October 9, 2024

Mr. Otis Spriggs
Director of Development Services
City of Angleton
121 S. Velasco
Angleton, TX 77515

Re: On-Going Services
Ashland Lift Station Construction Plans and Report (updated) – 3rd Submittal Review
Angleton, Texas
HDR Job No. 10361761

Dear Mr. Spriggs:

HDR Engineering, Inc. (HDR) has reviewed construction plans and report for the above referenced subdivision and offers the following exceptions noted:

Construction Plans and Lift Station Report:

1. The attached letter TCEQ Letter dated June 4, 2024 acknowledges a project summary letter transmittal dated 4/22/2024 was received and also notes that technical review of the plans and specifications is not required and that it is approved for construction. This item satisfies conditions noted in the previous review correspondence. Note, requirements and other conditional items found in the letter shall be followed accordingly.

HDR takes no objection to the proposed Ashland Lift Station Construction Plans and Report (updated) with the exceptions noted. Please note, this does not necessarily mean that the entire drawings, including all supporting data and calculations, has been completely checked and verified; however, the drawings and supporting data are signed, dated, and sealed by a Licensed Professional Engineer licensed to practice in the State of Texas, which therefore conveys the engineer's responsibility and accountability.

If you have any questions, please feel free to contact us at our office (713)-622-9264.

Sincerely,

HDR Engineering, Inc.

Javier Vasquez, P.E., CFM
Civil Engineer

cc: Files (10361761)

Attachments

hdrinc.com 4828 Loop Central Drive, Suite 700, Houston, TX 77081-2220
T (713) 622-9264 F (713) 622-9265
Texas Registered Engineering Firm F-754

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 4, 2024

David A. Olf, P.E.
QUIDDITY ENGINEERING, LLC
6330 West Loop South, Suite 150
Houston, TX 77401

Re: Ashton Gray Development LLC
Ashland Lift Station No. 1
Permit No. WQ0016176-001
WWPR Log No. 0424/096
CN606024818, RN111511218
Brazoria County

Dear Mr. Olf:

We have received the project summary transmittal letter dated 4/22/2024.

The rules which regulate the design, installation and testing of domestic wastewater projects are found in 30 TAC, Chapter 217, of the Texas Commission on Environmental Quality (TCEQ) rules titled, Design Criteria for Wastewater Systems.

Section 217.6(d), relating to case-by-case reviews, states in part that upon submittal of a summary transmittal letter, the executive director may approve of the project without reviewing a complete set of plans and specifications.

Under the authority of §217.6(e) a technical review of complete plans and specifications is not required. **However, the project proposed in the summary transmittal letter is approved for construction. Please note, that this conditional approval does not relieve the applicant of any responsibilities to obtain all other necessary permits or authorizations, such as wastewater treatment permit or other authorization as required by Chapter 26 of the Texas Water Code.** Below are provisions of the Chapter 217 regulations, which must be met as a condition of approval. These items are provided as a reminder. If you have already met these requirements, please disregard this additional notice.

- You must keep certain materials on file for the life of the project and provide them to TCEQ upon request. These materials include an engineering report, test results, a summary transmittal letter, and the final version of the project plans and specifications. These materials shall be prepared and sealed by a Professional Engineer licensed in the State of Texas and must show substantial compliance with Chapter 217. All plans and specifications must conform to any waste discharge requirements authorized in a permit by the TCEQ. Certain specific items which shall be addressed in the engineering report are discussed in §217.6(d). Additionally, the engineering report must include all constants, graphs,

equations, and calculations needed to show substantial compliance with Chapter 217. The items which shall be included in the summary transmittal letter are addressed in §217.6(d)(1)-(9).

- Any deviations from Chapter 217 shall be disclosed in the summary transmittal letter and the technical justifications for those deviations shall be provided in the engineering report. Any deviations from Chapter 217 shall be based on the best professional judgement of the licensed professional engineer sealing the materials and the engineer's judgement that the design would not result in a threat to public health or the environment.

- Any variance from a Chapter 217 requirement disclosed in your summary transmittal letter is approved. If in the future, additional variances from the Chapter 217 requirements are desired for the project, each variance must be requested in writing by the design engineer. Then, the TCEQ will consider granting a written approval to the variance from the rules for the specific project and the specific circumstances.

- Within 60 days of the completion of construction, an appointed engineer shall notify both the Wastewater Permits Section of the TCEQ and the appropriate Region Office of the date of completion. The engineer shall also provide written certification that all construction, materials, and equipment were substantially in accordance with the approved project, the rules of the TCEQ, and any change orders filed with the TCEQ. All notifications, certifications, and change orders must include the signed and dated seal of a Professional Engineer licensed in the State of Texas.

This approval does not mean that future projects will be approved without a complete plans and specifications review. The TCEQ will provide a notification of intent to review whenever a project is to undergo a complete plans and specifications review. Please be reminded of 30 TAC §217.7(a) of the rules which states, "Approval given by the executive director or other authorized review authority does not relieve an owner of any liability or responsibility with respect to designing, constructing, or operating a collection system or treatment facility in accordance with applicable commission rules and the associated wastewater permit".

If you have any questions or if we can be of any further assistance, please call me at (512) 239-4552.

Sincerely,

Louis C. Herrin, III, P.E.
Wastewater Permits Section (MC 148)
Water Quality Division
Texas Commission on Environmental Quality

LCHIII/tc

cc: TCEQ, Region 12 Office

CONSTRUCTION

OF

ASHLAND LIFT STATION No. 1

FOR

ASHTON GRAY DEVELOPMENT, LLC

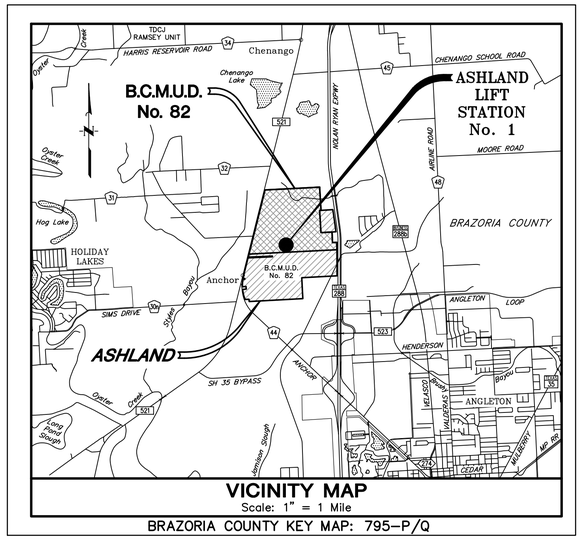
ON BEHALF OF

BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT No. 82

BRAZORIA COUNTY, TEXAS

NO.	DATE	REVISIONS	APP.

INDEX OF DRAWINGS



VICINITY MAP
Scale: 1" = 1 Mile

BRAZORIA COUNTY KEY MAP: 795–P/Q

APRIL 2024
QUIDDITY JOB NO. 16759–0010–09

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
4/5/2024

FLOODPLAIN INFORMATION:
FEMA PANEL: 48039C0430K
EFFECTIVE DATE: DECEMBER 30, 2020
BFE ELEVATION: 27.8 NAVD88
THIS SITE LIES WITHIN SHADED ZONE "X"

ONE–CALL NOTIFICATION SYSTEM
CALL BEFORE YOU DIG
(713) 223–4567 (In Houston)
(New Statewide Number Outside Houston)
1–800–545–6005
– OR –
TEXAS811 (DIG TESS): 1–800–344–8377
– OR –
LONE STAR NOTIFICATION CENTER: 1–800–669–8344
CALL AT LEAST 2 WORKING DAYS (48 HOURS) BEFORE YOU DIG

OWNER/DEVELOPER INFO
ASHTON GRAY DEVELOPMENT
101 PARKLANE BOULEVARD, SUITE 102 SUGAR LAND, TX 77478

ASHTON GRAY DEVELOPMENT, LLC
ON BEHALF OF BRAZORIA COUNTY MUD No. 82
ASHLAND LIFT STATION No. 1

QUIDDITY
BELLAIRE, TEXAS

K:\16759\16759–0010–09 Ashland –Lift Station No. 1\2 Design Phase\CAD\CVR.dwg Apr 02,2024 – 7:38am DA01

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

GENERAL NOTES:

1. PRIOR TO BIDDING THE PROJECT, THE CONTRACTOR SHALL INSPECT THE LIFT STATION SITE AND SATISFY ITSELF THAT ABOVE AND BELOW GROUND CONDITIONS OF THE SITE ARE ACCEPTABLE FOR CONSTRUCTION. CONTRACTOR SHALL NOTE ANY VISIBLE CONFLICTS NOT SHOWN IN THE DRAWINGS AND BRING TO THE ATTENTION OF THE ENGINEER PRIOR TO BIDDING THE PROJECT. SHOULD A CONSTRUCTION CONFLICT OCCUR DUE TO A VISIBLE CONFLICT APPARENT AT THE TIME OF BIDDING, ALL CONSTRUCTION AND ENGINEERING COSTS ASSOCIATED WITH THE CHANGE SHALL BE BORNE BY THE CONTRACTOR.
2. THIS PROJECT IS WITHIN THE CITY OF ANGLETON E.T.J. AND BRAZORIA COUNTY, TEXAS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL APPLICABLE CITY, COUNTY, STATE, AND FEDERAL PERMITS. CONTRACTOR TO OBTAIN ALL PERMITS REQUIRED BY REGULATION OF BRAZORIA COUNTY, TEXAS FOR FLOODPLAIN MANAGEMENT PRIOR TO STARTING CONSTRUCTION.
4. THE APPROXIMATE LOCATION OF EXISTING UTILITIES ARE GIVEN FOR REFERENCE ONLY. BEFORE COMMENCING THE WORK ON THIS CONTRACT, THE CONTRACTOR SHALL VERIFY BY FIELD INVESTIGATION THE ACTUAL LOCATIONS OF ALL UTILITY FACILITIES WITHIN AND ADJACENT TO THE LIMITS OF THE WORK THAT MAY BE AFFECTED BY THE WORK. CONFLICTS WHICH RESULT DUE TO NEGLIGENCE BY THE CONTRACTOR TO LOCATE, HORIZONTALLY AND VERTICALLY, EXISTING UTILITIES WHICH ARE SHOWN ON THE CONSTRUCTION DRAWINGS, OR WHICH THE CONTRACTOR HAS BEEN GIVEN NOTICE OR HAS KNOWLEDGE, SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE COST OF REMEDIAL WORK, REMOVAL OF PORTIONS OF THE WORK OR EXTENSIVE DESIGN CHANGES OCCASIONED BY THE FAILURE OF THE CONTRACTOR TO VERIFY THE LOCATION OF EXISTING UTILITIES AS DESCRIBED ABOVE SHALL BE BORNE BY THE CONTRACTOR.
5. CONTRACTOR IS TO CONTACT THE TEXAS811 AT 811 OR 1-800-344-8347 FOR LOCATION OF EXISTING FACILITIES THAT MAY NOT BE SHOWN ON THE PLANS AT LEAST 72 HOURS PRIOR BUT NOT MORE THAN 14 WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ALL EXISTING FACILITIES OR ANY OFF-SITE AREAS AFFECTED BY THIS CONSTRUCTION PROJECT TO EXISTING OR BETTER CONDITION, UNLESS OTHERWISE NOTED, AT NO ADDITIONAL COST TO THE OWNER.
7. CONTRACTOR SHALL COMPLY WITH O.S.H.A. REGULATIONS AND TEXAS STATE LAW CONCERNING TRENCH SAFETY SYSTEMS.
8. CONTRACTOR SHALL CONTACT QUIDDITY, MR. ALBERT LAZCANO, P.E. AT (713) 777-5337 A MINIMUM OF 48-HOURS PRIOR TO STARTING ANY WORK.
9. DURING CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN PEDESTRIAN AND VEHICULAR ACCESS TO ALL ADJACENT PROPERTIES. ACCESS SHALL BE MAINTAINED DURING ALL WEATHER CONDITIONS.
10. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION, AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY. ALL CONSTRUCTION STORM RUNOFF SHALL COMPLY WITH THE "NATIONAL POLLUTANTS DISCHARGE ELIMINATION SYSTEM" (NPDES) REQUIREMENTS, AND ALL ANGLETON DRAINAGE DISTRICT REQUIREMENTS. BEST MANAGEMENT PRACTICES SHALL BE FOLLOWED FOR SWPPP.
11. SHOULD SOFT UNSTABLE AREAS APPEAR DURING THE COURSE OF GRADING, THE CONTRACTOR SHALL REMOVE UNSTABLE MATERIAL AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL REPLACE THIS WITH A SUITABLE MATERIAL COMPACTED AS REQUIRED PER SPECIFICATIONS. (LIMITED TO 18" AT NO COST TO THE OWNER.)
12. ALL WASTE MATERIALS SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR.
13. PROVIDE ISOLATION JOINTS BETWEEN ALL PROPOSED SIDEWALKS AND ALL SLABS, STRUCTURES, AND PAVEMENTS. ALSO PROVIDE ISOLATION JOINTS WHERE PIPES PENETRATE CONCRETE SLABS OR PAVEMENT. ISOLATION JOINTS SHALL CONSIST OF ASPHALT IMPREGNATED FIBERBOARD AND JOINT SEALANT MATERIAL.
14. PROVIDE PROTECTIVE COATINGS FOR THE EQUIPMENT AND PIPING IN ACCORDANCE WITH SECTION 09921 OF THE SPECIFICATIONS. SEE SECTION 09921 FOR A LIST OF SPECIFIC ITEMS WHICH ARE TO RECEIVE PROTECTIVE COATINGS. PROVIDE OTHER PROTECTIVE COATINGS, SUCH AS HOT-DIP GALVANIZING, AS INDICATED ON THESE PLANS AND IN OTHER SECTIONS OF THE SPECIFICATIONS. TOUCH UP DAMAGED AREAS OF GALVANIZED FINISHES WITH A ZINC RICH PAINT (85 PERCENT ZINC MINIMUM) INTENDED FOR THE APPLICATION.
15. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING RED LINE RECORD DRAWINGS AND FINAL O&M MANUALS AT THE COMPLETION OF THIS PROJECT, AS PER THE SPECIFICATIONS, PRIOR TO FINAL PAYMENT.
16. CONTRACTOR TO FOLLOW CONSTRUCTION DETAILS IF DRAWINGS DEVIATE FROM CITY OF SUGARLAND STANDARDS.
17. ALL ITEMS IN THE WET WELL SHALL BE ACCESSIBLE FROM THE HATCH COVER. CONTRACTOR TO CONFIRM THE SIZE AND LOCATION OF THE WET WELL HATCHES PER SELECTED HATCH AND PUMP MANUFACTURERS' REQUIREMENTS (MINIMUM SIZE SHOWN).
18. SANITARY FACILITY CLEARANCES TO POTABLE WATER FACILITIES SHALL FOLLOW THE LATEST RULES AND REGULATIONS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY.
19. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND MAINTAINING SITE DRAINAGE AT ALL TIMES AT NO ADDITIONAL COST TO THE OWNER WHETHER BY GRADING OR PUMPING.
20. THE CONTRACTOR SHALL PROVIDE CONCRETE STRUCTURES AND TANKAGE THAT ARE FREE OF SUBSTANTIAL LEAKAGE AND WETTING OF EXTERIOR SURFACES.
21. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES TO THE EXISTING PUBLIC OR PRIVATE LINES INCLUDING BUT NOT LIMITED TO WATER LINES, WASTEWATER COLLECTION SYSTEM AND STORM SEWERS DURING CONSTRUCTION. ALL DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH CITY OF SUGARLAND STANDARDS WITH NO COST TO THE OWNER OR PUBLIC.

