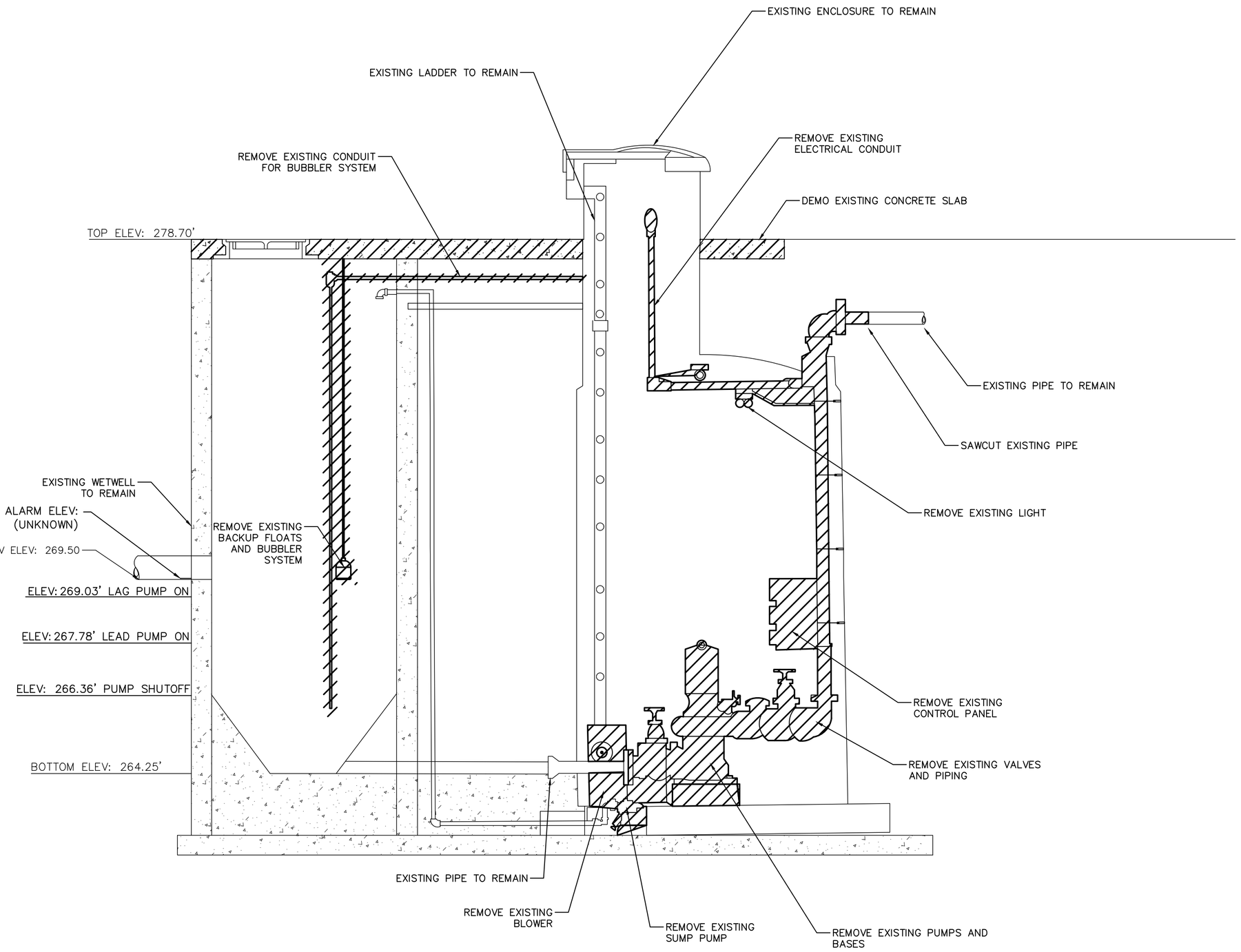
SURVEY BY: A2H, Inc. DATE: Aug-21 PROJECT NO:PN 290-21-001 47

DESIGN BY: BRAD DAVIS, P.E. DATE: Sep-22 SCALE: 1" = 5'

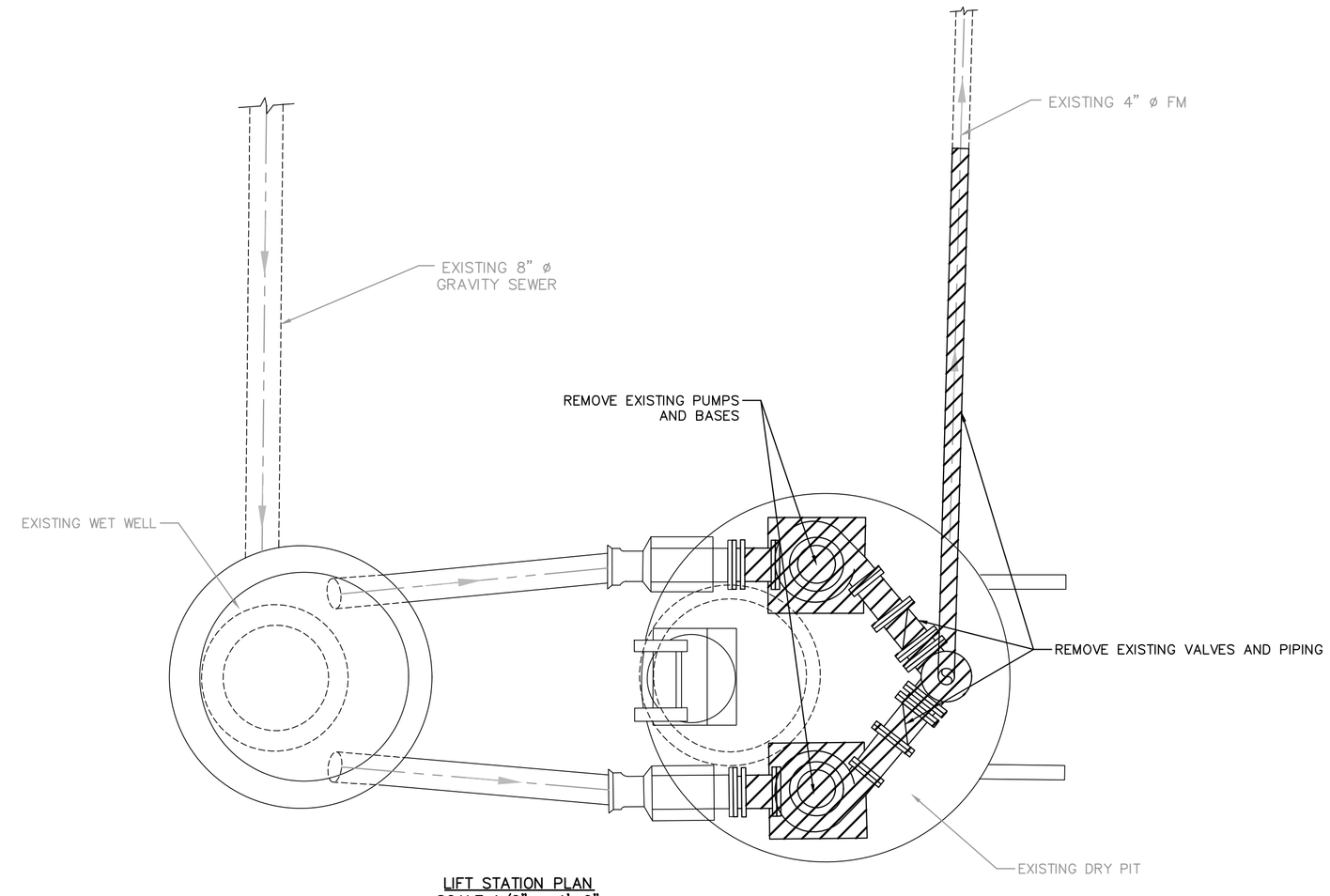
REVIEWED

DEPUTY CIVIL ENGINEER DATE CITY ENGINEER DATE

All inquiries regarding this drawing(s) shall be made to ABES ENGINEERING.



LIFT STATION SECTION
SCALE 1/2" = 1'-0"



LIFT STATION PLAN
SCALE 1/2" = 1'-0"

NOTES:

1. EXISTING PUMP DATA COLLECTED FROM THE "FINAL ASSESSMENT REPORT FOR 47 WEST VAN HUESEN DRIVE – SARP10 LIFT STATION ASSESSMENT PROJECT FOR CITY OF MEMPHIS" DATED OCTOBER 15, 2018

REVISIONS		
DATE	DESCRIPTIONS	APPROVED

BRADLEY J. DAVIS — REGISTERED ENGINEER — AGRICULTURE — MEMPHIS — STATE OF TENNESSEE
08-05-24

47 WEST VAN HUESEN DR LIFT STATION
DEVELOPER: SARP 10
ENGINEER: ABES ENGINEERING

C1.10

SHEET 2 OF 3
DIVISION OF ENGINEERING

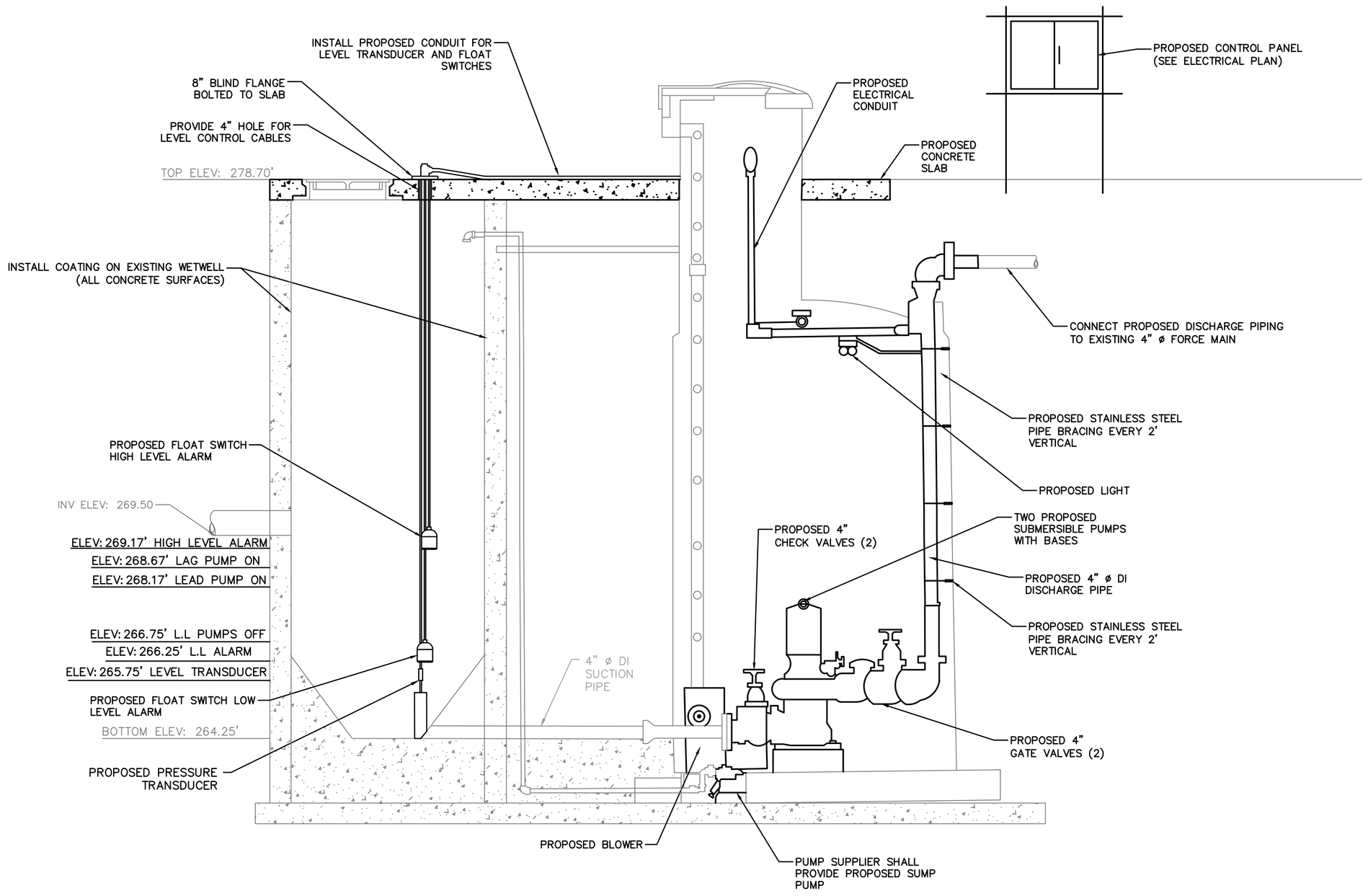
EXISTING LS DEMO PLAN AND SECTION

47 WEST VAN HUESEN DRIVE

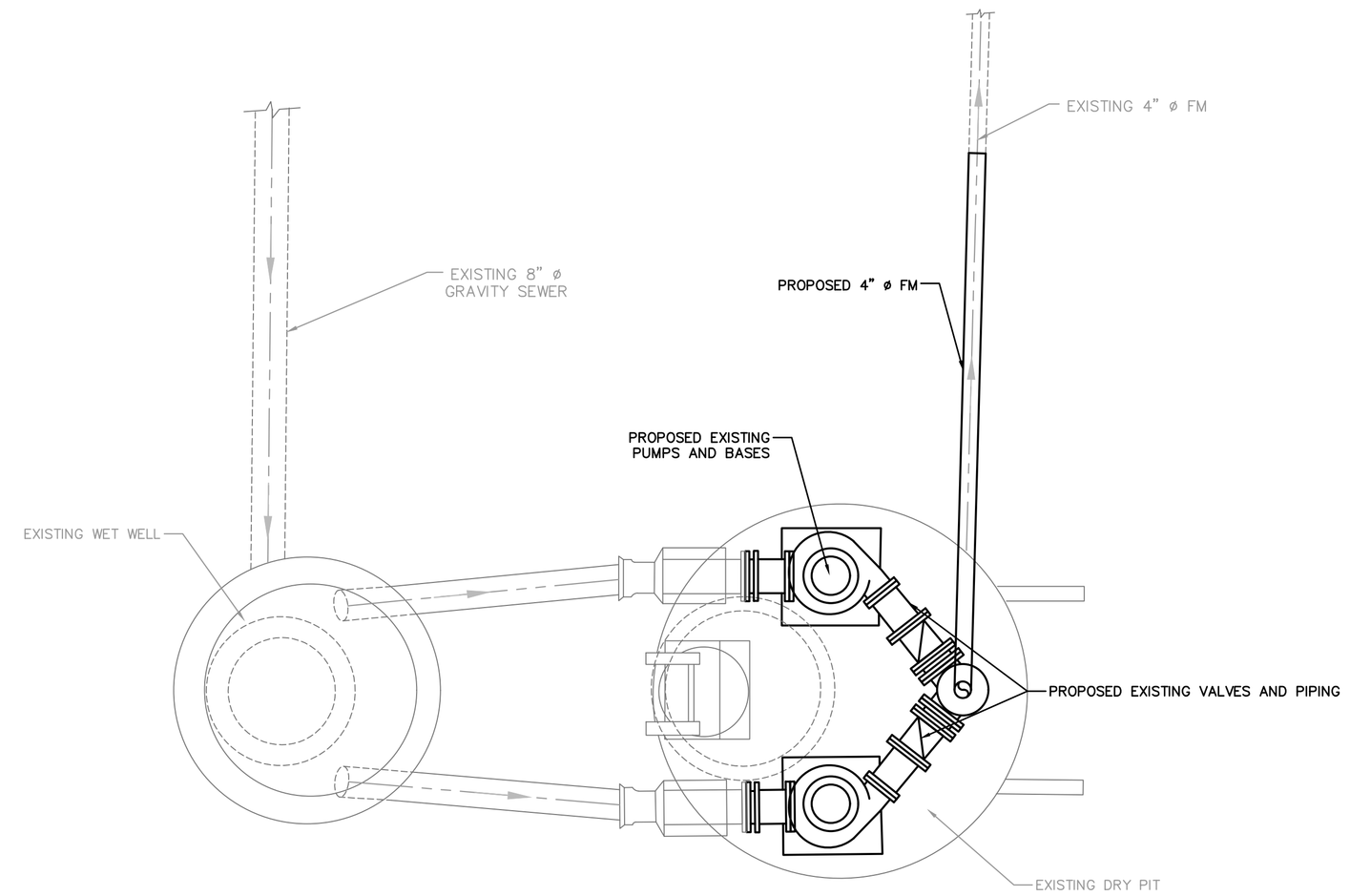
MEMPHIS, TENNESSEE

SURVEY BY: A2H, Inc. DATE: Aug-21 PROJECT NO:PN 290-21-001 47
DESIGN BY: BRAD DAVIS, P.E. DATE: Sep-22 SCALE: 1" = 2'
REVIEWED

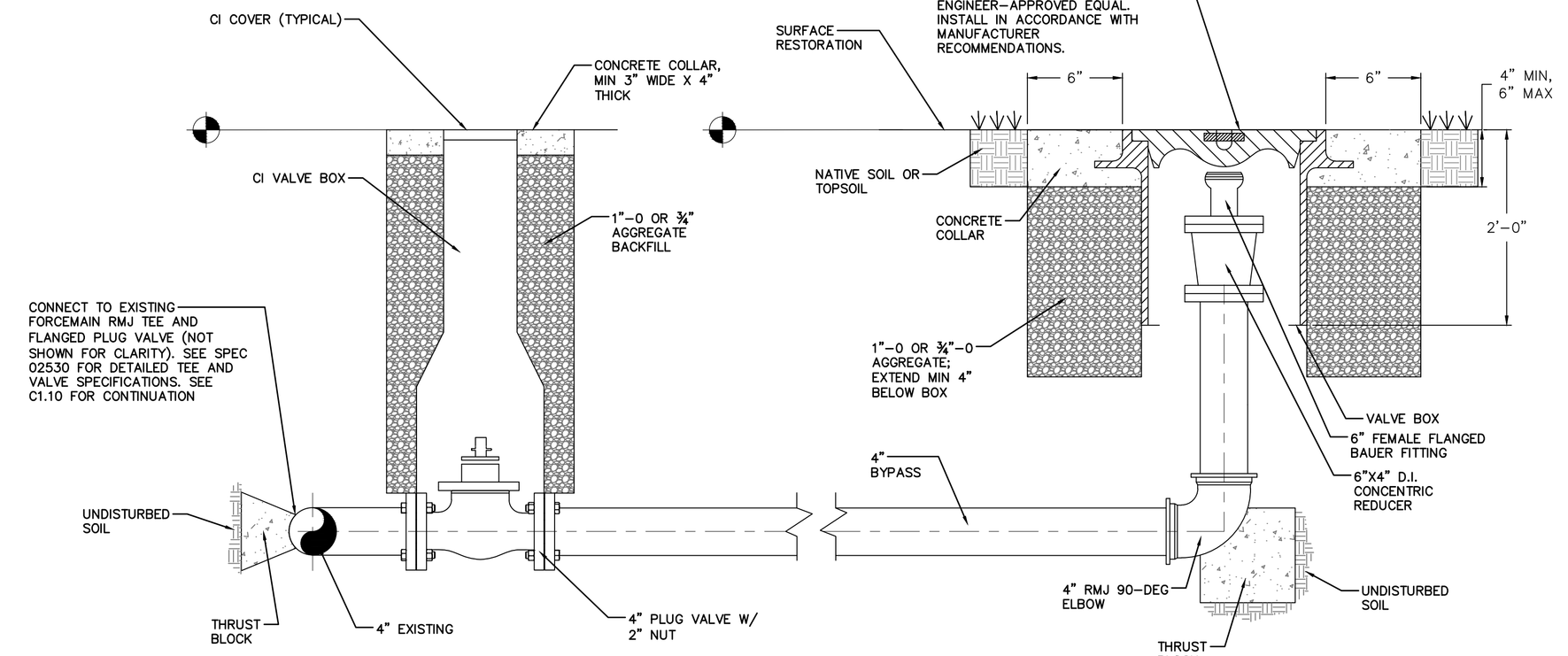
DEPUTY CIVIL ENGINEER DATE CITY ENGINEER DATE



LIFT STATION SECTION
SCALE 1/2" = 1'–0"



LIFT STATION PLAN
SCALE 1/2" = 1'–0"



A C1.20 FORCEMAIN EMERGENCY BYPASS CONNECTION DETAIL
NTS

LIFT STATION REHAB NOTES:

1. ALL PROPOSED PIPING TO BE DIP.
2. IN PREPARATION FOR COATING, THOROUGHLY CLEAN THE WETWELL AND LAWFULLY DISPOSE ON DEBRIS.
3. REMOVE AND REPLACE EXISTING PIPING, VALVES, AND APPURTENANCES.
4. CLEAN AND COAT EXISTING WETWELL WITH A 2–COAT EPOXY–MODIFIED–MORTAR AND HYBRID EPOXY COATING PER MANUFACTURERS RECOMMENDATIONS. COVER EXPOSED REBAR WITH COMPATIBLE PRIMER AND SEAL ANY LEAKS WITH HYDRAULIC CEMENT.
5. TWO PROPOSED SUBMERSIBLE PUMPS:
   FLYGT MODEL NT 3127 SH3 ADAPTIVE 445 (OR APPROVED EQUAL)
   MOTOR NUMBER N3127.060 21–10–4AL–D; 6.4HP; 1755RPM
   3 PHASE, 230V, 60HZ
   98 GPM AT 43' OF HEAD
6. REPLACE EXISTING BLOWER:
   DAYTON MODEL NO. 1TDR3 (OR APPROVED EQUAL)
   1/20 HP 115V, 50/60 HZ, 0.77 AMPS
   273 CFM @ FREE AIR 60 HZ.

REVISIONS

DATE	DESCRIPTIONS	APPROVED

BRADLEY J. DAVIS REGISTERED ENGINEER AGRICULTURAL ENGINEER STATE OF TENNESSEE
08-05-24

47 WEST VAN HUESEN DR LIFT STATION
DEVELOPER: SARP 10
ENGINEER: ABES ENGINEERING

C1.20

SHEET 3 OF 3
DIVISION OF ENGINEERING

PROPOSED LS PLAN AND SECTION

47 WEST VAN HUESEN DRIVE

MEMPHIS, TENNESSEE

SURVEY BY: A2H, Inc. DATE: Aug-21 PROJECT NO:PN 290-21-001 47
DESIGN BY: BRAD DAVIS, P.E. DATE: Sep-22 SCALE: 1" = 2'
REVIEWED

DEPUTY CIVIL ENGINEER DATE CITY ENGINEER DATE

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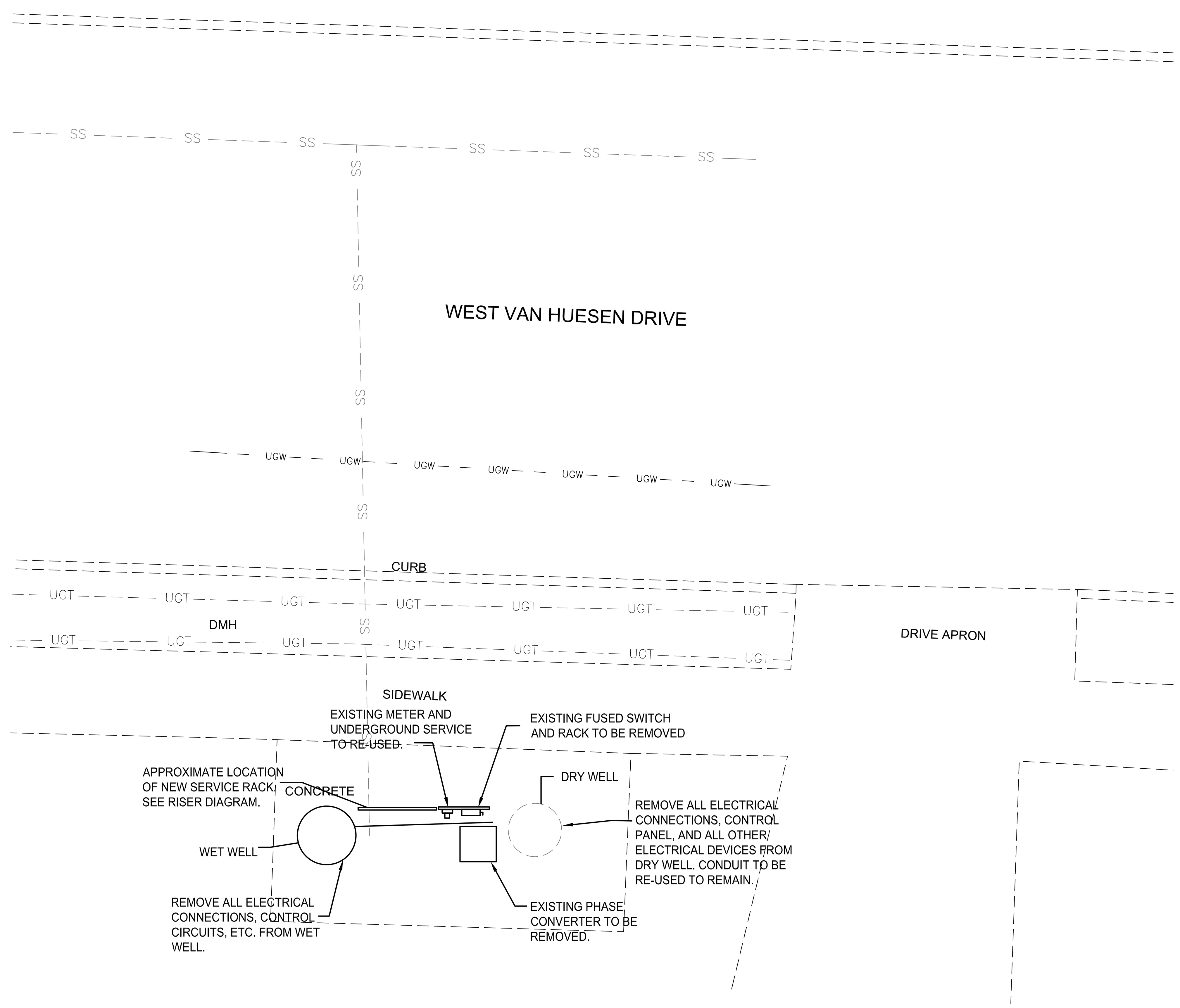