LIFT STATION PIPING NOTES:

1. LOCATIONS OF ALL EXISTING PIPING WERE DETERMINED FROM AVAILABLE EXISTING INFORMATION. THE CONTRACTOR SHOULD EXAMINE THE SITE PRIOR TO BIDDING THE PROJECT. CONTRACTOR SHALL VERIFY LOCATIONS AND FLOWLINES OF EXISTING PIPING UPON MOBILIZATION AND PRIOR TO BEGINNING CONSTRUCTION. EXTRA WORK REQUIRED TO MEET EXISTING CONDITIONS SHALL BE AT NO COST TO THE OWNER.
2. ALL PIPING SHALL BE DUCTILE IRON PIPE (D.I.P.) UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS. PROVIDE FLANGED JOINT (FIG. OR F.J.) PIPE AND FITTINGS ON ABOVEGROUND PIPE, AS SHOWN IN THE CONSTRUCTION DRAWINGS. PROVIDE RESTRAINED JOINT PUSH-ON (P.O. RESTRAINED) PIPE AND FITTINGS OR RESTRAINED MECHANICAL (MJ RESTRAINED) PIPE AND FITTINGS ON FIRST UNDERGROUND FITTINGS AND BELOW GROUND PIPE UNDERNEATH CONCRETE STRUCTURES AND ROADWAYS. ALL OTHER UNDERGROUND D.I.P SHALL HAVE PRESSURE TYPE PUSH-ON OR MECHANICAL JOINTS AND FITTINGS UNLESS OTHERWISE SHOWN. USE POLYWRAP ON ALL UNDERGROUND D.I.P. AND COAT ALL ABOVEGROUND D.I.P. IN ACCORDANCE WITH SECTIONS 09221 AND 15190 OF THE SPECIFICATIONS.
3. BED AND BACKFILL UNDERGROUND PIPING AS SHOWN IN THE BEDDING DETAILS ON SHEET C18. PROCESS LINES SHALL HAVE CLASS "C" PIPE BEDDING, SANITARY SEWERS SHALL HAVE CLASS "AA" BEDDING. PROCESS LINES SHALL BE DEFINED AS ALL LINES OTHER THAN GRAVITY SANITARY SEWERS AND STORM SEWERS AND MISCELLANEOUS SMALL DIAMETER PIPING. FOR PIPE BELOW STRUCTURES, STRUCTURAL BACKFILL REQUIREMENTS SHALL CONTROL OVER PIPING BACKFILL REQUIREMENTS.
4. ALL UNDERGROUND NUTS AND BOLTS MUST BE 304 STAINLESS STEEL. ALL ABOVEGROUND NUTS AND BOLTS MUST BE 304 STAINLESS STEEL. ALL DISSIMILAR PIPE, BOLT, NUT OR STRUCTURE MATERIAL MUST BE INSTALLED WITH ISOLATION KITS.
5. POLYVINYL CHLORIDE (P.V.C.) PIPE TWO INCHES (2") IN DIAMETER AND SMALLER SHALL BE SCHEDULE 80. THREE-INCH (3") AND FOUR-INCH (4") DIAMETER PIPE SHALL BE SCHEDULE 40. ALL P.V.C. PIPE LARGER THAN FOUR-INCHES (4") AND LESS THAN 18-INCHES (18") SHALL BE DR-18, CLASS 150 CONFORMING TO AWWA C-900. ALL P.V.C. PIPE 18-INCHES (18") AND LARGER SHALL BE DR-21, CLASS 150 CONFORMING TO AWWA C-905. ALL ABOVEGROUND PVC PIPE SHALL BE WRAPPED IN UV RESISTANT TAPE AND OF THE APPROPRIATE COLOR TO COMPLY WITH SPECIFICATION 15190.
6. ALL STEEL PIPE SHALL BE SCHEDULE 40, HOT-DIP GALVANIZED UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS. ALL FLANGED HDG STEEL PIPE GREATER THAN FOUR-INCHES (4") IN DIAMETER SHALL BE SHOP FITTED AFTER FABRICATION.
7. ALL PROPOSED LINES SHALL BE PAINTED, WRAPPED, OR MANUFACTURED IN THE COLOR AS INDICATED ON THE DRAWINGS AND IN ACCORDANCE WITH SPECIFICATION SECTIONS 09921-PROTECTIVE COATINGS, 15190-MECHANICAL IDENTIFICATION AND 15600-PLANT PIPING, INCLUDING COLOR CODE, FLOW DIRECTION AND PROCESS LABEL.
8. ALL NON-METALLIC UNDERGROUND PIPE SHALL BE INSTALLED WITH TRACER TAPE.
9. CONTRACTOR SHALL MAINTAIN A SIX-INCH (6") WORKING CLEARANCE BETWEEN ALL FLANGED PIPE CONNECTIONS AND ANY OBSTRUCTION (SUCH AS STRUCTURES, WALLS, SLABS, WALKWAY OR EQUIPMENT).
10. ALL PIPING LENGTHS SHOWN ON CALL-OUTS ON PLAN VIEW LAYOUTS ARE FOR GENERAL REFERENCE ONLY AND MUST BE CONFIRMED BY THE CONTRACTOR.
11. ALL PROPOSED AND EXISTING PIPES RUNNING ACROSS WALKWAYS SHALL BE PAINTED WITH BLACK AND SAFETY YELLOW STRIPES TWO-INCHES (2") WIDE, AND LETTERED "WATCH YOUR STEP" IN WHITE LETTERS FROM BOTH DIRECTIONS OF PIPE CROSSING.
12. UNLESS SPECIFICALLY OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS, ALL THROUGH-WALL PIPE SHALL HAVE A WALL FLANGE. ALL PENETRATIONS SHALL BE CAST-IN-PLACE WITH STRUCTURAL CONCRETE OR GROUTED IN BLOCK-OUTS WITH WATERPROOF NON-SHRINK GROUT. ALL BLOCK-OUTS FOR THROUGH-WALL PIPING SHALL BE KEYED, UNLESS OTHERWISE NOTED.
13. CONTRACTOR TO FIELD VERIFY FITTING REQUIREMENTS FOR ALL TIE-INS TO EXISTING PIPING.
14. INSTALL CHECK VALVES SO THAT THE WEIGHTED LEVER POSITION IS APPROXIMATELY 45 DEGREES BELOW THE VALVE'S HORIZONTAL CENTER LINE IN THE CLOSED POSITION; AND APPROXIMATELY 45 DEGREES ABOVE THE VALVE'S HORIZONTAL CENTER LINE IN THE FULL OPEN POSITION.
15. ALL GASKETS, GLANDS, PACKING AND RESILIENT VALVE SEATS ON PIPING SHALL BE RATED FOR SERVICE AT 250 PSI.
16. ALL RISER PIPING AND FORCE MAIN HEADER PIPING SHALL BE DUCTILE IRON, CLASS 53 WITH A MINIMUM WORKING PRESSURE OF 150 PSI PLUS A SURGE PRESSURE OF 100 PSI AND PRESSURE TYPE JOINTS.

SIGNAGE NOTES:

1. PROVIDE ALUMINUM WARNING SIGNS WHICH READ "DANGER, HIGH VOLTAGE", AND "NO TRESPASSING." INSTALL THESE SIGNS ON THE EXISTING ENTRANCE GATE. MINIMUM SIZE IS 8"X10" AND ALL SIGNS SHALL BE IN ENGLISH AND SPANISH. PROVIDE AN ALUMINUM SIGN APPROXIMATELY 12" X 24" ON THE FRONT GATE WHICH READS "BRAZORIA COUNTY M.U.D. NO. 82 – ASHLAND LIFT STATION NO. 1", AND THE LIFT STATION ADDRESS AND 24-HOUR EMERGENCY CONTACT.
2. PROVIDE IDENTIFICATION NUMBERS FOR EACH PUMP, WHICH CORRESPONDS TO THE IDENTIFICATION NUMBERS IN THE MOTOR CONTROL CENTER AND CONTROL PANELS. THESE NUMBERS SHALL BE LOCATED ON THE VERTICAL DISCHARGE PIPES OF THE PUMPS AND ON THE CONCRETE TOP SLAB OF THE LIFT STATION ADJACENT TO THE HATCH OPENING. THE NUMBERS SHALL CONSIST OF ONE COAT OF BLACK POLYURETHANE PAINT APPLIED WITH A STENCIL. NUMBER HEIGHT SHALL BE AT LEAST FOUR-INCHES (4").

SHORING AND TRENCH SAFETY:

1. CONTRACTOR SHALL INCLUDE COST OF SHORING IN BID PRICE FOR TRENCH SAFETY.
2. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE TRENCH SAFETY AND SHORING SYSTEMS IN ACCORDANCE WITH O.S.H.A. REGULATIONS.
3. TRENCH SAFETY BOXES SHALL NOT BE PLACED IN THE PIPE ZONE.

SANITARY SEWER CONSTRUCTION NOTES:

1. MAINTAIN 12-INCH MINIMUM CLEARANCE BETWEEN ALL SANITARY SEWERS, STORM SEWERS AND CULVERTS UNLESS OTHERWISE NOTED.
2. ALL SEWER LINES SHALL BE AIR-TESTED IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
3. FOR ALL PVC OR D.I.P., USE MANHOLE WATERSTOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS. (NO SEPARATE PAY).
4. SANITARY SEWER MANHOLES DO NOT NEED TO BE SEALED UNLESS OTHERWISE NOTED.
5. MANHOLE RIMS ARE TO BE SET AT THE ELEVATIONS SHOWN ON THE PLANS INITIALLY. AFTER PAVING AND GRADING IS COMPLETED, RIMS ARE TO BE ADJUSTED TO FOUR (4) TO SIX (6) INCHES ABOVE FINAL GRADE AND BACK-DRESSED WITH DIRT TO PROVIDE DRAINAGE AWAY FROM THE MANHOLE. MANHOLES LOCATED WITHIN PROPOSED PAVEMENT SHALL HAVE A RIM ELEVATION EQUAL TO THE ROAD ELEVATION.
6. IF WET SAND IS ENCOUNTERED IN THE FIELD, USE SPECIAL BEDDING PER CITY OF HOUSTON DWG 02317-01, 02317-02 AND AS DIRECTED BY THE ENGINEER.

CONCRETE CONSTRUCTION NOTES:

1. FORMS MAY BE REMOVED AFTER CONCRETE HAS REACHED ITS INITIAL SET, BUT NO SOONER THAN 24 HOURS AFTER THE POUR. CURING COMPOUNDS MUST BE APPLIED AS THE FORMS ARE STRIPPED. SEE SPECIFICATION 3300 FOR MORE DETAILS.
2. ALL CONSTRUCTION JOINTS MUST HAVE THE LAITANCE REMOVED TO EXPOSE BARE AGGREGATE BY BUSH HAMMERING OR OTHER APPROVED METHODS BEFORE STARTING THE NEXT POUR.

GRADING NOTES:

1. AREAS THAT ARE TO RECEIVE FILL WILL BE STRIPPED TO A DEPTH OF THREE-INCHES (3"). STRIPPINGS SHALL BE STOCK PILED AND THEN SPREAD EVENLY ON SURFACE OF FILL AREAS.
2. FILL SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF SIX-INCHES (6") OR LESS AND COMPACTED TO 95% OF MAXIMUM DENSITY AT MINUS THREE PERCENT (-3%) TO PLUS FIVE PERCENT (+5%) OF MOISTURE CONTENT AS DETERMINED BY AASHTO TEST METHOD T-99.
3. ALL EXISTING DRAINAGE SWALES IN FILL AREAS SHALL BE CLEANED AND MUCKED OF ANY VEGETATION, AND THEN FILLED AS SHOWN WITH EXCAVATION MATERIAL IN MAXIMUM EIGHT-INCH (8") LOOSE LIFTS, AND COMPACTED TO 95% PROCTOR DENSITY PER AASHTO STANDARD METHOD T-99.
4. FINAL GRADE ALL AREAS OF THE SITE AS SHOWN ON GRADING PLAN AFTER COMPLETION OF ALL OTHER CONSTRUCTION ACTIVITIES. GRADE ALL AREAS OF THE SITE SMOOTH TO DRAIN. THOROUGHLY CLEAN SITE TO REMOVE ALL CONSTRUCTION DEBRIS SUCH AS CONCRETE RUBBLE, REBAR, ETC. HYDROMULCH ALL AREAS WHICH WERE DISTURBED DURING CONSTRUCTION.

LIFT STATION START-UP AND COORDINATION NOTES:

1. CONTRACTOR SHALL NOTIFY ENGINEER OF AND BE PRESENT FOR THE START-UP OF ALL NEW EQUIPMENT AND SHALL BE RESPONSIBLE FOR PROPER START-UP PROCEDURES AS RECOMMENDED BY THE MANUFACTURER. A MANUFACTURER REPRESENTATIVE SHALL BE PRESENT FOR START-UP AND PRE-START-UP INSPECTION AS REQUIRED BY THE SPECIFICATIONS AND RECOMMENDED BY THE MANUFACTURER OF EACH EQUIPMENT ITEM. NO EQUIPMENT WILL QUALIFY FOR SUBSTANTIAL COMPLETION UNTIL CONTRACTOR MEETS ALL CONDITIONS LISTED IN THE SPECIAL CONDITIONS INCLUDING SUBMITTING START-UP REPORTS TO THE ENGINEER.

WATERLINE CONSTRUCTION NOTES:

1. TWELVE (12) INCH OR SMALLER WATERLINES SHALL HAVE A MINIMUM COVER OF FOUR (4) FEET BELOW TOP OF CURB. THE CONTRACTOR SHALL UNIFORMLY VARY THE ELEVATION OF THE WATERLINE FROM THE DEPTH SHOWN ON THE PLANS TO FACILITATE CONFLICT AVOIDANCE AND MAINTAIN CLEARANCES. MAXIMUM DEFLECTION OF JOINTS SHALL NOT EXCEED THE PIPE MANUFACTURER'S RECOMMENDATIONS.
2. WATERLINE FITTINGS SHALL BE DUCTILE IRON UNLESS OTHERWISE NOTED.
3. WATERLINES SHALL BE CONSTRUCTED SO THAT ALL CROSSES AND TEES WILL NOT BE LOCATED UNDER PROPOSED OR FUTURE PAVING.
4. MAINTAIN 12-INCH (12") MINIMUM CLEARANCE BETWEEN ALL WATERLINES, STORM SEWERS AND CULVERTS UNLESS OTHERWISE NOTED.
5. FOR SPECIAL WATERLINE / SANITARY SEWER CLEARANCES, SEE SANITARY SEWER CONSTRUCTION NOTES.
6. WATERLINES SHALL BE BANK SAND-BEDDED AND BACKFILLED IN ACCORDANCE WITH THE LATEST EDITION OF CITY OF SUGARLAND SPECIFICATIONS AND DETAILS.
7. SANITARY PRECAUTIONS MUST BE TAKEN DURING WATERLINE CONSTRUCTION, AS CALLED FOR BY AWWA STANDARDS, PRECAUTIONS INCLUDE KEEPING PIPE CLEAN AND CAPPING, OR OTHERWISE EFFECTIVELY COVERING OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS, OR OTHER SOURCES OF CONTAMINATION FROM UNFINISHED PIPE LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.
8. ALL NEWLY INSTALLED PIPES, COATINGS, AND RELATED PRODUCTS SHALL CONFORM TO AMERICAN NATIONAL STANDARDS INSTITUTE / NATIONAL SANITATION FOUNDATION (ANSI / NSF) STANDARDS AND MUST BE CERTIFIED BY AN ORGANIZATION ACCREDITED BY ANSI.

CONSTRUCTION SHALL CONFORM TO ANGLETON CONSTRUCTION MANUAL WHICH REFERENCES CITY OF SUGARLAND DESIGN STANDARDS

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

GENERAL NOTES
SHEET 1 OF 2

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

G2
04/05/2024 SHEET NO. 2 OF 25

K:\16759\16759-0010-09 Ashland -Lift Station No. 1\2 Design Phase\CAD\MISCD.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

UTILITY CONSTRUCTION NOTES:

1. DURING CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ADEQUATE DRAINAGE AND SAFE ACCESS TO ADJACENT PROPERTIES, REGARDLESS OF THE WEATHER CONDITIONS. DO NOT OBSTRUCT ROADWAYS, DRAINAGEWAYS, SIDEWALKS, OR PASSAGEWAYS ADJACENT TO THE CONSTRUCTION AREA.
2. WHEN TRENCH CONDITION WARRANTS THE USE OF DEWATERING SYSTEMS, THEIR USE SHALL BE REQUESTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL REMOVE ALL MUD, DIRT AND DEBRIS DEPOSITED OR DROPPED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY DAILY. MATERIAL THAT IS HAZARDOUS TO TRAFFIC SHALL BE REMOVED IMMEDIATELY.
4. CONTRACTOR SHALL PROTECT ALL TREES ADJACENT TO WORK AREA. NO TREES SHALL BE REMOVED WITHOUT PERMISSION OF THE OWNER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFEGUARDING AND PROTECTING ALL MATERIAL AND EQUIPMENT STORED ON THE JOB SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIALS IN A SAFE AND WORKMANLIKE MANNER TO PREVENT INJURIES, DURING AND AFTER WORKING HOURS, UNTIL PROJECT ACCEPTANCE.
6. THE CONTRACTOR SHALL PROVIDE SHEETING, SHORING AND BRACING NECESSARY TO PROTECT WORKMEN AND EXISTING UTILITIES DURING ALL PHASES OF CONSTRUCTION, AS MAY BE REQUIRED BY O.S.H.A., FEDERAL, STATE AND LOCAL LAWS, CODES AND ORDINANCES.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO THE EXISTING PUBLIC OR PRIVATE UTILITY LINES, INCLUDING, BUT NOT LIMITED TO, WATER LINES, WASTEWATER COLLECTION SYSTEMS, STORM SEWERS, BACKSLOPE INTERCEPTORS, IRRIGATION LINES, ELECTRICAL LINES, AND MATERIAL AND PROPERTY DAMAGES DURING CONSTRUCTION. ALL DAMAGES, RELOCATION, OR REPLACEMENT OF EXISTING UTILITIES SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIFICATIONS, DETAILS, AND REQUIREMENTS OF THE UTILITY'S OWNER.
8. THE CONTRACTOR SHALL RETURN ALL EXISTING PAVING AND DRIVEWAYS TO ORIGINAL OR BETTER CONDITION AT NO ADDITIONAL COST TO THE OWNER UNLESS OTHERWISE NOTED OR SPECIFICALLY CALLED OUT AS A PAY ITEM.

FORCE MAIN CONSTRUCTION NOTES:

1. ALL FORCE MAIN PIPE SHALL BE GREEN AND INCLUDE TRACER WIRE IN THE SAME TRENCH AND ABOVE THE FORCE MAIN IN ACCORDANCE WITH THE SPECIFICATIONS.
2. ALL PROPOSED 4–INCH TO 12–INCH FORCE MAINS SHALL BE POLYVINYL CHLORIDE PIPE OR DUCTILE IRON PIPE IN ACCORDANCE WITH THE SPECIFICATIONS.
3. ALL FORCE MAIN PIPE SHALL BE BANK SAND BEDDED AND BACKFILLED PER SPECIFICATIONS.
4. ALL FORCE MAINS SHALL BE HYDROSTATICALLY TESTED IN AN APPROVED MANNER IN ACCORDANCE WITH THE SPECIFICATIONS.
5. MAINTAIN 12–INCH MINIMUM CLEARANCE BETWEEN ALL SANITARY SEWERS, STORM SEWERS AND CULVERTS UNLESS OTHERWISE NOTED.
6. SANITARY SEWER MANHOLES SHALL BE STANDARD CITY OF SUGARLAND, UNLESS OTHERWISE NOTED.
7. ALL SANITARY MANHOLES WITHIN THE 100–YEAR FLOOD PLAIN (DESIGNATED) SHALL HAVE THE TOP SET AT LEAST TWELVE (12) INCHES ABOVE THE BASE FLOOD ELEVATION OR SEALED AND VENTED.
8. SANITARY SEWER MANHOLES SHALL BE PRECAST OR CAST–IN–PLACE IN ACCORDANCE WITH THE SPECIFICATIONS.
9. MANHOLE RIMS ARE TO BE SET AT THE ELEVATIONS SHOWN ON THE PLANS INITIALLY. AFTER SITE RESTORATION IS COMPLETED, RIMS ARE TO BE ADJUSTED TO THREE (3) TO SIX (6) INCHES ABOVE FINAL GRADE AND BACK–DRESSED WITH DIRT TO PROVIDE DRAINAGE AWAY FROM THE MANHOLE.
10. ALL TEES, ELBOWS, BENDS, AND PLUGS SHALL INCLUDE RESTRAINT OF FITTINGS. RESTRAINT MAY BE BY MEANS OF THRUST BLOCKS OR RESTRAINED JOINT PIPE (OF APPROVED MANUFACTURER). IF RESTRAINED JOINT PIPE IS USED, ALL PIPES LESS THAN 12–INCHES (12") IN DIAMETER SHALL INCLUDE A MINIMUM OF TWO (2) JOINTS OF RESTRAINT ON EACH SIDE OF THE FITTING AND ALL PIPES EQUAL TO OR GREATER THAN 16–INCHES (16") IN DIAMETER SHALL INCLUDE A MINIMUM OF THREE (3) JOINTS OF RESTRAINT ON EACH SIDE OF THE FITTING. WATERLINE FITTINGS SHALL BE CAST OR DUCTILE IRON UNLESS OTHERWISE NOTED. ALL PIPE FITTINGS SHALL BE MECHANICAL JOINTS.

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

GENERAL NOTES
SHEET 2 OF 2

QUIDDITY
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6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759–0010–09 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

G3
04/05/2024 SHEET NO. 3 OF 25

K:\16759\16759–0010–09 Ashland –Lift Station No. 1\2 Design Phase\CAD\MISCD.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

GENERAL LEGEND

FUTURE	EXISTING	PROPOSED	
			PROPERTY LINE
			EASEMENT LINE
			BUILDING LINE
OHP	OHP	OHP	OVERHEAD POWER LINE
GAS	GAS	GAS	GAS LINE
T	T	T	TELEPHONE LINE
SWB	SWB	SWB	SOUTHWESTERN BELL TELEPHONE LINE
AIR	AIR	AIR	AIR LINE
CL2	CL2	CL2	CHLORINE LINE
LAS	LAS	LAS	LIQUID AMMONIUM SULFATE LINE
HFS	HFS	HFS	HYDROFLUOROSILICIC ACID LINE
POLY	POLY	POLY	POLYETHYLENE PIPING
FM	FM	FM	OFF-SITE FORCE MAIN PIPING
			TYP PIPE FITTING (VERTICAL)
			TYP PIPE FITTING (HORIZ)
			TYPICAL PIPE VALVE
			CONCRETE PIPE SUPPORT
			MANHOLE
			UNDERGROUND PLANT PIPING => 4"
			UNDERGROUND PLANT PIPING < 4"
			ABOVEGROUND PLANT PIPING
			EDGE OF PAVEMENT
			TOP OF BANK
			TOE OF SLOPE
			DRAINAGE SWALE
			CHAIN LINK FENCE
			WOODEN FENCE
			WROUGHT IRON FENCE
			BARBED WIRE FENCE
100.0	100.0	125	NATURAL GROUND CONTOUR
			CONCRETE PAVEMENT
			CRUSHED CONCRETE PAVEMENT
			ASPHALT PAVEMENT
			GRAVEL ROAD
107.5	107.5	108.0	GRADE ELEVATION
			SLOPE TO DRAIN
		CJ	SAW-CUT CONTROL JOINT
		EJ	EXPANSION JOINT
		IJ	ISOLATION JOINT
		KJ	KEYED CONSTRUCTION JOINT
			SOIL BORING (SEE GEOTECHNICAL REPORT)
			EXISTING ITEM TO BE DEMOLISHED
			EXISTING ITEM TO BE ABANDONED
			EDGE OF EXISTING FLOODPLAIN

GENERAL ABBREVIATIONS

AC	ACRES
BCDR	BRAZORIA COUNTY DEED RECORDS
BCOPRRP	BRAZORIA COUNTY OFFICIAL PUBLIC RECORDS OF REAL PROPERTY
CF	CLERK'S FILE
CFM	CUBIC FEET PER MINUTE
CL2	CHLORINE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
DIP	DUCTILE IRON PIPE
DO	DISSOLVED OXYGEN
EL	ELEVATION
FAA	FREE AVAILABLE AMMONIA
FC	FILM CODE
FF	FINISHED FLOOR
FM	FORCE MAIN
FT	FEET
FT/S	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
GAL	GALLONS
GPM	GALLONS PER MINUTE
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GW	GROUND WATER
HDG	HOT DIP GALVANIZED
HOA	HAND OFF AUTO
HP	HORSE POWER
HR	HOUR
LAS	LIQUID AMMONIUM SULFATE
LCP	LOCAL CONTROL PANEL
LF	LINEAR FEET
mA	MILLIAMP
MH	MANHOLE
MONO	MONOCHLORAMINE
NC	NORMALLY CLOSED
NO	NUMBER
ORP	OXYDATION REDUCTION POTENTIAL
PG	PAGE
POLY	POLYPHOSPHATE
PP	POWER POLE
PVC	POLYVINYL CHLORIDE PIPING
RCP	REINFORCED CONC PIPE
ROW	RIGHT-OF-WAY
SAN SEW	SANITARY SEWER
SCH	SCHEDULE
SQ FT	SQUARE FEET
SS	STAINLESS STEEL
STM SEW	STORM SEWER
SW	SURFACE WATER
TAA	TOTAL AVAILABLE AMMONIA
TAC	TOTAL AVAILABLE CHLORINE
TDH	TOTAL DYNAMIC HEAD
TOB	TOP OF BANK
TOC	TOP OF CONCRETE
TOF	TOP OF FLOOR
TOS	TOP OF SLAB
TOW	TOP OF WALL
TPD	TELEPHONE PEDESTAL
TSP	TELEPHONE SERVICE POLE
UE	UNDERGROUND ELECTRIC
V	VOLTS
VOL	VOLUME
WM	WATER METER

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

GENERAL SYMBOLS AND ABBREVIATIONS

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

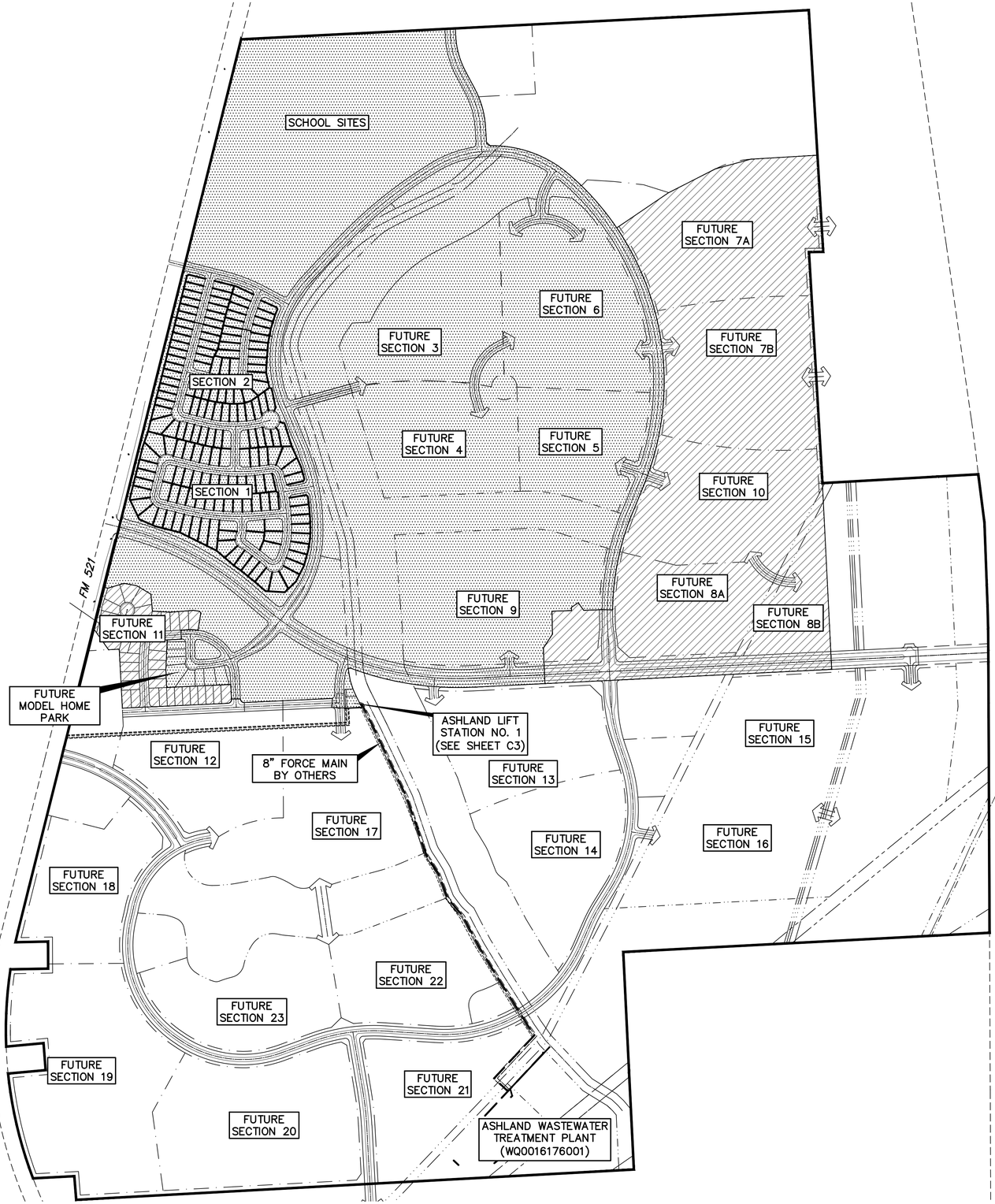
SCALE: DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

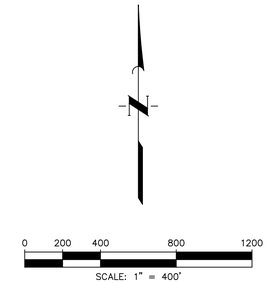
STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

G4
04/05/2024 SHEET NO. 4 OF 25

K:\16759\16759-0010-09 Ashland - Lift Station No. 1\2 Design Phase\CAD\MISCD.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS





LEGEND:

ASHLAND LIFT STATION No. 1
PHASE 1 SERVICE AREA
631 ESFC

ASHLAND LIFT STATION No. 1
PHASE 2 SERVICE AREA
463 ESFC

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

OVERALL SITE LAYOUT

QUIDDITY
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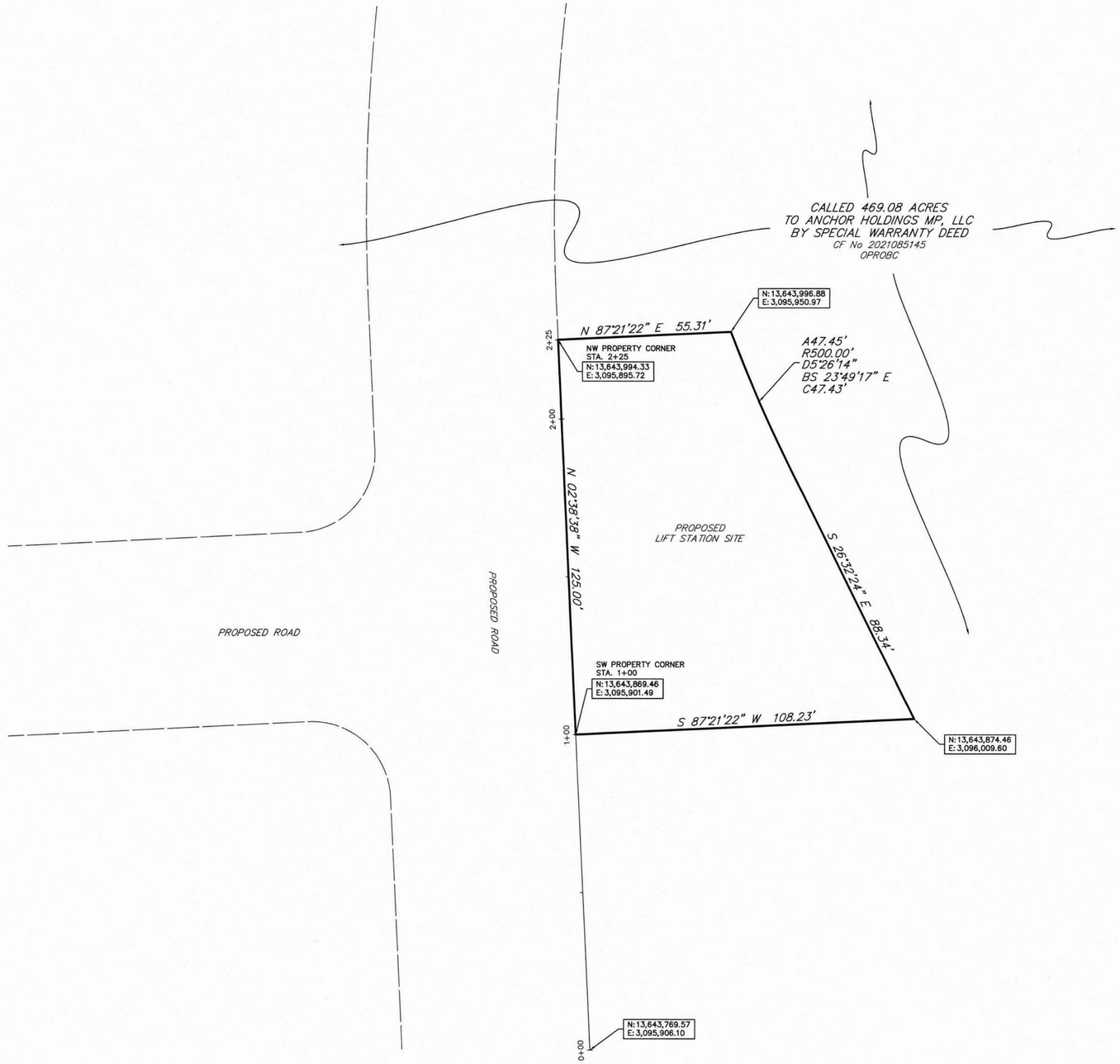
SCALE: _____ DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

C1
04/05/2024 SHEET NO. 5 OF 25

K:\16759\16759-0010-09 Ashland -Lift Station No. 1\2 Design Phase\CAD\OVERALL SITE.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



NORTH
SCALE: 1" = 20'

0 20 40 60

GENERAL NOTES:

1. Elevations were obtained with Real Time Kinetic Global Positioning Satellite Equipment and are based on National Geodetic Survey Monument Designation:
DG6956 DW11 CLUTE COOP CORS ARP
DL3490 TXBC BAY CITY CORS ARP
DH3614 TXLM LA MARQUE CORS ARP

2. Temporary Benchmark A being a PK Nail in asphalt located on the east side of FM 521, approximately 1600' +/- south from FM 32, at the northwest corner of the subject tract, 4.0' feet from the edge of asphalt and 37' northwest from a power pole.
Elevation = 40.01 feet, NAVD 88.

3. Temporary Benchmark B being a PK Nail in asphalt located on the east side of FM 521, 3130 feet north from the intersection of Anchor Road, 2.7' from the edge of asphalt and 36' northwest from a power pole.
Elevation = 36.59 feet, NAVD 88.

4. According to Map No. 48039C0430K of the Federal Emergency Management Agency's Flood Insurance Rate Maps for Brazoria County, Texas and Incorporated Areas, dated December 30, 2020, the subject tract is situated within: Shaded Zone "X"; defined as areas of 500-year flood; areas of 100-year flood with average depths of less than 1-foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

This flood statement does not imply that the property or structures thereon will be free from flooding or flood damage. On rare occasions floods can and will occur and flood heights may be increased by man-made or natural causes. This flood statement shall not create liability on the part of the surveyor.

5. Coordinates and bearings shown hereon are based on the Texas Coordinate System, South Central Zone, NAD 83. The survey data shown hereon is on Surface Coordinates. The survey data can be converted to Grid by applying a combined scale factor of 0.999870017.

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

LIFT STATION SURVEY CONTROL

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: DAO
DATE: MAY 2023 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

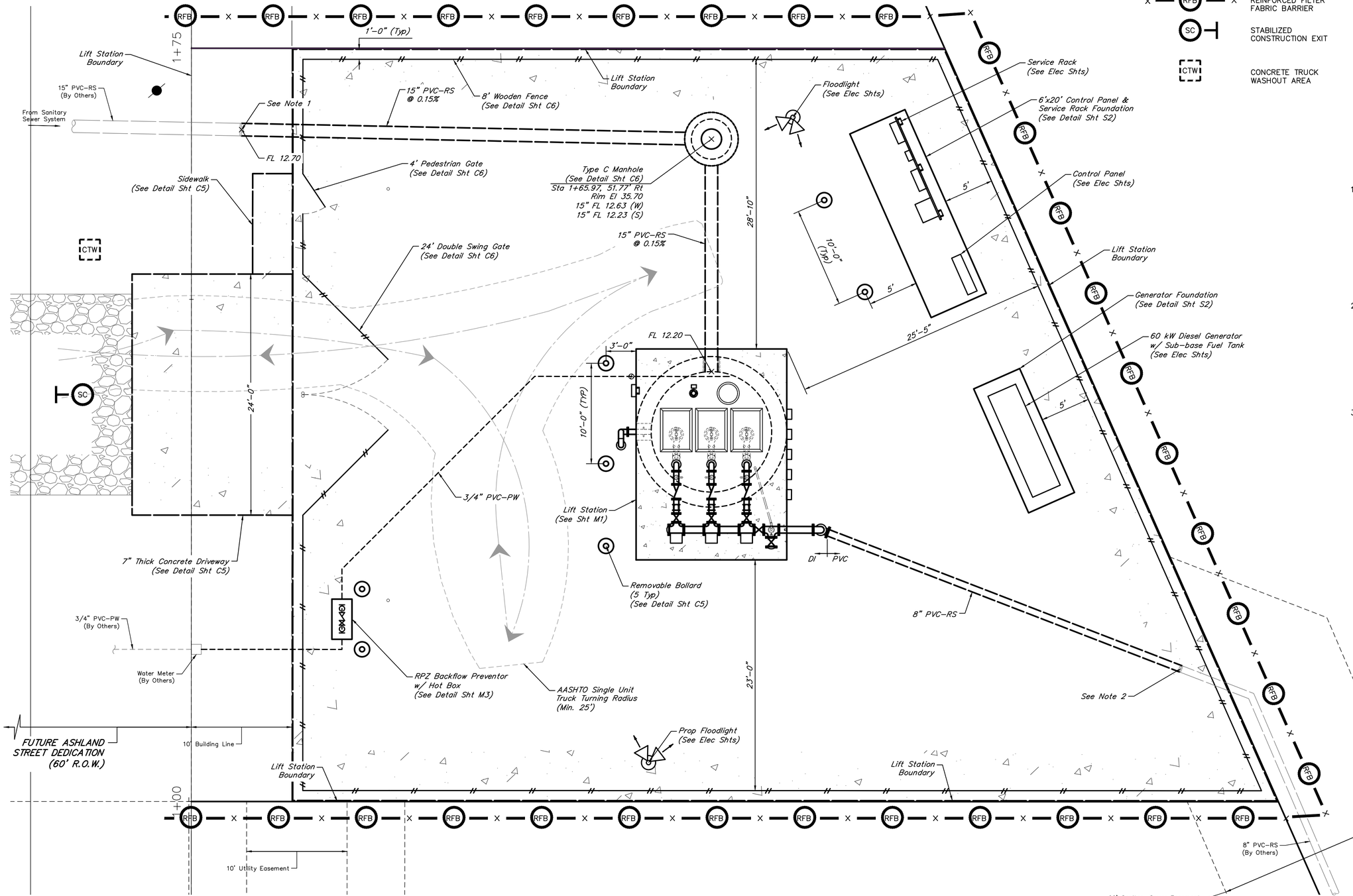
STATE OF TEXAS
REGISTERED
STEVEN JARES
5317
PROFESSIONAL
LAND SURVEYOR

Apr. 12, 2024

C2
SHEET NO. 6 OF 25

K:\16759\16759-0010-09 Ashland -Lift Station No. 1\2 Design Phase\CAD\SURVEY CONTROL.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



LEGEND:

- RFB — REINFORCED FILTER FABRIC BARRIER
- SC — STABILIZED CONSTRUCTION EXIT
- CTW — CONCRETE TRUCK WASHOUT AREA

0 2.5 5 10 15
SCALE: 1" = 5'

NOTES:

1. Contractor to field locate 15" PVC sanitary sewer (by others), remove plug and connect proposed 15" PVC sanitary sewer. If 15" PVC sanitary sewer (by others) is not in the ground at time of construction, Contractor to stub-out proposed 15" PVC sanitary sewer five feet (5') inside site boundary at elevation 12.70, plug, and mark location and flow line with a wooden stake painted red.
2. Contractor to field locate 8" PVC force main (by others), remove plug and connect proposed 8" PVC force main. If 8" PVC force main (by others) is not in the ground at time of construction, Contractor to stub-out proposed 8" PVC force main five feet (5') inside the site boundary as shown, plug, and mark location and flow line with a wooden stake painted red.
3. Contractor to perform pressure testing prior to connecting to adjacent piping.