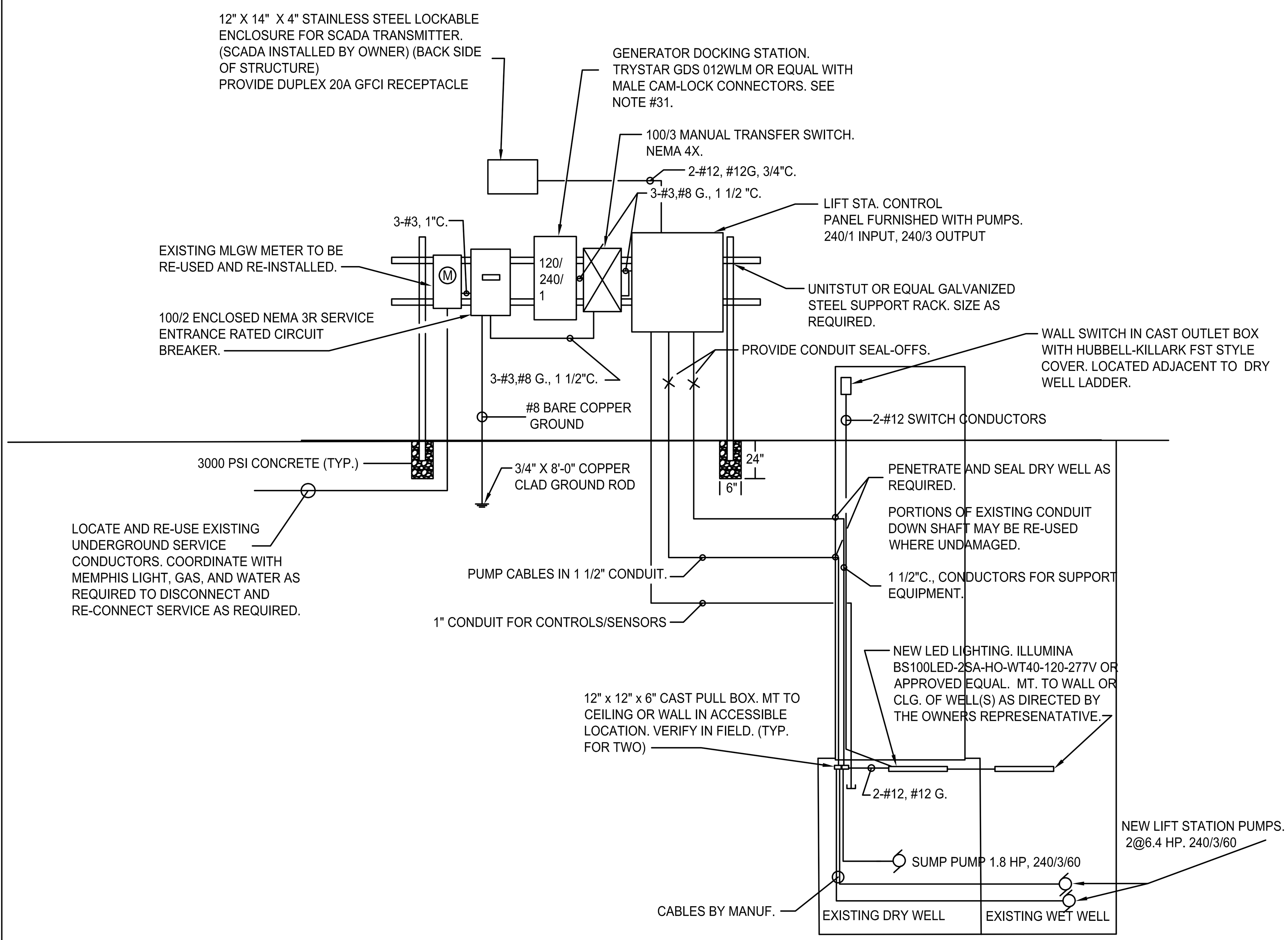
D1 — 1" = 5'
ELECTRICAL SITE PLAN

ELECTRICAL GENERAL NOTES:

1. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALSNECESSARY FOR A COMPLETE AND FULLY OPERATIONAL ELECTRICAL SYSTEM/INSTALLATION.
2. MATERIALS AND INSTALLATION SHALL COMPLY WITH ALL CODES, LAWS, AND ORDINANCES OF FEDERAL, STATE, AND LOCAL GOVERNING BODIES HAVING JURISDICTION.
3. ALL MATERIALS AND EQUIPMENT SHALL BE LISTED AND/OR LABELED BY U.L., ETL, CSA, OR ANOTHER RECOGNIZED TESTING LABORATORY.
4. THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS, INSPECTIONS, GOVERNMENTAL FEES, TAXES AND LICENSES NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF ALL ELECTRICAL WORK.
5. ALL FEES ASSESED BY MEMPHIS LIGHT, GAS, AND WATER DIVISION IN CONNECTION WITH THE NEW SERVICE WILL E PAID BY THE OWNER DIRECTLY TO MLGW.
6. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO GOVERNMENTAL AGENCIES, UTILITY COMPANIES, AND LOCAL CODE OFFICIALS, SHOP DRAWINGS AND/OR INSTALLATION DETAILS WHICH ARE REQUIRED BY THESE AGENCIES FOR THEIR APPROVAL.
7. THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER IN WRITING OF ANY MATERIALS OR APPARATUS BELIEVED TO BE INADEQUATE, UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES, RULES, OR REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.
8. ALL NEW ELECTRICAL WORK OR MODIFICATIONS TO EXISTING ELECTRICAL DISTRIBUTION PANELS, PANELBOARDS, ETC. SHALL BE INSTALLED AS INDICATED ON THE ELECTRICAL CONSTRUCTION DOCUMENTS. CONTRACTOR . SHALL SUBMIT SHOP DRAWINGS OF ALL EQUIPMENT TO BE INSTALLED INDICATING ELEVATIONS, AND ALL DIMENSIONS FOR APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION. CODE REQUIRED CLEARANCES IN FRONT OF ALL ELECTRICAL EQUIPMENT SHALL BE MAINTAINED AT ALL TIMES.
9. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE CONTRACT DOCUMENTS, MAKE A SCHEDULED ARRANGEMENT WITH THE PROJECT MANAGER TO VISIT THE SITE, AND THOROUGHLY BECOME FAMILIAR WITH LOCAL CONDITIONS RELATING TO THE WORK. FAILURE TO DO SO WILL NOT RELIEVE THE CONTRACTOR OF THE OBLIGATIONS OF THE CONTRACT.
10. THE CONTRACTOR SHALL PROVIDE TEMPORARY POWER AND WIRING FOR THE PERFORMANCE OF ALL TRADES, FOR THE ENTIRE PERIOD OF CONSTRUCTION AND SHALL REMOVE ALL TEMPORARY WIRING AT THE COMPLETION OF CONSTRUCTION. ALL COSTS FOR ESTABLISHING AND REMOVING TEMPORARY POWER SHALL BE INCLUDED IN BID.
11. THE EXISTING ELECTRICAL SYSTEMS ARE TO REMAIN IN SERVICE TO PROVIDE FOR THE OWNER'S EXISTING FUNCTIONS. SHOULD IT BECOME NECESSARY TO SHUT-DOWN ANY SYSTEM OR PORTION OF A SYSTEM, APPROVAL IN WRITING MUST BE OBTAINED FROM THE PROJECT MANAGER AND SHALL BE ONLY FOR THE PERIOD AND TIME AGREED UPON. THE BID IS TO INCLUDE THE COST OF ANY TEMPORARY WIRING AND PREMIUM TIME REQUIRED FOR THE SHUTDOWN. EXISTING ELECTRICAL WORK TO BE DEMOLISHED SHALL BE COORDINATED TO ALLOW MINIMUM DOWN-TIME OF THE STATION.
12. ALL MATERIALS AND EQUIPMENT SHALL BE ERECTED, INSTALLED, TOOLED, CONNECTED, CLEANED, ADJUSTED, TESTED, CONDITIONED, AND PLACED IN SERVICE IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS AND RECOMMENDATIONS.
13. ALL CUTTING, DRILLING, AND PATCHING OF MASONRY, DRYWALL, CONCRETE, STEEL, OR IRON WORK BELONGING TO THE SITE SHALL BE DONE BY THIS CONTRACTOR IN ORDER THAT WORK MAY BE PROPERLY INSTALLED. UNDER NO CONDITIONS MAY STRUCTURAL WORK BE CUT, EXCEPT AT THE DIRECTION OF THE ENGINEER OR THEIR REPRESENTATIVE. ALL PENETRATIONS SHALL BE SEALED WITH APPROVED MATERIAL.
14. SHOP DRAWINGS SHALL INCLUDE MANUFACTURER'S NAMES, CATALOG NUMBERS, CUTS, DIAGRAMS, AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND REVIEW THE EQUIPMENT.
15. CONTRACTOR SHALL PROVIDE "AS-BUILT" DOCUMENTATION AND HARD COPY REPRODUCIBLE DRAWINGS AT THE COMPLETION OF THE PROJECT AND SUBMIT TO THE ARCHITECT AND THE ENGINEER. AS-BUILT DRAWINGS SHALL INDICATE EXACT CIRCUIT NUMBERS, LOCATIONS OF ALL DEVICES, CEILING FIXTURES, AND RACEWAY FOR LIGHTING, TELECOMMUNICATIONS AND POWER DISTRIBUTION SYSTEMS AS INSTALLED.
16. ALL MATERIAL, EQUIPMENT, WIRING DEVICES, ETC. SHALL BE NEW AND OF COMMERCIAL GRADE UNLESS SPECIFICALLY INDICATED AS EXISTING TO BE REUSED ON DRAWINGS.
17. EXCEPT AS NOTED OTHERWISE, ALL WORK REQUIRED FOR THE ELECTRICAL INSTALLATION AS SHOWN ON DRAWINGS SHALL INCLUDE ALL LABOR, INSTALLATION METHODS, EQUIPMENT, AND MATERIALS AND SHALL BE IN STRICT COMPLIANCE WITH ALL BUILDING STANDARDS.
18. PROVIDE A COMPLETE METAL RACEWAY SYSTEM, FITTINGS AND ENCLOSURES FOR ALL ELECTRICAL WIRING SYSTEMS TO BE INSTALLED FOR THE PROJECT.
19. MINIMUM CONDUIT SIZE SHALL BE 3/4 INCH. ALL CONDUIT SHALL BE GALVANIZED RIGID STEEL WITH APPROPRIATE FITTINGS AND CAST BOXES WHERE REQUIRED.
20. WIRE NUMBER 8 AND SMALLER FOR USE IN INTERIOR DRY LOCATIONS SHALL BE TYPE THWN THERMOPLASTIC 600 VOLT INSULATED COPPER CONDUCTORS. FEEDERS AND POWER WIRING NUMBER 6 AND LARGER SHALL BE TYPE THW 600 VOLT INSULATED COPPER. WIRE WHICH IS INSTALLED IN RACEWAY IN MOIST OR DAMP LOCATIONS SHALL BE THW, 600 VOLT INSULATED COPPER CONDUCTORS. NO WIRE SMALLER THAN NUMBER 12 AWG SHALL BE USED FOR LIGHTING OR POWER.
24. THE CONTRACTOR SHALL PROVIDE A NEW TYPEWRITTEN PANEL DIRECTORY FOR EACH PANEL AT THE COMPLETION OF THE PROJECT. EACH CIRCUIT BREAKER SHALL BE LABELLED TO IDENTIFY LOAD TYPE AND LOCATION.
25. PERFORM ALL WORK OF A DEMOLITION NATURE THAT MAY BE REQUIRED OR NECESSARY FOR THE FULL AND COMPLETE EXECUTION OF THE WORK, WHETHER EXPLICITLY SHOWN AND/OR SPECIFIED OR NOT. EXACT EXTENT OF DEMOLITION WILL NOT BE FULLY INDICATED BY DRAWINGS. DETERMINE THE NATURE AND EXTENT OF DEMOLITION THAT WILL BE NECESSARY BY COMPARING THE CONTRACT DOCUMENTS WITH ARCHITECTURAL AND DEMOLITION DRAWINGS TO EXISTING CONDITIONS. ELECTRICAL EQUIPMENT WHICH WILL NOT BE REUSED SHALL BE TURNED OVER TO THE OWNER OR REMOVED FROM THE PREMISES AS DETERMINED BY THE PROJECT MANAGER.
26. ANY EXISTING ELECTRICAL MATERIAL AND EQUIPMENT WHICH INTERFERES WITH THE NEW WORK SHALL BE REMOVED OR RELOCATED BY THE CONTRACTOR. VERIFY REMOVAL AND NEW LOCATION OF EQUIPMENT WITH THE PROJECT MANAGER AND THE ARCHITECT/ENGINEER PRIOR TO WORK.
27. VERIFY CLEARANCES FOR ALL NEW OR EXISTING RELOCATED ELECTRICAL WORK BEFORE PROCEEDING WITH CONSTRUCTION. COORDINATE USAGE OF AVAILABLE SPACE WITH ALL TRADES. IN THE EVENT OF CONFLICTS, NOTIFY THE ARCHITECT AND ENGINEER BEFORE PROCEEDING WITH THE WORK.
28. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THESE DRAWINGS. WHERE MORE STRINGENT REQUIREMENTS THAN THOSE DESCRIBED HEREIN OR AS SET FORTH UNDER CODES, LAWS, AND ORDINANCES OF FEDERAL, STATE, AND LOCAL GOVERNING BODIES HAVING JURISDICTION, THOSE GREATER REQUIREMENTS SHALL BE ADHERED TO.
29. EXISTING CONDITIONS OF ALL EXISTING BUILDING EQUIPMENT, DEVICES, FIXTURES, AND SYSTEMS THAT REQUIRE REWIRING, REUSE, RELOCATION, OR REFURBISHING AS PER DRAWINGS AND SPECIFICATIONS SHALL BE FIELD VERIFIED BY THE E.C. PRIOR TO COMMENCEMENT OF ANY WORK TO BE COMPLETELY OPERATIONAL. E.C. SHALL SUBMIT A WRITTEN STATEMENT AND ITEMIZED LISTING OF ALL EXISTING CONDITIONS OF THE FOLLOWING, ALTHOUGH NOT LIMITED TO THOSE LISTED:

    THE WRITTEN STATEMENT SHALL BE SUBMITTED TO THE PROJECT MGR. PRIOR TO WORK. IN THE EVENT THAT THE CONTRACTOR COMMENCES WORK WITHOUT SUBMITTAL, THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY AND COST TO MAINTAIN THE ABOVE IN GOOD WORKING ORDER AND CONDITION.
30. CONTRACTOR SHALL REFER TO CIVIL ENGINEERING DRAWINGS FOR EXACT LOCATIONS OF ALL NEW EQUIPMENT.
31. GENERATOR CONNECTION BOX SHALL BE PROVIDED WITH ENGRAVED IDENTIFICATION PLAQUE (RED/WHITE LETTERS) WITH VOLTAGE AND PHASE CONFIGURATION OF STATION AS INDICATED. LETTERS TO BE 3" IN HEIGHT. NAMEPLATE SCREWED TO BOX USING STAINLESS STEEL SCREWS.

D3 — NTS
ELECTRICAL GENERAL NOTES



B4 — NTS
ELECTRICAL RISER DIAGRAM

A2H
ENGINEERS • ARCHITECTS • PLANNERS
3009 Davies Plantation Road, Lakeland, TN 38002 — 901.372.0404 — www.A2H.com
A2H, Inc.

CONSTRUCTION DOCUMENTS

REVISIONS

ITEM NO.	DESCRIPTION	DATE

8/5/2024

DWG NO. **E1.0**

DIVISION OF ENGINEERING
ELECTRICAL SITE PLAN

LOCATION: MEMPHIS, TENNESSEE

SURVEY: A2H, INC — DATE: 08/2021 — PROJECT: 21117.02
DESIGN BY: A2H, INC — DATE: 09/2022 — SCALE: AS NOTED
REVIEWED BY:

LIFT STATION REHAB DESIGN – GROUP 3

DEVELOPER: SARP 10
ENGINEER: A2H, INC.

CITY ENGINEER — DATE

SPECIFICATIONS

City of Memphis

Lift Station Rehab for SARP 10

A2H No. 21117.02

Prepared By:

A2H

ENGINEERS · ARCHITECTS · PLANNERS

3009 Davies Plantation Road
Lakeland, TN 38002

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www.A2H.com

A2H, Inc.

SECTION 000107
SEALS PAGE

CIVIL ENGINEER:
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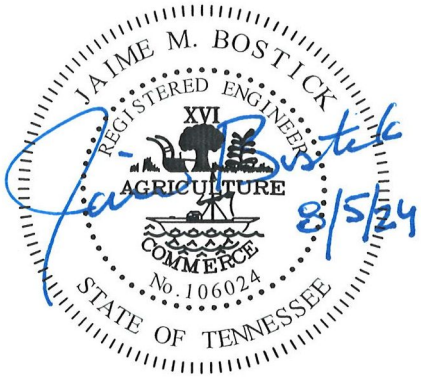
A2H, INC.
3009 DAVIES PLANTATION ROAD
LAKELAND, TN 38002
PHONE: (901) 372-0404



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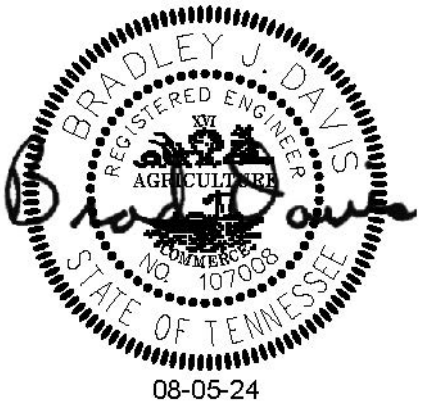

ELECTRICAL ENGINEER:
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END OF SECTION

SPECIFICATIONS
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SECTION 01551
TRAFFIC CONTROL FOR CONSTRUCTION WORK ZONES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This work shall consist of furnishing, erecting, illuminating, handling, and maintaining all construction signs (warning, regulatory, and guide), barricades, and other traffic control devices designated for installation at locations specified by the Plans or the approved Traffic Control Plan, or directed or approved by the Purchaser for the purpose of handling traffic safely through construction work zones. This work shall include the provision of flaggers or special measures necessary to assure the handling of traffic safety through construction work zones.

PART 2 - MATERIALS

2.01 GENERAL REQUIREMENTS

A. All signs, barricades, markers, lights, and other traffic control devices for use in construction work zones shall meet the requirements of Part VI of the Tennessee Manual on Uniform Traffic Control Devices (MUTCD). Materials used in the fabrication, construction, and installation of the construction signs, barricades, and other traffic control devices shall conform to the requirements of the MUTCD, and the City of Memphis Standard Construction Specifications.

B. Items are not required to be new. Used items may be acceptable provided the following conditions are met:
   1. Units are in good repair, clean, and structurally sound.
   2. Reflective sheeting on any unit is clean and in good repair.
   3. All legends and messages are sharp, clean, and legible.
   4. Reflectivity of said units during the hours of darkness shall provide acceptable, clean and uniform delineation without dead spots.

C. No test reports are required, but the Purchaser will visually inspect all units and accessories for compliance with the various dimensional and material stipulations noted before approving their use in the work. The approval of any unit for use is subject to satisfactory field performance and does not preclude the Purchaser ordering replacements for deteriorated, damaged or otherwise unsatisfactory performance of units; said replacements for these previously approved units shall be without additional compensation.

2.02 SUBMITTALS

A. A Traffic Control Plan shall be submitted to the Program Manager, including the following items:
   1. Outline of permit acquisition procedure for lane closures.
   2. Methods for proper signing and barricades, which comply with local requirements and the City.
   3. Major streets (e.g. Shelby County Principal Arterial & Minor Arterial) requiring a City approved permit if taking a lane for mobile operations, secured through Traffic Control Plan submittal to the City and signed by a TN P.E. The City requires a two week lead time for permit processing.
   4. The Contractor will be required to deliver a sample primary/arterial road Traffic Control Plan for review by the City.
   5. If the City determines that the nature of the work operation or the type of road in which the Contractor is working requires a permit, the Contractor will be required to modify the sample Traffic Control Plan to obtain a permit from the City.
   6. For everywhere else where a permit is not required, the Contractor shall develop, provide, and implement a Traffic Control Plan for all mobile operations in accordance with standard MUTCD specifications.
   7. The Contractor is also responsible for acquiring all necessary disposal and/or landfill site permits required to perform this work.

8. Railroad Rights of Way: The Contractor shall notify the Program Manager when work or access to manholes and sanitary sewers lie within the 25 feet railroad easement, as measured by 25 feet outside the nearest rail of the tracks. To access sewer facilities within the 25 feet of the railroad right of way, the Contractor shall contact 48 hours in advance the Program Manager, who will alert the City's Zone Construction Inspector to coordinate individual railroad direction and guidance.

2.03 CHANNELIZING AND WARNING DEVICES.

Reflectorization of channelizing and warning devices shall be accomplished using materials meeting the requirements of Specification Section 02891 Paragraph 2.02 F.

A. Traffic Cones.
   1. Traffic cones and tubular markers shall be a minimum of 18 inches in height with a broadened base and shall be made of materials to withstand impact without damage to themselves or to vehicles. Orange shall be the predominant color on cones and tubular markers. For nighttime use they shall be reflectorized or equipped with lighting devices for maximum visibility. The design of traffic cones and tubular markers shall be according to the requirements of Section 6C of the MUTCD.

B. Vertical Panels.
   1. Vertical panels used as channelizing or warning devices shall be 8 to 12 inches in width and a minimum of 24 inches in height. They shall be orange and white striped and reflectorized. The design or vertical panels shall be according to Section 6C of the MUTCD.

C. Drums.

D. Drums used for traffic warning or channelization shall be approximately 36 inches in height and a minimum of 18 inches in diameter. The markings shall be horizontal, circumferential, orange and white reflectorized stripes meeting the requirements of Section 6C of the MUTCD.

E. Barricades.
   1. A barricade is a portable or fixed device having from one to three rails with alternate orange and white reflectorized stripes used to control traffic by closing, restricting, or delineating all or a portion of the right-of-way. Barricades shall be of one of three types: Type I, Type II, and Type III. The characteristics and design of each type of barricade shall be according to Section 6C of the MUTCD.

F. High Level Warning Devices.
   1. High level warning devices are used to supplement other controls and warning devices and are designed to be seen over the top of preceding vehicles. They shall consist of an orange diamond and three flags. The lowest point of all three flags shall be no less than 8 feet above the roadway. The design shall be according to the requirements of Section 6C of the MUTCD.

G. Warning Lights.
   1. As used herein, warning lights are portable, lens directed, enclosed lights. The color of the light emitted shall be yellow. They may be used either in a steady burn or flashing mode. Warning lights shall be in accordance with the current requirements of ITE Standard for Flashing and Steady Burn Warning Lights (Table 01551-1) and Section 6E of the MUTCD.

TABLE 01551-1
WARNING LIGHTS

	Type A Low Intensity	Type B High Intensity	Type C Steady Burn
Lens Directional Faces	1 or 2	1	1 or 2
Flashing Rate per Minute	55 to 75	55 to 75	Constant

Flash Duration1 Minimum Effective Intensity2 Minimum Beam Candle Power2	10% 4 Candelas	8% 35 Candelas	Constant 2 Candelas
Hours of Operation	Dusk to Dawn	24 hrs/day	Dusk to Dawn
1 Length of time that instantaneous intensity is equal to or greater than effective intensity.			
2 These values must be maintained within a solid angle 90 on each side of the vertical axis and 50 above and 50 below the horizontal axis.			

PART 3 - CONSTRUCTION REQUIREMENTS

3.01 GENERAL REQUIREMENTS.

A. Traffic Control Plan
   1. A Traffic Control Plan shall be developed by the Contractor and approved by the Purchaser before any road, street, or highway, or any section or lane thereof is closed to traffic and construction operations that will for any reason render the roadway generally unsuitable for use of the traveling public are started. Where the Plans and Contract Documents for projects involving roads, streets, and highways do not specify a Traffic Control Plan, and where so required by the Contract Documents, the Contractor shall prepare and submit to the Purchaser for approval a Traffic Control Plan for the project which shall include, but not be limited to, signing; application and removal of pavement markings; construction; scheduling; closure of streets or lanes; detours; methods and devices for delineation and channelization; placement and maintenance of devices for delineation and channelization; roadway lighting; traffic regulations; and surveillance and inspection. The Traffic Control Plan shall define in detail the sequence of construction and the proposed number, type, color, size, and placement of construction traffic control devices for each construction phase, all in accordance with Part VI of the Tennessee Manual on uniform Traffic Control Devices for Streets and Highways (MUTCD).

B. Personnel
   1. The Contractor shall designate or otherwise provide personnel to furnish continuous surveillance over his traffic control operations. This designee will also be available at night to respond to calls involving damage to barricades, lights, signs, and similar items, either through vandalism or traffic accident. The Contractor shall make known the name of the person providing the surveillance at the preconstruction conference.

C. Traffic Control Devices
   1. All traffic control devices necessary for the first stage of construction shall be properly placed and in operation before any construction is allowed to start. When work of a progressive nature is involved, such as resurfacing a road under traffic, the necessary signs shall be moved concurrently with advancing operation.

D. Construction Signs
   1. All construction signs shall be erected such that all supports are vertical, sign panels generally perpendicular to the travelway and legends horizontal so that they effectively convey the intended message. These signs shall be mounted on stationary or temporary supports as directed by the Purchaser and dependent on the type work being performed. In general, work being performed at spot locations and of short duration will necessitate the use of temporary supports properly weighted for stability. If the construction signs are not to be lighted, the supports shall not extend above the top edge of the sign panel.

2. The location, horizontal and vertical placement with respect to the pavement, legends, sheeting, dimensions, and spacing of supports of warning signs, barricades, and other traffic control devices shall be as required by the Plans, the Traffic Control Plan, the MUTCD, and as directed or approved by the Purchaser. The Contractor must advise and have the approval of the Purchaser prior to installing or removing traffic control devices from the project.
3. During periods of nonuse, construction signs and other devices shall be removed from the work area, or covered with opaque material, or otherwise positioned so they do not convey their message to the traveling public. If covered, the covering material shall be installed in accordance with the Plans and in such manner that no damage will occur to the sign panel during installation. Covering material shall be maintained in a neat manner during its use.
4. All construction signs, barricades, and other devices which require lighting, as designated by Plans or directed by the Purchaser, shall be provided with warning lights or electric incandescent or fluorescent lighting. It will be the Contractor's responsibility to install electric lighting in a safe manner and in accordance with the latest edition of the National Electrical Code, National Electrical Safety Code, and/or all local codes. The Contractor will be responsible for investigating, procuring, and bearing the expense of a continuous power source whether by battery, generator, or commercial A.C. supply.

E. Flaggers
1. Flaggers with proper attire and flags shall be provided when ordered by the City or Purchaser or when the Contractor deems flaggers necessary to safely handle traffic through the construction zone. Flaggers shall wear either an approved uniform or a vest of fluorescent orange color an be equipped with either a red flag of fluorescent material or a paddle with a reflective red and white STOP sign on one side and a reflective orange and black SLOW sign on the other side. Flaggers are considered a general requirement of all traffic control schemes and no direct payment will be made for such.

F. If at any time the City or Purchaser determines that proper provisions for safe traffic control are not being provided or maintained, he may order suspension of the work until the proper level is achieved. In cases of serious or willful disregard for safety of the public or his employees by the Contractor, the Purchaser may proceed forthwith to place the traffic control measures in proper condition and deduct the cost thereof from payment due or becoming due the Contractor.

3.02 MAINTENANCE

A. The Contractor shall assume full responsibility for the continuous and expeditious maintenance of all construction warning signs, barricades, and other traffic control devices. Maintenance shall include but shall not be limited to replacement of sign panels, barricades, and other devices which in the opinion of the Purchaser are damaged or deteriorated beyond effective use; replacement of broken supports; plumbing of leaning signs; cleaning of dirty signs, barricades, and other devices; repair of defaced signs; and replacement of stolen items.

B. All items used for traffic control shall be generally maintained in its original placement condition and such maintenance will be considered a part of the original installation cost. Failure to maintain all traffic control devices in such manner as to provide adequate continuous safety to the public will be cause for action by the Purchaser as noted in Specification Section 01551 Paragraph 3.01.I.

PART 4 – MEASUREMENT

EACH ACCEPTED ITEM RELATED TO TRAFFIC CONTROL FOR CONSTRUCTION WORK ZONES SHALL BE MEASURED AS DESCRIBED HEREIN. ALL WORK NOT DESCRIBED HEREIN SHALL BE CONSIDERED INCIDENTAL TO THE PROVISION OF TRAFFIC CONTROL FOR CONSTRUCTION WORK ZONES.

4.01 TRAFFIC CONTROL PLAN.

A. Development of a Traffic Control Plan for the construction work zone will be paid for on a lump sum basis and no measurement will be made.

4.02 TRAFFIC CONTOL DEVICES FOR CONSTRUCTION WORK ZONES.

A. Furnishing, erecting, and maintaining traffic control devices and other incidentals and personnel required for handling traffic safely through construction work zones will be paid for on a lump sum basis and no measurement will be made.

PART 5 – PAYMENT

PAYMENT FOR ACCEPTED WORK SHALL BE MADE AT THE APPROPRIATE CONTRACT PRICE WHICH SHALL BE PAYMENT IN FULL FOR ALL WORK REQUIRED UNDER THE PAY ITEM. PAYMENT WILL BE MADE UNDER THE PAY ITEMS LISTED AT THE END OF THIS SPECIFICATION SECTION.