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

LIFT STATION SITE LAYOUT AND SWPPP

QUIDDITY
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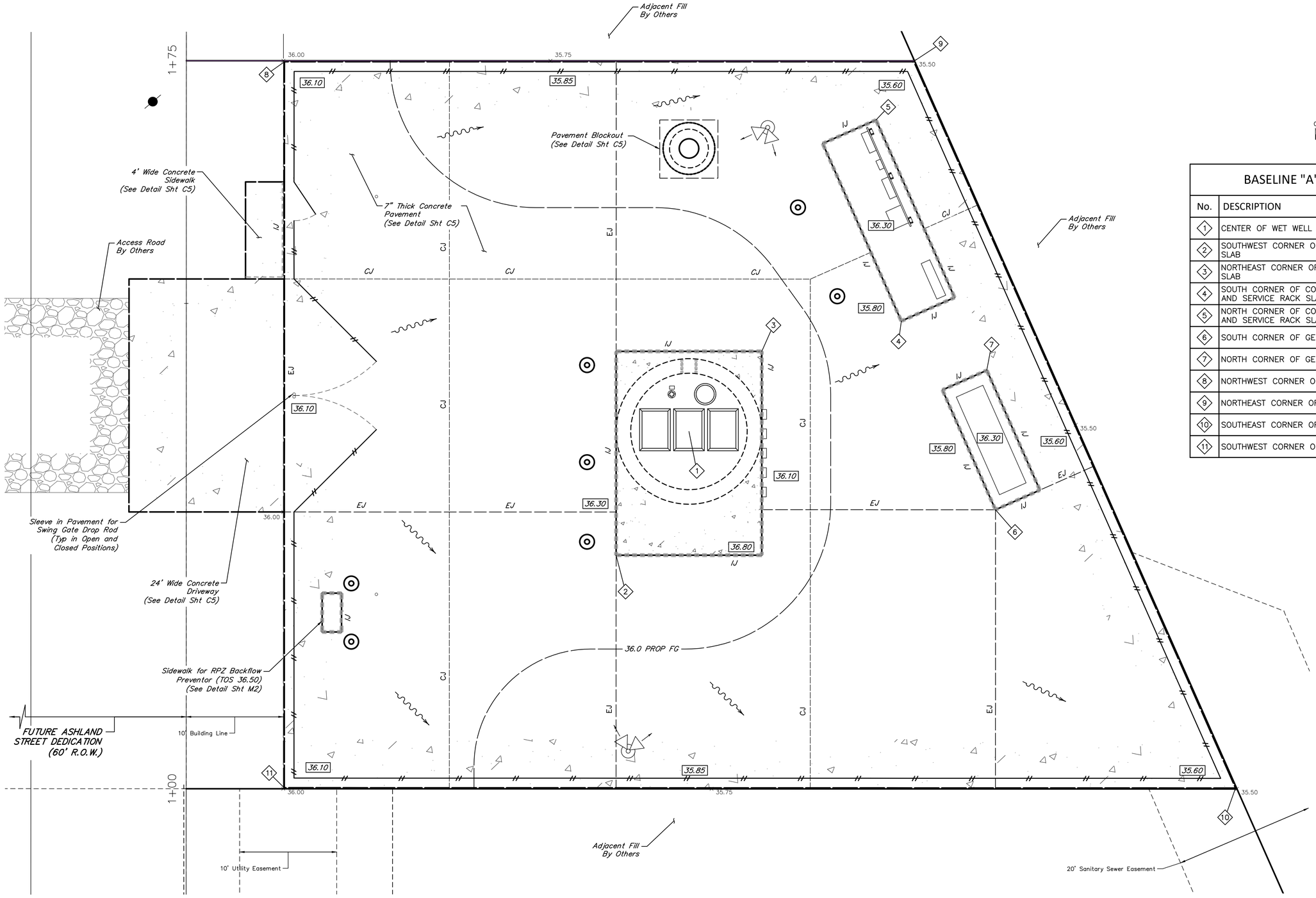
SCALE: 1" = 5' DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

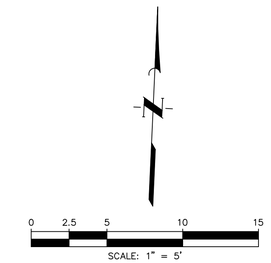
STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

C3
04/05/2024 SHEET NO. 7 OF 25

K:\16759\16759-0010-09 ashland -lift station no. 1\2 design phase\CAD\SITE.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS





BASELINE "A" STATION/OFFSET TABLE

No.	DESCRIPTION	STATION	OFFSET
1	CENTER OF WET WELL	1+36.82	51.78' Rt
2	SOUTHWEST CORNER OF WET WELL SLAB	1+24.07	44.28' Rt
3	NORTHEAST CORNER OF WET WELL SLAB	1+45.07	59.28' Rt
4	SOUTH CORNER OF CONTROL PANEL AND SERVICE RACK SLAB	1+48.20	73.65' Rt
5	NORTH CORNER OF CONTROL PANEL AND SERVICE RACK SLAB	1+68.91	71.04' Rt
6	SOUTH CORNER OF GENERATOR SLAB	1+28.76	83.36' Rt
7	NORTH CORNER OF GENERATOR SLAB	1+43.13	82.46' Rt
8	NORTHWEST CORNER OF PAVEMENT	1+74.90	10.10' Rt
9	NORTHEAST CORNER OF PAVEMENT	1+74.91	74.94' Rt
10	SOUTHEAST CORNER OF PAVEMENT	1+00.09	108.09' Rt
11	SOUTHWEST CORNER OF PAVEMENT	1+00.10	10.10' Rt

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

LIFT STATION PAVING AND DRAINAGE LAYOUT

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SCALE: _____ DGN. BY: DAO
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STATE OF TEXAS
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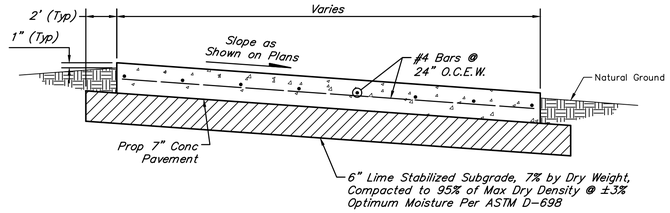
133819
LICENSED PROFESSIONAL ENGINEER

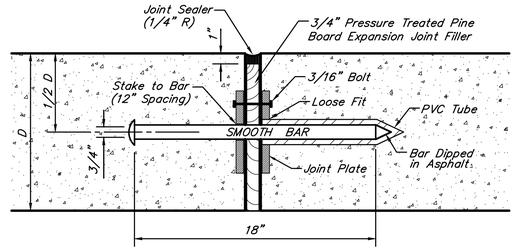
C4
04/05/2024 SHEET NO. 8 OF 25

K:\16759\16759-0010-09 ashland - lift station no. 1\2 design phase\CAD\SITE.dwg

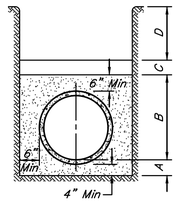
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



STANDARD CONCRETE PAVEMENT DETAIL
NOT TO SCALE



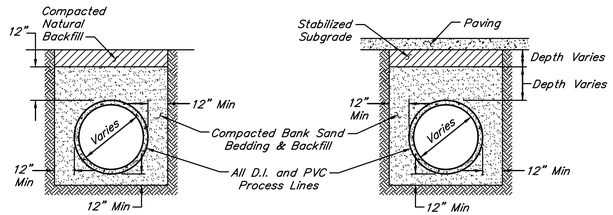
PAVEMENT EXPANSION JOINT (EJ)
NOT TO SCALE



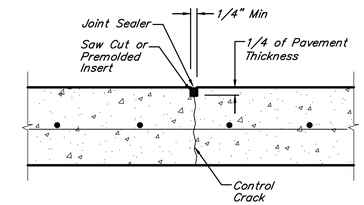
LEGEND:

A – Cement stabilized sand placed before pipe is laid up to flowline of pipe or above (minimum depth 7").
B – Cement stabilized sand, thoroughly rodded, placed after pipe is laid.
C – Earth fill placed same day pipe is laid.
D – Earth fill placed next day (or later) after pipe is laid.

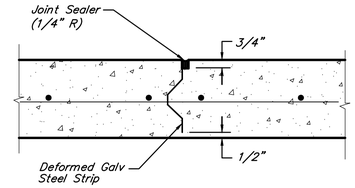
CLASS "AA" BEDDING FOR PIPE SEWERS
36" DIAMETER AND SMALLER
NOT TO SCALE



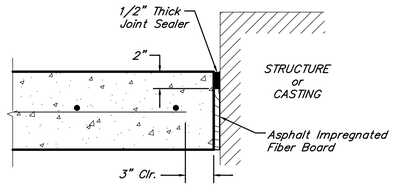
CLASS "C" BEDDING FOR PLANT PROCESS PIPING DETAIL
NOT TO SCALE



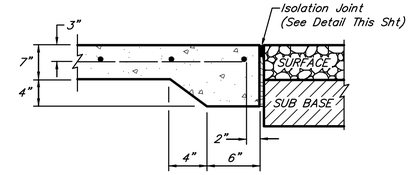
SAW-CUT CONTROL JOINT (CJ)
NOT TO SCALE



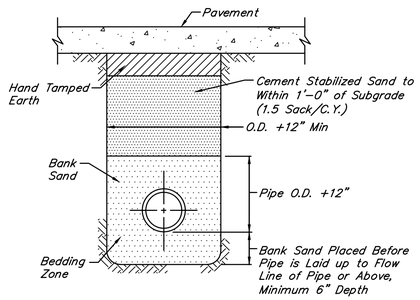
KEYED CONSTRUCTION JOINT (KJ)
NOT TO SCALE



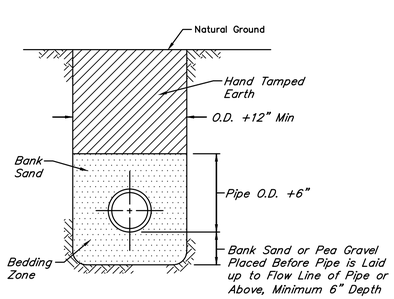
ISOLATION JOINT (IJ)
NOT TO SCALE



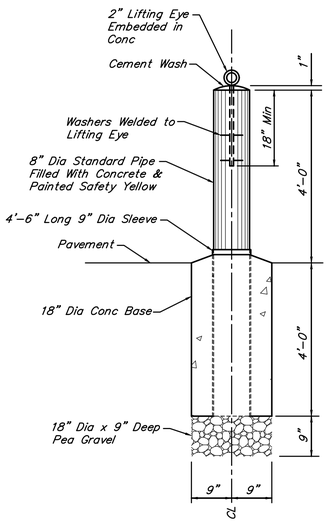
PAVING HEADER DETAIL
NOT TO SCALE



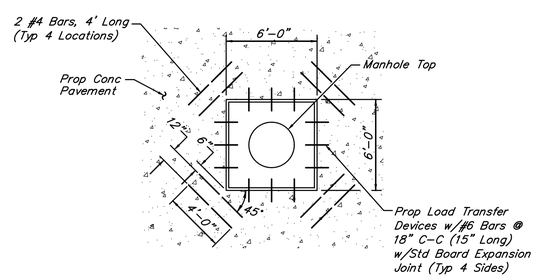
WATERLINE BEDDING DETAIL (UNDER CONCRETE PAVEMENT)
NOT TO SCALE



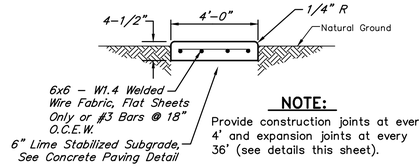
WATERLINE BEDDING DETAIL (NOT UNDER CONCRETE PAVEMENT)
NOT TO SCALE



REMOVABLE BOLLARD DETAIL
NOT TO SCALE



PAVEMENT BLOCK OUT
NOT TO SCALE



NOTE:
Provide construction joints at every 4' and expansion joints at every 36' (see details this sheet).

TYPICAL CONCRETE SIDEWALK DETAIL
NOT TO SCALE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

CIVIL DETAILS
SHEET 1 OF 3

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

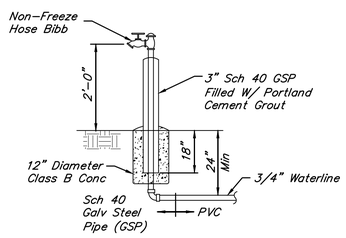
SCALE: DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

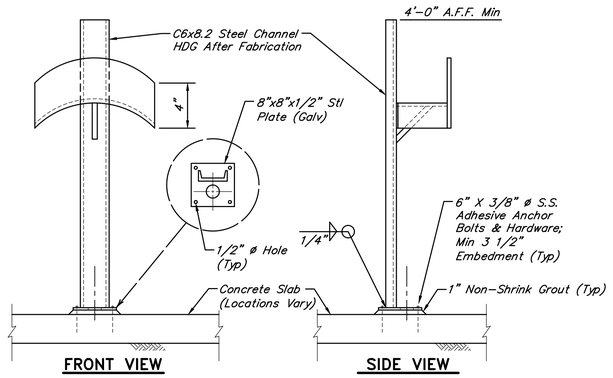
C5
04/05/2024 SHEET NO. 9 OF 25

K:\16759\16759-0010-09 Ashland -Lift Station No. 1\2 Design Phase\CAD\MISCD.dwg

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



HOSE BIBB DETAIL
NOT TO SCALE



HOSE RACK DETAIL
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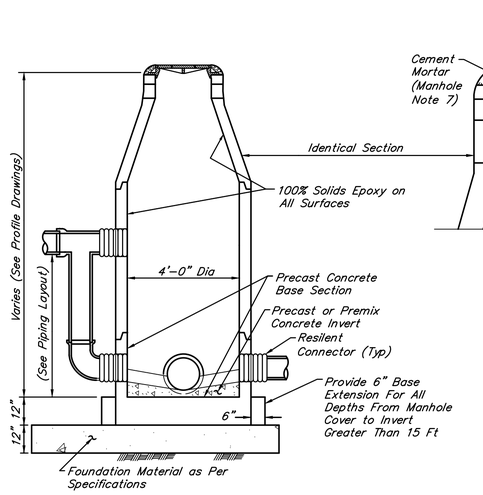
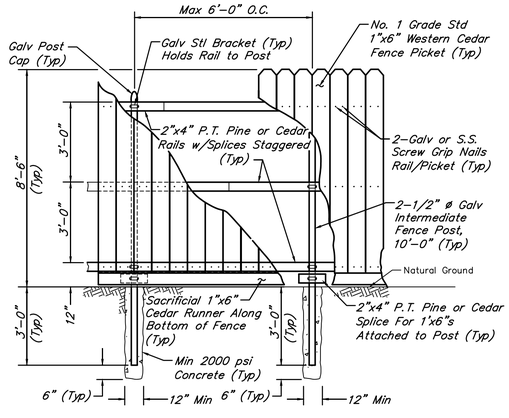


TYPE "C" MANHOLE DETAIL
NOT TO SCALE

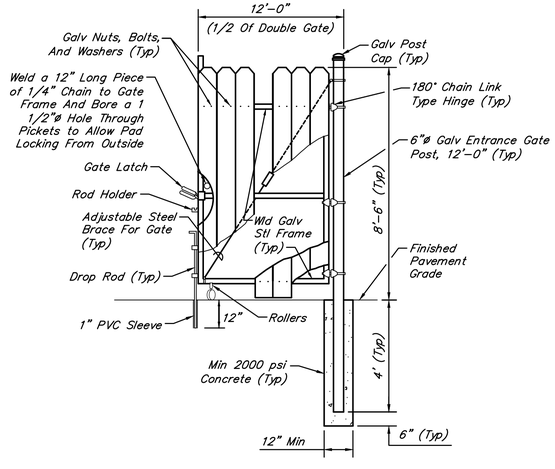
MANHOLE NOTES:

1. Depth of manhole determines sections required.
2. Precast concrete rings shall be provided for a combined adjustment height of at least 12". The total height of the adjustment rings shall not exceed 1'-6".
3. Manhole wall thickness for depth exceeding 12'-0" shall be determined to meet loading conditions. Min thickness 5".
4. Manhole drop and intersecting pipes shall be installed only when called for in plan and profile drawing.
5. Seat manhole frame in sealant per specifications.
6. Eccentric precast concrete manhole may be used.
7. Omit cement mortar when manhole is located in paved areas.
8. Min reinforcing in the precast concrete base shall be #5 @ 8 EW.
9. Provide backfill to match adjacent pipe trench backfill per specifications.



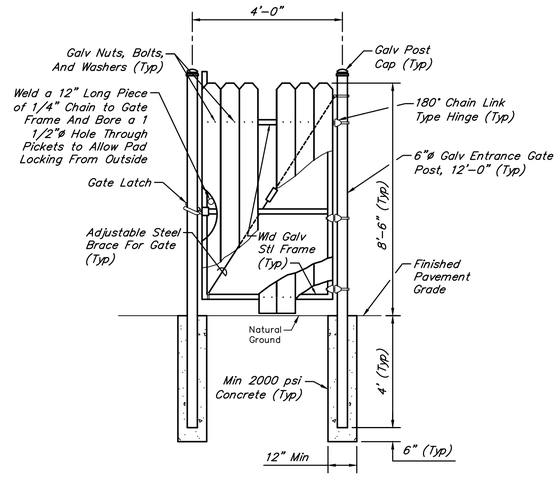
NOTE:
All fence & gate posts to be schedule 40 galvanized steel.

WOOD FENCE DETAIL
NOT TO SCALE



NOTE:
All fence & gate posts to be schedule 40 galv. steel.

WOOD GATE DETAIL
NOT TO SCALE



WALK-IN WOOD GATE DETAIL
NOT TO SCALE

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ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

CIVIL DETAILS
SHEET 2 OF 3

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

C6
04/05/2024 SHEET NO. 10 OF 25

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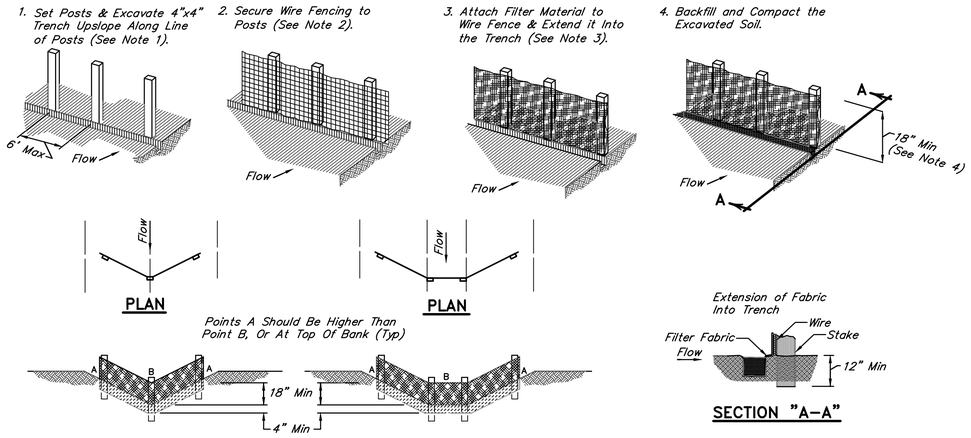
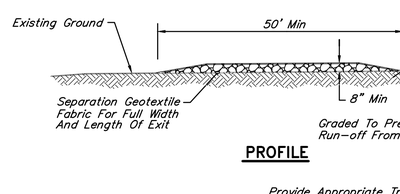


CONSTRUCTION NOTES:

1. Set 2"x2" wooden stakes spaced a maximum of 6' apart & embedded 12" min.
2. Woven wire fence to be fastened securely to fence posts with staples.
3. Filter cloth to be fastened to woven wire fence with ties spaced every 24" at top & midsection.
4. Minimum height of filter should be 18" & a maximum of 36" above natural ground.
5. When two sections of filter cloth adjoin each other, they shall be overlapped 6" at the posts, & folded.

REINFORCED FILTER FABRIC BARRIER

NOT TO SCALE



CONSTRUCTION NOTES:

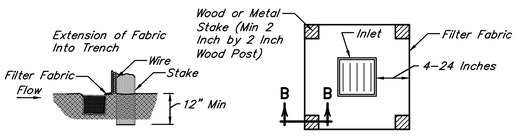
1. Length shall be as shown on the construction drawings, but not less than 50 feet.
2. Thickness shall be not less than 8 inches.
3. Width shall be not less than full width of all points of ingress or egress.
4. Stabilization for other areas shall have the same aggregate thickness and width requirements as the stabilized construction exit, unless otherwise shown on the construction drawings.
5. Stabilized area may be widened or lengthened to accommodate a truck washing area. an outlet sediment trap must be provided for the truck washing area.
6. Stabilized construction exit shall be maintained free of sediment for the duration of the project.

STABILIZED CONSTRUCTION EXIT

NOT TO SCALE

EROSION AND SEDIMENTATION CONTROL NOTES:

1. Prior to start of construction, Contractor shall install erosion and sedimentation controls at location shown on plans.
2. Contractor shall inspect all erosion and sedimentation control systems specified herein, at a minimum of once every calendar day.
3. Contractor shall maintain, repair and/or replace damaged erosion and sedimentation control system throughout the duration of the contract. (No separate pay.)
4. Contractor shall provide protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials.
5. Contractor shall locate fuel/material storage areas away from storm water conveyance systems. Contractor shall use silt fencing, hay bales, or berms around fuel storage areas. (No separate pay.)
6. Contractor shall advise Owner immediately, verbally, and in writing, of any fuel or toxic material spills onto the project/construction area and the action taken to remedy the problem.
7. Contractor is responsible for disposing of his fuels, materials, and contaminated excavations in a legally approved manner. (No separate pay.)
8. Contractor is responsible for complying with all applicable environmental laws.
9. Contractor is responsible for providing adequately maintained sanitary facilities.
10. At completion of the contract, Owner and/or Owner's representative with the Contractor shall examine erosion and sedimentation control system before relieving Contractor of his maintenance responsibilities.
11. If erosion and sedimentation control system is existing from prior contracts, Owner and/or Owner's representatives with the Contractor shall examine the existing erosion and sedimentation control system for damage prior to Contractor starting construction of the contract. Any damage noted at this time shall be repaired at Owner's expense.
12. Contractor shall be responsible for street cleaning, on a daily basis, all mud and dirt deposited on the existing pavement due to his construction activity.
13. If paving contractor removes or punctures timber grate to establish drainage, inlet must be be surrounded by filter fabric fence.



CONSTRUCTION NOTE:

1. See Construction Notes for Filter Fabric Fence.

SILT FENCE INLET PROTECTION BARRIER

NOT TO SCALE

MANHOLE / INLET PROTECTION NOTES:

1. Inlets and manholes that are not complete and/or are subject to conveying storm water flows are to be protected to prevent sediment from entering the proposed or existing storm sewer system.
2. Protection shall consist of one layer of 3x12-inch oak timbers, one (1) inch apart, covered with one layer of woven polypropylene or polyester filter fabric (Exxon GTF 100S, Phillips SUPAC 4WS[UV] or approved equal) held in place with 1/2" staples. Timbers shall be held in place with two (2) 2x4's nailed securely to each timber over the filter fabric. The filter fabric shall extend beyond the perimeter of the oak timbers as to ensure one (1) foot of bury between the manhole or inlet and the surrounding soil as shown.
3. Filter fabric to be cleaned or replaced when it ceases to function properly or as directed by the Engineer.
4. Contractor may submit plans for alternate methods of protection. These alternate methods must be approved prior to use in the field.
5. No separate payment shall be made for inlet and manhole protection. Include the cost in related lump sum bid prices.

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

CIVIL DETAILS
SHEET 3 OF 3

QUIDDITY
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C7
04/05/2024 SHEET NO. 11 OF 25

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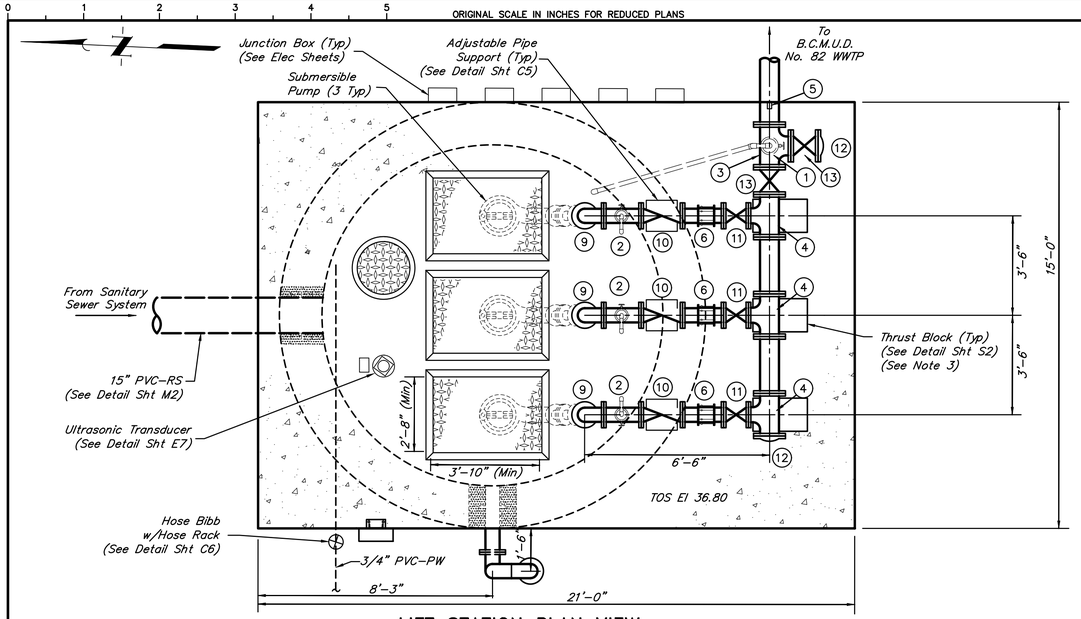
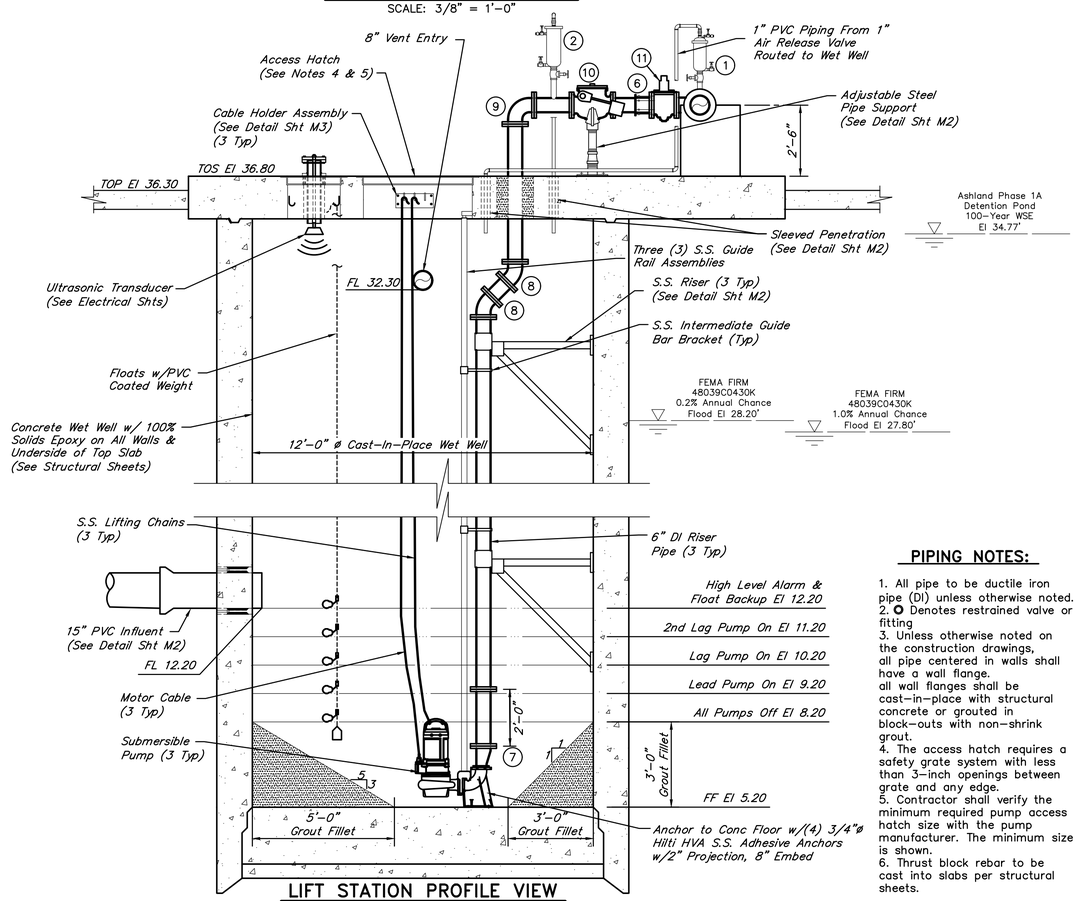
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



LIFT STATION PLAN VIEW

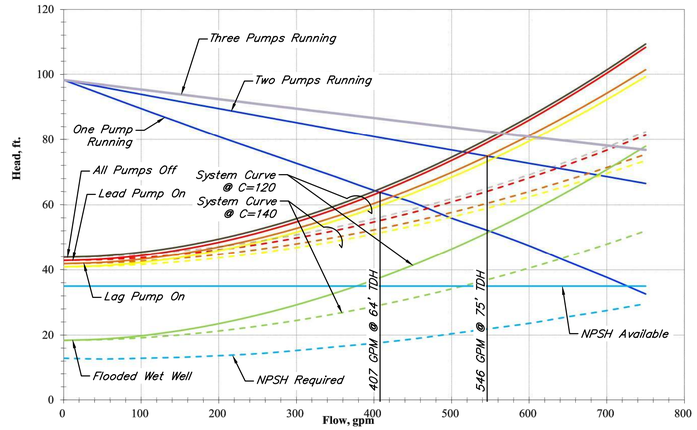
SCALE: 3/8" = 1'-0"



LIFT STATION PROFILE VIEW

SCALE: 3/8" = 1'-0"

PHASE I – SYSTEM CURVE WITH PROPOSED PUMP



NOTE:

The pump curves shown are based on submersible pumps designed to meet the duty condition. The system curve represents approximately 3,100 linear feet eight–inch (8") diameter PVC force main, approximately thirty linear feet (30') of eight–inch (8") diameter DI header pipe, and approximately thirty–nine linear feet (39') of six–inch (6") diameter DI riser pipe. The design static head was calculated from the "1st Lag Pump On" elevation and the water surface elevation in the wastewater treatment plant headworks.

VALVE AND FITTINGS SCHEDULE

NO.	DESCRIPTION
1	1" Air Release Valve
2	1" Air & Vacuum Valve
3	8"x8" Tee, FJ
4	8"x6" Tee, FJ
5	Pressure Gauge (See Detail Sht M3)
6	6" Restrained Coupling Adapter (See Detail Sht M2)
7	6"x4" Eccentric Reducer, FJ
8	6"x45° Bend, FJ
9	6"x90° Bend, FJ
10	6" Air Cushioned Swing Check Valve, FJ
11	6" Eccentric Plug Valve, FJ
12	8" Blind Flange
13	8" Eccentric Plug Valve, FJ

PIPING NOTES:

1. All pipe to be ductile iron pipe (DI) unless otherwise noted.
2. ✪ Denotes restrained valve or fitting
3. Unless otherwise noted on the construction drawings, all pipe centered in walls shall have a wall flange. all wall flanges shall be cast–in–place with structural concrete or grouted in block–outs with non–shrink grout.
4. The access hatch requires a safety grate system with less than 3–inch openings between grate and any edge.
5. Contractor shall verify the minimum required pump access hatch size with the pump manufacturer. The minimum size is shown.
6. Thrust block rebar to be cast into slabs per structural sheets.

SINGLE PUMP DATA

PUMP DATA	SINGLE PUMP OPERATING IN OLD PVC PIPING (C=120)	SINGLE PUMP WITH TWO PUMPS OPERATING IN OLD PVC PIPING (C=120)
FLOW (GPM)	407	276
TDH (FT.)	64	75
MIN. OVERALL EFF. (%)	60	50
STATIC HEAD (FT.)	42.9	41.9
SHAFT HP (MAX)	10.2	9.1
RPM	3,570	3,570

PHASE I – STATION OPERATION TABLE

RISING LEVEL CYCLE		
ELEVATION	ACTION	PUMP(S) IN OPERATION
9.20	LEAD PUMP TURNS ON	LEAD PUMP ON
10.20	LAG PUMP TURNS ON	LEAD & LAG PUMP ON
11.20	2nd LAG PUMP TURNS ON	LEAD & LAG PUMPS ON
12.20	HIGH LEVEL ALARM	LEAD & LAG PUMPS ON
FALLING LEVEL CYCLE		
ELEVATION	ACTION	PUMP(S) IN OPERATION
8.20	ALL PUMPS TURN OFF	NONE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

LIFT STATION PLAN AND PROFILE

QUIDDITY
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6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

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LICENSED PROFESSIONAL ENGINEER

M1
04/05/2024 SHEET NO. 12 OF 25

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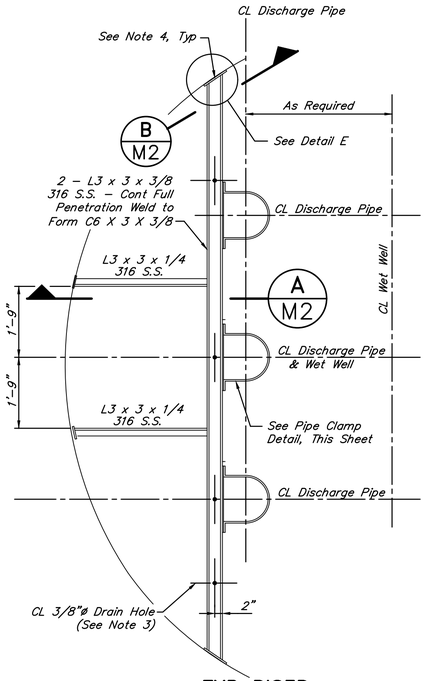
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

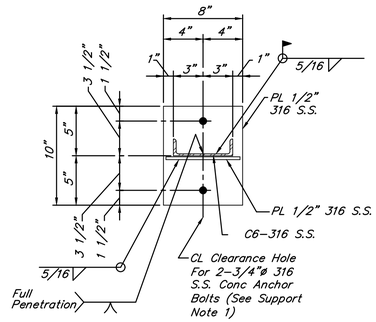


TYP RISER SUPPORT PLAN FOR 3 PUMPS

NOT TO SCALE

SUPPORT NOTES:

1. Concrete anchor bolts shall have 6" minimum embedment and shall be type 316 stainless steel.
2. See station and structural drawings for dimensions and information not shown.
3. Drill 3/8" holes 1" off CL of C6 at midspan between lateral pipe supports to allow for drainage. 3 holes per channel where 2 lateral supports required; 2 holes per channel where 1 lateral support required.
4. Set 1/4" neoprene gasket on wall surface in Sika 1A (or equal) sealant.