5.01 TRAFFIC CONTROL

A. Payment will be made for the work completed and accepted by the Purchaser at the contract lump sum price, which shall be full compensation for furnishing, erecting, illuminating, handling, and maintaining all construction signs (warning, regulatory, and guide), barricades, and other traffic control devices designated for installation at locations specified by the Plans, the Traffic Control Plan, or directed or approved by the Purchaser for the purpose of handling traffic safety through construction work zones for the duration for the project. Payment shall also include provision for flaggers or special measures necessary to assure the handling of traffic safely through construction work zones.

B. Payment will be made under:

Item No.	Pay Item	Pay Unit
01551-5.01	TRAFFIC CONTROL	Lump Sum

END OF SECTION

SECTION 01610
BASIC PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 MATERIALS AND EQUIPMENT

A. All materials and permanently installed equipment (for example, traffic signalization equipment, sewer pumps, and other such items) furnished by the Contractor for the Work shall conform to the requirements of the Plans and Contract Documents, including the applicable City of Memphis Standard Construction Specifications and Design Standards.

B. Throughout the entire Project, all units of any one item of installed equipment shall be of the same manufacture and model unless otherwise approved by the Purchaser.

1.02 EQUIVALENT MATERIALS AND EQUIPMENT

A. The General Conditions allow for the substitution of equivalent materials and equipment, with the written approval of the Purchaser.

B. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of materials and equipment required for the Work. It is not intended to exclude products equivalent in quality and similar in design. Whenever any article, material, or equipment is identified by using the name of a manufacturer or vendor, the term “or approved equal” if not inserted shall be implied.

C. If the Contractor proposes to furnish materials or supplies other than those specified, he shall furnish complete descriptive data, including performance capabilities, specifications, and other data as required in the Contract General Conditions. The provisions of this substitution of materials shall not relieve the Contractor of the responsibility of meeting the requirements of the Plans and Contract Documents. All materials must be approved by the Purchaser before any installation will be permitted.

1.03 LIST OF MAJOR EQUIPMENT AND MATERIALS

A. The Contractor shall submit to the Purchaser for approval, with due promptness after award of Contract but in no case later than at the preconstruction conference, a list of major equipment and materials which he proposes to provide. The list shall include in sufficient detail to identify the materials, the name of the manufacturer’s model number of all material that is identified on the Plans or in the Contract Documents, including catalog literature for standard equipment and detailed scale drawings of any nonstandard or special equipment and of any proposed deviation from the Plans. A signed statement shall accompany this list stating that materials and equipment are in exact accordance with Project specifications. No charge shall be made to the Purchaser for any materials or equipment purchased, labor performed, or delay to the Work prior to approval of materials by the Purchaser.

1.04 SOURCE OF SUPPLY

A. The source of supply for each material to be supplied by the Contractor shall be subject to approval by the Purchaser before delivery is started.

1.05 SAMPLES AND TESTING

A. Representative samples of materials included for incorporation in the Work shall be submitted to the Purchaser for his examination and/or testing when so specified or requested.

B. All testing of materials shall be made in accordance with the standard methods of testing of the ASTM, AASHTO, NEMA, ITE, or other applicable standard specifications.

1.06 PROPOSAL QUNTITIES

A. The quantities appearing in the Proposal Sheet(s) of the Proposal are approximate and are proposed and shown for the comparison of bids and award of a Contract. The Purchaser does not guarantee or assume any responsibility that the quantities indicated on the Plans or in the Proposal will hold true and accurate in the construction of the Project. The Contractor shall not plead deception or misunderstanding because of variation from these quantities. Unless otherwise provided in the Contract Documents, payment to the Contractor will be made only for the actual quantities of Work performed and accepted, and materials and equipment furnished and placed in accordance with the Contract. The Contractor is reminded of the limitation provided by Section 838 of the Charter of the City of Memphis which limits the total amount of the increase in the Contract Price, for any reason, to ten (10) percent of the original Contract award amount. There are no specific limitations on the amount by which the Contract Price and project quantities may be decreased.

PART 2 – MEASUREMENT

2.01 MEASUREMENT OF QUANTITIES

A. All Work completed under the Contract will be measured by the Purchaser according to United States standard measure.

B. The term “ton” will mean the short ton consisting of 2,000 pounds avoirdupois.

C. The determination of quantities for specific items will be made as set for the in the subsection titled “Measurement” under the applicable Sections of the Standard Construction and Material Specifications hereof, or of other Specifications provided for the Work.

D. Longitudinal and transverse measurements for surface area computations will be to the exact dimensions shown in the horizontal plane on the Plans or as ordered in writing by the Purchaser.

E. Structures will be measured according to the lines and exact dimensions shown on the Plans or as altered to fit field conditions by direction to the Purchaser.

F. In all cases where measurement of materials is based on certified weights, the Contractor shall furnish the Purchaser certified weigh bills showing the net weight of materials received in each shipment. In no instance will the Purchaser pay for materials in excess of the amounts represented by the certified weigh bills.

G. When certified scale weights are not used for measurement, all materials which are measured or proportioned by weight shall be weighed on accurate, approved scales, by competent, qualified personnel, at locations designated by the Purchaser.

H. Trucks used to haul material being paid for by weight shall be weighed empty at such times as the Purchaser directs, and each truck shall bear a plainly legible identification mark.

I. Measurements for payment will be made to the nearest fractional units specified below, unless otherwise specified herein or in the Contract Documents for the project.

Unit of Measurement	Nearest Unit
Linear Foot	0.1 LF
Square Foot	0.1 SF
Square Yard	0.1 SY
Ton	0.1 Ton
Cubic Yard	0.01 CY
1,000 SF Unit	0.1 Unit

END OF SECTION

SECTION 02230
SITE CLEARING

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This work shall consist of clearing and grubbing, removal, and disposal of all vegetation and debris within the limits of the rights-of-way and easement areas. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits; the preservation from injury or defacement of all vegetation and objects designated to remain; and all necessary replacement of fences, trees, hedges, shrubs, and flowers.

PART 2 - EQUIPMENT

2.01 EQUIPMENT

A. All equipment for the satisfactory performance of the Work shall be on the project and approved before the Work will be permitted to begin.

PART 3 – CONSTRUCTION REQUIREMENTS

3.01 CLEARING AND GRUBBING

A. The Purchaser will establish rights-of-way lines and construction limits. All trees, shrubs, edges, fences, and other items to remain shall be as indicated on the Plans or as directed by the Purchaser.

B. The rights-of-way shall be cleared of all vegetation and debris except items designated to remain. All other trees, stumps, roots, brush, hedges, and other protruding obstructions within the excavation area shall be completely grubbed. In embankment areas, sound undisturbed stumps and roots which will be a minimum of five (5) feet below subgrade or slope of embankment will be allowed to remain in place provided undercutting or other corrective measures are not stipulated in the plans or directed by the Purchaser and providing stumps do not extend more than six (6) inches above the ground surface. If excavation is not required, the area shall be grubbed to a minimum depth of six (6) inches below existing grade to remove grass, roots, and other organic material.

C. Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed as directed by the Purchaser. Tree limbs and branches shall be trimmed to provide twenty (20) feet vertical clearance over the entire right-of-way. All trimming shall be done by skilled workmen in accordance with good tree surgery practices, and cut or scarred surfaces of trees or shrubs to remain shall be treated with an approved asphalt base paint prepared especially for tree surgery.

D. Within embankment areas, all depressions resulting from grubbing operations shall be backfilled with suitable material and left uniform. All depressions in excavation areas below subgrade elevation shall be backfilled with suitable material and compacted in accordance with the provisions of Specification Section 02530.

E. When specified on the Plans or Right-of-Way Agreement or so directed by the Engineer, all fences removed for construction purposes shall be replaced with salvaged existing materials or with acceptable in-kind new materials to enclose the original enclosed area as nearly as possible and tie back to the old fence.

3.02 DISPOSAL OF DEBRIS

A. All material from removal of structures and obstructions except salvaged items shall be disposed of off the Project and it shall be the Contractor’s responsibility to secure any permits necessary for the disposal.

PART 4 – MEASUREMENT

4.01 MEASUREMENT

A. This item will be paid from a lump sum basis and no measurement will be made.

PART 5 – PAYMENT

5.01 PAYMENT FOR WORK

A. Payment will be made for the work, completed and accepted by the Purchaser, at the contract lump sum price, which price will be full compensation for clearing and grubbing vegetation; removal and disposal of vegetation, debris, backfilling of depressions below subgrade elevation, protection of trees to remain; restoration of fences, trees, hedges, shrubs, flowers, or other growth as required; and moving salvageable materials to designated storage locations in accordance with the stipulations and provisions of the contract.

Payment will be made under:

Item No.	Pay Item	Pay Unit
02230-01	Clearing and Grubbing	Lump Sum

END OF SECTION

SECTION 02530
SEWER PIPE INSTALLATION

PART 1 - GENERAL

1.01 SCOPE

A. This Work will consist of the construction of sanitary sewers,siphons, and service connections of the kinds and dimensions shown on the Plans, stipulated in the Contract Documents, or as directed by the Purchaser. The construction will be accomplished by these Specifications and in conformity with the lines, grades,and details shown on the Plans or established by the Purchaser. The Contractor will perform all work necessary to complete the Contract with the best modern practice. Without specifications that state the quality of any work , the Contractor is required to perform such items using first-quality construction. Unless otherwise provided,the Contractor will furnish all material,equipment,tools,labor and incidentals necessary to complete the Work.

PART 2 - MATERIALS AND EQUIPMENT

2.01 MATERIAL

A. Construction Material
   1. All material furnished by the Contractor will be new, high quality and free from defects. Previously used material in acceptable condition may be used for bracing,forms, false work,and similar uses. Material not conforming to the requirements of the Specifications will be considered defective and will be removed immediately from the site.

B. Higher Strength Pi pe
   1. The Contractor may substitute a higher strength pipe of the same type as that specified subject to the approval of the Purchaser.

C. Qual ificati ons of Manufacturer s
   1. Pipe for sanitary sewers will be the standard product of an established, reputable manufacturer made in a permanent plant. Suppliers for each material to be used by the Contractor will be subject to approval by the Purchaser. No material will be delivered until the manufacturer and product have been approved by the Purchaser. For any construction project , pipe and appurtenances for each pipe material shall be the product of a single manufacturer having a minimum of 10 years domestic experience producing the type of pipe supplied.

D. Material Inspection and Testing
   1. Representative samples of material intended for incorporation in the work will be submitted for examination when so specified or requested. All material to be used in the work will be sampled, inspected, and tested by current ASTM specifications, or other standard specifications approved by the Purchaser. The Contractor will furnish the Purchaser with three copies of certified reports from an accredited testing laboratory showing the results of the tests carried out on representative samples of material to be used on the Project. Each length of pipe delivered to the project will show the laboratory's stamp. The performance or cost of all testing is the responsibility of the Contractor .
   2. The Contractor will notify the Purchaser before any deliveries of material and will make whatever provisions are necessary to aid the Purchaser in the inspection and culling of the material before installation.

E. Storage
   1. The Contractor will provide and maintain storage facilities and exercise such measures to maintain the specified quality and fitness of material to be incorporated in the work. The interior and sealing surfaces of the pipe, fittings and adapters will be kept free from dirt and foreign matter. PVC pipe, fittings , and adapters stored outside and exposed to sunlight will be covered with an opaque material with proper ventilation.

F. Ductile Iron Pipe and Fittings
   1. Ductile iron pipe for force main applications will conform to ANSI A 21.51. The pipe thickness design will conform to ANSI A 21.50. If no thickness class is specified on the Plans or Contract Documents, Class 50 or approved equivalent will be used. All ductile iron pipe will be lined with either Protecto 401 Ceramic Epoxy, SewPer Coat Cement Mortar Lining, or Polyethylene. Linings will be applied according to manufacturer's recommendations. Fittings will conform to the requirements of ANSI A 21.10. Unless otherwise specified, joints will be push-on gasket type conforming to the requirements of ANSI A 21.11. Mechanical joints will conform to the requirements of ANSI A 21.11. Flanged joints will conform to the requirements of ANSI A 21.15. Flexible joint ductile iron pipe for river crossing applications will conform to ASTM A 536 and will be Grade 70-50-05. Steel retainer rings will conform to ASTM A 148 for Grade 90-60.

G. Ductile Iron Couplings
   1. Ductile iron couplings for use in connecting of smooth end joints of cast iron, ductile iron, asbestos cement, steel, PVC or other types of pipe must be capable of fitting this variety of pipes with one set of follower flanges or end rings.
   2. Sleeve shall be of Ductile Iron ASTM A536. Ends shall have a smooth inside taper to provide uniform gasket seal. Sleeve shall be given a shop coat of oil–modified urethanes, corrosion resistant paint, or epoxy coating.
   3. Follower flanges or end rings shall be of the thickness determined by the coupling size, and shall be ductile iron, ASTM-536. Flanges shall be identified by a color-coded shop coat finish.
   4. 4Gaskets shall be compression – type, formed with Virgin Styrene Butadiene Rubber (SBR,) ASTM D2000 3 BA715, and compounded with ingredients to produce permanence and resistance to set after installation. O.D. range shall be imprinted/molded on the gasket in permanent ink (Minimum).
   5. Bolts and Nuts shall be of high-strength, low-alloy steel, with nominal coarse thread, and hex nuts with black finish.
   6. Dimensions and minimum stress values shall be in accordance with AWWA/ANSI C111/A21.11.
   7. Manufacturers and Products:
      a. Smith-Blair, Inc. 441
      b. JCM Industries 210
      c. Romac Industries, Inc. 501
      d. Or Equal

H. Polwinyl Chloride (PVC) Gravity Pipe and Fittings (8-15 inch Di ameter)
   1. All PVC gravity pipe and fittings 8-15 inches in diameter shall be solid wall PVC; no profile wall PVC pipe is allowed for pipes 15 inches or less in diameter. PVC solid wall pipe and fittings for gravity sewer applications will conform to the requirements of ASTM D 3034. The standard dimension ratio (SOR) will be SOR 26 (Type PSM). PVC resin will conform to ASTM D 1784 cell class 12454C. A different cell class will be allowed only if the material meets the requirements of a superior cell class than 12454C. Fittings for PVC gravity sewer pipe will be fabricated from PVC meeting the respective ASTM PVC pipe standard for molded or extruded PVC. The wall thicknesses of the waterway and bell of fittings will be no less than the respective minimum thicknesses for the equivalent pipe. All fittings will be compatible with the pipe to which they are attached.
   2. All PVC gravity pipe joints will be gasketed bell and spigot push-on type conforming to ASTM D 3212, unless directed otherwise in these Specifications. Gaskets will be part of a complete pipe section and purchased as such. Lubricant will be as recommended by the pipe manufacturer.
   3. Combination Air Valves

I. The Combination Air Valve shall consist of a combination of an air and vacuum large orifice and an automatic small orifice in a single body. The valve must be designed to operate with liquids carrying solid particles. The valve shall discharge air during the filling or charging of the
   1. system and admit air to the system while being emptied of liquid and discharge accumulated air from the system while it's under pressure and operating. Each of these valves shall be designed to separate the liquid from the sealing mechanism. The valve shall have a working pressure range up to 150 psi or as specified on the plans. Combination Valves shall be A.R.I. or approved equal.
      a. The manufacturer shall certify venting capacity and provide three copies of installation and maintenance manuals for each type of Combination Air Valve supplied.
      b. The Manufacturer shall guarantee all items specified to be free from defects in design, materials and workmanship for one year from the date of acceptance. During the guarantee period, the Manufacturer shall furnishand install replacement parts for any defective component at no additional cost.

J. Check Valves, Gate Valves and Ball Valves
   1. All check valves shall have external arms so that the valve may be opened and closed by hand. Check valves shall be controlled closing swing check valves and shall be Golden Anderson Series 250, or Valve and Primer Series 6000, or as approved . Each check valve shall have a cast iron body, stainless steel springs, stainless steel hinge pins and stops, Teflon spring and hinge bearings and standard trim for IBBM construction. All wetted components shall be 316 stainless steel. Each check valve shall have Buna N seals.
   2. All check valves shall be class 125 vertical or horizontal swing type with iron body and flanged ends.
   3. Knife gate valves will be manufactured by Red Valve Company,Inc,Pittsburgh,PA;and shall be their Standard Flexgate, or approved equal. Knife gate valves must conform to AWWA C-504 requirements.The shaft shall be constructed of Type 304 stainless steel. The knife gate shall be Type 316 stainless steel. The valve seat shall be a resilient, mechanically retained, field replaceable. polytetraflouroethylene elastomer. The upper and lower bearings shall be self lubricating Teflon. The valve shall be equipped with a handwheel.
   4. Bonneted knife gate valves shall be Pratt LVC Figure 193 or approved equal.
      a. Valves shall be of the Bonneted Knife Gate Valve type, rated for 150 PSI CWP. Flanges shall be drilled and tapped to ANSI B16.5, Class150 pound standard with raised faces. Flange raised face shall be machined using serrated-spiral or serrated-concentric grooves with a 125-250 RMS finish. Valve bodies shall be 316 stainless steel.
      b. The valve bonnet shall be fabricated with 316 stainless steel liner, packing box and bonnet flange raised face. Bonnet flange and stiffeners shall be 316 stainless steel. A gate wiper shall be used between the bonnet flange and the body top flanges. The wiper material shall be UHMWPE.
      c. Valve shall have 316 stainless steel gate and integral cast stainless steel seat in the valve body. Gate shall be of design and thickness to withstand full 150 PSI rated pressure without permanent deflection to the gate. Gate shall have a rounded, beveled bottom. Seat and gate shall have a fully machined finish for one way shutoff. Minimum of two gate wedges shall be provided to assist seating of the gate against the seat in the lower half of the valve body. Gate guides shall be provided in the upper half of the valve body.
      d. Packing gland shall be cast stainless steel. Packing shall be Teflon lubricated synthetic packing with a minimum of 4 rows of packing. Packing gland bolts, studs and nuts shall be 304 Stainless steel.

e. Valve yoke shall be cast 304 stainless steel. Yoke shall be the flat top design to allow bolt-on field installation or conversion of actuators without welding or machining. Valve stem shall be 316 stainless steel (same material grade as bonnet liner) with full ACME threads. Stem nut shall be bronze. Stem nut shall be enclosed by the use of a cast stainless steel retainer.

f. Valves shall be designed, manufactured and tested to MSS SP-81 standard or AWWA C520 standard.

1) Wedge gate valves will be resilient wedge gate valves as manufactured by Mueller Co., or approved equal. Wedge gate valves must conform to AWWA C 509 or AWWA C 515 and will be either series 2360 or series 2361.

2) All ball valves for 2 inch and 3 inch diameter fittings shall be full port, brass ball valves , shall be rated to 125 psi minimum, and shall meet the requirements of NSF/ANSI 61/8. Ballvalves will have threaded connections and blowout proof stems. Ball valves will be Series FBV-3C as manufactured by Watts, or as approved.

3) Valve manufacturer shall furnish certification that each valve has been subjected to a hydrostatic water pressure twice the pressure class and that each valve is free of defects.The valve manufacturer shall guarantee all items specified to befree from defects in design, materials and workmanship for one year from the date of acceptance . The manufacturer shall, during the guarantee period, furnish and install replacement parts for any defective component at no additional cost.

K. Adapters and Couplings

1. At the direction of the Purchaser, a connection of sanitary sewer pipes, 6 inches through 16 inches, of dissimilar material, different sizes or for the repair of sanitary sewer pipes of similar material may be made by means of an approved compression or mechanical connector or adapter . The gaskets for compression connectors or adapters will be manufactured of an approved preformed elastomeric material conforming to applicable sections of ASTM Standards C 425, C 564, C1173, D 3212, and D 5926. Mechanical couplings or adapters will have tightening clamps or devices made of 300 series stainless steel with a stainless steel shear ring and stainless steel hardware, as specified in ASTM A 240. If a stainless steel shear band is not used a concrete collar is required. Each connector and adapter will bear the manufacturer's name and required markings. Installation will be by the manufacturer's recommendations.

2. At the direction of the Purchaser, a connection of sanitary sewer pipes (18 inches in diameter and larger) of dissimilar material,different sizes or for the repair of sanitary sewer pipes of similar material may be made in accordance with Specification Section 02530 Paragraph 3.09.C. Mechanical connectors meeting the above requirements may be used at the direction of the Purchaser.

L. Crushed Limestone

1. Crushed limestone will be size No. 67 Coarse Aggregate meeting the requirements of the Tennessee DOT Standard Specifications for Road and Bridge Construction and the following gradation:

Total Percent by Dry Weight, Passing Each Sieve (U.S. Standard)					
Size No.	1"	3/4"	3/8"	No. 4	No. 8
67	100	90	20	0	0
		100	55	10	5

2. Crushed limestone meeting the requirements of the Tennessee DOT Standard Specifications for Road and Bridge Construction, size No. 57 Coarse Aggregate will be used as directed by the Engineer or as shown on the plans. Size No. 57 Coarse Aggregate will meet the following gradation:

Total Percent by Dry Weight, Passing Each Sieve (U.S. Standard)					
Size No.	1"	3/4"	3/8"	No. 4	No. 8
57	100	95	25	0	0
		100	60	10	5

M. Pit Run Gravel

1. Pit run gravel will consist of one of the three gradations shown in the table below.

Total Percent by Dry Weight, Passing Each Sieve (U.S. Standard)							
Size No.	2-1/2'	2"	1-1/2"	1"	3/8"	No. 40	Clay*
1	100	95-100			35-65	10-30	1-12
2		100	95-100		40-65	10-30	1-12
3			100	90-100	45-65	10-35	2-12

*Clay content will be determined by the Hydrometer Test-AASHTO T 88. Clay content up to 15 percent may be used with the approval of the Purchaser.

2. That portion passing the No. 40 sieve will be known as the binder. The binder aggregate will consist of hard durable particles of limestone or sound siliceous material. Shale aggregate or pipe clay binder will not be acceptable. The percent of silt will not exceed the percent of clay by more than 25 percent. If the binder material is insufficient to bond the aggregate a satisfactory binding material may be incorporated ,as approved by the Purchaser,so that the resultant mixture will comply with these Specifications. The mixing will be done uniformly, and blending of material on stockpiles or in the pits by bulldozers,clamshells, draglines, or similar equipment will not be permitted.

N. Non-Shrinking Grout

1. Grout will be mixed in small quantities as needed and will not be retempered or used after it has begun to set. Unless otherwise specified,the grout will consist of one part portland cement, two parts masonry sand byvolume, a nonshrinking, nonmetallic admixture and sufficient water to form a grout of proper consistency. When nonshrinking or nonshrinking fast setting grout is specified it will be formulated by the incorporation of an admixture, or a premixed grout may be used.

PART 3 - CONSTRUCTION REQUIREMENTS

3.01 EXCAVATION

A. All excavation performed under this Section including trench excavation, structure excavation, and channel excavation, but excluding undercut excavation, will be considered unclassified excavation despite the nature of the material and objects excavated and will not be measured or paid for separately except as specifically noted. Pavement removal and replacement will be accomplished as specified in Specification Section 02950.

B. Trench Excavation

1. All trenches will be open cut unless otherwise shown on the Plans. Tunneling, boring, or jack ing may be allowed by written permission of the Purchaser.

2. . Trenches may be excavated by machinery to a depth that will not disturb the finished subgrade . The remaining material will be hand excavated so that the pipe is bedded on a firm , undisturbed subgrade .
3. No more than 300 feet of trench will be opened ahead of the completed sanitary sewer,nor will more than 100 feet be left unfilled except by written permission from the Purchaser. Inspecial cases the Purchaser may limit the distance to which the trench may be opened by notifying the Contractor in writing.
4. The width of trenches below a level 1 foot above the outside top of pipe will be at least 6 inches but not more than 12 inches on each side of the outside of the pipe for all sizes up to and including 16 inches in diameter. A maximum trench width dimension for these pipe sizes will be 36 inches. For 18 inch diameter pipes, the width of trenches below a level 1 foot above the outside top of pipes will be at least 6 inches on each side of the pipe, with a maximum trench width of 42 inches. For pipe sizes more than 18 inches, the width of trenches below a level 1foot above the outside top of the pipe will be at least 12 inches but no more than 15 inches on each side of the outside of the pipe. If the trench width at or below 1 foot above the top of pipe exceeds the width specified, provisions will be made at the Contractor's expense to compensate for the additional load upon the pipe.
5. The sides of the trench will be as nearly vertical as possible. The bottom of the trench will be carefully graded, formed, and aligned according to City of Memphis Standard SST-3 and to the satisfaction of the Purchaser before sanitary sewers are laid.

C. Other Excavation
1. Undercut Excavation:
   a. Undercut excavation will consist of removing and disposing of unsatisfactory material below the grade established on the Plans for sanitary sewers, structures, and manholes. No undercut excavation will be done without prior authorization of the Purchaser. The limits of undercut excavation will be determined by the Purchaser who will be present during the undercut operations .
2. Undercut areas will be backfilled with No. 67 limestone or other aggregate approved by the Purchaser to the grade established on the Plans. The backfill will be placed in 6 inch maximum lifts and compacted to 95 percent of maximum density at plus or minus 2 percent of optimum moisture content as determined by Laboratory Standard Proctor Test (ASTM D 698) or a minimum relative density of 0.75. Undercut backfill will be encapsulated in geotextile fabric conforming to Specification Section 02370 2.01.C.
3. Unauthorized Excavation Below Subgrade or Outside Limits:
   a. Any unauthorized excavation and subsequent removal and backfilling beyond the lines and grades shown on the plans will be at the Contractor 's expense. The excess space between the undisturbed bottom and sides of the excavation and subgrade limits shown on the Plans will be backfilled according to Specification Section 02530 Paragraph 3.02.C.2.

D. Change i n Location and Grade
1. If the Purchaser orders inwriting that the location or grade of a proposed sanitary sewer facility be changed from that shown on the Plans, the following provisions will apply. If the change is made before excavation work has begun and the item being constructed is covered in the Proposal Sheet(s) by pay items with appropriate depth classifications , the appropriate pay item will apply. If the facility being constructed is not covered in the Proposal Sheet(s) and if the average excavation per linear foot at the changed location or grade is within 10 percent of the original Plan quantity, there will be no change in the unit price for this work . If the average excavation per linear foot at the changed location varies more than 10 percent above or below original Plan quantities,a Change Order will be prepared to cover the new work . For purposes of comparing changed quantities with Plan quantities, a 1 foot long strip will be calculated from natural ground line to invert along both the revised and original locations. These calculations will then be multiplied by the proper lengths to determine the total cost.

2. If the change is made after excavation has already begun on the original Plan location, the procedures described above will apply to payment for work along the changed location. If abandonment of an existing excavation is required due to a change by the Purchaser, a Change Order will be prepared covering the backfilling and restoration of the abandoned excavation. Backfilling and restoration of the abandoned excavation will be accomplished according to the appropriate section of these Specifications .
3. Filling a portion of existing excavation to meet changed grades will be accomplished according to Specification Section 02530 Paragraph 3.11.
4. If a change in a location and/or grade is authorized in writing by the Purchaser at the written request of the Contractor , the Contractor will not receive any additional compensation for the changed work . Backfilling and restoration of abandoned excavation work will be accomplished totally at the Contractor's expense. If changes requested by the Contractor result in reduced lengths and/or depth of excavation, the revised quantities using Proposal unit prices or Change Orders as appropriate will be used to develop payment.

E. Disposition of Exc ava ted Material
1. Excavated material suitable for backfill will be stored no closer than 2 feet from the edge of the excavation. Excavated material will not obstruct crosswalks, sidewalks, driveways, street intersections, nor interfere unreasonably with travel on streets. Gutters or other surface drainage facilities will not be obstructed. The Contractor must provide access to fire hydrants,mail boxes, sewer and conduit manholes and similar utility or municipal service facility as required. Excavated material intended for backfill will be stored in a way that minimizes loss of excavated material due to erosion. The Contractor shall comply with all applicable OSHA regulations and City of Memphis Storm Water Ordinances.
2. Unless otherwise directed, all excavated material that will not be used for backfilling or restoration will be removed from the site and disposed of by the Contractor. If the Contractor proposes to store or place such excess excavated material upon any private property, written consent of the property owner or owners must be obtained by the Contractor in advance. A certified copy will be given to the Purchaser. No surplus or excess material will be deposited in any stream channel nor anywhere that would change preconstruction surface drainage.

F. Control of Water
1. The Contractor will keep all excavations free of water . If the trench subgrade consists of good soil in good condition at the time of excavation , it will be the Contractor's responsibility to maintain it in suitable condition. Dams, flumes,channels, sumps, or other work and equipment necessary to keep the excavation clear of water will be provided by the contractor. Dewateringof trenches.will be incidental to trench excavation .The Contractor will avoid producing mud in the trench bottom by his operations. If necessary or so ordered by the Purchaser,the Contractor will remove any soil that becomes unacceptable and replace it with limestone or other approved aggregate at his own expense to maintain a firm, dry base.
2. Pipe bedding, laying,jointing, and the placing of concrete or masonry will be done in a water free trench or excavation. Trenches will be kept clear of water until pipe joints , concrete and masonry have set and are resistant to water damage. The water will be disposed of in a manner acceptable to the Purchaser.
3. All gutters, pipes,drains, conduits, culverts, catch basins, storm water inlets,ditches , creeks, and other storm water facilities will be kept in operation,or their flows will be satisfactorily diverted and provided for during construction. Any facilities disturbed during construction will be restored to the satisfaction of the Purchaser.

G. Excava tion Around Obstructions
1. The Contractor will perform all excavation by hand where excavation by machinery would endanger trees , structures, or utilities that otherwise might be saved by hand excavation.

2. The Contractor will cautiously excavate test holes to find the limits of underground obstructions anticipated within the excavation. When a water pipe, gas pipe, other sanitary sewer, storm drain, or similar utility comes within the limits of the trench, such facilities will be properly supported.

H. Excavation for Manholes and Special Structures
1. The Contractor will be responsible for performing the Work according to the lines and elevations shown on the Plans or as directed by the Purchaser. The Contractor will excavate as required for all structures with foundations carried to firm , undisturbed earth at the elevation of the underside of the structure.
2. The outside dimensions of excavations for manholes and special structure will be at least 12 inches greater than the outside of the masonry or concrete work to permit backfilling around the structure.
3. Where structures are to be built in street rights-of-way or paved areas,the excavation will not exceed 2 feet from the outside of the masonry or concrete work . If the excavation exceeds this limit, the Contractor will be required to backfill the entire space around the structure with pit run gravel compacted as specified in Specification Section 02530 Paragraph 3.11.B.

I. Special Protection
1. Treacherous Ground:
   a. When running sand, quicksand, or other treacherous ground is encountered, the work will be carried on with the utmost urgency and will continue day and night should the Purchaser so direct.
2. Sheeting and Shoring:
   a. The Contractor will furnish, place, and maintain sheeting and shoring as required to support the sides of any excavation to prevent earth movement that could endanger the workers or public and to prevent damage to the excavation, adjacent utilities or property. The Contractor will place the sheeting and shoring without the Purchaser's instructions .
3. Sheeting will extend below structure invert a sufficient depth to assure adequate support. In the installation of sheeting. the use of vibratory type pile drivers (as opposed to impact type) will be limited to sheeting driven no greater than 5 feet below the invert. The sheeted trench width,as measured between those faces of the sheeting in contact with the earth trench wall, will not exceed the maximum width of a trench per Specification Section 02530 Paragraph 3.02 .B. Walers and struts will be designed and installed to present no obstructions to proper placement of the pipe, bedding, cradle or encasement, and they will not interfere with the satisfactory installation of the pipe.
4. Sheeting, bracing, and shoring will be withdrawn and removed as the backfilling is being done, except where the Purchaser permits the material to be left in place. The Contractor will cut off sheeting left in place at least 2 feet below the surface and will remove the cut off material from the excavation.
5. All sheeting, bracing, and shoring which is not left in place under this provision will be removed in a way that will not endanger the completed work or other structures, utilities, storm drains, sewers, or property. The Contractor will be careful to prevent the opening of voids during the extraction process.
6. If sheeting and shoring are not specifically required on the Plans or in the Specifications, steel drag shields or trench boxes may be used subject to the authorization of the Purchaser. Voids left by the advancement of the shield will be carefully backfilled and compacted following trench backfill requirements.
7. Excess Width of Trench:

a. If the Contractor is permitted to use equipment that results in wider trenches than specified , approved methods will be used around the pipe to resist the additional load caused by the extra width. The dimensions of the cradle or other methods will be specified by the Purchaser. The contractor is responsible for meeting all applicable OSHA requirements. No extra compensation will be allowed for the additional material or work. Excess width trenches for semi-rigid and flexible pipewill be backfilled and compacted according to ASTM D 2321,and no concrete cradle will be used.

8. Underpinning:
   a. When excavations require underpinning of existing structures, the Contractor will submit shop drawings of underpinning details to the Purchaser for review before commencement of excavation below the foundation of the structure . Review of underpinning details by the Purchaser will not relieve the Contractor of his responsibility for protection of the structure and its contents.

J. . Existing Utilities

1. It shall be the Contractor’s responsibility to arrange for the location of existing utilities prior to excavation. The Contractor will also be responsible for coordinating the relocation of any existing utilities with the appropriate utility owner.
2. Protection
   a. The Contractor will protect any storm drain, sewer,or utility within the limits of the construction. The Contractor will proceed with caution and will use every means to establish the exact location of underground structures and facilities before excavating in the vicinity. The City will not be responsible for the cost of protection or repair or replacement of any structure, pipe line, conduit, service connection,or similar facility broken or darnaged by the Contractor's operations. All water and gas pipes and other conduits near or crossing the excavation will be properly supported and protected by the Contractor.
3. If the construction requires the removal and replacement of any overhead wires or poles. underground pipes, conduits, structures or other facilities, the Contractor will arrange for such work with the Owner or Owners of the facilities. No additional payment will be made by the City for this work.
4. Sewer and utility services between mains and buildings will be maintained and adjusted as necessary by the Contractor to provide as nearly a continuous operation as can be expected . This will be accomplished in any way that the Contractor chooses,provided the individualservice is not interrupted for more than two consecutive hours. The occupants will be notified by the Contractor at least six hours before such service interruptions. When a break occurs, the Contractor will notify the affected occupant(s) of the probable length of time that the service will be interrupted.
5. If existing underground facilities or utilities require removal and replacement for the performance of this work , all replacements will be made with new material conforming to the requirements of these Specifications. If not specified, the material will be as approved by the Owner.
6. The removal and replacement of water services to adapt to new construction will be the Contractor's responsibility within the limits where the new service line grade blends smoothly with the existing service line grade.
7. The Contractor will be responsible for any damage to the sewer house connection because of his operations. The Purchaser does not guarantee the number, size, condition, nor length of adjustment necessary to bring a service to a new grade.

3.02 SEWER PIPE INSTALLATION

A. General

1. Sewer pipe and bedding will be constructed as shown on the Plans. It willbe the Contractor's responsibility to find all underground utilities before construction to insure there are no conflicts with the proposed line and grade. The Contractor's surveyor shall verify the base information on the City's plans prior to commencement of construction. Any discrepancies in the plans shall be reported to the Purchaser immediately. If approved by the Purchaser, minor changes in the alignment or grade will be permitted to avoid underground facilities , if straight alignment can be maintained between manholes. If minor changes in line or grade cannot avoid a conflict with the existing utility, the Contractor will arrange with the owner of said utility to have it adjusted as required to accommodate the proposed sewer at no additional expense to the City.

B. Modifications of Exi sting Sanitarv Sewer Facili ties
   1. Maintenance of Flow:
      a. Where existing sewer lines are being modified, the Contractor will arrange his work so that sewage flow will be maintained during the construction period with no discharge of sewage into the open trench. and no back up of sewage in the existing line. The contractor will provide necessary bypass pumping capacity to carry flow downstream of the section to be modified.
   2. Sewer pipe called for in the Specifications or Plans to be abandoned will be sealed at each end for a minimum distance of 18 inches,or one-half the diameter of the pipe, whichever is greater.
   3. Unless otherwise specified, the pipe will be sealed with a brick bulkhead and/or acceptable cement grout to form a solid watertight plug completely bonded to the pipe. Any sewer manholes to be abandoned will be abandoned per Specification Section 02531 Paragraph 3.03.8.
   4. The Contractor will be allowed to remove pipe to be abandoned if wanted. If the Contractor elects the removal method, all associated costs will be included in the cost for other Pay items.
   5. Connection to Existing Manholes:
      a. The Contractor will core suitable openings into existing manholes or remove existing pipe to accommodate the sewer pipe at the proper elevation, location, and direction, as indicated on the Plans. Care will be used to avoid unnecessary damage to the existing manhole.
   6. All loose material will be removed from the cut surfaces that will be completely coated with nonshrinking grout before setting the pipe. Before inserting the pipe, a sufficient thickness of grout will be placed at the bottom and sides of the opening for proper bedding of the pipe. For semi-rigid and flexible pipe installations a water stop as approved by the pipe supplier will be installed on the pipe according to the manufacturer's recommendations. After setting,all spaces around the pipe will be solidly filled with nonshrinking grout and neatly pointed up on the inside to present a smooth joint,flush with the inner wall surface. Any necessary revisions on the existing manhole invert will be made to provide a smooth, plastered surface for properly channeled sewage flow from the new connection. Plaster on the exterior of brick manholes will be repaired with nonshrinking grout. Particular care will be given to insure that the earth sub-base and bedding next to the manhole will provide firm solid support to the pipe.
   7. Removal of Sewer Pipe:
      a. Existing pipes and manholes to be removed and their locations will be shown on the Plans. Existing sewer pipe and manholes that must be removed to excavate for the proposed sewer will be included in the cost of the proposed sewer pipe and no additiona lcompensation will be made to the Contractor. The City reserves the right to retain or reject salvage of any material encountered. All remaining material becomes the property of the Contractor who will be responsible for properly disposing of the same.

3.03 PIPE EMBEDMENT

A. Pipe embendment will be defined as that material supporting, surrounding and extending to 6 inches above the top of the pipe. Pipe embendment for sewer pipe shall conform to the requirements given below. At the direction of the Purchaser or as shown on the Drawings, sewer pipe and backfill shall be encapsulated in geotextile fabric meeting the following requirements.

Physical Property	Test Method	Acceptable Test Result
Tensile Strength, wet, lbs.	ASTM D-1682	200 (min)
Elongation, wet, %	ASTM D-1682	40 (min)
Coefficient of Water Permeability, cm/sec	Constant Head	0.03 (min)
Puncture Strength, lbs.	ASTM D-751	100 (min)
Pore Size - EOS U.S. Standard Sieve	Corps of Engineers CW-02215	40 (max)

B. Crushed Limestone
   1. Pipe embedment material shall be Number 67 crushed limestone. Pipe 8 inches to 24 inches in diameter shall be bedded on 4-inches of Number 67 crushed limestone. Pipe 27 inches to 48 inches in diameter shall be bedded on 6-inches of bedding material. Pipe embedment for pipes larger than 48 inches in diameter shall be by design based on anticipated soil conditions. After pipe installation, crushed limestone shall then be tamped under the haunches and continued in layers not more than 6 inches in loose thickness around and above the pipe to a level 6 inches above the outside top of the pipe. The remainder of the installation shall be as outlined in this Specification’s Backfill requirements.

3.04 PIPE LAYING

A. Inspection Before Laying
   1. All pipe will be inspected on delivery. Pipe that does not conform to the requirements of these Specifications or is not suitable for use will be rejected and immediately removed from the work site.

B. Preparation of Pipe Ends
   1. All surfaces of the pipe to be joined will be clean and dry. All necessary lubricants, primer, adhesives,and similar material will be used as recommended by the pipe or joint manufacturer's specifications.

C. Care During Hoisting, Placing, And Pushing Home
   1. Equipment used to handle,lay,and join pipewill beequipped and used as to prevent damage to the pipe. All pipe and fittings will be carefully handled and lowered into the trench. Damaged pipe or jointing material will not be installed.

D. Direction of Work
   1. The laying of pipewill be commenced at the lowest point. The bellor grooved end will be laid upgrade. All pipe will be laid with ends abutting and true to line and grade.They will be carefully centered so that when laid they will form a sewer with a uniform invert.

E. Uniform Pipe Bearing

1. Special care will be taken to insure that the pipe is solidly and uniformly bedded,cradled, or encased according to the Plans. For pipe with a bell that is larger than the barrel of the pipe the bedding material will be removed to a depth that will provide continuous support for the bell and barrel. No pipe will be brought Into position for joining until the preceding length has been bedded, joined, and secured in place. Where a concrete cradle is required, the pipe will be supported at no more than two places with masonry supports of minimum size sufficient to provide the required clearance and to prevent displacement during placing of concrete.

F. Ali gnment and Grade
1. Each piece of pipe will be checked for vertical and horizontal alignment immediately after being laid. All adjustments to alignment and grade must be made by scraping away or filling in under the barrel of the pipe and not by wedging or blocking up any portion of the pipe or striking the pipe to drive it down. Curved alignments will not be allowed except as directed by the Purchaser.

G. Backfilling to Secure Pipe
1. When the joint is made, sufficient backfill material will be simultaneously placed along each side of the pipe to prevent moving the pipe off line and grade. Particular care will be used to prevent disturbance or damage to the pipe and the joints during backfilling.

H. Flotation and Water in the Trench
1. The Contractor will take all necessary precautions to prevent flotation of the pipe in the trench. Water will not be allowed to rise in the trench. The Contractor will use well points, sump pumps,or another approved method of dewatering as required to lower the water table below the bottom of the excavation while minimizing the migration of fines from the surrounding area. The Contractor will make a request to the Purchaser and receive approval prior to the use of special dewatering equipment other than well points or sump pumps. Dewatering operations are considered incidental to the work and no additional compensation will be made to the Contractor.

I. Open Ends
1. Whenever pipe laying is stopped for any significant length of time, such as at the end of a workday , the unfinished end will be protected from damage and a temporary tight fitting plug or bulkhead will be placed in the exposed ends of the pipe to keep soil or other debris from entering the pipe.

J. . Concrete Cradle Section next to Manhole
1. The pipe will be supported from the manhole wall to the limits of the manhole excavation in a normal sewer trench with a concrete cradle,structurally continuous with the manhole base slab or footing. Cost for this work is incidental to the cost of the pipe installation.

K. Cutting Pipe
1. Cutting will be in a neat workmanlike manner at right angles to the pipe axis without damage to the pipe. Observe specifications regarding joi nt locations. Smooth the cut end by power grinding or filing to remove burrs and sharp edges. Repair lining of the pipe as required.

L. Wyes and Special Fittings
1. Wyes, stubs,reducers, fittings,or other special pipes will be installed as shown on the Plans or where ordered by the Purchaser. The fittings and special pipes will be made of a compatible material, type,and class and/or strength designation as the pipe and installed as required by the Plans and Specifications . The cost for providing and installing the above items is incidental to the cost of the pipes.

M. Valves
1. Valves and appurtenant fittings will be installed as shown on the Plans or where directed by the Purchaser.

2. Check valves and gate valves will be installed on either flanged or mechanical joint ductile iron pipe.
3. Air release, vacuum relief and combination air valves larger than 3 inches in diameter will be installed on either flanged or mechanical joint ductile iron pipe. A gate valve conforming to Specification Section 02530 2.01.Q shall be installed to isolate these air valves from the force main.
4. Air release,vacuum relief and combination air valves 3 inches in diameter and smaller will be installed on a ductile iron tap T fitting. A ball valve conforming to Specification Section 02530.Q shall be installed on a 6" threaded nipple between the 'T' and the air valve.

3.05 PIPE JOINTS

A. General
1. Pipe will be jointed immediately following the laying of each section. No pipe section will be left overnight which has not been completely jointed to the preceding pipe section in conformance with these Specifications.
2. The following provisions will apply to insure tight and sound joints:
a. The joint will be placed with special care to avoid breakingjoints and to leave gasket, if required, in proper position.
b. All pipe 12 inches in diameter or larger will have dead weight held by crane while being lined up and pushed home.
c. Pipe will be pushed home with a constant and even force and not jarred home by the momentum of a moving force that will place an impact load on pipe.
d. Cement and lubricant will be used as recommended by the manufacturer and designated by the Purchaser.

B. Compression Joints
1. The two ends to bejoined will be thoroughly cleaned and a compression gasket compatible with the type of pipe to be joined will be at the position recommended by the pipe manufacturer.
2. . Lubricant recommended by the gasket manufacturer will be liberally applied to the gasket and both ends immediately before pipe ends are joined . The upstream pipe will be positioned such that the spigot may enter the bell squarely. The pipe being laid will be pushed home and the gasket position checked with a feeler gauge before installation of the next section. Flat, unconfined gaskets on concrete pipewill be cemented to the spigot at the position recommended by the pipe manufacturer .

C. Mechanical Joints
1. The two ends to be joined will be thoroughly cleaned with a wire brush and the plain end, socket end, and gasket will be brushed with soapy water. The end will be centered in the socket and adequate anchorage will be provided to hold the pipe in position until the joint can be completed. When deflecting pipe from a straight line is necessary, the deflection will be made after joint assembly and before tightening bolts. Pipe deflection will not exceed that specified by ANSI C 600.
2. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. All bolts will be torqued to the required range recommended by the pipe manufacturer.Over stressing of bolts will be avoided. Ga1..1ge lines on the spigot end will be checked following assembly to ensure proper positioning of bell and spigot has been accomplished.
3. Any joints not properly positioned will be disassembled, cleaned, and reassembled as previously indicated.

D. Flanged Joints

1. The two ends to be joined will be thoroughly cleaned with a wire brush. Bolt holes on each pipe flange to be joined will be aligned and bolts inserted. Bolts will be torqued evenly by alternating tightening of bolts opposite one another until all bolts are torqued to the recommended pressure.

E. Restrained Joints
1. Restrained push-on joints are to be used as specified on the plans or by the Purchaser. These special joints will be installed as specified by the manufacturer. The length of the pipe to be restrained will be determined by the Purchaser based on pipe size, internal pressure, depth of cover, and soil characteristics around the pipe.

3.06 BACKFILLING

A. General
1. After sanitary sewer facilities have been bedded and installed according to these Specifications and upon permission of the Purchaser, the backfill may be placed. Backfilling operations will continue following as closely behind pipe installation as practical. All backfill will be placed in uniform horizontal layers. Pushing backfill material down a ramp into excavated areas will not be permitted. No trash will be allowed to accumulate in the space to be backfilled. Particular care will be taken to avoid allowing wood to be included in the backfill, other than sheeting and shoring that has been approved to be left in place.
2. The Contractor will be responsible for the condition of the trenches and filled areas during the contract and warranty period. The Contractor will maintain frequent inspection of the same. Anytime during the 12-month warranty period the trenches or filled areas settle and sunken places appear, the Contractor will be required to refill these sunken places when they are discovered with suitable material and willreplace all damaged curb,gutter, and sidewalk. All soft or dangerous trenches will be marked, barricaded and caution lighted for the protection of the public.
3. Property with an existing dwelling located on it or lots within a developed subdivision or planned development are considered improved property.

B. Street Right-of-Way and I mproved Property
1. Backfill Material:
a. Backfill for manhole and pipe trench excavations through pavements in street or highway right-of-way or where the Purchaser orders, will be made with pit run gravel or other acceptable material as approved by the Purchaser. The backfill will be from the top of the bedding material or foundation to the subgrade elevation of the pavement. Pea gravel or similar granular material approximately uniform in size and without bonding properties will not be used.
2. Backfill for manhole and pipe trench excavations beyond pavements in street or highway right-of-way or outside public right-of-way will be made with select earth from the top level of the bedding material or foundation to the subgrade elevation in paved area, or within 1 inch of the surface in areas to be sodded, or to the surface in all other areas.
3. Select material will be free from debris, organic matter,perishable compressible material and will contain no stones or lumps larger than 6 inches. Rocks and lumps smaller than 6 inches will not exceed an amount that will interfere with the consolidating properties of the fill material. Care will be taken that stones and lumps are kept separated and well distributed.and that all voids are completely filled with fine material. No rocks or lumps will come in direct contact with the pipe. The upper 3 feet of backfill in sodded or planted areas will be free of rocks or lumps larger than 1 inch in diameter.
4. Placement and Compaction:
a. Sanitary Sewer Trenches:

1) Backfill material will be placed by hand in 6 inch loose layers and tamped to a point 2 feet above the outside top of the pipe. Backfill will be compacted with suitable mechanical tamping equipment with special care being taken not to damage the pipe or joints. Use of compaction equipment directly above semi-rigid and flexible pipe should be avoided until sufficient backfill has been placed to ensure that the equipment will not damage the pipe. A minimum of 36 inches of compacted backfill above the top of semi-rigid and flexible pipe will be in place before wheel loading and a minimum of 48 inches of compacted backfill before use of pneumatic tampers. From these elevations to the subgrade elevation of the pavement, bottom of the sod, or to the original ground surface, suitable backfill will be mechanically placed in 9 inch, maximum, loose layers . All backfill material will be compacted to 95 percent of maximum density at plus or minus 2 percent of optimum moisture content as determined by Laboratory Standard Proctor Test (ASTM D 698).

b. Manholes and Special Structures:

1) When the masonry or concrete work has set sufficiently to withstand compaction, and the Purchaser authorizes, backfill material will be placed in 6 inch loose layers and compacted with heavy tampers or pneumatic tampers to 95 percent of maximum density at plus or minus 2 percent of optimum moisture content as determined by Laboratory Standard Proctor Test (ASTM D 698). Suitable backfill will be placed in this manner from the foundation of the structure to the subgrade elevation of the pavement, the bottom of the sod or to the original ground surface.

C. Open Areas and Unimproved Property

1. Backfill Material:

a. Backfill of excavations on unimproved property will be made with select material from the top level of bedding material or foundation to the surface. Non-granular select material to be used for backfill will be free from debris, organic matter and perishable compressible material, and will contain no stones , lumps or rock fragments larger than 6 inches. Rocks or lumps smaller than 6 inches in diameter will not exceed an amount that will interfere with the consolidating properties of the fill material. No rocks or lumps will come in direct contact with the pipe. Stones and lumps will be kept separated and well distributed,and all voids will be completely filled with fine material.

2. Placement of Backfill:

a. Backfill procedures specified in Specification Section 02530 Paragraph 3.11.B will apply from the trench bottom to a point 2 feet above the outside of the pipe. From this point to slightly above the surrounding surface elevation, suitable backfill may be placed by bulldozer or other mechanical means.

D. Removal of Excess Material

1. After the trench or excavation has been properly backfilled, all excess dirt will be removed from the streets, roadways and improved private property so pavements or turfed areas may be replaced and properties cleaned.

2. In open areas and unimproved property, the excess material may be used to fill low spots on property next to the right-of-way/easement. Before spreading excess soil, the Contractor will obtain written permission from the property owner for the spreading of excess soil, and a copy of the written permission willbe submitted to the Engineer. Such spreading or filling will not obstruct surface drainage and be to the satisfaction of the property owner. Excess material will be disposed of by the Contractor.

3.07 BYPASS PUMPING

A. As required for acceptable completion of the work and/or to avoid damages due to sewer spills or overflows, the Subcontractor shall provide for sewer flow maintenance around the line segments and manholes designated for rehabilitation. The bypass shall typically be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent sanitary sewer system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. Bypassing of sanitary sewage into the storm water system will not be allowed. For all bypass pumping, pump noise shall be kept to a minimum to the satisfaction of the Purchaser. The Subcontractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service. The Subcontractor shall also advise those customers against water usage until the mainline is back in service. After completing the necessary work on the main line, the Subcontractor shall advise those customers that the sewer main is back in service.

B. Bypass pumping is defined as providing pumps, standby pumps, piping, elevated structural support for aerial crossings, manpower to operate, routine maintenance and repair capability, pipe plugs, fuel, route and pump site clearing and any other work necessary to provide a complete bypass pumping operation. Any structures proposed by the Subcontractor for construction over or penetration into the interceptor piping for the purpose of performing the bypass operations must be approved by the Purchaser prior to implementation. The Subcontractor shall submit design drawings and details that are signed and sealed by a professional engineer licensed in the State of Tennessee. All bypass pump schemes must be submitted to and approved by the Purchaser in advance.

C. Public advisory services shall be required to notify all parties whose service laterals will be out of service and to advise against water usage until the mainline is back in service.

D. The Subcontractor shall be required to provide businesses with temporary service, as needed, and shall be responsible for all necessary bypass pumping flows.

3.08 FINAL GRADING

A. Final grading around sanitary sewer facilities willconform to the elevation of adjacent undisturbed ground or as shown on the Plans. Sufficient grading will be done to provide adequate drainage.

3.09 CLEANING

A. All necessary precautions will be taken to prevent the entrance of mud,sand, or other obstructing material into the pipelines. As the work progresses,the interior of the sewer will be cleaned of all dirt, jointing material and extraneous material. On small pipe where cleaning after laying may be difficult, a squeegee will be kept in the pipeline and pulled forward past each joint immediately after its completion. Before final inspection the Contractor will remove all debris and foreign material.

3.10 TRAFFIC CONTROL

A. All traffic control shall be installed and maintained in accordance Section 01551 – Traffic Control for Work Zones. At a minimum, the Subcontractor must have two trucks with flashing yellow lights on the work site. Traffic cones must also be placed downstream of the construction site to divert cars into the adjacent lane(s) per MUTCD requirements. On roads with a heavy traffic volume, a flagman may also be needed to assist with traffic control. At the end of each working period, the Subcontractor shall plate all open excavations to maintain traffic flow.

3.11 FALL PROTECTION

A. Subcontractor shall install and maintain all fall protection measures in accordance with the SARP10 Loss Control Manual. The Subcontractor shall construct a controlled access zone around the manhole being adjusted. At a minimum, the fall protection zone shall include traffic cones encircled with pennant tape. The controlled access zone must have one point of access with an entrance log.

3.12 PROTECTION OF DOWNSTREAM FACILITIES

A. The Subcontractor must take all steps necessary to assure that no material is allowed to fall into the line during his installation process. The Subcontractor shall bear all cost of repairs resulting from any damages to downstream facilities resulting from failure to abide by this stipulation.

3.13 WASTEWATER SPILLS

A. Should the Subcontractor spill any wastewater, such that the sewage either immediately or ultimately enters the waters of the State of Tennessee, then the Subcontractor shall be completely responsible for any fines or penalties imposed on the Purchaser or the Subcontractor by the USEPA or the State of Tennessee.

PART 4 - FINAL TESTING AND ACCEPTANCE

4.01 LEAKAGE TESTS

A. The Contractor will perform hydrostatic pressure and leakage tests concurrently conforming to AWWA C 600, AWWA C 605, ASTM D 2774 or ASTM F 2164 procedures as applicable and as modified herein. Tests will apply to all sewage force mains after backfilling.

B. Force mains will be tested separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug,or between test plugs. Select test segments such that adjustable seated valves are isolated for individual checking. The Contractor will furnish and install test plugs at no additional cost, including all anchors , braces and other devices to withstand hydrostatic pressure on plugs. The Contractor will be responsible for any damage to public or private property caused by failure of plugs. Limit water fill rates of line to available venting capacity.