B M2 SECTION

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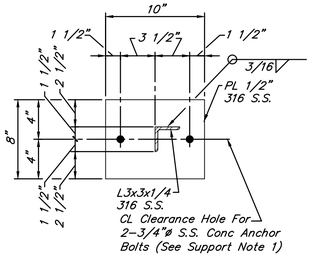

C M2 SECTION

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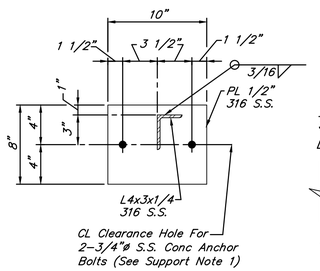

D M2 SECTION

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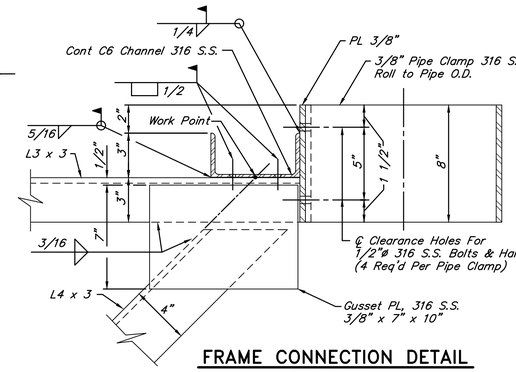
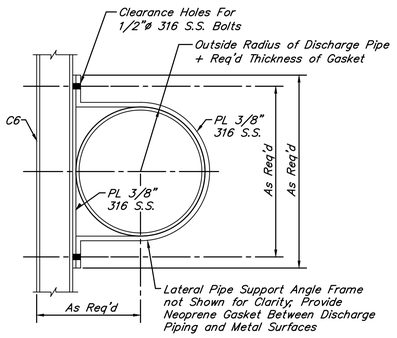


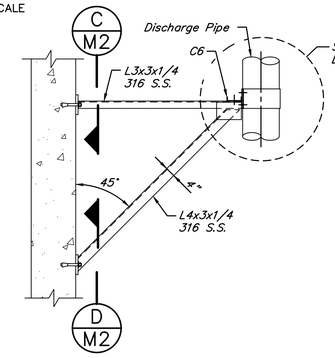
FRAME CONNECTION DETAIL

NOT TO SCALE



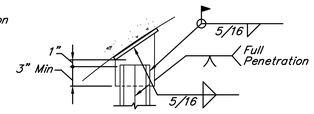
PIPE CLAMP DETAIL

NOT TO SCALE

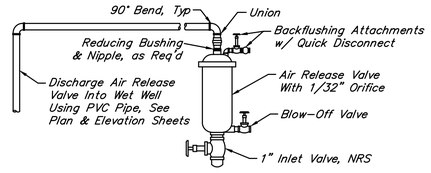


A M2 TYP LATERAL PIPE SUPPORT FRAME

NOT TO SCALE

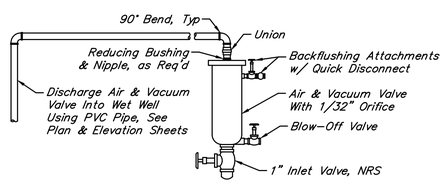


DETAIL E



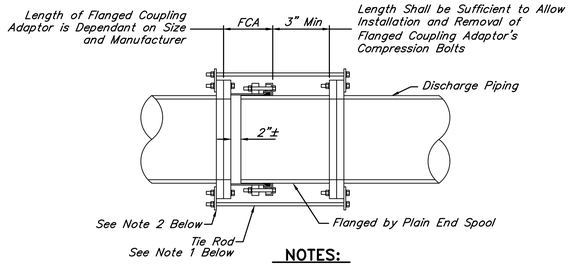
TYPICAL AIR RELEASE VALVE ASSY

NOT TO SCALE



TYPICAL AIR & VACUUM VALVE ASSY

NOT TO SCALE

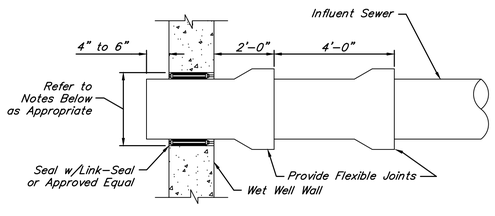


NOTES:

1. Provide a number of tie rods equal to 1/2 the number of flange bolts. Evenly space installation of tie rods. Diameter of tie rods to be equal to the diameter of flange bolts. Length of tie rods to be determined by Contractor based on size and manufacturer of flanged coupling adaptor and final length of spool piece.
2. Provide 316 S.S. tab for attachment of tie rods. Size to be determined by Contractor.
3. Contractor to submit details during shop drawing submission.
4. All hardware shall be 316 stainless steel. Tie rods should be threaded.
5. This restraint does not replace thrust blocks to be provided at other locations.

TYP FLANGED COUPLING ADAPTOR RESTRAINT DETAIL

NOT TO SCALE

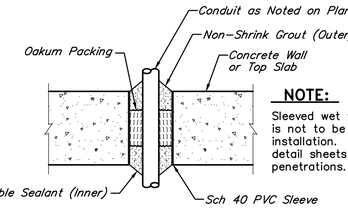


FOR OPENINGS TO BE CORED (CAISSON CONSTRUCTION):

1. Identify pipe penetration location with 1" dia plastic pipe sleeve.
2. Diameter of penetration opening shall be equal to pipe outer diameter plus 2 times link–seal thickness.
3. Provide additional reinforcement around penetration opening as per detail on structural sheets before casting wall.

TYP INFLUENT SEWER ENTRY DETAIL

NOT TO SCALE

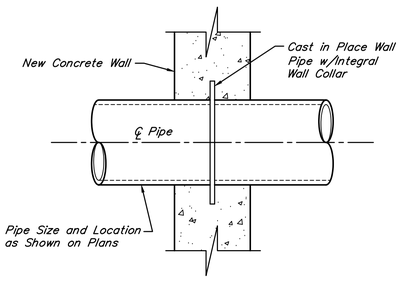


NOTE:

Sleeved wet well penetration is not to be used for conduit installation. See electrical detail sheets for conduit penetrations.

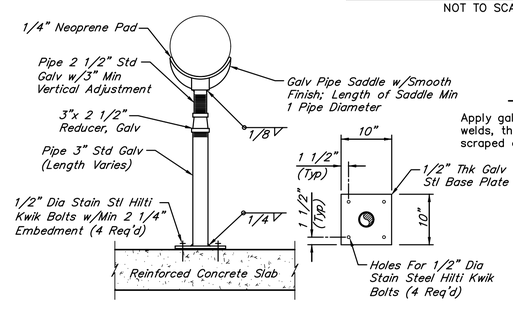
SLEEVED WET WELL PENETRATION DETAIL

NOT TO SCALE



PIPE PENETRATION DETAIL

NOT TO SCALE



NOTE:

Apply galvanizing paint to all welds, threads and any areas scraped during construction.

3" ADJUSTABLE STEEL PIPE SUPPORT

NOT TO SCALE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

MECHANICAL DETAILS – SHEET 1 OF 2

QUIDDITY
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M2
04/05/2024 SHEET NO. 13 OF 25

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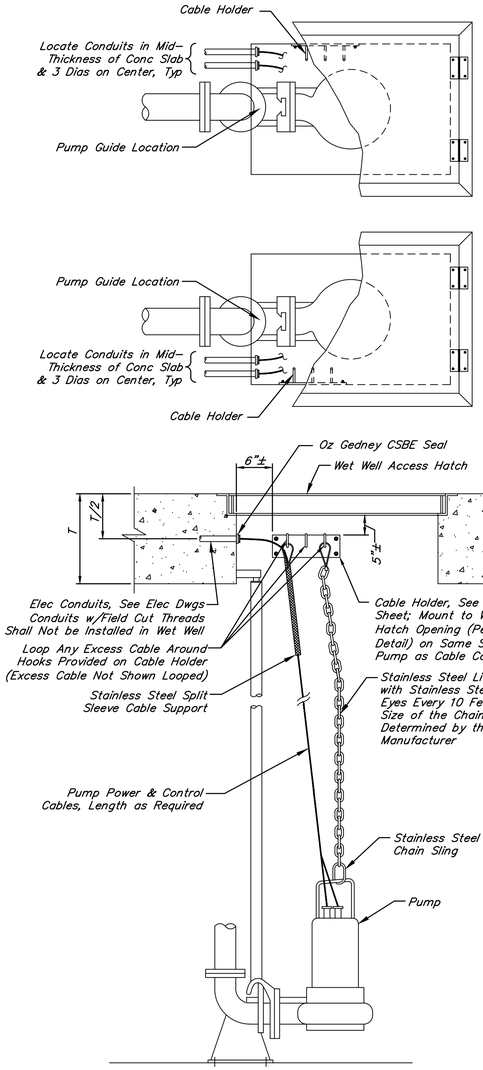
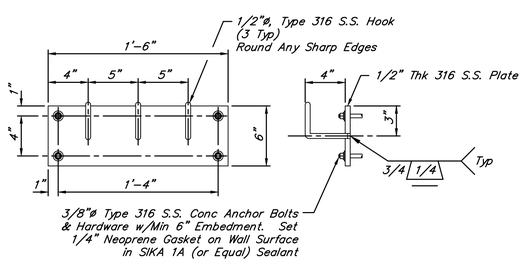


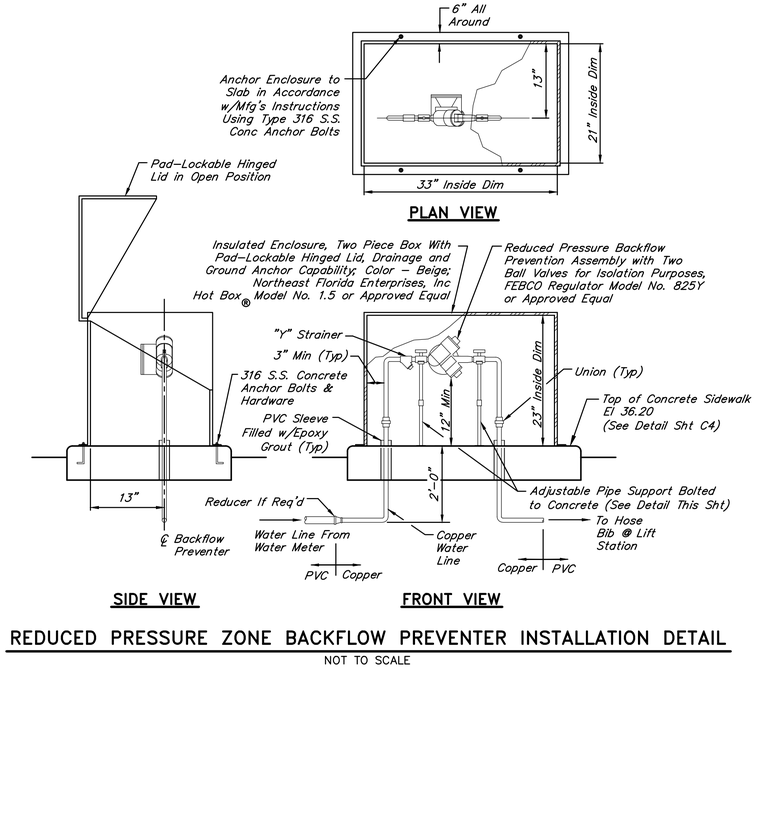
TYP PUMP LIFTING & CABLING DETAIL

NOT TO SCALE



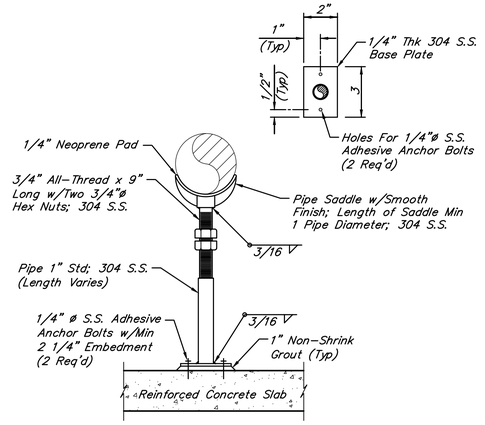
TYPICAL CABLE HOLDER ASSY

NOT TO SCALE



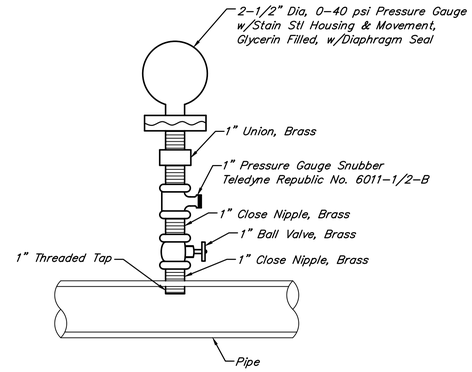
REDUCED PRESSURE ZONE BACKFLOW PREVENTER INSTALLATION DETAIL

NOT TO SCALE



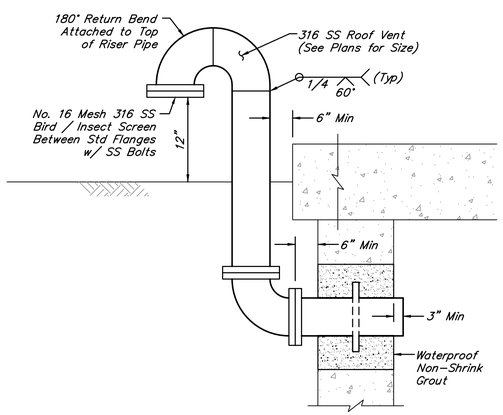
ADJUSTABLE STEEL PIPE SUPPORT FOR BACKFLOW PREVENTER

NOT TO SCALE



PRESSURE GAUGE W/DIAPHRAGM SEAL DETAIL

NOT TO SCALE



WET WELL VENT DETAIL

NOT TO SCALE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

MECHANICAL DETAILS - SHEET 2 OF 2

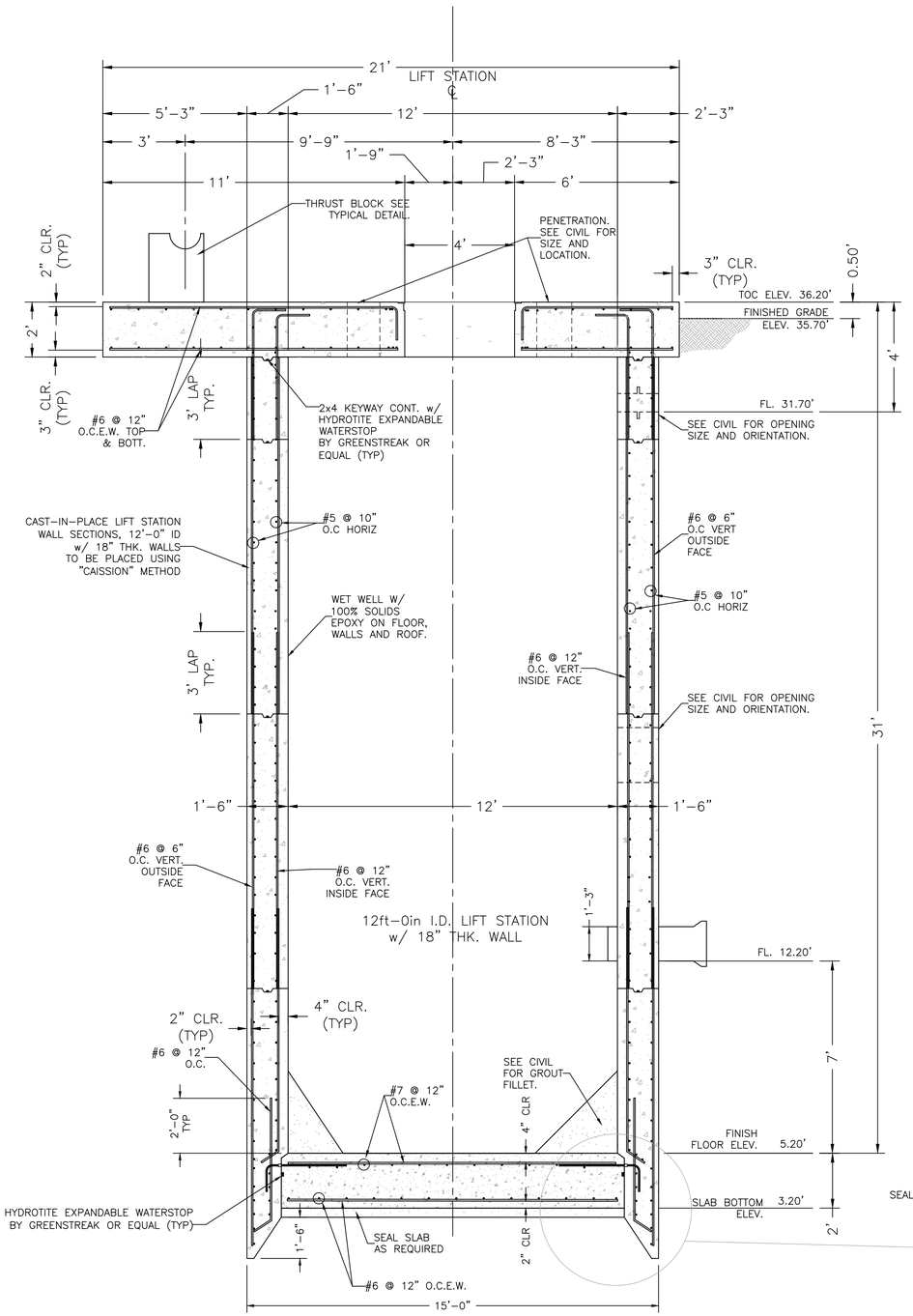
QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY: DAO
DATE: APRIL 2024 DWN. BY: BAW
JOB NO. 16759-0010-09 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