C. Hydrostatic Pressure Test

1. Conduct tests at 1.5 times maximum operating pressure determined by following

   Ppr = 0.650 (OP-GE), in which

   Ppt = test pressure in psi at gauge elevation OP = operating pressure in feet as indicated for highest elevation of the hydraulic gradient on each section of the line

   GE = elevation in feet at center line of gauge

D. Hydrostatic Leakage Test

1. Conduct tests conforming to AWWA C 600, AWWA C 605, ASTM D 2774 or ASTM F 2164 procedures, as applicable, at maximum operating pressure determined by following formula:

   P11 = 0.433 (OP-GE) , in which

   P_{11} = test pressure in psi at gauge elevation

   OP = operating pressure in feet as indicated for highest elevation of the hydraulic gradient on each section of the line

   GE = elevation in feet at center line of gauge

E. Satisfactorily complete previously defined pressure tests before determining the amount of leakage. Maximum allowable leakage will be determined by the following formula:

$$L = \frac{ND\,JP}{7400}$$

L = Allowable leakage in gallons/hour

N = Number of joints in length of pipeline tested
D = Nominal diameter of the pipe, in inches
P = Average test pressure during leakage test,in pounds per square inch, gauge

4.02 FINAL ACCEPTANCE

A. When all work required by the Contract has been completed, the Contractor shall submit to the Engineer written certification from a registered land surveyor that the centerline of each structure is within 2.0 feet of the centerline of the sewer easement or the location designated on the plans. After receiving the surveyor's certification from the Contractor,the Engineer will make a final inspection of he Work , includingany tests for operation. After completion of this inspection the Engineer will,if all things are satisfactory to him, issue to the Contractor a Certificate of Completion certifying that the Work required by the Contract has been completed according to the Contract Drawings and Specifications. However, the Certificate will not operate to release the Contractor or his sureties from any guarantees under the Contract or the Performance Bond. Upon receipt of the Certificate of Completion the Contractor will clean the premises and see that they are in an orderly condition.

PART 5 - MEASUREMENT

5.01 SITE PREPARATION AND RESTORATION

A. This work will be required within the construction limits and will not be paid for directly but will be considered as a subsidiary obligation of the Contractor under other contract items..

5.02 BYPASS TEE ASSEMBLY

A. Bypass tee assembly shall be measured per each.

5.03 COMBINATION AIR VALVE ASSEMBLY

A. Combination air valve assembly shall be measured per each.

5.04 VALVES

A. Valves shall be measured per each.

5.05 BYPASS PUMPING

A. Bypass pumping will be measured as a lump sum item.

5.06 WET WELL PIPING REPLACEMENT

A. Wet well piping replacement will be measured as a lump sum item.

5.07 DRY PIT PIPING REPLACEMENT

A. Dry pit piping replacement will be measured as a lump sum item.

5.08 UNDERCUT BACKFILL

A. Undercut backfill will be measured by the ton of limestone in place.

5.09 EXCAVATION

A. All work for excavation, blasting,drainage of trenches and dewatering , backfilling of excavation, compaction,grading,protection of existing utilities,disposal of excess material,and all other similar items included in this section of the Specifications but not covered by a Pay Item herein will be considered obligations of the Contractor under other Pay Items of the Contract.

5.10 SEWAGE FORCE MAIN

A. Sewage force main length will be measured per linear foot along the centerline of the pipe from the point of measurement at the pumping station or valve box shown on the Plans to the end of the force main at its discharge location. Shut-off and relief valves. valve boxes, and thrust blocks are incidental to the construction of the force main and/or pump station and will not be measured for payment.

5.11 TRAFFIC CONTROL

A. No separate payment will be made for traffic control. All work pertaining to traffic control shall be considered obligations of the Subcontractor under other Pay Items of the Contract.

PART 6 - PAYMENT

6.01 UNDERCUT BACKFILL

A. Accepted quantities of undercut backfill will be paid for at the contract unit price per ton of limestone furnished and placed, which will be full compensatio n for undercut excavation, special protection. protection of existing utilities, and backfilling to bottom of facility subgrade elevations. complete in place.

6.02 SEWAGE FORCE MAIN

A. The accepted quantities of sewage force main will be paid for at the contract unit price per linear foot furnished and laid for the various sizes, types and classes or wall thicknesses , which will be full compensation for material and material testing, excavation,special protection. protection of existing utilities, bedding, laying, jointing, fittings, shut-off valves, relief valves, valve pits, thrust blocks, cleaning and inspection, conducting acceptance tests, connection to existing sewer manholes or structures, removal and/or abandonment of existing pipe withinthe limits of excavation and backfilling outside pavement areas.

6.03 BYPASS TEE ASSEMBLY

A. Bypass tee assembly will be paid for at the contract unit price per each. This item will include but not be limited to all work and materials necessary to install the bypass tee assembly as shown on the plans including, but not limited to, all piping between and including the solid sleeves/couplings, fittings, valve, Bauer connection, precast concrete vault with drain line,crushed stone, excavation, and backfill.

6.04 COMBINATION AIR VALVE ASSEMBLY

A. Combination air valve assembly will be paid for at the contract unit price per each. This item will include but not be limited to all work and materials necessary to install the combination air valve assembly as shown on the plans including, but not limited to, air valve, piping, fittings, ball valve, and service saddle.

6.05 VALVES

A. Valves will be paid for at the contract unit price per each per type and size. This item will include but not be limited to all work and materials necessary to install the valve as shown on the plans.

6.06 BYPASS PUMPING

A. Bypass pumping will be paid at the appropriate contract lump sum price. This item includes all materials and labor necessary to properly comply with the bypass pumping requirements listed in the specification.

6.07 WET WELL PIPING REPLACEMENT

A. Wet well piping replacement will be paid at the appropriate contract lump sum price. This item includes all materials and labor necessary to replace the piping as shown on the plans including couplings, pipe and fittings, and sealing of existing pipe penetrations.

6.08 DRY PIT PIPING REPLACEMENT

A. Dry pit piping replacement will be paid at the appropriate contract lump sum price. This item includes all materials and labor necessary to replace the suction and discharge piping in the dry pit, wall piping connections, including couplings, pipe and fittings, check valves, gate valves,and coating of dry pit.

6.09 PAYMENT WILL BE MADE UNDER

ITEM NO.	PAY ITEM	PAY UNIT
360 NORTH HIGHLAND		
01-02530-6.01	BYPASS TEE ASSEMBLY	EACH
01-02530-6.02	8" GATE VALVE	EACH
01-02530-6.03	8" CHECK VALVE	EACH
01-02530-6.04	8" DUCTILE IRON PIPE	LF
01-02530-6.05	BYPASS PUMPING	LUMP SUM
1217 MEADOWLARK		
02-02530-6.01	BYPASS TEE ASSEMBLY	EACH
02-02530-6.02	4" GATE VALVE	EACH
02-02530-6.03	4" CHECK VALVE	EACH
02-02530-6.04	4" X 6" REDUCER	EACH
02-02530-6.05	4" DUCTILE IRON FORCE MAIN	LF
02-02530-6.06	BYPASS PUMPING	LUMP SUM
4730 EAST SHORE		
03-02530-6.01	BYPASS TEE ASSEMBLY	EACH
03-02530-6.02	8" PLUG VALVE	EACH
03-02530-6.03	8" CHECK VALVE	EACH
03-02530-6.04	8" DUCTILE IRON FORCE MAIN	LF
03-02530-6.05	BYPASS PUMPING	LUMP SUM
47 WEST VAN HUESEN		
04-02530-6.01	BYPASS TEE ASSEMBLY	EACH
04-02530-6.02	4" PLUG VALVE	EACH
04-02530-6.03	4" CHECK VALVE	EACH
04-02530-6.04	4" DUCTILE IRON FORCE MAIN	LF
04-02530-6.05	BYPASS PUMPING	LUMP SUM

END OF SECTION

SECTION 02533
REHABILITATION AND REPAIR OF EXISTING MANHOLES AND WET WELLS PART 1

PART 1 - GENERAL

1.01 SCOPE

A. This work shall consist of the repair and rehabilitation of existing sanitary sewer manholes as shown on the Drawings, stipulated in the Contract Documents, or as directed by the Purchaser. All specifications and provisions noted herein shall also apply to lift station concrete wet well rehabilitation and repair. The construction will be accomplished by these Specifications and in conformity with the details shown on the Drawings or established by the Purchaser. The Subcontractor shall perform all work necessary to complete the Contract with the best modern practice. Unless otherwise provided, the Subcontractor is required to furnish all labor, materials, equipment, and incidentals required to rehabilitate or repair manholes as noted on the Drawings or directed by the Purchaser.

B. Accurately field measure and size each individual manhole. Each existing sewer manhole designated to be repaired or rehabilitated may have a different configuration and varying field dimensions.

C. Each manhole to be rehabilitated shall be thoroughly cleaned of all loose or missing bricks, loose mortar, holes, etc. shall be repaired. All leaks shall be plugged with active leak-stop material prior to manhole rehabilitation. The material for stopping leaks and repairing nonleaking holes, cracks, etc. in concrete and masonry manholes shall be compatible with the coating system used for rehabilitation.

D. The presence or absence of leakage through manhole walls noted on the manhole inspection reports and as seen in the Subcontractor's independent manhole inspections prior to bidding or construction depend on the groundwater levels and conditions at the time of the inspections. High groundwater levels in the project area typically occur in the dormant season (December through May), but will vary with rainfall in any given year and sewer location. Under certain circumstances, the groundwater currently entering the leaking sewer mains and laterals may migrate to the manholes after the sewer mains and laterals are rehabilitated or replaced. The Subcontractor shall reflect assumptions and judgments on leakage through manhole walls based on this information in the unit prices bid for lining manholes. All leakage shall be stopped prior to lining manholes. No additional payment will be made for repairing leaks not visible prior to bidding or sewer rehabilitation.

E. When applicable, the manhole lining shall not be installed until all main sewer lining and other manhole rehabilitation work is complete.

F. Where existing manholes are being repaired or rehabilitated, the Subcontractor shall arrange his work so that sewage flow will be maintained during the construction period with no discharge of sewage into an open trench, and no backup of sewage into the existing line. The Subcontractor shall provide necessary bypass pumping capacity to carry flow downstream of the manhole to be rehabilitated or repaired.

G. Replacement Manholes shall conform to Specification Section 02531 of the City of Memphis Standard Construction Specifications modified by the SARP10 Program.

H. Cast iron frames shall be set at the required elevation and properly bonded to the flat top, eccentric cone, or grade rings with two rings of butyl mastic sealant and anchor bolts as specified in Section 02532 Sanitary Sewer Manhole Adjustments. of the City of Memphis Standard Construction Specifications modified by the SARP10 Program.

I. Definitions/Standards
   1. ASTM D-638: Test Method for Tensile Properties of Plastics.

2. ASTM D-695: Test Method for Compressive Properties of Rigid Plastics.
3. ASTM D-790: Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
4. ASTM D-4541: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
5. ASTM D-412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
6. ASTM D-2240: Standard Test Method for Rubber Property Durometer Hardness
7. ASTM D-522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
8. ICRI03732: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

J. Quality Assurance
1. The subcontractor shall furnish materials of quality required by the American Society for Testing and Materials (ASTM) standards and industry approved standards and specifications.
2. Provide guarantee against defective materials and workmanship in accordance with the requirements of these specifications.

K. Sequencing
1. All required interruptions of flow through manholes or any other portion of the sanitary sewer system shall be coordinated with the Owner and Purchaser, and approval must be received from the Purchaser prior to the interruption.

L. Substitutions
1. Should the Subcontractor wish to use any brand or type of material other than as specified herein, he shall so state in writing to the Purchaser naming the proposed substitution and manufacturer. This statement shall be accompanied by a certificate of compliance from an approved independent testing laboratory that the proposed substitute meets or exceeds the specified requirements and has been tested in accordance with the specified test standards. The statement shall also include documented proof that the proposed brand or type of material has a proven record of performance when used in the intended application as confirmed by actual field test or successful installations.

M. Samples
1. The Subcontractor shall apply the manhole lining system material on a sample area not less than four square feet (4 ft2) in size. When approved, the sample area shall serve as a standard of acceptance for all further work.

1.02 SUBMITTALS

A. Unless otherwise specified, all sample submittals shall be delivered to the Purchaser within two weeks of the NTP.

B. Site Subcontractor emergency phone numbers.

C. Schedules of work on a weekly basis that will be delivered no later than 2:00 PM on Thursday for the week following with daily AM email updates of approximate crew locations each day. Weekly schedule format shall contain a map, with sufficient streets labeled and identified at a scale to provide clarity, along with the nature and type of crew located by map area

D. Product Data on the following:
1. Crack and hole repair products
2. Cementitious plug material
3. Active leak-stop material
4. Frame and cover seals

5. Coating system including application requirements and chemical resistance data
6. Gasket polymer properties

E. Manufacturer's Certificate of Compliance for each type of product that product furnished meets requirements of this Section.

F. Manufacturer's written recommendations for product handling and installation.

G. Confined space entry plans.

H. Subcontractor shall submit to the Purchaser evidence indicating that the proposed applicators are fully qualified to perform the work, and any proposed applicator found to be not qualified shall (at the written request of the Purchaser) be removed forthwith by the Subcontractor.

I. The Coating Manufacturer shall warranty the entire project to include any and all aspects of the surface preparation, base material installation and protective coating applications for a period of ten (10) years from the date of acceptance by the Purchaser. The warranty shall make no distinction between installation practices and material performance and shall not be prorated with respect to elapsed time for the entire warranty period. Manufacturer shall, within a reasonable period of time after receipt of written notice thereof by the Purchaser [period not to exceed sixty (60) calendar days], repair defects in materials or workmanship during said TEN (10) year period, and any damage to other work caused by such defects or repairing of same at his own expense and without cost to the Purchaser.

1.03 DELIVERABLES

A. The Subcontractor shall provide post-rehabilitation MACP inspection for each manhole. Refer to Section 02544 Manhole GPS & MACP Inspection.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole Lining System
   1. The manhole lining system shall be spray applied or centrifugally cast manhole coating system.
   2. The material applied onto the surface of brick or concrete manholes shall be a coating system consisting of a base coat and/or top coat to provide corrosion resistance within a sanitary sewer environment. The thickness of the base coat and top coat shall meet the manufacturer's recommendation. Where applicable, the coating shall be applied to the roof, fillets, hatch frames, and underside of hatch surfaces. Subcontractor can request to not use a base coat but must provide to the Purchaser evidence of successful installations of the product without using a base coat and its capability to properly adhere to the manhole wall and form a smooth finish on the wall, bench, and invert. In cases where the base coat is not used, the thickness of the top coating will be increased by the base coat thickness listed above.
   3. The top coat applied shall be an approved polymer based polyurethane, a geopolymer, or a high-build solvent free epoxy product in conjunction with a high- strength cementitious repair/patch/base coat. The following products are acceptable and approved: Spectrashield Liner Systems, OBIC Armor 1000, Vortex Structure Guard, GeoKrete Geopolymer by Quadex, or EcoCast.
   4. The installer shall warrant and save harmless the Owner and his Purchaser against all claims for patent infringement and any loss thereof. The Subcontractor shall handle and store all material and shall dispose of all wastes in accordance with applicable regulations.
   5. Each system shall be designed for application over damp (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces. Active leaks shall be stopped using a premixed fast-setting, volume-stable waterproof cement plug consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents or urethane injection. It shall not

contain chlorides, gypsum, plasters, iron particles, aluminum powder or gas-forming agents, or promote corrosion of steel it may come in contact with. Set time shall be approximately 1 minute. Ten-minute compressive strength shall be approximately 500 PSI.

6. All invert channels shall be coated with the protective top coat only to prevent infiltration and to build up the invert channel to the new sewer main invert elevations; to fill all voids, cracks, holes, etc.; and to form a smooth flow channel. The entire channel shall be coated. The coating thickness shall be in accordance with manufacturer's recommendations.

B. Mortar

1. Mortar shall be composed of one part Portland cement and two parts sand (volumetric measure) thoroughly mixed in a tight box, with water added gradually and mixed continually until mortar has attained the proper consistency for use in brick masonry; prepared only in such quantities as needed for immediate use; mortar mixed for more than 30 minutes, re-tempered, or previously set will not be allowed.

C. Butyl Mastic Sealant

1. The sealant shall be used when joining the casting frame to the existing manhole and for all manhole adjustments to provide a watertight structure. The sealing compound shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. It shall be supplied in extruded rope form of suitable cross section and in such sizes as to seal the joint space. Use two complete ropes at each joint. The sealing compound shall be protected by a suitable removable two-piece wrapper, which shall be designed so that half may be removed longitudinally without disturbing the other half in order to facilitate application of the sealing compound. The sealant shall also meet the requirements of the following table:

Composition	Test Method	Minimum	Maximum
Bitumen (Petroleum Plastic Content)	ASTM D4	50	70
Ash Inert Mineral Matter	AASHTO T11	30	50
Volatile Matter	ASTM D6	---	2.0
Property	Test Method	Minimum	Maximum
Specific Gravity at 77 degrees F	ASTM D71	1.2	1.3
Ductility at 77 degrees F(cm)	ASTM D113	5.0	---
Softening Point	ASTM D36	320 degrees F	---
Penetration 77 degrees F (150 gms) 5 sec.	ASTM D217	50	120

2.02 EQUIPMENT

A. The Subcontractor shall furnish and maintain in good condition all equipment and facilities as required for the proper execution and inspection of the Work. All equipment and facilities shall be on site and approved by the Purchaser before work will be permitted to begin.

PART 3 EXECUTION

3.01 PRELIMINARY AND GENERAL ITEMS

A. Notification of Work
   1. The Subcontractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated that their service will be discontinued while the work is completed. The Subcontractor shall notify individual property owners at least 72 hours in advance, giving the date, start time, and estimated completion time for the work being conducted. This notification shall be coordinated with the door hanger distribution.

B. Traffic Control
   1. All traffic control shall be installed and maintained in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). At a minimum, the Subcontractor must have two trucks with flashing yellow lights on the work site. Traffic cones must also be placed downstream of the construction site to divert cars into the adjacent lane(s) per MUTCD requirements. On roads with heavy traffic volume, a flagman may also be needed to assist with traffic control. For bidding purposes, the Subcontractor should assume that a flagman will be needed on 30 percent of the setups.

C. Fall Protection
   1. The Subcontractor shall install and maintain all fall protection measures in accordance with OSHA standards and the SARP10 Loss Control Manual. The Subcontractor shall construct a controlled access zone around the manhole being rehabilitated, repaired or adjusted. At a minimum, the fall protection zone shall include traffic cones encircled with pennant tape. The controlled access zone must have one point of access with an entrance log.

D. Cleaning/Surface Prep
   1. All manholes to be rehabilitated shall be thoroughly cleaned before rehabilitation. All grease, oil, laitance, coatings, loose bricks, mortar, unsound concrete and other foreign materials shall be completely removed. Debris resulting from cleaning shall be removed from the manhole and not allowed to be carried downstream.

E. Flow Control
   1. The Subcontractor shall be responsible for plugging or diverting the flow of sewage as needed for repair and coating of manhole inverts and benches.

F. Bypass of Flow
   1. As required for acceptable completion of the work and/or to avoid damages due to sewer spills or overflows, the Subcontractor shall provide for sewer flow maintenance around the manholes designated for rehabilitation. The bypass shall typically be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent sanitary sewer system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. Bypassing of sanitary sewage into the storm water system will not be allowed. For all bypass pumping, pump noise shall be kept to a minimum to the satisfaction of the Purchaser. The Subcontractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service. The Subcontractor shall also advise those customers against water usage until the mainline is back in service. After completing the necessary work on the main line, the Subcontractor shall advise those customers that the sewer main is back in service.
   2. Bypass pumping is defined as providing pumps, standby pumps, piping, elevated structural support for aerial crossings, manpower to operate, routine maintenance and repair capability, pipe plugs, fuel, route and pump site clearing and any other work necessary to provide a complete bypass pumping operation. Any structures proposed by the Subcontractor for construction over or penetration into the interceptor piping for the

purpose of performing the bypass operations must be approved by the Purchaser prior to implementation. The Subcontractor shall submit design drawings and details that are signed and sealed by a professional engineer licensed in the State of Tennessee. All bypass pump schemes must be submitted to and approved by the Purchaser in advance.

3. Public advisory services shall be required to notify all parties whose service laterals will be out of service and to advise against water usage until the mainline is back in service.
4. The Subcontractor shall be required to provide businesses with temporary service, as needed, and will be responsible for all necessary bypass pumping flows.

G. Wastewater Spills

1. Should the Subcontractor spill any wastewater, such that the sewage either immediately or ultimately enters the waters of the State of Tennessee, then the Subcontractor shall be completely responsible for any fines or penalties imposed on the Purchaser or the Subcontractor by the USEPA or the State of Tennessee.

3.02 MANHOLE REHABILITATION – COATINGS

A. The surface prior to spraying shall be damp without noticeable water droplets or running water. Materials shall be spray applied to a minimum uniform thickness to ensure that all cracks, crevices, and voids are filled and a smooth surface remains after light troweling. The Subcontractor shall perform light troweling to compact the material into voids and to set the bond, where applicable.

B. Existing manhole steps shall be cut and removed prior to coating. Manhole steps are not to be replaced.

C. The first application shall have begun to take an initial set (disappearance of surface sheen which could be 15 minutes to one hour depending upon ambient conditions) before the second application to ensure a minimum total finished thickness of 1/2 inch. The final finished thickness may need to be greater than 1/2 inch in accordance with the manufacturer's recommendations to withstand groundwater pressures. A depth gauge shall be used during application, at various locations, to verify the required thickness. The surface then shall be troweled to smooth finish with care taken not to over trowel so as to bring additional water to the surface and weaken it. Manufacturer's recommendation shall be followed whenever more than 24 hours have elapsed between applications.

D. The bench covers used to catch debris shall be removed and the bench and invert sprayed such that a gradual slope is produced from the walls to the invert with the thickness at the edge of the invert being no less than 1/2 inch. The wall-bench intersection shall be rounded to a uniform radius the full circumference of the intersection.

E. No application shall be made to frozen surfaces or if freezing is expected to occur within the manhole for 24 hours after application. If ambient temperatures are in excess of 95°F, precautions shall be taken to keep the mix temperature at time of application below 90°F, using ice if necessary.

F. The final application shall have a minimum of four (4) hours cure time before subjected to actual flow.

3.03 INVERT AND BENCH REPLACEMENT

A. Remove all loose grout and rubble from existing channel. Replace the invert and bench by removing the existing invert and bench and reconstructing with concrete conforming to Section 03050 Portland Cement Concrete. Work shall include aligning inflow and outflow ports in such a manner as to prevent the deposition of solids at the transition point. All inverts shall follow the grades of the pipe entering the manhole. Changes in direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit, but shall be shaped to allow easy entrance of maintenance equipment including buckets, T.V.

camera, etc. Benches shall be constructed to the highest pipe crown elevation and sloped to drain toward the flow-through channel.

B. Apply a minimum ½-inch finished thickness of liner material over the surface of the replaced invert and bench where coating is noted on Drawings or directed by the Purchaser. Allow the liner material to cure for a minimum of four hours before being subjected to flow.

3.04 RESET AND RESEAL MANHOLE FRAME AND COVER

A. If the existing manhole frame is misaligned on the manhole, the Subcontractor shall remove the existing manhole frame and cover and, if they are not being reused, dispose of them as directed by the Purchaser. It shall be the responsibility of the Subcontractor, at no additional cost to the Purchaser, to repair any damage to the chimney or corbel caused by the removal of the existing manhole frame. Existing frames and covers that are to be reused shall be thoroughly cleaned before reinstallation.

B. If the manhole frame is to be raised, the work shall be performed in conformance with Section 02532 of the City of Memphis Standard Construction Specifications modified by the SARP10 Program.

C. The manhole frame for the cover shall be set on the manhole sidewall in a full bed of flexible butyl resin gasket material at the required elevation. In addition, the frame shall be bolted to the grade rings. Where manholes are constructed in paved areas or fill slopes, the surface of the frame and cover shall be tilted so as to conform to the exact slope, crown, and grade of the existing pavement or area adjacent thereto.

D. Any new manhole frame and cover replacement shall result in a minimum 24 inches diameter clear opening to the manhole.

3.05 SEWER MANHOLE DROP CONSTRUCTION

A. Inside drop structures shall be installed in existing manholes at the locations shown on the Drawings and/or as directed by the Purchaser. Drop construction shall conform to the details shown on Sanitary Manhole Drop Construction Detail. The Subcontractor shall cut a hole in the manhole wall to permit inserting the inlet pipe at the required flow line elevation, horizontal angle, and slope, and to allow two (2) inches space around the pipe for bedding and filling solidly with nonshrinking grout. Care shall be used to avoid unnecessary damage to the existing masonry or concrete. Drop structure construction shall be installed before cementitious coating is applied where shown on the Drawings or directed by the Purchaser.

B. All loose material shall be removed from the cut surfaces, which shall be completely coated with grout before setting the pipe. Before inserting the pipe and flexible connector, a sufficient thickness of grout shall be placed at the bottom and sides of the opening for proper bedding of the pipe. After setting, all spaces around the pipe shall be solidly filled with grout and neatly pointed up on the inside to present a smooth joint, flush with the inner and outer wall surface. Any necessary modifications to the existing invert shall be made to provide a smooth, plastered surface for properly channeled sewage flow from the new connection. All drop construction shall be constructed of either ductile iron pipe with push on or mechanical joints or PVC pipe. Solvent cement joints may be used on PVC for drop construction. The vertical drop construction shall have the dead weight held by suitable means until the steel support straps are secured in place and tightened. The pipe mechanical joint bolts, if used, shall not be positioned against the manhole wall. The steel support straps shall be fastened to the manhole wall with two bolts per strap set in expansion sleeves in drilled holes.

3.06 MANHOLE REHABILITATION ACCEPTANCE

A. After the manhole rehabilitation work has been completed, the manhole shall be visually inspected by the Subcontractor in the presence of the Purchaser's Representative, and the work shall be accepted if found satisfactory to the Purchaser's Representative. When a

cementitious coating is applied, the finished surface shall be free of blisters, “runs” or “sags” or other indications of uneven coating thickness. No evidence of visible leaks shall be allowed.

B. Vacuum Testing will be required for all manholes that receive a cementitious coating. The vacuum testing method shall be conducted as follows:
   1. Subcontractor shall plug all pipe openings, taking care to securely brace the plugs and the pipe. The plugs shall be placed a minimum of 6 feet beyond the manhole wall.
   2. With the vacuum tester in place, the Subcontractor shall inflate the compression to affect a seal between the vacuum base and the structure. The Subcontractor shall connect the vacuum pump to the outlet port with the valve open and evacuate the manhole to 10-inches Hg (0.3 bar) for 48 inch diameter manholes and 5-inches Hg (0.15 bar) for 60-inch and greater diameter manholes.
   3. Subcontractor shall close vacuum inlet/outlet ball valve, disconnect the vacuum pump, and monitor the vacuum for the specified time period. If the vacuum does not drop in excess of 1-inch Hg over the specified time period, the manhole is considered acceptable and passes the test. If the manhole fails the test, The Subcontractor shall identify the leaking areas by removing the head assembly, coating the interior surfaces of the manhole with a soap and water solution, and repeating the vacuum test for approximately thirty seconds. Once the leaks have been identified, the Subcontractor shall complete all necessary repairs by sealing the leaks of the manhole to the satisfaction of the Purchaser’s Representative, and repeat test procedures until satisfactory results are obtained.

Vacuum Test Timetable			
Manhole Diameter (inches)			
Depth (Feet)	48”	60”	72”
4’	10 sec.	13 sec.	16 sec.
8’	20 sec.	26 sec.	32 sec.
12’	30 sec.	39 sec.	48 sec.
16’	40 sec.	52 sec.	64 sec.
20’	50 sec.	65 sec.	80 sec.
24’	60 sec.	78 sec.	96 sec.
*	5.0 sec.	6.5 sec.	8.0 sec.
*Add extra testing time “T”, for each additional 2-foot depth. (The values listed above have been extrapolated for ASTM designation C924-85.			