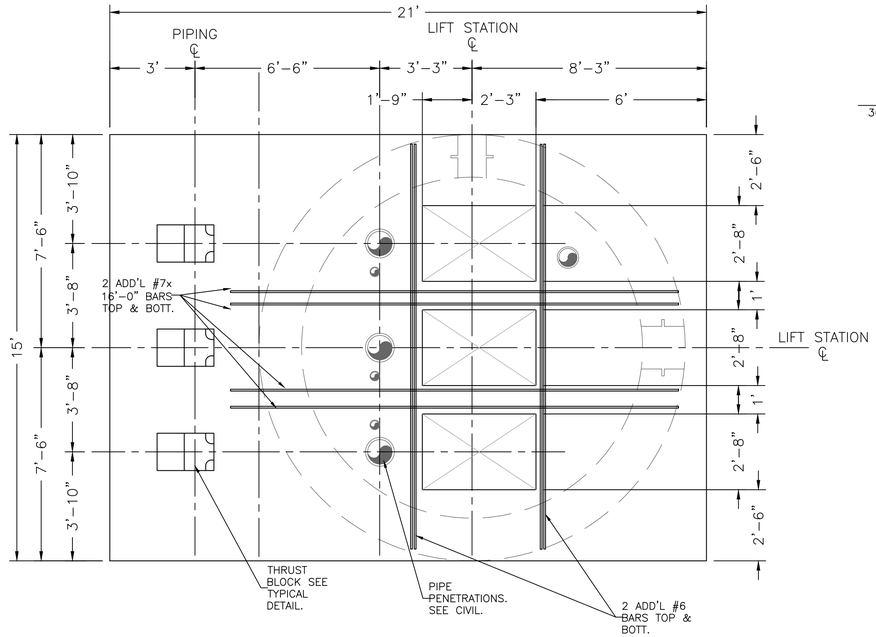
STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER

M3
04/05/2024 SHEET NO. 14 OF 25

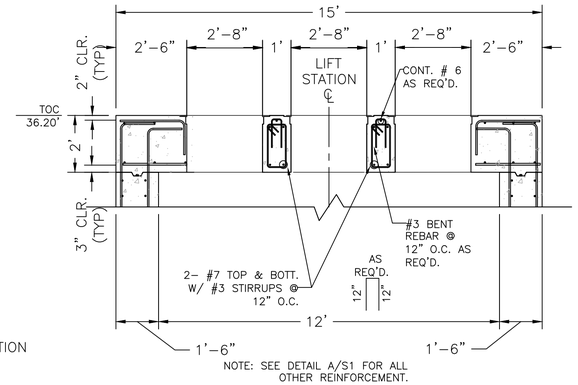
K:\16759\16759-0010-09 Ashland -Lift Station No. 1\2 Design Phase\CAD\MISCD.dwg



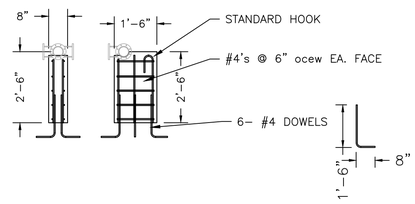
A S1 SECTION
SCALE: 3/8" = 1'-0"



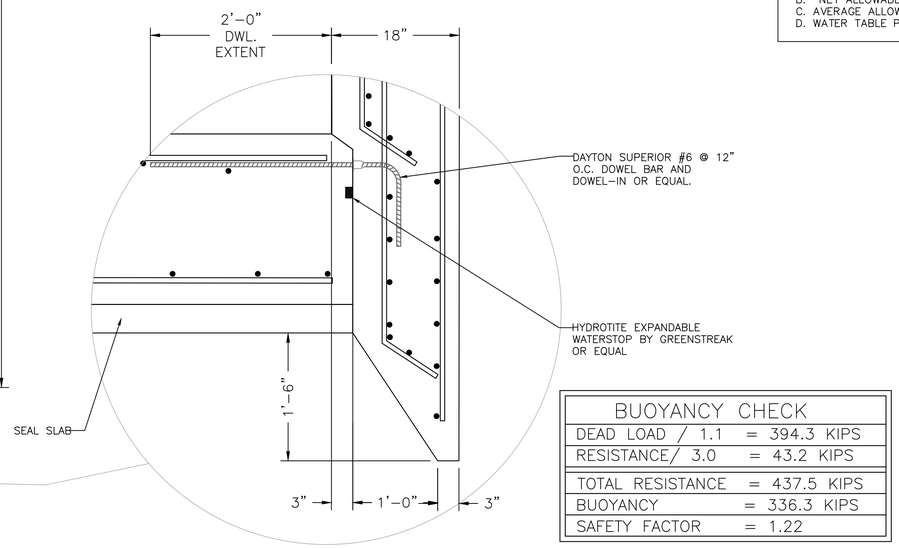
B S1 LIFT STATION PLAN
SCALE: 3/8" = 1'-0"



C S1 LIFT STATION SECTION
SCALE: 3/8" = 1'-0"



D S1 THRUST BLOCK DETAIL
SCALE: 3/8" = 1'-0"



BUOYANCY CHECK	
DEAD LOAD / 1.1	= 394.3 KIPS
RESISTANCE/ 3.0	= 43.2 KIPS
TOTAL RESISTANCE	= 437.5 KIPS
BUOYANCY	= 336.3 KIPS
SAFETY FACTOR	= 1.22

GEOTECHNICAL REPORT

A. SOIL REPORT BY TOLUNAY-WONG ENGINEERS,INC- PROJECT NO 22.14.070.
B. NET ALLOWABLE BEARING PRESSURE - 4000 PSF
C. AVERAGE ALLOWABLE FRICTIONAL RESISTANCE - 500 PSF
D. WATER TABLE PER SOIL REPORT - 17.2 FT BELOW SURFACE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

STRUCTURAL PLAN AND PROFILE

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

STATE OF TEXAS
PAUL E. MALEK
82860
LICENSED PROFESSIONAL ENGINEER
3-28-24
Paul E. Malek, PE

THESE PLANS WERE PREPARED UNDER THE SUPERVISION OF
MBC MANAGEMENT
FIRM NO. F-789
7984 HWY 6, NAVASOTA, TX 77868
CONSULTING ENGINEER PAUL MALEK, P.E.
P.E. LICENSE # 82860

SCALE: _____ DGN. BY: _____
DATE: APRIL 2023 DWN. BY: _____
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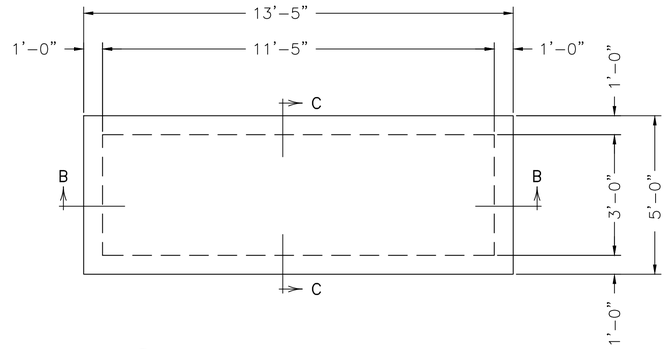
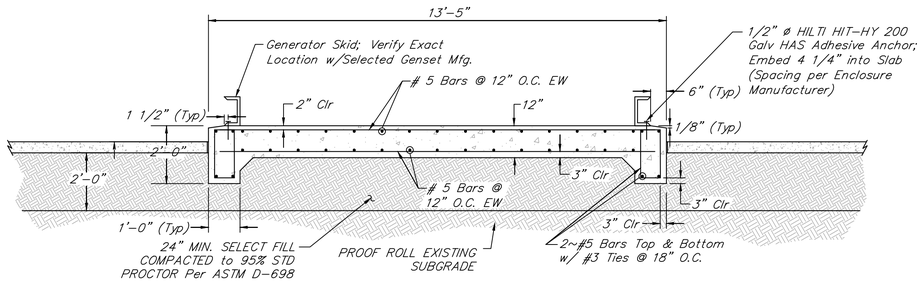
SUBMITTED: SURV. BY: _____
F.B. NO. _____

S1
SHEET NO. 15 OF 25



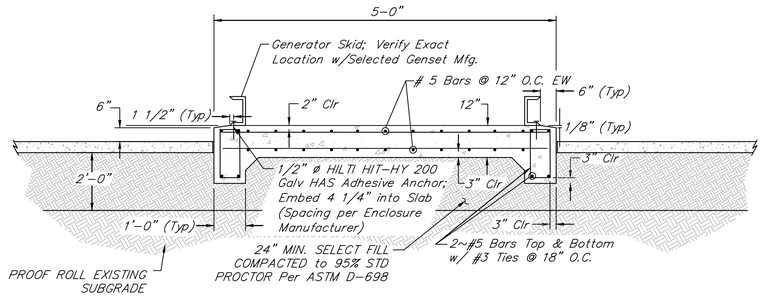
A S2 GENERATOR PAD PLAN

SCALE: NTS



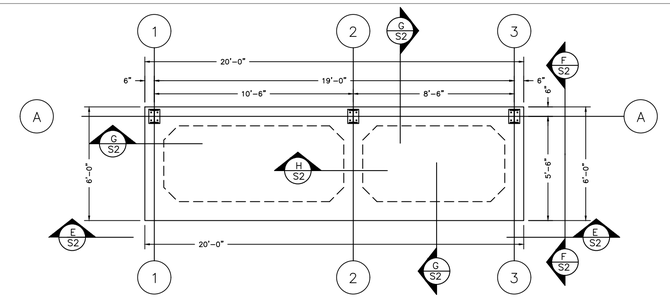
B S2 GENERATOR PAD SECTION

SCALE: NTS



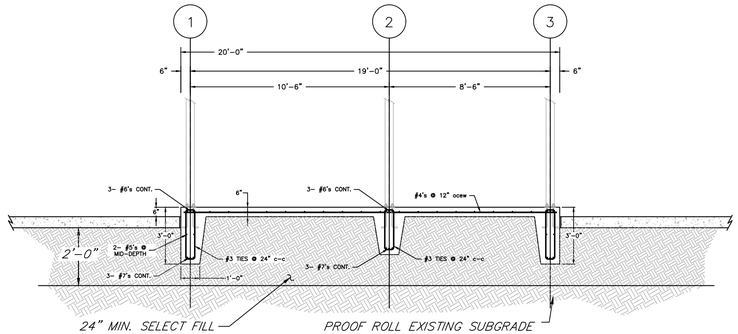
C S2 GENERATOR PAD SECTION

SCALE: NTS



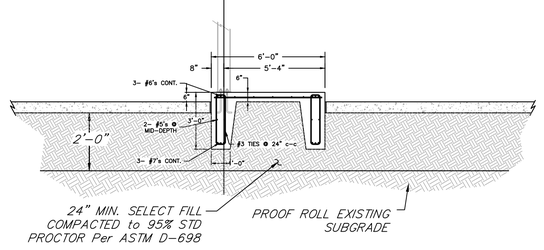
D S2 SERVICE RACK & CONTROL PANEL PAD PLAN

SCALE: 1/4" = 1'-0"



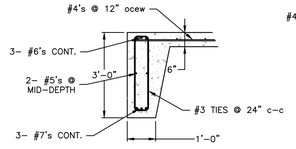
E S2 SERVICE RACK & CONTROL PANEL PAD SECTION

SCALE: 1/4" = 1'-0"



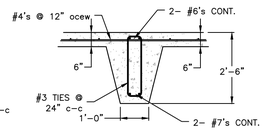
F S2 SERVICE RACK & CONTROL PANEL PAD SECTION

SCALE: 1/4" = 1'-0"



G S2 SECTION

NTS



H S2 SECTION

NTS

STRUCTURAL NOTES:

I. GENERAL

A. ALL STRUCTURAL PLAN DIMENSIONS ARE INTERPRETED FROM AND SHALL BE VERIFIED WITH THE PLANT DRAWINGS. THE ENGINEER SHALL BE NOTIFIED IF DISCREPANCIES EXIST.
B. STRUCTURAL DRAWINGS TO BE COORDINATED WITH ARCHITECTURAL, ELECTRICAL, MECHANICAL DRAWINGS FOR ALL OPENINGS, INSERTS, AND RELATED ITEMS.
C. ANY UNUSUAL CONDITIONS ENCOUNTERED SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO CONCRETE PLACEMENT.
D. LOCATIONS OF CONSTRUCTION JOINTS NOT SHOWN SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONCRETE PLACEMENT.
E. THE CONTRACTOR SHALL ADHERE TO THE TRENCH AND EXCAVATION SAFETY REQUIREMENTS SET FORTH IN THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS 29 CFR, PART 1926, SUBPART P, EXCAVATIONS.

II. CONCRETE

A. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS IN ACCORDANCE WITH ASTM C-39 AND SHALL HAVE A MINIMUM MODULUS OF RUPTURE OF 450 PSI AS 28 DAYS IN ACCORDANCE WITH ASTM C-78. AN AIR ENTRAINMENT AGENT SHALL BE USED. (FLY ASH SHALL NOT BE USED).
B. WHERE CONCRETE IS PLACED AGAINST FORMS OR SEAL SLABS REINFORCING BARS SHALL HAVE A MINIMUM OF 2 INCHES CLEAR COVER, A MINIMUM OF 4 INCHES OF CLEAR COVER WHEN EXPOSED TO WASTEWATER, UNLESS SHOWN OTHERWISE. WHERE CONCRETE IS PLACED AGAINST EARTH, REINFORCING BARS SHALL HAVE A MINIMUM OF 3 INCHES CLEAR COVER.
C. CONCRETE FACES SHALL NOT DEVIATE MORE THAN 3/16" FROM THE PLAN DIMENSIONS.
D. UNLESS NOTED, ANCHOR BOLTS SHALL BE STAINLESS STEEL.

III. REINFORCING STEEL

A. ALL REINFORCING STEEL SHALL BE ASTM A-615, GRADE 60.
B. DETAILING OF REINFORCING SHALL BE IN ACCORDANCE WITH ACI 315, LATEST EDITION, UNLESS SHOWN OTHERWISE. PLACING OF REINFORCING SHALL BE IN ACCORDANCE WITH C.R.S.I., " RECOMMENDED PRACTICE FOR PLACING OF REINFORCING BARS", LATEST EDITION.
C. WHERE IT IS NECESSARY TO SPLICE REINFORCEMENT AT LOCATIONS OTHER THAN THOSE SHOWN ON THE DRAWINGS, THE SPLICE LOCATIONS SHALL BE APPROVED BY THE ENGINEER. LAP SPLICES AND EMBEDMENT LENGTHS, NOT SHOWN ON THE DRAWINGS, SHALL BE IN ACCORDANCE WITH C.R.S.I., LATEST EDITION.

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

GENERATOR PAD / ELECTRICAL CANOPY FOUNDATION

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: APRIL 2023 DWN. BY: _____
JOB NO. 16759-0010-09 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
PAUL E. MALEK
82860
LICENSED
PROFESSIONAL ENGINEER
3-28-24
Paul E. Malek, PE

THESE PLANS WERE PREPARED UNDER THE SUPERVISION OF
MBC MANAGEMENT
FIRM NO. F-789
7984 HWY 6, NAVASOTA, TX 77868
CONSULTING ENGINEER PAUL MALEK, P.E.
P.E. LICENSE # 82860

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

BUILDING CODE:
1. 2015 INTERNATIONAL BUILDING CODE.
2. BUILDING CATEGORY: IV, NON-HURRICANE.
3. IMPORTANCE FACTOR: 1.15.

LOADS:
1. ROOF DEAD LOAD = 3 PSF.
2. ROOF LIVE LOAD = 20 PSF (NON-REDUCIBLE).
3. COLLATERAL LOAD = 3 PSF.
4. SUPERIMPOSED ROOF LOAD:
   A. NONE.
5. GROUND SNOW LOAD = 5 PSF.
6. ROOF SNOW LOAD = 5 PSF.
7. WIND LOAD:
   BASIC WIND SPEED = 150 MPH.
   BUILDING CATEGORY III
   WIND EXPOSURE "C"
   WIND PRESSURE = 105.98 PSF
8. SEISMIC LOAD:
   SEISMIC USE GROUP: I
   SPECTRAL RESPONSE COEFFICIENTS
   SDS = 0.010
   SD1 = 0.040
   SITE CLASS: D
   BASIC SEISMIC-FORCE-RESISTING SYSTEM:
   ORDINARY STEEL BRACED FRAMES
   ANALYSIS PROCEDURE:
   EQUIVALENT LATERAL FORCE PROCEDURE

ENGINEERED METAL BUILDING

A. RIGID FRAMES: ASTM A 529. PRE-ENGINEERED METAL BUILDING FRAMES TO SPAN AND ROOF SLOPES SHOWN AND DESIGNED TO SUPPORT DEAD LOADS INDICATED, LIVE LOADS OF 20 psf AND WIND LOADS AS SET FORTH BY THE INTERNATIONAL BUILDING CODE.