   4. The Purchaser reserves the right to reject any and all manholes that do not pass vacuum testing requirements, and replacement shall be at the Subcontractor’s expense. A significant number of leaks on a single manhole or significant number of manholes leaking shall be considered as a basis for rejection and replacement of manholes.
   5. Where vacuum testing is not applicable, the Subcontractor shall be directed by the Purchaser to conduct a high-voltage holiday test.

3.07 WARRANTY AND GUARANTEE FOR REHABILITATED MANHOLES

A. The Subcontractor shall guarantee the rehabilitated manholes for ten (10) years after acceptance by the Purchaser to the extent that he will repair any leaks that may appear in them during this period because of faulty workmanship or materials furnished by him at no additional expense to the Owner. As required by 2.01.A.9, the Subcontractor shall also have written documentation that the Coating Manufacturer provides a ten (10) year warranty for all manholes receiving a cementitious coating.

PART 4 MEASUREMENT & PAYMENT

4.01 MEASUREMENTS

A. Wet Well Rehabilitation –Coating
   1. Coating will be measured per vertical foot of wet well from the invert up to the bottom of the frame casting.

B. Traffic Control
   1. Traffic control is considered to be an incidental to the wet well rehabilitation .

C. Bypass Pumping
   1. Bypass pumping is considered to be an incidental to the wet well rehabilitation.

D. Dewatering
   1. Dewatering is considered to be an incidental to the wet well rehabilitation.

4.02 PAYMENTS

A. Wet Well Rehabilitation – Coating
   1. Coating of wet wells will be paid for at the contract unit price per vertical foot which shall be compensation for draining of wet well, surface preparation, sprayed on lining.

4.03 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
02533-4.01.A	Wet Well Coating	VF

END OF SECTION

SECTION 02630
SITE PREPARATION AND RESTORATION

PART 1 – SCOPE

1.01 SCOPE OF WORK

A. This Work shall consist of the removal of brush, rubbish, fences, structures, abandoned appliances, building foundations, all trees, shrubs and plants not to be protected, and all other obstacles within the right-of-way / easement limits shown on the Plans and/or in the Special Instructions; the disposal of debris; and the restoration and/or protection of trees, shrubs, plants, fences, turfed areas, and structures after construction of drainage facilities is completed.

PART 2 – EQUIPMENT

2.01 EQUIPMENT

A. All equipment for the satisfactory performance of the work shall be on the project and approved before the work will be permitted to begin.

PART 3 – CONSTRUCTION REQUIREMENTS

3.01 RIGHT-OF-WAY AND EASEMENT

A. The Subcontractor shall confine his construction activities within the rights-of-way and/or easements per easement/rights-of-way plats provided by the owner. The Subcontractor shall be responsible for obtaining written agreements for use of private property outside of City of Memphis acquired rights-of-way/easements for such purposes as storage of material and equipment and access to the construction site. The Subcontractor shall provide a copy of all such written agreements to the Purchaser immediately upon obtaining the necessary documentation.

3.02 EXISTING OBSTRUCTIONS.

A. Where applicable, locations of obstructions shown on the Plans are approximate and are shown only for information purposes and are not intended as an accurate location of such obstructions. Obstructions not shown on the Plans but encountered by the Subcontractor shall be removed as necessary and, if directed by the Owner, replaced in their original state or protected by the Subcontractor at no additional cost to the Purchaser.

3.03 REMOVAL OF VEGETATION.

A. The rights-of-way/permanent easements shall be cleared of all dead trees, living trees, stumps, brush, projecting roots, hedge, weeds, pole stubs, logs, and other objectionable material, vegetation and growth. This work shall include the removal of all trees, shrubs, and plants not suitable for moving and replanting as determined by the Owner. All trees, stumps, roots, pole stubs, brush, hedge, and other protruding obstructions within the rights-of-way/easements shall be removed to within 3 inches of existing ground. This work shall be done well in advance of excavation operations. Trees and shrubs to be replanted shall be extracted with an ample ball of earth around roots so that transplanting may be successful. The root ball shall be wrapped in burlap. Vegetation stored for replanting shall be watered sufficiently to protect the root system from dehydration.

B. Low hanging branches and unsound branches on trees or shrubs designated to remain, shall be removed. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices.

3.04 REMOVAL OF OBSTRUCTIONS

A. Existing fence material and posts within the rights-of-way/easement limits shall be moved from the construction area and stored in such a manner as to protect them against damage. The Subcontractor shall be responsible for the condition of the removed fence material and posts. The Subcontractor shall demolish and remove all structures and structure foundations within the rights-of-way/easement limits unless otherwise instructed by the Purchaser. Such structures and foundations shall be removed to 12 inches below the subgrade elevation or as directed by the Purchaser. If permitted by the Purchaser, the Subcontractor shall backfill basements, cisterns, and the like in an approved manner. The Subcontractor shall remove all abandoned vehicles, appliances and rubbish within the rights-of-way/easement limits.

3.05 PROTECTION OF OBSTRUCTIONS OUTSIDE RIGHT-OF-WAY/EASEMENT LIMITS.

A. The Contractor shall protect and avoid damage to all trees, shrubs, plants, fences, turfed areas, structures, and all other objects outside of the right-of-way/easement limits shown on the Plans and right- of-way/easement plats from damage due to construction operations. Damage caused by the Contractor shall be repaired or restored at no cost to the Purchaser. Particular care shall be used to avoid damage to trees, shrubs, bushes, turfed areas, and private property located adjacent to rights-of-way/easements on private property. No trees, plants, turfed areas, or other objects outside such limits shall be disturbed or damaged without the written permission of the property owner.

3.06 SPECIAL PROTECTION OF OBSTRUCTIONS INSIDE EASEMENT LIMITS.

A. Wherever the underground installation of drainage facilities conflicts with other improvements previously made by the Purchaser, other governmental bodies, or adjacent property owners, the Contractor shall be responsible for their protection and preservation, including necessary removal and storage of such improvements, and subsequent replacement to obtain, to the fullest extent possible, the undisturbed condition.

3.07 DISPOSAL OF DEBRIS.

A. All trees, brush, logs, snags, leaves, sawdust, bark, construction debris, and refuse shall be collected and disposed of in accordance with all applicable City codes and ordinances. Debris shall be removed from the site as soon as practical and shall not be left until the completion of the contract. If burning of debris is allowed by the Purchaser, the Contractor must obtain and pay for a permit from the City of Memphis Department of Fire Prevention and all precautions necessary shall be exercised to prevent the spread of fire and such burning shall be in accordance with Division 1, “General Requirements” of these Specifications. Burning shall be done only at approved locations and in conformity with the laws, ordinances, and requirements of agencies and officials having jurisdiction. When materials are to be disposed of, the Contractor shall obtain written permission before hand from the property owner on whose property the disposal is to be made and shall file a copy of such permit with the Purchaser. Unless otherwise provided in the Contract Documents, the Contractor shall make his own arrangements for disposing of such materials off site.

3.08 REPLACEMENT OF VEGETATION

A. As soon as backfill operations permit, the Contractor shall replace transplanted trees, shrubs, and plants. The Contractor shall properly water the transplanted vegetation immediately upon replanting and at suitable intervals thereafter. If shrubs, plants, or trees die after transplanting and before final acceptance of the Work, the Contractor shall at his expensed replace same with equal shrubbery, plants, or trees.

3.09 REPLACEMENT OF FENCES

A. Any fences disturbed within the rights-of-way/easement limits shall be replaced to the satisfaction of the Owner. Fences in such poor condition that they cannot be removed and replaced shall be replaced with new fence material similar in original quality, size, and appearance to the removed fence or a written release shall be obtained from the property owners. For chain link fence, new fence materials and construction methods shall conform to the requirements of Specification Section 02820. For box culvert or pipe construction, any fences removed shall be replaced in their original location. Any fence damaged during construction shall be restored to original or better condition. For channel lining construction, removal of fences shall be performed with care and the fence rolled up or stacked and stored on the owner's property. All side yard fences within the easement shall be replaced or extended to the new channel with in-kind fence material.

PART 4 – MEASUREMENT

4.01 SITE PREPARATION AND RESTORATION.

A. No measurement of area will be made. When changes in the Contract Documents affect the rights-of-way/easement area, a proportionate adjustment for the increased or decreased area will be made.

B. This work will be required within the construction limits and will not be paid for directly but will be considered as a subsidiary obligation of the Subcontractor under other contract items.

END OF SECTION

SECTION 02920
SEEDING

PART 1 – GENERAL

1.01 SCOPE

A. This work shall consist of furnishing and placing seed, commercial fertilizer, agricultural limestone, erosion control fabric, and mulch material when specified, and of caring for such areas until acceptance, all in accordance with these Specifications, on all newly graded earthen areas that are not to be paved, stabilized, or sodded, unless otherwise indicated on the plans or directed by the Purchaser.

PART 2 – MATERIALS AND EQUIPMENT

2.01 MATERIALS.

A. Grass Seed.

1. The seed shall meet the requirements of the Tennessee Department of Agriculture and no “Below Standard” seed will be accepted. Grass seed furnished under these Specifications shall be packed in new bags or bags that are sound and not mended.
2. The Contractor shall furnish the Purchaser a certified laboratory report from an accredited commercial seed laboratory or from a State seed laboratory showing the analysis of the seed to be furnished and approving the seed for purity and germination. The report from an accredited commercial seed laboratory shall be signed by a Senior Member of the Society of Commercial Seed Technologists. At the discretion of the Purchaser, samples of the seed may be taken for a check against the certified laboratory report. Sampling and testing will be in accordance with the requirements of the Tennessee Department of Agriculture.
3. When a seed group is used, the percentages forming the group shall be as set out below, unless otherwise specified.

Name	Quantity, % by Weight
Group A	
Lespedeza (Common or Korean)	20
Sericea Lespedeza	15
Ky. 31 Fescue	40
English Rye	15
White Dutch Clover	5
Weeping Love Grass	5
Group B	
Ky. 31 Fescue	55
Redtop	15
English Rye	20
White Dutch Clover	5
Weeping Love Grass	5
Group C	
Sericea Lespedeza	50
Ky. 31 Fescue	30
English Rye	15
White Dutch Clover	5

4. In mixing or forming “Groups” of seed, they shall be uniformly mixed. “Group” seed shall not be mixed until after each type seed that is used to form the “Group” has been tested and inspected separately and approved for purity and germination. Seed mixed before tests and inspection are made will not be accepted.

B. Fertilizer.
   1. Manufactured fertilizer shall be a standard commercial fertilizer containing the specified percentages by weight of nitrogen (N), phosphoric acid (P2O5) and potash (K2O). The fertilizer shall be furnished in standard containers with the name, weight, and guaranteed analysis of the contents clearly marked. The containers shall insure proper protection in handling and transporting the fertilizer. All commercial fertilizer shall comply with local, state, and federal fertilizer laws.

C. Agricultural Limestone.
   1. Agricultural limestone shall contain not less than eighty-five (85%) of calcium carbonate and magnesium carbonate combined and shall be crushed so that at least 85 percent will pass the No. 10 mesh sieve and 100 percent will pass the 3/8 inch sieve.

D. Mulch Material.
   1. All mulch material shall be air dried and virtually free of noxious weeds and weed seeds or other materials detrimental to plant growth on the work site or on adjacent agricultural lands. Hay shall be stalks of approved grasses, sedges, or legumes seasoned before baling or loading. Straw shall be stalks of rye, oats, wheat, or other approved grain crops. Both hay and straw shall be suitable for spreading with standard mulch blower equipment. Biodegradable fabric as specified in this section may be used as an alternate to mulch material at the Contractor’s option.

E. Inoculants for Legumes.
   1. Inoculants for treating legume seed shall be standard cultures of nitrogen fixing bacteria that are adapted to the particular kind of seed to be treated. The inoculant shall be supplied in convenient containers of a size sufficient to treat the amount of seed to be planted. The label on the container shall indicate the specified legume seed to be inoculated and the date period to be used.

F. Mulch Binder.
   1. Cut back asphalt, Grade RC-70 or RC-250 conforming to AASHTO Specifications shall be used.

G. Water.
   1. Water shall be free from any harmful or objectionable qualities or organisms.

H. Biodegradable Fabric.
   1. Biodegradable fabric shall consist of a knitted or bonded construction of yarn with uniform openings interwoven with strips of biodegradable paper. The fabric shall be degradable by exposure to ultraviolet light. The fabric shall be “Hold/Gro” as manufactured by Gulf States Paper Corporation of Tuscaloosa, Alabama, or equal. The fabric shall be furnished in rolls and shall conform to the following requirements:
      a. Roll Widths: 5 feet minimum and 10 feet maximum.
      b. Roll Length: Approximately 360 feet.
      c. Weight: Approximately 0.2 pounds per square yard of fabric.
   2. Fabric shall be secured in a place with wood pegs or other biodegradable materials.
   3. The manufacturer shall provide moisture proof bags comparable to 4 to 6 mil opaque polyethylene bags for protection of the fabric prior to installation.

2.02 EQUIPMENT

A. All equipment necessary for the satisfactory performance of this construction shall be on the project and inspected before work will be permitted to begin.

PART 3 - CONSTRUCTION REQUIREMENTS

3.01 GENERAL

A. The Contractor shall notify the Purchaser at least 48 hours in advance of the time he intends to begin sowing seed and shall not proceed with such work until permission to do so has been granted by the Purchaser. Before starting seeding operations on any area, final dressing and the placing of topsoil shall have been completed in accordance with the project requirements. All seeding and related operations shall be continuous operations.

3.02 PREPARING THE SEEDBED.

A. Each area to be seeded shall be scarified, disked, harrowed, raked, or otherwise worked until it has been loosened and pulverized to a depth of not less than one inch. This operation shall be performed only when the soil is in a tillable and workable condition. Fertilizer, at the rate of not less than 23 pounds of Grade 6-12-12 or equivalent, per 1,000 square feet, and agricultural limestone, at the rate of not less than 100 pounds per 1,000 square feet, shall be distributed evenly over the seedbed, unless other are specified on the plans or in the Contract Documents. The limestone and fertilizer shall be lightly harrowed, raked, or otherwise incorporated into the soil as specified above when mixed with seed in water and applied with power sprayer equipment.

3.03 TIME OF SEEDING.

A. Group “A” seed shall be used for seeding from February 1 to August 1, and Group “B” seed shall be used from August 1 to December 1, except that either Group “A” or “B” may be used during the month of August. Group “C” seed shall be used from February 1 to December 1 and only when specified on the Plans or in the Contract Documents. Seeding shall be performed only when the soil is in a tillable and workable condition, and no seeding shall be performed between December 1 and February 1, unless otherwise permitted.

3.04 SEEDING.

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed and thoroughly watered after seeding. Care shall be exercised to not wash seeding by over watering. Seed shall be sown uniformly by means of a rotary seeder, wheelbarrow seeders, hydraulic equipment, or other satisfactory means, and unless otherwise specified on the Plans or in the Contract Documents, at the rate of 1½ pounds per 1,000 square feet. Group “C” seed and seeds of legumes when sown alone shall be inoculated before sowing in accordance with the recommendations of the manufacturer of the inoculant and as directed by the Purchaser. No seeding shall be done during windy weather, or when the ground surface is frozen, wet, or otherwise nontillable.

3.05 BIODEGRADABLE FABRIC.

A. When biodegradable fabric is specified, the fabric shall be loosely draped over the seeded area. The seed bed to be covered shall be prepared, fertilized, limed, seeded, and watered prior t installation of the fabric. If the slope is greater than 3 to 1, fabric shall be applied vertically with paper strips oriented parallel to the slope.

B. The Contractor shall dig a 4 inch deep check ditch 1 foot back from the slope crown, then fold, place and peg fabric every 9 inches in the check ditch, and cover with soil. An identical check ditch shall be provided 1 foot away from the bottom of the slope. When 2 or more lengths of fabric are required to be installed side by side to cover an area, they shall overlap 4 inches minimum. Fabric installed end to end shall overlap 4 inches minimum with the upgrade section on top of the lower grade section. End to end overlaps of adjacent rows of fabric shall be staggered a minimum of 5 feet. Each length of fabric shall be pegged in 3 rows, each edge and the center, with pegs placed on 3 foot centers maximum. Overlapped ends shall be pegged on 9 inch centers across the fabric overlap. Pegs shall be driven flush with the ground. The Contractor shall strictly adhere to the installation directions provided by the manufacturer of the fabric.

C. The Contractor shall maintain and protect the biodegradable fabric until Final Acceptance or until the Purchaser has determined that the fabric has served its useful life, whichever occurs first. Maintenance shall consist of watering as required, repairs made necessary by erosion, wind, fire, or any other cause until Final Acceptance. Following the restoration of damaged areas under plant establishment requirements for applicable underlying items, the fabric shall be repaired or replaced to meet the original requirements and maintained until Final Acceptance of the Project.

3.06 MULCHING.

A. When seeding with mulch is specified, the mulch material shall be spread evenly over the seeded areas at an approximate rate of 75 pounds per 1,000 square feet immediately following the seeding operations. This rate may be varied by the Purchaser, depending on the texture and condition of the mulch material and the characteristics of the area seeded. All portions of the seeded areas shall be covered with a uniform layer of mulch, so that approximately 25 percent of the ground is visible. The mulch shall be held in place by the use of an approved mulch binder. Cutback asphalt or emulsified asphalt shall be applied at the approximate rate of 4 gallons per 1,000 square feet as required to hold the mulch in place. Mulch in medians and other areas affected by traffic shall be held in place by applying asphalt binder at the approximate rate of 11 gallons per unit. The Contractor shall cover exposed structures, guardrails, signs, and appurtenances, if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

3.07 MAINTENANCE AND REPAIR.

A. All seeded areas shall be cared for and maintained properly to the Purchaser’s satisfaction until Final Acceptance of the Work and for the duration of the warranty period. Such care shall include, but not be limited to watering as necessary, fertilizing, and mowing the seeded areas when required by the Purchaser. When mowing is required, mower blades shall be set at sufficient height to protect the vitality of the growth. Areas which have been previously seeded and mulched in accordance with this Specification Section but which have been eroded, damaged or failed to successfully establish a stand of grasses or legumes shall be repaired as directed by the Purchaser. All material and labor required to maintain and repair seeded areas shall be furnished by the Contractor at no cost to the City. If the Purchaser directs the Contractor to place additional fertilizer on the area to be reseeded, and additional 4 pounds of agricultural limestone will be required for each additional pound of fertilizer.

PART 4 – MEASUREMENT

4.01 FURNISHING THE SEED

A. The furnishing of seeding as specified herein may be incidental to the work of the Contract, or may be measured and payment made under the Pay Items described herein, as defined by the Pay Items in the Proposal Sheet(s) and/or as included in the Plans and Contract Documents. If payment is made separately, measurement for the work of this Specification will be as described below.

4.02 SEEDING (WITH MULCH)

A. The area of seeding (with mulch) to measured for payment will be the number of seeding units, with mulch, in accordance with these Specifications. Each unit will consist of 1,000 square feet measured along the surface.

4.03 SEEDING (WITHOUT MULCH)

A. The area of seeding (without mulch) to be measured for payment will be the number of seeding units in accordance with these Specifications. Each unit will consist of 1,000 square feet measured along the surface.

4.04 BIODEGRADABLE FABRIC

A. Biodegradable fabric to be measured for payment will be the number of 1,000 square foot units for which biodegradable fabric has been applied over seeded areas. Measurement will be along the surface.

4.05 GENERAL

A. All work and materials for seed bed preparation, application of fertilizer and limestone, application of mulch binder, watering and maintenance and repair of work, and all other similar items included in this section of the Specifications but not covered by a Pay Item herein will be considered as a subsidiary obligation of the Contractor under other items of the Contract.

PART 5 – PAYMENT

5.01 SEEDING (WITH MULCH)

A. Seeding (with mulch) will be paid for at the contract unit price per unit (1,000 square feet), for the accepted quantities, which price will be full payment for preparing the seedbed, and for furnishing and placing all materials including fertilizer, water, agricultural limestone, seed, mulch materials, mulch binder and inoculant, complete in place; and for maintenance and repair of the seeded and grassed area.

5.02 SEEDING (WITHOUT MULCH)

A. Seeding (without mulch) will be paid for at the contract unit price per unit (1,000 square feet) for the accepted quantities, which price will be full payment for preparing the seedbed, and for furnishing and placing all materials including fertilizer, water, agricultural limestone, seed, and inoculant, complete in place; and for maintenance and repair of the seeded and grassed areas.

5.03 BIODEGRADABLE FABRIC

A. Biodegradable fabric will be paid for at the contract unit price per unit (1,000 square feet) for furnishing, installing, maintaining, and protecting the fabric, which price will be full payment for accomplishing the above.

5.04 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
02920-5.01	SEEDING (WITH MULCH)	Unit of 1,000 SF
02920-5.02	SEEDING (WITHOUT MULCH)	Unit of 1,000 SF
02920-5.03	BIODEGRADABLE FABRIC	Unit of 1,000 SF

END OF SECTION

SECTION 11310
DRY PIT SUBMERSIBLE PUMPS, VALVES, CONTROLS, & ACCESSORIES

PART 1 - GENERAL

1.01 SCOPE

A. This section includes equipment for one duplex submersible pump station to be supplied with integral electric motors, suction elbows, pump stand and electrical control panel assembly, and other miscellaneous installation accessories. All equipment shall be supplied by a single source supplier that adheres to the quality standards established and expressly named in this specification.

B. Acceptable manufacturers are those who meet this specification in its entirety and that can demonstrate compliance with these specifications through the submittal process outlined in section 2.04 such that no exceptions or deviations are noted (See Paragraph 2.04 Submittal). The System Supplier, for all equipment approved for this project shall meet or exceed all performance, material, service, and warranty requirements of this specification.

C. The Bidder shall be responsible for supplying the equipment specified herein to meet or exceed these specifications as obtained from the System Supplier for this project. The System Supplier shall be an Authorized Distributor of the proposed products and shall be capable of servicing the products with repair service and parts availability within 50 miles of the City of Memphis. The responsive System Supplier shall routinely stock complete pumps, controls and parts to repair those units in their own facility. All equipment approved for this project shall meet or exceed all performance, service, and warranty requirements of this

1.02 RELATED REQUIREMENTS

A. Bid Form

B. General Conditions

C. Shop Drawings

D. Painting

E. Electrical

PART 2 – QUALITY ASSURANCE

2.01 GENERAL

A. A. The pumps shall be suitable for pumping raw sewage and shall be designed and fully guaranteed for this use. The fluid temperature range shall be from 40 degrees to 104 degrees F.

2.02 STANDARDS

A. A. The test code of the American Hydraulic Institute for testing pumps and sound engineering practice shall be used. Where required, all pump performance documentation, including flow/head curves, shall adhere to the Hydraulic Institute Standards and shall allow no negative tolerance on flow, head, hydraulic efficiency or any other criteria deemed by the Engineer to be necessary to evaluate pumping system performance.

2.03 ENVIRONMENTAL CONDITIONS

A. All equipment as specified herein shall be so supplied with respect to environmental conditions at the jobsite.

2.04 SUBMITTALS

A. Complete equipment and control submittals, complete assembly, foundation support, and installation drawings, together with detailed specifications and data covering pumps, motors, material used, parts, devices and other accessories forming a part of the equipment furnished shall be submitted for approval in accordance with the procedure set forth in the General Conditions.
   1. Data and specifications for the equipment shall include, but shall not be limited to the following:

B. Setting plans. Setting plans shall include:
   1. Anchor bolt layout
   2. Anchor bolt dimensions.
   3. Outline dimensions and weights of pumps, bases, motors, and control enclosures, etc.

C. Pumps. Data and drawings shall include:
   1. Manufacturer, type and model number.
   2. Assembly drawing, nomenclature and material list, O & M manual, and parts list.
   3. Type, manufacturer, model numbers, location and spacing of bearings.
   4. Impeller type, diameter, thru-let dimensions, sphere size, number of vanes and identification number.
   5. Complete motor performance data including: rating, voltage/phase/frequency; design type; service factor; insulation class; motor pole number; actual rotation speed when combined with the specified pumps; current, power factor and active input power (KW) as a continuous function of shaft power from no load to at least 115 percent load; start (max. Inrush) current; locked rotor current; NEC code letter; and motor torque as a continuous function through the motor start cycle from no rotation to synchronous speed.
   6. Complete performance test curve(s) showing full range (shutoff to run-out) head vs. Capacity, NPSHR, hydraulic efficiency, motor active (KW) input power, motor total (KVA) input power (based on measured current and voltage), and shaft power (BHP). See Sec. 3.01 Shop Tests.
   7. Location and description of Service Centers and spare parts stock.
   8. Warranty for the proposed equipment.

D. Controls. Complete Schematics and Documentation shall include:
   1. Panel layout drawings that show accurate dimensions, location of components, and proper connection of terminations with complete schematics of the proposed equipment.
   2. Cut sheets on all items to be provided.
   3. Operation manuals on VFDs or PLCs to be provided.

   The manufacturer shall indicate, by arrows to points on the Q/H curves, limits recommended for stable operation, between which the pumps are to be operated to prevent surging, cavitation, and vibration. The stable operating range shall be as large as possible, and shall be based on actual hydraulic and mechanical characteristics of the units and shall meet the hydraulic performance requirements of the proposed system.

PART 3 - TESTING

3.01 SHOP TESTS

A. Pumps and Motors. Each pump and motor shall be performance tested as specified hereinafter; all pumps shall be tested with motor cables to be supplied with the pumps.

B. Each pump shall be tested for performance at the factory to determine the head vs. Capacity, motor total electrical power draw (KVA), and motor active electrical power draw (KW) for the full speed at which the pumps are specified and shown on a performance test curve. The motor and cable on each pump shall be tested for moisture content or insulation defects. After the test, the pump cable end shall be fitted with a shrink-fit rubber boot to protect it from moisture or water.

3.02 ACCEPTANCE TESTS

A. Acceptance tests shall be run to demonstrate that the pumping units, motors and control system meet the following requirements:

B. The pumping units operate as specified without excessive noise, cavitation, vibration, and without overheating of the bearings.

C. All automatic and manual controls function in accordance with the specified requirements.

D. All drive equipment operates without being overloaded.

PART 4 - PERFORMANCE

4.01 SUBMERSIBLE PUMPS

A. Submersible Pumps shall meet the following performance requirements:

Item (Units)	4730 East Shore	1217 Meadowlark
Primary Duty Point (GPM/ft.)	595 GPM@ 71’ TDH	306 GPM@ 34’ TDH
Secondary Duty Point (GPM/ft.) Less than 60 Hz	1000 GPM@ 38’ TDH	237 GPM@ 21’ TDH
Minimum Shutoff Head (ft.)	124 Ft.	124 Ft.
Maximum Specific Energy at Primary Duty Point (KWHr/MG)	359 KWHr/MG	190 KWHr/MG
Max Motor Rating (HP) at 40 degrees C	20 HP @ 40° C	5 HP @ 40° C
Maximum NPSHre (ft) in Operation Range	14 Feet	15 Feet
Voltage/Cycle/Phase	230VAC/60Hz/ 3Phase	240VAC/60Hz/ 3Phase
Motor Design Type	NEMA Class B, NEMA MG1, Part 31	NEMA Class B, NEMA MG1, Part 31
Motor Service Factor	Greater than 1.15	Greater than 1.15
Minimum Motor Efficiency	87%	85%
Motor Insulation Rating	Class H	Class H
Maximum Rated Current (A)	52 Amps	12 Amps
Pump Suction x Discharge Size (inches)	6” x 4”	4” x 4”

PART 5 - PUMPING EQUIPMENT

5.01 PUMP DESIGN (DRY PIT SUBMERSIBLE)

A. The pumps shall be capable of handling raw, unscreened sewage. Pumps shall be supplied with a mating suction elbow and pump stand and be capable of delivering the flow specified in the table above. The pumps shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The pump and motor shall be non-overloading at any point on the curve. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of sixty five (65) feet. No portion of the pump shall bear directly on the sump floor

5.02 PUMP CONSTRUCTION

A. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 304 stainless steel. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass shall be protected by a factory applied spray coating. All castings must be blasted before coating. All wet surfaces are to be coated with two-pack oxyrane ester Duasolid 50. The total layer thickness should be at least 120 microns. Zink dust primer shall not be used.

B. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Pump/Motor unit mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton Rubber O-rings. Joint sealing will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific bolt torque limit. Rectangular cross-sectioned gaskets that require specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used in any part of the pump.

5.03 CABLE & CABLE SEAL

A. The cable entry shall be threaded and sealed by a field replaceable dual grommet system. A nylon clamp shall secure a strain relief function. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

B. The motor shall be equipped with 50 feet of shielded submersible cable. The shield within the cable shall allow for a control panel mounted interface component to communicate both ways with the integrally mounted control unit within the pump/motor housing. The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

5.04 COOLING SYSTEM

A. Each unit shall be provided with an adequately designed cooling system that allows up to 10 motor starts per hour on a continuous basis and the ability to pump liquids of up to 104oF with no damage to motor windings, bearings, or drive shaft seals.

B. The motor shall be provided with an integral motor cooling system. A motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket. The cooling liquid shall pass about the stator housing in the closed loop system in turbulent flow providing for superior heat transfer. The cooling system shall have one fill port and one drain port integral to the cooling jacket. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F. (40°C.). Operational restrictions at temperatures below 104°F are not acceptable. Fans, blowers or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

5.05 MECHANICAL SEAL

A. Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber, shall contain one stationary and one positively driven rotating corrosion resistant tungsten-carbide seal ring. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

B. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication

5.06 SHAFT

A. The pump and motor shaft shall be the same unit. The pump shaft shall be an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be AISI Type 431 stainless steel and shall be completely isolated from the pumped liquid. The use of Stainless steel sleeves shall not be considered equal to stainless steel shafts.

5.07 IMPELLER AND VOLUTE

A. The impeller shall be of Hard-IronTM (ASTM A-532 (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

B. The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. Due to the likely presence or sand or grit the insert ring shall be cast of Hard-IronTM ASTM A-532 Alloy III A 25% chrome cast iron and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

5.08 BEARINGS

A. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

5.09 MOTOR & PROTECTION DEVICES

A. The integrated control system shall continuously monitor the leakage sensor in the stator housing and the temperature of the motor. If the motor temperature is too high, the pump shall be capable of operating at a reduced speed until the high temperature conditions are normalized. The operator shall be able to modify the setting of the control system to decide if the active leakage signal shall stop or not stop the pump. External trips or overload devices for motor protection shall not be required.

PART 6 – CONTROL PANEL

6.01 SCOPE

A. The System Supplier shall provide a Duplex Pump Control system that shall control connected pumps in an energy conservation mode of operation. The system shall be capable of adapting to changing inflow conditions and shall automatically regulate pumped outflow based on inflow conditions and shall seek an optimal energy efficiency for the pump station. This shall be accomplished by either providing a Programmable Logic Controller (PLC) with Variable Frequency Drives (VFDs) to provide a station adaptable feature or Variable Frequency Drive with integral software designed for this purpose. Either supplied system shall be MONITORING SYSTEM ready for integration into the City of Memphis MONITORING SYSTEM system, if applicable. MONITORING SYSTEM ready specification means that the units are capable of MODBUS communication. Radios, cellular modems, antennas etc. are not included in this control panel. This system will incorporate the functionality as noted in the following sections.

6.02 ELECTRICAL CONTROL PANEL SPECIFICATIONS

A. The System Supplier shall furnish a NEMA 3R Painted (white) steel control panel enclosure that will house the equipment furnished as specified herein to provide integral liquid level control, moisture and thermal protection modules with either a PLC and VFD's or Advanced Integrated VFD. The enclosure shall be a definite purpose enclosure to maximize cooling of the installed equipment and will be provided with a minimum of the following:

1. Main Lugs for Incoming Power. The Control Panel shall incorporate Feeder Breakers of the appropriate size. The breakers shall be Heavy Duty NEMA rated and suitable for use with aluminum or copper conductors. Utility Meter and Fused Disconnect shall be located outside of the panel and be provided by an Electrical Contractor or shall be existing where applicable.
2. Each pump motor circuit shall be protected by a properly sized H frame molded case circuit breaker. Each pole of these breakers shall provide inverse time delay overload protection and instantaneous short circuit protection by means of a thermal magnetic element. The breaker shall be operated by a toggle type handle and shall have a Quick-make, Quick-break over center switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping due to overload or short circuit shall be clearly indicated by the handle automatically assuming a position midway between the manual "ON" and "OFF" position. The minimum interrupting rating of the breaker shall be 42,000 amps at 460 VAC. Pump motor circuit breaker toggle shall be operable through a cutout in the inner door.
3. Hand-Off-Automatic (external or integral to the VFD HMI) switches to select the operating mode for each pump installed on the control panel inner deadfront door.
4. Elapsed time meters and Run, Fail and Alarm Lights shall be provided for each pump motor with appropriate relays as required.
5. In the event either pump operation selector switch is in the "Off" position, the control system software shall automatically designate the operating pump motor as the "next pump motor to operate" after that pump motor is started.

6. The hinged inner door shall be provided and fabricated from, 5052-H32.080, marine alloy aluminum. The hinged inner door shall contain cutouts for all circuit breaker toggles. Control switches and indicators shall be labeled and mounted to the hinged inner door to keep operators from entering the live electrical compartment. A warning sign stating "DANGER -- Disconnect All Sources Of Power Before Opening Door" shall be installed on the inner door. The inner door shall be completely removable for ease of service and shall be held closed by at least (2) hand operated 1/4 turn fasteners. The following items shall be mounted on the inner door:
7. Hand-Off-Automatic – External or Integral to the VFD Operator Interface
8. Back-panel - The control system enclosure shall include a removable back-panel. The back-panel shall be painted white and fabricated from cold roll steel.
9. Components shall be fastened to the back-panel using stainless steel pinhead machine screws. All devices shall be clearly labeled in accordance with the schematic ladder diagram.
10. Transient Voltage Surge Suppressors on the 120VAC circuit
11. Loop Power Surge Suppressor
12. Dual Signal Splitters 9106 for a total of 3 Analog Outputs
13. Lightening Arrestor
14. Cooling Fan and Enclosure Light
15. Top Mounted Alarm Light

B. Energy Management Components furnished by the System Supplier
1. A Variable Frequency Drive with integral wastewater algorithms or a PLC with Variable Frequency Drive shall be provided for each pump in the system, sized for the appropriate voltage and power. The units(s) shall be supplied by the System Supplier and designed for wastewater pumping and with functionality pre-programmed for the specific pump model used. The VFD with Integral Control or PLC with VFD shall provide all level control functionality, hand/auto operation, pump alternation, pump over temperature monitoring, seal leakage monitoring, pump self-cleaning, sump cleaning and pipe cleaning algorithms. The supplied system shall also include capability to monitor station inflow, pump speed and energy consumption in order to automatically operate the pump station at optimal energy efficiency.
2. The system shall be tested and approved in accordance with national and international standards and comply with Directive 98/37/EC, Safety of Machinery and EN60204-1.
3. It shall conform to the relevant safety provisions of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC and has been designed and manufactured in accordance with the following harmonized European standards:

EN 61800-5-1: 2003	Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy.
EN 61800-3 2nd Ed: 2004	Adjustable speed electrical power drive systems. EMC requirements and specific test methods
EN 55011: 2007	Limits and Methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment (EMC)
EN60529 : 1992	Specifications for degrees of protection provided by enclosures

The variable frequency drive ampere rating shall be equal to or greater than the ampere rating listed on the motor being driven by the variable frequency drive.

4. The drive units shall be modularly constructed. Printed circuit boards shall be connected in such manner that they are easily removed from the unit. Power components shall be readily accessible and be connected in such manner that they are easily removed from the unit. The pump drive shall be freestanding for wall mounting or cabinet installation construction, for 230-480V, 60HZ 3Phase supply and shall be rated for IP55 and IP66 isolation class.

C. System Operation – VFD with Integral Control or PLC and VFD Functionality
   1. High/Low Level Sump Control:
      a. The system shall provide automatic level control via means of a submersible pressure transducer (4-20mADC) and one (1) non-mercury liquid level float switch. A user-programmable Start Level shall indicate the point at which the pump will start. Upon activation the pump shall run at maximum speed for a pre-determined period, then ramp down to an energy efficient optimal speed, calculated by the system. When the water level reaches the Stop Level, the pump shall stop. The Optimal Speed shall either be calculated by the system or manually entered by the user.
      b. In case of high inflow, the system shall increase pump speed until the water level begins to decrease. When the water level reaches the Stop Level, the pump shall stop.
      c. In case of very high inflow, when a pump or pumps are unable to overcome the inflow conditions even at maximum speed, additional pumps shall be activated and run at maximum speed until the stop Level is reached. If water levels continue to rise, a High Level Alarm shall be activated.
      d. The system shall incorporate a Minimum Speed function that prevents the pump from operating at speeds too low to move water based on the pump curve.
   2. Run Time Averaging:
      a. The system shall provide capability to balance run times for even wear among available operable pumps. This shall be a function of the control system and not require external devices, such as an Alternating Relay. The function shall operate by determining a “random” start level based on the Start Level setting. The system shall determine a random start level independent of each other. The system shall determine new random start levels every 24 hours. The pump with the lowest random start level shall be first to start on any given pump cycle. Other pumps shall remain in Standby capacity in case the lead and/or lag pump shall not be able to lower the water level as described in the section above. By recalculating the random start levels every 24 hours, balanced run times are accomplished.
   3. Pump Cleaning Function:
      a. The system shall incorporate a “self-cleaning” function to remove debris from the pumps. The cleaning shall be triggered by three circumstances:
         1) Soft Clogging: When motor current equals 20% or greater above rated motor current , in the drive, for a period of 7 seconds
         2) Hard Clogging: When motor current equals 80% or greater above rated current for a period of 0.01 seconds
         3) Schedule Cleaning: The system is pre-programmed to perform cleaning regularly
         4) The cleaning function shall consist of forced stopping, reversal and forward runs timed to allow for debris to fall from the impeller. After cleaning cycle is complete, drive shall resume to automatic operation.
   4. Sump Cleaning Function:
      a. The system shall incorporate a sump cleaning function to ensure surface solids and grease is regularly removed from the sump. The sump cleaning function shall perform regularly when enabled by the operator. Sump cleaning shall consist of the following functions

1) Sump cleaning is triggered when internal timer expires and during a normal pump down cycle
2) Pump is automatically ramped to maximum speed
3) Pump runs at maximum speed for designated time or until the pump are snoring."
4) When Sump Cleaning is over, the pump is shut off and resumes normal operation.

5. Pipe Cleaning Function:
   a. The system shall incorporate a pipe cleaning function to avoid discharge pipe sedimentation and clogging due to reduced pump speed. This shall be an automatic feature that initiates with every pump cycle. Upon reaching Pump Start Level, the system shall operate the pump at 100% speed for a determined time before ramping down to the most energy efficient speed for the duration of the cycle.
6. Energy Efficiency Speed Finder:
   a. The system shall provide a function that automatically calculates the most energy efficient speed for the pump based on station inflow characteristics. An algorithm calculates the optimal speed whereby the most water is pumped using the least amount of energy, the optimal speed is constantly adjusted to account for changes inflow without requiring operator adjustment, multiple setpoints, etc.
   b. The energy efficient function prevents the drive from running off of the system curve for the pump. This will ensure maximum hydraulic efficiency as well as electrical efficiency is maintained.
7. Alarms & Monitoring:
   a. The system shall provide alarms and monitoring for the system, pump and sump. Alarms shall be presented on the display, via a Summary Alarm relay and via Modbus registers. All alarms, when occurring, shall remain active until reset. Alarms shall have a built-in 4 second delay to prevent nuisance tripping. Alarms shall be as follows:
      1) Pump Monitoring:
         (a) Pump Over Temperature (thermal contacts in motor stator)
         (b) Pump Seal Leak (Seal leakage sensor)
      2) Sump Monitoring:
         (a) High Sump Level (via level float switch or submersible transducer)
         (b) Submersible transducer Sensor Error (Submersible transducer is not connected, reports faulty values or the wrong start level is used)
      3) Pump drive Monitoring (includes, but not limited to):
         (a) Drive Overcurrent
         (b) Drive Overload Trip
         (c) Drive Overvoltage
         (d) Drive Undervoltage
         (e) Drive Overtemperature (internal)
         (f) Drive Overtemperature (ambient)
         (g) Drive Undertemperature (ambient)
         (h) Input Phase Loss
         (i) Drive Output Max Torque Exceeded

D. Submersible Pressure Transducer:
   1. The liquid level of the wet well shall be sensed by a submersible level transducer. The transducer shall be a 2-wire type to operate from the level controller’s regulated loop power supply and produce an instrumentation signal (4-20mA) in direct proportion to the measured level excursion over a factory-calibrated range of zero to (30) feet of water. The unit shall be set to operate at 16.4 Feet for this application.

2. The transducer shall be of the ceramic capacitive, relative pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed approximately 6 inches above the wet well floor. The sensor shall be hung in the wet well using a cable bracket including two sliding cable locking jaws in a location in the wet well and as shown on the job plans.
3. The transducer housing shall be fabricated of PPS (polyphenylene sulfide) with a ceramic bottom diaphragm.
4. The transducer element shall incorporate high over-pressure protection and be designed to withstand intermittent overpressures (10) times the full-scale range being sensed. Metallic diaphragms shall not be acceptable in that they are subject to damage or distortion. Sensing principles employing LVDTs, resistive or pneumatic elements shall not be acceptable.
5. The internal pressure of the lower transducer assembly shall be relieved to atmospheric pressure through a heavy-duty urethane jacketed hose/cable assembly and a slack PVC bellows mounted in the control panel. The sealed breather system shall compensate for variations in barometric pressure and expansion and contraction of air due to temperature changes and altitude as well as prevent fouling from moisture and other corrosive elements.
6. The transducer assembly shall be installed where directed by the Engineer and connected with other system elements and placed in successful operation
7. The transducer shall have a programming feature using a standard USB interface and a laptop computer, the servicing transmitter can be programmed on-the-fly to the required measuring range. The design without sharp edges prevents particles, textiles and paper from sticking to the housing or the diaphragm. The transducer shall be surge resistant.
8. The transducer power cable shall be steel reinforced PUR cable with high tensile strength (2,000 lb).

PART 7 – PUMP STATION VALVES

7.01 PUMP STATION VALVES

A. The system supplier shall furnish 2 check valves, 2 knife gate valves and the number of air vacuum/air release valves as shown on the plans. These items shall be shipped loose for installation in the pump station valve vault and along the force main as required. Piping, fittings, bolts, gaskets in the valve vault and along the force main shall be supplied by the contractor.

7.02 PUMP STATION VALVES – SUPPLY AS SHOWN ON THE PLANS

A. Plug valves shall be of the non-lubricating, eccentric type and shall be designed for a working pressure of 175 psi for valves 12” and smaller, 150 psi for valves 14” and larger. Valves shall provide tight shut-off at rated pressure. Valve shall be manufactured by Henry Pratt. Valves 20” and smaller shall have round port design. Minimum port area for all valves shall be 80% of corresponding pipe area.

B. The plug valve body shall be cast iron ASTM A126 Class B with welded-in overlay of 90% nickel alloy content on all surfaces contacting the face of the plug. Sprayed, plated, nickel welded rings or seats screwed into the body are not acceptable. The valve plug shall be cast iron ASTM A126 Class B, with Buna N resilient seating surface to mate with the body seat. Valve flanges shall be in strict accordance with ANSI B16.1, Class 125.

C. Plug valve shall be furnished with permanently lubricated sleeve type bearings conforming to AWWA C504. Bearings shall be of sintered, oil impregnated type 316 stainless steel ASTM A-743 Grade CF-8M or bronze ASTM B-127. Valves shaft seals shall be of the “U” cup type, in accordance with AWWA C504. Seals shall be self adjusting and repackable without moving the bonnet from the valve. 6” and smaller exposed valves shall be provided with wrench actuators. 8” and larger exposed valves shall be provided with worm gear type manual actuators. All buried valves shall be provided with worm and gear actuators suited for the intended service.

D. Swing check valves are of self-contained free swinging disc style. Valves conform to all standards set forth in AWWA C508. Valve hinge pins are Stainless Steel and conform to the industry standards set forth for cushion valves. Manufacturer should have a minimum of ten years experience supplying AWWA C508 valves. Valves shall conform to ANSI B16.1: Cast Iron Pipe Flanges and Flanged Fittings Class 25,125,250 and 800 and AWWA C508: Swing Check Valves for Waterworks Service, 2" through 24" NPS. Valves are rated for 200 p.s.i. water working pressure. All testing is done in accordance with AWWA C508. Valves have integrally cast flat face flanges in accordance with ANSI BI6.1 Class 125. All cast iron used conforms to ASTM A126 CLB. Valve Hanger and Disc are of cast iron conforming to ASTM A126 CLB. Hinge Pins conform to ASTM A276 GR304. Seat Rings are of Low Zinc Bronze conforming to ASTM B62 or of Stainless Steel conforming to ASTM A276 GR316. Internal and external coatings are high build two component epoxy conforming to AWWA C550. All valves meet the standards of AWWA C508 All valves utilize a single disc mounted to a clevis hinge which prevents the disc from tipping. The valve disc swings open once the pump starts and allows for full flow. When closed the valve offers a tight shut-off. Valve body and cover are of Cast Iron, valve hinge is of Cast Iron. Disc seating surface is either Bronze, Stainless Steel or of Buna-n depending on application. Valve seat rings are of Bronze or Stainless Steel. The valve body has a bolted cover design and flanges are integral to body casting –not wafer style. Valve body and disc are designed in such a way as to minimize turbulence. Spring systems are externally mounted on the side of the body and do not come into contact with main line media. Markings on the valves are in accordance with AWWA C508, and include the name of manufacturer, the year of manufacture, maximum working pressure and size of valve. All valves are built for horizontal installation. However, all valves operate equally well in the vertical installations.

E. Knife Gate Valves shall be of the Bonneted type, rated for 150 PSI CWP. Flanges shall be drilled and tapped to ANSI B16.5, Class150 pound standard with raised faces. Flange raised face shall be machined using serrated-spiral or serrated-concentric grooves with a 125-250 RMS finish. Valve bodies shall be cast CF8 or CF8M stainless steel (304ss).The valve bonnet shall be fabricated with 304stainless steel liner, packing box and bonnet flange raised face. Bonnet flange and stiffeners shall be 304 stainless steel. A gate wiper shall be used between the bonnet flange and the body top flanges. The wiper material shall be UHMWPE. Valve shall have 304 gate and integral cast stainless steel seat in the valve body. Gate shall be of design and thickness to withstand full 150 PSI rated pressure without permanent deflection to the gate. Gate shall have a rounded, beveled bottom. Seat and gate shall have a fully machined finish for one way shutoff. Minimum of two gate wedges shall be provided to assist seating of the gate against the seat in the lower half of the valve body. Gate guides shall be provided in the upper half of the valve body. Packing gland shall be cast stainless steel (CF8/CF8M). Packing shall be Teflon lubricated synthetic packing with a minimum of 4 rows of packing. Packing gland bolts, studs and nuts shall be 304 Stainless steel. Valve yoke shall be cast CF8 (304) stainless steel. Yoke shall be the flat top design to allow bolt-on field installation or conversion of actuators without welding or machining. Valve stem shall be 304 stainless steel (same material grade as bonnet liner) with full ACME threads. Stem nut shall be bronze. Stem nut shall be enclosed by the use of a cast stainless steel retainer. Manually actuated valves shall be hand wheel operated for all sizes. Bevel gear operators are recommended for valves 16" and above where frequent operation is required and/or where used in applications above 75 PSI. Valves shall be designed, manufactured and tested to MSS SP-81 standard or AWWA C520 standard.

F. Air and Vacuum Valves, where required, shall have the following functions: continuous discharge of dis-entrained pressurized air/gas, unrestricted vacuum break, and pipeline surge protection in a single chamber. Valves shall be anti-surge and anti-shock air release and vacuum break valves. The small orifice shall release air accumulations after the pipeline is filled, under pressure and in operation. The valve shall be equipped with an integral surge alleviation mechanism that automatically dampens surge pressures due to rapid air discharge or the subsequent rejoining of separated water columns. The valves shall be designed with the following features and materials of construction:

1. The intake/discharge orifice area is equal to the nominal size of the valve, i.e., an 8" valve shall have 8" full flow inlet and 8" outlet.
2. Nozzle and Anti-Shock floats shall be solid unbreakable HDPE that will not deform under twice the design working pressure.
3. Manufacturer shall have ISO 9001, and third party vacuum testing to certify sizing and performance. CFD, FEA or other types of theoretical modeling are not acceptable.
4. Valve shall have a 10 year in-service warranty for all internal components.
5. 304 Stainless Steel Body, Flange, Top Cover and Fasteners
6. 316 Stainless Steel Nozzle & Lower Float Assembly
7. Integral High Density Polyethylene Anti-Shock and Nozzle Floats
8. EPDM Seats and Seals
9. Tangential top and bottom Flushing Ports.

PART 8 - EXECUTION

8.01 INSPECTION

A. Inspect all equipment upon arrival at job site and prior to installation. Notify manufacturer of any damage and/or shortage.

B. Inspect concrete mounting pads and anchor bolts for correct size and alignment prior to installation.

8.02 PREPARATION

A. Make corrections and/or repairs as required for items inspected and found to be deficient.

8.03 INSTALLATION

A. Install pumps and accessories in strict accordance with the manufacturer's instructions.

8.04 FIELD QUALITY CONTROL

A. The manufacturer's field engineer or representative shall inspect and check the installation after erection and be on hand for initial start-up of the equipment for a period of at least three (3) days. He shall also instruct operating personnel in the operation and maintenance of the system.

8.05 ADJUSTING AND CLEANING

A. Adjust equipment as required and within limits of manufacturer's instructions for proper alignment.

B. Apply proper type and quantity of lubricants for short term storage or start-up operation as applicable.

C. Clean equipment of any foreign matter or substances.

D. Field paint all components to be painted in accordance with manufacturers recommendations.

8.06 PROTECTION

A. After installation and painting protect the equipment from any damage by work of other trades. Repair any damage that nevertheless may occur.

PART 9 - SERVICE AND WARRANTY

9.01 SERVICE

A. The pump manufacturer shall have an authorized factory service center capable of completely servicing the proposed pumps within 100 miles of the project site. The pump manufacturer shall have a factory direct service center/stocking facility capable of completely servicing, and which stocks identical complete drive units, and spare parts for, the proposed pumps within 100 miles of the project site.

9.02 PUMP WARRANTY

A. The pump manufacturer shall provide prorated warranty for the units supplied to the Owner against defects in material and workmanship for a period of at least five (5) years or 10,000 operating hours in writing under the operating conditions presented by this project. Pump manufacturer shall demonstrate ability to support claimed warranty coverage by meeting all requirements of Section 4.01 of this specification.

B. The manufacturer guarantees the installation to be free from clogging when pumping sewage and wastewater containing solids and debris normally found in domestic wastewater. This guarantee is extended to the original owner for a period of 24 - months from the date of start - up of the equipment by the local authorized distributor. Should the pump impeller clog with typical solids and/or debris normally found in domestic wastewater during this period, the manufacturer shall reimburse the owner for reasonable cost to remove the pump, clear the obstruction and reinstall the affected pump unit . The manufacturer reserves the right to inspect the pump station, pump units and possibly modify the pump unit, if deemed necessary, to mitigate any further occurrence of pump clogging at no cost to the owner.

END OF SECTION

SECTION 11311
DRY PIT SUBMERSIBLE PUMPS, VALVES, CONTROLS, & ACCESSORIES

PART 1 - GENERAL DESCRIPTION

1.01 SCOPE

A. This section includes equipment for one duplex submersible pump station to be supplied with integral electric motors, suction elbows, pump stand and electrical control panel assembly, and other miscellaneous installation accessories. All equipment shall be supplied by a single source supplier that adheres to the quality standards established and expressly named in this specification.

B. Acceptable manufacturers are those who meet this specification in its entirety and that can demonstrate compliance with these specifications through the submittal process outlined in section 2.04 such that no exceptions or deviations are noted (See Paragraph 2.04 Submittal). The System Supplier, for all equipment approved for this project shall meet or exceed all performance, material, service, and warranty requirements of this specification.

C. The Bidder shall be responsible for supplying the equipment specified herein to meet or exceed these specifications as obtained from the System Supplier for this project. The System Supplier shall be an Authorized Distributor of the proposed products and shall be capable of servicing the products with repair service and parts availability within 50 miles of the City of Memphis. The responsive System Supplier shall routinely stock complete pumps, controls and parts to repair those units in their own facility. All equipment approved for this project shall meet or exceed all performance, service, and warranty requirements of this

1.02 RELATED REQUIREMENTS

A. Bid Form

B. General Conditions

C. Shop Drawings

D. Painting

E. Electrical

PART 2 - QUALITY ASSURANCE

2.01 GENERAL

A. The pumps shall be suitable for pumping raw sewage and shall be designed and fully guaranteed for this use. The fluid temperature range shall be from 40 degrees to 104 degrees F.

2.02 STANDARDS

A. The test code of the American Hydraulic Institute for testing pumps and sound engineering practice shall be used. Where required, all pump performance documentation, including flow/head curves, shall adhere to the Hydraulic Institute Standards and shall allow no negative tolerance on flow, head, hydraulic efficiency or any other criteria deemed by the Engineer to be necessary to evaluate pumping system performance.

2.03 ENVIRONMENTAL CONDITIONS

A. All equipment as specified herein shall be so supplied with respect to environmental conditions at the jobsite.

2.04 SUBMITTALS

Complete equipment and control submittals, complete assembly, foundation support, and installation drawings, together with detailed specifications and data covering pumps, motors, material used, parts, devices and other accessories forming a part of the equipment furnished shall be submitted for approval in accordance with the procedure set forth in the General Conditions.

Data and specifications for the equipment shall include, but shall not be limited to the following:

A. Setting plans. Setting plans shall include:
   1. Anchor bolt layout
   2. Anchor bolt dimensions.
   3. Outline dimensions and weights of pumps, bases, motors, and control enclosures, etc.

B. Pumps. Data and drawings shall include:
   1. Manufacturer, type and model number.
   2. Assembly drawing, nomenclature and material list, O & M manual, and parts list.
   3. Type, manufacturer, model numbers, location and spacing of bearings.
   4. Impeller type, diameter, thru-let dimensions, sphere size, number of vanes and identification number.
   5. Complete motor performance data including: rating, voltage/phase/frequency; design type; service factor; insulation class; motor pole number; actual rotation speed when combined with the specified pumps; current, power factor and active input power (KW) as a continuous function of shaft power from no load to at least 115 percent load; start (max. Inrush) current; locked rotor current; NEC code letter; and motor torque as a continuous function through the motor start cycle from no rotation to synchronous speed.
   6. Complete performance test curve(s) showing full range (shutoff to run-out) head vs. Capacity, NPSHR, hydraulic efficiency, motor active (KW) input power, motor total (KVA) input power (based on measured current and voltage), and shaft power (BHP). See Sec. 3.01 Shop Tests.
   7. Location and description of Service Centers and spare parts stock.
   8. Warranty for the proposed equipment.

C. Controls. Complete Schematics and Documentation shall include:
   1. Panel layout drawings that show accurate dimensions, location of components, and proper connection of terminations with complete schematics of the proposed equipment.
   2. Cut sheets on all items to be provided.
   3. Operation manuals on VFDs or PLCs to be provided.

The manufacturer shall indicate, by arrows to points on the Q/H curves, limits recommended for stable operation, between which the pumps are to be operated to prevent surging, cavitation, and vibration. The stable operating range shall be as large as possible, and shall be based on actual hydraulic and mechanical characteristics of the units and shall meet the hydraulic performance requirements of the proposed system.

PART 3 - TESTING

3.01 SHOP TESTS

A. Pumps and Motors. Each pump and motor shall be performance tested as specified hereinafter; all pumps shall be tested with motor cables to be supplied with the pumps.

B. Each pump shall be tested for performance at the factory to determine the head vs. Capacity, motor total electrical power draw (KVA), and motor active electrical power draw (KW) for the full speed at which the pumps are specified and shown on a performance test curve. The motor and cable on each pump shall be tested for moisture content or insulation defects. After the test, the pump cable end shall be fitted with a shrink-fit rubber boot to protect it from moisture or water.

3.02 ACCEPTANCE TESTS

Acceptance tests shall be run to demonstrate that the pumping units, motors and control system meet the following requirements:

A. The pumping units operate as specified without excessive noise, cavitation, vibration, and without overheating of the bearings.

B. All automatic and manual controls function in accordance with the specified requirements.

C. All drive equipment operates without being overloaded.

PART 4 – PERFORMANCE

4.01 SUBMERSIBLE PUMPS

Submersible pumps shall meet the following performance requirements:

Item (Units)	**360 North Highland**	**47 West Van Heusen**
Primary Duty Point (GPM/ft.)	515 GPM@ 36’ TDH	100 GPM@ 46’ TDH
Secondary Duty Point (GPM/ft.) Less than 60 Hz	800 GPM@ 25’ TDH	200 GPM@ 30’TDH
Minimum Shutoff Head (ft.)	60 Ft.	54 Ft.
Maximum Specific Energy at Primary Duty Point (KWHr/MG)	190 KWHr/MG	360 KWHr/MG
Max Motor Rating (HP) at 40 degrees C	7.5 HP @ 40° C	6.4 HP @ 40° C
Maximum NPSHre (ft) in Operation Range	14 Feet	5 Feet
Voltage/Cycle/Phase	230VAC/60Hz/ 3Phase	230VAC/60Hz/ 3Phase
Motor Design Type	NEMA Class B, NEMA MG1, Part 31	NEMA Class B, NEMA MG1, Part 31
Motor Service Factor	Greater than 1.15	Greater than 1.15
Minimum Motor Efficiency	85%	87%
Motor Insulation Rating	Class H	Class H
Maximum Rated Current (A)	21 Amps	17 Amps
Pump Suction x Discharge Size (inches)	6” x 4”	4” x 3”

PART 5 - PUMPING EQUIPMENT

5.01 PUMP DESIGN (DRY PIT SUBMERSIBLE)

A. The pumps shall be capable of handling raw, unscreened sewage. Pumps shall be supplied with a mating suction elbow and pump stand and be capable of delivering the flow specified in the table above. The pumps shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The pump and motor shall be non-overloading at any point on the curve. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of sixty five (65) feet. No portion of the pump shall bear directly on the sump floor

5.02 PUMP CONSTRUCTION

A. Major pump components shall be of gray cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other casting irregularities. Higher density cast irons (Class 40 and above) with reduced vibration dampening, will not be acceptable for pump driver castings, such as stator and bearing housings. All exposed nuts or bolts shall be AISI type 316 stainless steel. All metal surfaces coming into contact with the pumped media, other than stainless steel and/or brass, shall be protected by a factory-applied coating system suitable for sewerage pumping applications.

B. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Pump/Motor unit mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton Rubber O-rings. Joint sealing will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific bolt torque limit.

C. Rectangular cross-sectioned gaskets that require specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used in any part of the pump.

5.03 CABLE & CABLE SEAL

A. The cable entry shall be threaded and sealed by a field replaceable grommet. A nylon clamp shall secure a strain relief function. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

B. The motor shall be equipped with 50 feet of shielded submersible cable. The shield within the cable shall allow for a control panel mounted interface component to communicate both ways with the integrally mounted control unit within the pump/motor housing. The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

5.04 COOLING SYSTEM

A. The cooling system shall provide sufficient cooling to run the pump at continuous pump duty in an ambient temperature of up to 104°F. Operational restrictions at temperatures below 104°F or the demand of auxiliary cooling systems like fans or blowers are not acceptable.

B. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication. The cooling system shall be a radiant heat sink type system integral to the stator housing.

5.05 MECHANICAL SEAL

A. Each pump shall be provided with dual tandem mechanical shaft seal system comprising two totally independent seal assemblies. The seals shall operate in a seal lubricant buffer chamber that hydro-dynamically lubricates the lapped seal faces at a constant rate. The inner seal, located between the lubricant buffer chamber and the stator housing, shall contain one stationary and one positively driven rotating ring, functioning as an independent secondary barrier between the pumped liquid and the stator housing. Both inner seal faces shall be corrosion resistant Tungsten Carbide. The outer of the tandem set of seals function as the primary barrier between the pumped liquid and the stator housing. This set shall consist of a stationary ring and a positively driven rotating ring, both of which shall be corrosion resistant.

B. Each interface shall be held in contact by its own spring system supplemented by external liquid pressures. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable. The lower (outer) seal shall not bear on the impeller and shall remain fixed upon impeller removal.

C. Shaft seals without positively driven rotating members, or conventional double mechanical seals with a common single or double spring acting between the upper and lower units requiring a substantial pressure differential to offset external pressure and effect sealing, shall not be considered acceptable nor equal to the dual independent seal system specified. Cartridge-type seals comprising a single rotating element sandwiched between dual stationary elements will not be considered a dual tandem seal system and will not be accepted. Seals shall not be of the uni-directional type, but capable of dual rotation with no damage. The shaft sealing system shall be capable of withstanding volute pressures up to 1.5 times pump shutoff head. No seal damage shall result from operating the pumping unit in its liquid environment, from running pump dry, or from reverse pump operation. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside.

5.06 SHAFT

A. The pump and motor shaft shall be the same unit. The pump shaft shall be an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be AISI Type 431 stainless steel and shall be completely isolated from the pumped liquid. The use of Stainless steel sleeves shall not be considered equal to stainless steel shafts.

5.07 IMPELLER AND VOLUTE

A. The impeller shall be of Hard-IronTM (ASTM A-532 (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall move axially upwards on its shaft to allow larger debris to pass through and immediately return to normal operating position. The impeller shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

B. The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. Due to the likely presence or sand or grit the insert ring shall be cast of Hard-IronTM ASTM A-532 Alloy III A 25% chrome cast iron and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

5.08 BEARINGS

A. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a single ball type bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

5.09 MOTOR & PROTECTION DEVICES

A. The integrated control system shall continuously monitor the leakage sensor in the stator housing and the temperature of the motor. If the motor temperature is too high, the pump shall be capable of operating at a reduced speed until the high temperature conditions are normalized. The operator shall be able to modify the setting of the control system to decide if the active leakage signal shall stop or not stop the pump. External trips or overload devices for motor protection shall not be required.

PART 6 – CONTROL PANEL

6.01 SCOPE

A. The System Supplier shall provide a Duplex Pump Control system that shall control connected pumps in an energy conservation mode of operation. The system shall be capable of adapting to changing inflow conditions and shall automatically regulate pumped outflow based on inflow conditions and shall seek an optimal energy efficiency for the pump station. This shall be accomplished by either providing a Programmable Logic Controller (PLC) with Variable Frequency Drives (VFDs) to provide a station adaptable feature or Variable Frequency Drive with integral software designed for this purpose. Either supplied system shall be MONITORING SYSTEM ready for integration into the City of Memphis MONITORING SYSTEM system, if applicable. MONITORING SYSTEM ready specification means that the units are capable of MODBUS communication. Radios, cellular modems, antennas etc. are not included in this control panel. This system will incorporate the functionality as noted in the following sections.

6.02 ELECTRICAL CONTROL PANEL SPECIFICATIONS

A. The System Supplier shall furnish a NEMA 3R Painted (white) steel control panel enclosure that will house the equipment furnished as specified herein to provide integral liquid level control, moisture and thermal protection modules with either a PLC and VFD's or Advanced Integrated VFD. The enclosure shall be a definite purpose enclosure to maximize cooling of the installed equipment and will be provided with a minimum of the following:

1. Main Lugs for Incoming Power. The Control Panel shall incorporate Feeder Breakers of the appropriate size. The breakers shall be Heavy Duty NEMA rated and suitable for use with aluminum or copper conductors. Utility Meter and Fused Disconnect shall be located outside of the panel and be provided by an Electrical Contractor or shall be existing where applicable.
2. Each pump motor circuit shall be protected by a properly sized H frame molded case circuit breaker. Each pole of these breakers shall provide inverse time delay overload protection and instantaneous short circuit protection by means of a thermal magnetic element. The breaker shall be operated by a toggle type handle and shall have a Quick-make, Quick-break over center switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping due to overload or short circuit shall be clearly indicated by the handle automatically assuming a position midway between the manual "ON" and "OFF" position. The minimum interrupting rating of the breaker shall be 42,000 amps at 460 VAC. Pump motor circuit breaker toggle shall be operable through a cutout in the inner door.
3. Hand-Off-Automatic (external or integral to the VFD HMI) switches to select the operating mode for each pump installed on the control panel inner deadfront door.
4. Elapsed time meters and Run, Fail and Alarm Lights shall be provided for each pump motor with appropriate relays as required.
5. In the event either pump operation selector switch is in the "Off" position, the control system software shall automatically designate the operating pump motor as the "next pump motor to operate" after that pump motor is started.

6. The hinged inner door shall be provided and fabricated from, 5052-H32.080, marine alloy aluminum. The hinged inner door shall contain cutouts for all circuit breaker toggles. Control switches and indicators shall be labeled and mounted to the hinged inner door to keep operators from entering the live electrical compartment. A warning sign stating "DANGER -- Disconnect All Sources Of Power Before Opening Door" shall be installed on the inner door. The inner door shall be completely removable for ease of service and shall be held closed by at least (2) hand operated 1/4 turn fasteners. The following items shall be mounted on the inner door:
7. Hand-Off-Automatic – External or Integral to the VFD Operator Interface
8. Back-panel - The control system enclosure shall include a removable back-panel. The back-panel shall be painted white and fabricated from cold roll steel.
9. Components shall be fastened to the back-panel using stainless steel pinhead machine screws. All devices shall be clearly labeled in accordance with the schematic ladder diagram.
10. Transient Voltage Surge Suppressors on the 120VAC circuit
11. Loop Power Surge Suppressor
12. Dual Signal Splitters 9106 for a total of 3 Analog Outputs
13. Lightening Arrestor
14. Cooling Fan and Enclosure Light
15. Top Mounted Alarm Light

B. Energy Management Components furnished by the System Supplier
   1. A Variable Frequency Drive with integral wastewater algorithms or a PLC with Variable Frequency Drive shall be provided for each pump in the system, sized for the appropriate voltage and power. The units(s) shall be supplied by the System Supplier and designed for wastewater pumping and with functionality pre-programmed for the specific pump model used. The VFD with Integral Control or PLC with VFD shall provide all level control functionality, hand/auto operation, pump alternation, pump over temperature monitoring, seal leakage monitoring, pump self-cleaning, sump cleaning and pipe cleaning algorithms. The supplied system shall also include capability to monitor station inflow, pump speed and energy consumption in order to automatically operate the pump station at optimal energy efficiency.
      a. The system shall be tested and approved in accordance with national and international standards and comply with Directive 98/37/EC, Safety of Machinery and EN60204-1.
      b. It shall conform to the relevant safety provisions of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC and has been designed and manufactured in accordance with the following harmonized European standards:

EN 61800-5-1: 2003	Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy.
EN 61800-3 2nd Ed: 2004	Adjustable speed electrical power drive systems. EMC requirements and specific test methods
EN 55011: 2007	Limits and Methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment (EMC)
EN60529 : 1992	Specifications for degrees of protection provided by enclosures

The variable frequency drive ampere rating shall be equal to or greater than the ampere rating listed on the motor being driven by the variable frequency drive.

2. The drive units shall be modularly constructed. Printed circuit boards shall be connected in such manner that they are easily removed from the unit. Power components shall be readily accessible and be connected in such manner that they are easily removed from the unit. The pump drive shall be freestanding for wall mounting or cabinet installation construction, for 230-480V, 60HZ 3Phase supply and shall be rated for IP55 and IP66 isolation class.

C. System Operation – VFD with Integral Control or PLC and VFD Functionality
   1. High/Low Level Sump Control:
      a. The system shall provide automatic level control via means of a submersible pressure transducer (4-20mADC) and one (1) non-mercury liquid level float switch. A user-programmable Start Level shall indicate the point at which the pump will start. Upon activation the pump shall run at maximum speed for a pre-determined period, then ramp down to an energy efficient optimal speed, calculated by the system. When the water level reaches the Stop Level, the pump shall stop. The Optimal Speed shall either be calculated by the system or manually entered by the user.
      b. In case of high inflow, the system shall increase pump speed until the water level begins to decrease. When the water level reaches the Stop Level, the pump shall stop.
      c. In case of very high inflow, when a pump or pumps are unable to overcome the inflow conditions even at maximum speed, additional pumps shall be activated and run at maximum speed until the stop Level is reached. If water levels continue to rise, a High Level Alarm shall be activated.
      d. The system shall incorporate a Minimum Speed function that prevents the pump from operating at speeds too low to move water based on the pump curve.
   2. Run Time Averaging:
      a. The system shall provide capability to balance run times for even wear among available operable pumps. This shall be a function of the control system and not require external devices, such as an Alternating Relay. The function shall operate by determining a “random” start level based on the Start Level setting. The system shall determine a random start level independent of each other. The system shall determine new random start levels every 24 hours. The pump with the lowest random start level shall be first to start on any given pump cycle. Other pumps shall remain in Standby capacity in case the lead and/or lag pump shall not be able to lower the water level as described in the section above. By recalculating the random start levels every 24 hours, balanced run times are accomplished.
   3. Pump Cleaning Function:
      a. The system shall incorporate a “self-cleaning” function to remove debris from the pumps. The cleaning shall be triggered by three circumstances:
         1) Soft Clogging: When motor current equals 20% or greater above rated motor current , in the drive, for a period of 7 seconds
         2) Hard Clogging: When motor current equals 80% or greater above rated current for a period of 0.01 seconds
         3) Schedule Cleaning: The system is pre-programmed to perform cleaning regularly
         4) The cleaning function shall consist of forced stopping, reversal and forward runs timed to allow for debris to fall from the impeller. After cleaning cycle is complete, drive shall resume to automatic operation.
      b. Sump Cleaning Function:

1) The system shall incorporate a sump cleaning function to ensure surface solids and grease is regularly removed from the sump. The sump cleaning function shall perform regularly when enabled by the operator. Sump cleaning shall consist of the following functions
2) Sump cleaning is triggered when internal timer expires and during a normal pump down cycle
3) Pump is automatically ramped to maximum speed
4) Pump runs at maximum speed for designated time or until the pump are snoring."
5) When Sump Cleaning is over, the pump is shut off and resumes normal operation.

c. Pipe Cleaning Function:
1) The system shall incorporate a pipe cleaning function to avoid discharge pipe sedimentation and clogging due to reduced pump speed. This shall be an automatic feature that initiates with every pump cycle. Upon reaching Pump Start Level, the system shall operate the pump at 100% speed for a determined time before ramping down to the most energy efficient speed for the duration of the cycle.

d. Energy Efficiency Speed Finder:
1) The system shall provide a function that automatically calculates the most energy efficient speed for the pump based on station inflow characteristics. An algorithm calculates the optimal speed whereby the most water is pumped using the least amount of energy, the optimal speed is constantly adjusted to account for changes inflow without requiring operator adjustment, multiple setpoints, etc.
2)

e. Alarms & Monitoring:
The system shall provide alarms and monitoring for the system, pump and sump. Alarms shall be presented on the display, via a Summary Alarm relay and via Modbus registers. All alarms, when occurring, shall remain active until reset. Alarms shall have a built-in 4 second delay to prevent nuisance tripping. Alarms shall be as follows:
1) Pump Monitoring:
(a) Pump Over Temperature (thermal contacts in motor stator)
(b) Pump Seal Leak (Seal leakage sensor)
2) Sump Monitoring:
(a) High Sump Level (via level float switch or submersible transducer)
(b) Submersible transducer Sensor Error (Submersible transducer is not connected, reports faulty values or the wrong start level is used)
3) Pump drive Monitoring (includes, but not limited to):
(a) Drive Overcurrent
(b) Drive Overload Trip
(c) Drive Overvoltage
(d) Drive Undervoltage
(e) Drive Overtemperature (internal)
(f) Drive Overtemperature (ambient)
(g) Drive Undertemperature (ambient)
(h) Input Phase Loss
(i) Drive Output Max Torque Exceeded

D. Submersible Pressure Transducer:

1. The liquid level of the wet well shall be sensed by a submersible level transducer. The transducer shall be a 2-wire type to operate from the level controller's regulated loop power supply and produce an instrumentation signal (4-20mA) in direct proportion to the measured level excursion over a factory-calibrated range of zero to (30) feet of water. The unit shall be set to operate at 16.4 Feet for this application.
2. The transducer shall be of the ceramic capacitive, relative pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed approximately 6 inches above the wet well floor. The sensor shall be hung in the wet well using a cable bracket including two sliding cable locking jaws in a location in the wet well and as shown on the job plans.
3. The transducer housing shall be fabricated of PPS (polyphenylene sulfide) with a ceramic bottom diaphragm.
4. The transducer element shall incorporate high over-pressure protection and be designed to withstand intermittent overpressures (10) times the full-scale range being sensed. Metallic diaphragms shall not be acceptable in that they are subject to damage or distortion. Sensing principles employing LVDTs, resistive or pneumatic elements shall not be acceptable.
5. The internal pressure of the lower transducer assembly shall be relieved to atmospheric pressure through a heavy-duty urethane jacketed hose/cable assembly and a slack PVC bellows mounted in the control panel. The sealed breather system shall compensate for variations in barometric pressure and expansion and contraction of air due to temperature changes and altitude as well as prevent fouling from moisture and other corrosive elements.
6. The transducer assembly shall be installed where directed by the Engineer and connected with other system elements and placed in successful operation
7. The transducer shall have a programming feature using a standard USB interface and a laptop computer, the servicing transmitter can be programmed on-the-fly to the required measuring range. The design without sharp edges prevents particles, textiles and paper from sticking to the housing or the diaphragm. The transducer shall be surge resistant.
8. The transducer power cable shall be steel reinforced PUR cable with high tensile strength (2,000 lb).

PART 7 – PUMP STATION VALVES

7.01 PUMP STATION VALVES

A. The system supplier shall furnish 2 check valves, 2 knife gate valves and the number of air vacuum/air release valves as shown on the plans. These items shall be shipped loose for installation in the pump station valve vault and along the force main as required. Piping, fittings, bolts, gaskets in the valve vault and along the force main shall be supplied by the contractor.

7.02 PUMP STATION VALVES – SUPPLY AS SHOWN ON THE PLANS

A. Plug valves shall be of the non-lubricating, eccentric type and shall be designed for a working pressure of 175 psi for valves 12" and smaller, 150 psi for valves 14" and larger. Valves shall provide tight shut-off at rated pressure. Valve shall be manufactured by Henry Pratt. Valves 20" and smaller shall have round port design. Minimum port area for all valves shall be 80% of corresponding pipe area.

B. The plug valve body shall be cast iron ASTM A126 Class B with welded-in overlay of 90% nickel alloy content on all surfaces contacting the face of the plug. Sprayed, plated, nickel welded rings or seats screwed into the body are not acceptable. The valve plug shall be cast iron ASTM A126 Class B, with Buna N resilient seating surface to mate with the body seat. Valve flanges shall be in strict accordance with ANSI B16.1, Class 125.

C. Plug valve shall be furnished with permanently lubricated sleeve type bearings conforming to AWWA C504. Bearings shall be of sintered, oil impregnated type 316 stainless steel ASTM A-743 Grade CF-8M or bronze ASTM B-127. Valves shaft seals shall be of the “U” cup type, in accordance with AWWA C504. Seals shall be self adjusting and repackable without moving the bonnet from the valve. 6” and smaller exposed valves shall be provided with wrench actuators. 8” and larger exposed valves shall be provided with worm gear type manual actuators. All buried valves shall be provided with worm and gear actuators suited for the intended service.

D. Swing check valves are of self-contained free swinging disc style. Valves conform to all standards set forth in AWWA C508. Valve hinge pins are Stainless Steel and conform to the industry standards set forth for cushion valves. Manufacturer should have a minimum of ten years experience supplying AWWA C508 valves. Valves shall conform to ANSI B16.1: Cast Iron Pipe Flanges and Flanged Fittings Class 25,125,250 and 800 and AWWA C508: Swing Check Valves for Waterworks Service, 2” through 24” NPS. Valves are rated for 200 p.s.i. water working pressure. All testing is done in accordance with AWWA C508. Valves have integrally cast flat face flanges in accordance with ANSI BI6.1 Class 125. All cast iron used conforms to ASTM A126 CLB. Valve Hanger and Disc are of cast iron conforming to ASTM A126 CLB. Hinge Pins conform to ASTM A276 GR304. Seat Rings are of Low Zinc Bronze conforming to ASTM B62 or of Stainless Steel conforming to ASTM A276 GR316. Internal and external coatings are high build two component epoxy conforming to AWWA C550. All valves meet the standards of AWWA C508 All valves utilize a single disc mounted to a clevis hinge which prevents the disc from tipping. The valve disc swings open once the pump starts and allows for full flow. When closed the valve offers a tight shut-off. Valve body and cover are of Cast Iron, valve hinge is of Cast Iron. Disc seating surface is either Bronze, Stainless Steel or of Buna-n depending on application. Valve seat rings are of Bronze or Stainless Steel. The valve body has a bolted cover design and flanges are integral to body casting –not wafer style. Valve body and disc are designed in such a way as to minimize turbulence. Spring systems are externally mounted on the side of the body and do not come into contact with main line media. Markings on the valves are in accordance with AWWA C508, and include the name of manufacturer, the year of manufacture, maximum working pressure and size of valve. All valves are built for horizontal installation. However, all valves operate equally well in the vertical installations.

E. Knife Gate Valves shall be of the Bonneted type, rated for 150 PSI CWP. Flanges shall be drilled and tapped to ANSI B16.5, Class150 pound standard with raised faces. Flange raised face shall be machined using serrated-spiral or serrated-concentric grooves with a 125-250 RMS finish. Valve bodies shall be cast CF8 or CF8M stainless steel (304ss).The valve bonnet shall be fabricated with 304stainless steel liner, packing box and bonnet flange raised face. Bonnet flange and stiffeners shall be 304 stainless steel. A gate wiper shall be used between the bonnet flange and the body top flanges. The wiper material shall be UHMWPE. Valve shall have 304 gate and integral cast stainless steel seat in the valve body. Gate shall be of design and thickness to withstand full 150 PSI rated pressure without permanent deflection to the gate. Gate shall have a rounded, beveled bottom. Seat and gate shall have a fully machined finish for one way shutoff. Minimum of two gate wedges shall be provided to assist seating of the gate against the seat in the lower half of the valve body. Gate guides shall be provided in the upper half of the valve body. Packing gland shall be cast stainless steel (CF8/CF8M). Packing shall be Teflon lubricated synthetic packing with a minimum of 4 rows of packing. Packing gland bolts, studs and nuts shall be 304 Stainless steel. Valve yoke shall be cast CF8 (304) stainless steel. Yoke shall be the flat top design to allow bolt-on field installation or conversion of actuators without welding or machining. Valve stem shall be 304 stainless steel (same material grade as bonnet liner) with full ACME threads. Stem nut shall be bronze. Stem nut shall be enclosed by the use of a cast stainless steel retainer. Manually actuated valves shall be hand wheel operated for all sizes. Bevel gear operators are recommended for valves 16” and above where frequent operation is required and/or where used in applications above 75 PSI. Valves shall be designed, manufactured and tested to MSS SP-81 standard or AWWA C520 standard.

F. Air and Vacuum Valves, where required, shall have the following functions: continuous discharge of dis-entrained pressurized air/gas, unrestricted vacuum break, and pipeline surge protection in a single chamber. Valves shall be anti-surge and anti-shock air release and vacuum break valves. The small orifice shall release air accumulations after the pipeline is filled, under pressure and in operation. The valve shall be equipped with an integral surge alleviation mechanism that automatically dampens surge pressures due to rapid air discharge or the subsequent rejoining of separated water columns. The valves shall be designed with the following features and materials of construction:
   1. The intake/discharge orifice area is equal to the nominal size of the valve, i.e., an 8" valve shall have 8" full flow inlet and 8" outlet.
   2. Nozzle and Anti-Shock floats shall be solid unbreakable HDPE that will not deform under twice the design working pressure.
   3. Manufacturer shall have ISO 9001, and third party vacuum testing to certify sizing and performance. CFD, FEA or other types of theoretical modeling are not acceptable.
   4. Valve shall have a 10 year in-service warranty for all internal components.
   5. 304 Stainless Steel Body, Flange, Top Cover and Fasteners
   6. 316 Stainless Steel Nozzle & Lower Float Assembly
   7. Integral High Density Polyethylene Anti-Shock and Nozzle Floats
   8. EPDM Seats and Seals
   9. Tangential top and bottom Flushing Ports.

PART 8 - EXECUTION

8.01 INSPECTION

A. Inspect all equipment upon arrival at job site and prior to installation. Notify manufacturer of any damage and/or shortage.

B. Inspect concrete mounting pads and anchor bolts for correct size and alignment prior to installation.

8.02 PREPARATION

A. Make corrections and/or repairs as required for items inspected and found to be deficient.

8.03 INSTALLATION

A. Install pumps and accessories in strict accordance with the manufacturer's instructions.

8.04 FIELD QUALITY CONTROL

A. The manufacturer's field engineer or representative shall inspect and check the installation after erection and be on hand for initial start-up of the equipment for a period of at least three (3) days. He shall also instruct operating personnel in the operation and maintenance of the system.

8.05 ADJUSTING AND CLEANING

A. Adjust equipment as required and within limits of manufacturer's instructions for proper alignment.

B. Apply proper type and quantity of lubricants for short term storage or start-up operation as applicable.

C. Clean equipment of any foreign matter or substances.

D. Field paint all components to be painted in accordance with manufacturers recommendations.

8.06 PROTECTION

A. After installation and painting protect the equipment from any damage by work of other trades. Repair any damage that nevertheless may occur.

PART 9 - SERVICE AND WARRANTY

9.01 SERVICE

A. The pump manufacturer shall have an authorized factory service center capable of completely servicing the proposed pumps within 100 miles of the project site. The pump manufacturer shall have a factory direct service center/stocking facility capable of completely servicing, and which stocks identical complete drive units, and spare parts for, the proposed pumps within 100 miles of the project site.

PUMP WARRANTY

A. The pump manufacturer shall provide prorated warranty for the units supplied to the Owner against defects in material and workmanship for a period of at least five (5) years or 10,000 operating hours in writing under the operating conditions presented by this project. Pump manufacturer shall demonstrate ability to support claimed warranty coverage by meeting all requirements of Section 4.01 of this specification.

B. The manufacturer guarantees the installation to be free from clogging when pumping sewage and wastewater containing solids and debris normally found in domestic wastewater. This guarantee is extended to the original owner for a period of 24 - months from the date of start - up of the equipment by the local authorized distributor. Should the pump impeller clog with typical solids and/or debris normally found in domestic wastewater during this period, the manufacturer shall reimburse the owner for reasonable cost to remove the pump, clear the obstruction and reinstall the affected pump unit . The manufacturer reserves the right to inspect the pump station, pump units and possibly modify the pump unit, if deemed necessary, to mitigate any further occurrence of pump clogging at no cost to the owner.

END OF SECTION