B. DESIGN:
1. GENERAL:
   A. ALL STRUCTURAL STEEL MEMBERS AND WELDED PLATE MEMBERS SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST EDITION OF AISC SPECIFICATIONS.
   B. ALL LIGHT-GAGE, COLD FORMED STRUCTURAL MEMBERS AND COVERINGS SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST EDITION OF THE AISI SPECIFICATIONS.
2. DESIGN LOADS:
   A. LIVE LOAD:
      1. ROOF LIVE LOAD: 20 psf.
   B. DEAD LOAD:
      1. 3.0 psf IN ADDITION TO STEEL BUILDING D.L. (COLLATERAL LOAD)
   C. WIND LOAD:
      1. MEET OR EXCEED INTERNATIONAL BUILDING CODE.
      2. MINIMUM WIND SPEED - 130 mph, 3 sec GUST
   D. UPLIFT (APPLIED UPWARDS TO THE ROOF SYSTEMS IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE.)
   E. SEISMIC LOAD:
      1. MEET OR EXCEED INTERNATIONAL BUILDING CODE.
   F. SNOW LOAD:
      1. MEET OR EXCEED INTERNATIONAL BUILDING CODE.
   G. DESIGN LOAD COMBINATIONS:
      1. DEAD + FLOOR LIVE + ROOF LIVE (OR SNOW).
      2. DEAD + FLOOR LIVE + WIND LOAD (OR SEISMIC).
      3. DEAD + FLOOR LIVE + WIND + 1/2 SNOW.
      4. DEAD + FLOOR LIVE + 1/2 WIND + SNOW.
      5. DEAD + FLOOR LIVE + SNOW + SEISMIC.

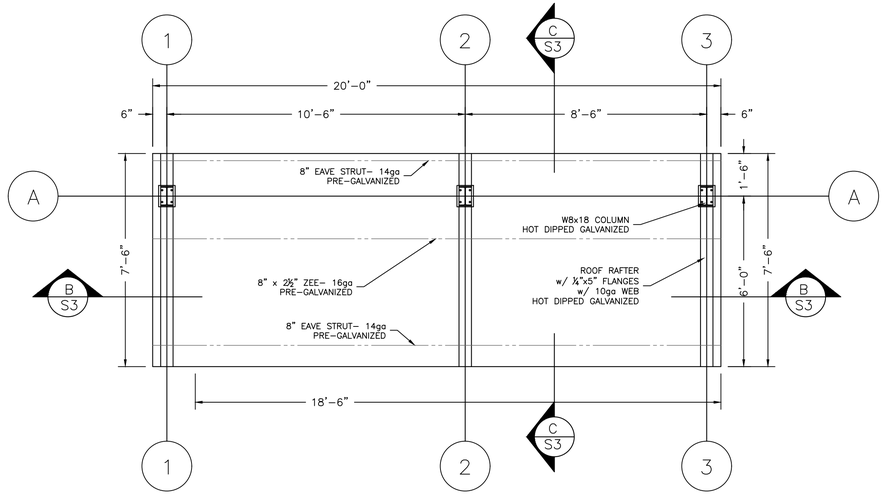
C. MEMBERS AND CONNECTIONS:
1. HOT-ROLLED STRUCTURAL SHAPES: 36 ksi, ASTM A 36.
2. PLATE AND BAR STOCK MEMBERS: 42 ksi, ASTM A 529.
3. COLD FORMED MEMBERS: 50 ksi, ASTM A 607 (GRADE 50).
4. ROD BRACING: 36 ksi, ASTM A 36.
5. MISCELLANEOUS MEMBERS: 42 ksi.
6. PRIMARY BOLTED CONNECTIONS: ASTM A 325.
7. SECONDARY BOLTED CONNECTIONS: ASTM A 307.
8. SHOP CONNECTIONS: AWS STRUCTURAL WELDING CODE.

D. MEMBER COATINGS:
1. HOT DIPPED GALVANIZED MAIN FRAMES.
2. PRE-GALVANIZE SECONDARY MEMBERS.

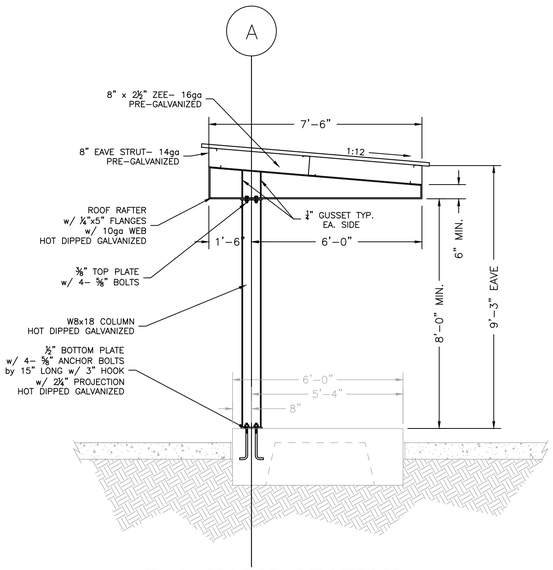
E. ROOFING MATERIAL:
1. "PBR" ROOF PANEL.
2. 26 ga. "GALVALUME" METAL
3. NO ROOF INSULATION.

F. WALL MATERIAL:
1. NO WALL PANEL.

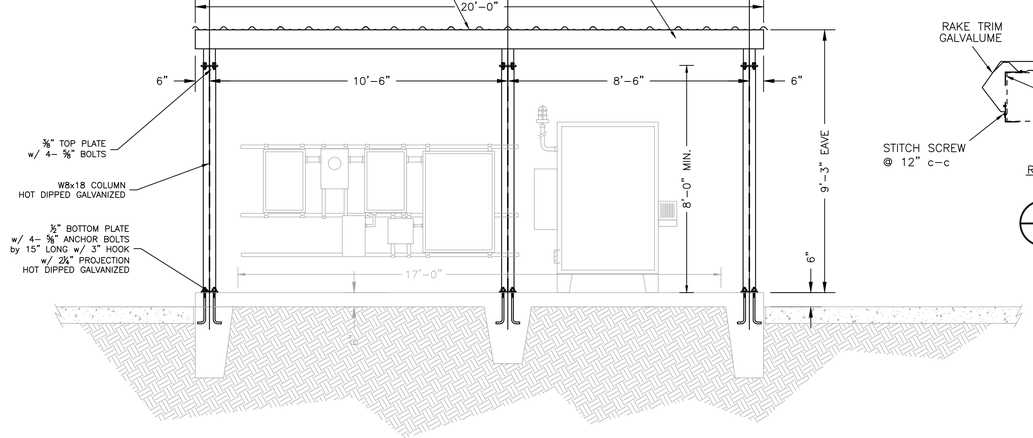
G. TRIM MATERIAL:
1. COLOR AS PER OWNER.



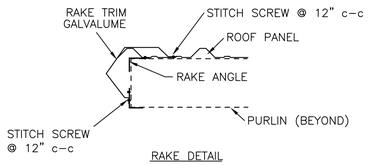
A/S3 CANOPY PLAN
SCALE: 3/8" = 1'-0"



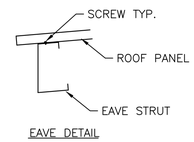
C/S3 CANOPY SECTION
SCALE: 3/8" = 1'-0"



B/S3 CANOPY SECTION
SCALE: 3/8" = 1'-0"



RAKE DETAIL



EAVE DETAIL

D/S3 BLDG. DETAILS
NTS

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL EQUIPMENT CANOPY

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

STATE OF TEXAS
PAUL E. MALEK
82860
LICENSED
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Paul E. Malek, P.E.

THESE PLANS WERE PREPARED UNDER THE SUPERVISION OF
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7984 HWY 6, NAVASOTA, TX 77868
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S3
SHEET NO. 17 OF 25

Z:\PUBLIC\Design Projects_ 2024\0006 - Quiddity - Ashland LS 1\Revit CAD\Ashland LS No. 1 - 03.28.24.dwg Mar 28,2024 - 2:42pm rvala

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

ELECTRICAL PLAN SHEET SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
(A)	LIGHT FIXTURE (LETTER INDICATES TYPE PER SCHEDULE)	(FS)	FLOAT SWITCH
A	SINGLE SPECIAL PURPOSE RECEPTACLE (LETTER INDICATES TYPE PER SCHEDULE)	(S)	SOLENOID VALVE
	TELEPHONE UTILITY SYSTEM OUTLET	(T)	ELECTRIC THERMOSTAT
	CLASS 1, DIV I, CONDUIT SEAL	T	TEMPERATURE ACTUATED DEVICE
WP	RECEPTACLE, WP INDICATES A WET PROOF LOCATION COVER. NEMA 3R, UNLESS OTHERWISE INDICATED.	$	SINGLE POLE TOGGLE SWITCH
	UNFUSED SAFETY SWITCH – WP, 3P, 30A, 600V, NEMA 3R, UNLESS OTHERWISE INDICATED.	$2	DOUBLE POLE TOGGLE SWITCH
30	FUSED SAFETY SWITCH – 3P, 600V, 30A MINIMUM, NEMA 3R OR AS REQUIRED TO ACCOMMODATE FUSE SIZE INDICATED	$3	3 – WAY SWITCH
	COMBINATION PROTECTIVE DEVICE & MAGNETIC STARTER	$T	MANUAL ROTARY TIMER LIGHT SWITCH
	SINGLE UNIT PUSHBUTTON STATION	$WP	SINGLE POLE TOGGLE SWITCH, WP INDICATES WEATHERPROOF COVER
	2–UNIT PUSHBUTTON STATION	(J)	JUNCTION BOX
I	ON/OFF SELECTOR SWITCH		EXPOSED CONDUIT
S	"START/STOP" SELECTOR SWITCH		UNDERGROUND CONDUIT
	AIR TERMINAL	BC	BARE STRANDED GROUND CONDUCTOR
	FLEX CONDUIT	G	GROUND CONDUCTOR UNDERGROUND
	EXPOSED PUMP CABLE	T	TELEPHONE CONDUCTORS
	CONDUIT CONCEALED IN FLOOR SLAB OR UNDER FLOOR SLAB. (CONDUITS 1–1/2" OR LARGER SHALL BE INSTALLED UNDER FLOOR SLAB). CONDUITS RUN UNDER FLOOR SLAB SHALL BE ENCASED IN CONCRETE. SEE NOTE 2	E	EMPTY CONDUIT
	HOMERUN TO PANEL OR MCC AS NOTED		CAPPED CONDUIT
A E0 E	CONCRETE ENCASED DUCTBANK (SECTION INDICATES CONDUIT CONFIGURATION & DESIGNATIONS)	OH	POWER COMPANY OVERHEAD POLE LINE
	LIGHTING PANEL	LS	LIMIT SWITCH
	UTILITY METERING CABINET	FS	FLOW SWITCH
	TELEPHONE UTILITY SYSTEM BACKBOARD	PS	PRESSURE SWITCH
	DISTRIBUTION PANEL	TS	TORQUE SWITCH
	CABINET OR PULL BOX	PE	PNUEMATIC/ELECTRIC SWITCH
	EXISTING	PLS	PROXIMITY LIMIT SWITCH
	PROPOSED	MS	MAGNETIC REED DOOR SWITCH
	DEMOLITION WORK ITEMS	T	TRANSFORMER
			DEVICE AS DESIGNATED
			EXISTING POWER COMPANY POLE
			PROPOSED POWER COMPANY POLE
		XXX	CONDUIT/CONDUCTOR TAGS

CONTROL DIAGRAM SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
CR	CONTROL RELAY		HOLDING COIL CONTACT (NORMALLY OPEN–NORMALLY CLOSED)
TD	TIME DELAY RELAY	CR CR	CONTROL RELAY CONTACT (NORMALLY OPEN–NORMALLY CLOSED)
R	LED TYPE PILOT LIGHT PUSH–TO–TEST W–WHITE; R–RED; G–GREEN TEST WIRING NOT SHOWN FOR CLARITY	F	FLOAT SWITCH
	THERMOSTAT	PE	PHOTOELECTRIC SWITCH
TD 0–0–X	TIME DELAY CONTACT (O=OPEN, X=CLOSED, DESIGNATION INDICATES CONTACT POSITION WHEN RELAY IS RESET–TIMING–TIMED OUT)	B	BELL
	SPACE HEATER	ETM	ELASPED TIME METER
TD1 NO TC	CONTACT ON TIME DELAY RELAY TIME DELAY CLOSED AFTER ENERGIZATION		CONTROL POWER TRANSFORMER
		M	MOTOR STARTER OPERATING COIL
OFF–ON	ON–OFF SWITCH, 2 POSITION TOGGLE	A	LIGHT FIXTURE, A = TYPE
	PUSHBUTTON, NORMALLY CLOSED		MOTOR CONTROL STATION
	PUSHBUTTON, NORMALLY OPEN		HAND–OFF–AUTO SELECTOR SWITCH
	SELECTOR SWITCH	SC	SURGE CAPACITOR
	CONTROL STATION/DISCONNECT SWITCH		SURGE ARRESTER
	MOMENTARY RESET PUSHBUTTON		CONDUIT STUB UP
M	AUXILIARY STARTER CONTACTS	H O A	HAND SELECTOR SWITCH
	PRESSURE SWITCH, OPENS ON RISE		
	PRESSURE SWITCH, CLOSES ON RISE		
	LEVEL OR LEAK DETECTION SWITCH		FUSE
	LIMIT SWITCH, NORMALLY CLOSED		SOLENOID VALVE
	LIMIT SWITCH, NORMALLY OPEN		
	LIMIT SWITCH, NORMALLY OPEN, HELD CLOSED		SPACE HEATER
	LIMIT SWITCH, NORMALLY CLOSED, HELD OPEN	OL's X2	OVERLOADS
	TEMPERATURE ACTUATED SWITCH, OPENS ON RISE		GROUND CONNECTION
	TEMPERATURE ACTUATED SWITCH, CLOSES ON RISE	R	PUSH–TO–TEST INDICATING LIGHT
	POWER FACTOR CORRECTION CAPACITOR		

ONE–LINE DIAGRAM LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	MOLDED CASE CIRCUIT BREAKER	LS	LOCK–STOP STATION (MAINTAINED CONTACT)
	COMBINATION "MCP" MOTOR STARTER	HOA	HAND–OFF–AUTO SWITCH
PFR	PHASE FAILURE RELAY	ETM	ELAPSED TIME METER
	SPACE HEATER	MS	MOISTURE SENSOR
F	EXHAUST FAN	NG	NEUTRAL/GROUND PAD
G	INDICATING LIGHT (COLOR NOTED)	TS	TEMPERATURE SENSOR IN MOTOR
3/4	3 PHASE MOTOR (HORSEPOWER NOTED)	GB	GROUND BUS
SPD	SURGE PROTECTIVE DEVICE	IC	MICRO–SWITCH – STARTER DISCONNECT TO PREVENT CONTROL OPERATION WHEN MOTOR IS DE–ENERGIZED
	SYSTEM GROUND	RVSS	REDUCED VOLTAGE SOFT STARTER W/INTERNAL BYPASS CONTACTOR
	SERVICE HEAD	FS	FLOAT SWITCH
	TRANSFORMER		FUSED SWITCH
	CURRENT TRANSFORMER	R	LED TYPE PILOT LIGHT PUSH–TO–TEST W–WHITE; R–RED; G–GREEN TEST WIRING NOT SHOWN FOR CLARITY
	FUSE		
	POWER FACTOR CORRECTION CAPACITOR		
M	SERVICE METER		
3	CONTROL CONTACT, 3 = NEMA STARTER SIZE		
PM	3 PHASE POWER MONITOR (SINGLE PHASE PROTECTION RELAY)		
3 OL'S M	NEMA STANDARD MAGNETIC MOTOR STARTER OPERATING COIL		
	THERMAL OVERLOAD		
	AUTOMATIC SWITCH		
MCP	MOTOR CIRCUIT PROTECTOR		

ABBREVIATIONS:

A	AMP	GFI	GROUND FAULT INTERRUPT	N	NEUTRAL
ADJ	ADJUSTABLE	GND	GROUND	N3R	NEMA 3R
AFF	ABOVE FINISHED FLOOR	HL&P	HOUSTON LIGHTING & POWER	N4X	NEMA 4X
AI	ANALOG INPUT	H–O–A	HAND OFF AUTO	N.C.	NORMALLY CLOSED
ALT	ALTERNATOR	HPS	HIGH PRESSURE SODIUM	NEC	NATIONAL ELECTRICAL CODE
AO	ANALOG OUTPUT	INC	INCANDESCENT	NEUT	NEUTRAL
ATS	AUTOMATIC TRANSFER SWITCH	JB	JUNCTION BOX	N.O.	NORMALLY OPEN
C	CONDUIT	KA SYM	THOUSAND AMPS SYMMETRICAL	OL	OVERLOAD
CA	CABLE	KS	KEY SWITCH	P	POLE
CAB	CABINET	KVA	KILO–VOLT–AMPS	PLC	PROGRAMMABLE LOGIC CONTROLLER
CAT.	CATALOG	KW	KILO–WATT	POS	POSITION
CB	CIRCUIT BREAKER	L	LINE	PS	PRESSURE SWITCH
CKT	CIRCUIT	LOS	LOCK OUT STOP	PVC	POLYVINYL CHLORIDE
CNP	CENTERPOINT POWER	LS	LIMIT SWITCH	PVC RGS	PVC COATED RIGID GALV CONDUIT
COMM	COMMUNICATIONS	LSI	LONG TIME, SHORT TIME, INSTANTANEOUS	PWR	POWER
CONT	CONTINUED	LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT	R	RELAY
CPT–N	CONTROL POWER TRANSFORMER NEUTRAL	LV	LOW VOLTAGE	RALM	PUMP ALARM RELAY
CPU	CENTRAL PROCESSING UNIT	LVN	LOW VOLTAGE NEUTRAL	REE	ELEC BLDG ENTRY AUX RELAY
CT	CURRENT TRANSFORMER	M	MOTOR RUN CONTACT	RGS	RIGID GALVANIZED CONDUIT
CU	COPPER	MADC	MILLIAMPERE DIRECT CURRENT	RHLA	HIGH LEVEL ALARM RELAY
CW	COOL WHITE	MCC	MOTOR CONTROL CENTER	RM	PUMP RUN AUX RELAY
DI	DISCRETE INPUT	MCP	MOTOR CIRCUIT PROTECTOR	RMOR	MOTOR OVERLOAD AUX RELAY
DIREC	DIRECTIONAL	MIN.	MINUTES	RMTH	MOTOR TEMPERATURE RELAY
DIV	DIVISION	MOR	MOTOR OVERLOAD RELAY	RPLC	PLC MODE AUX RELAY
DN	DOWN	mS	MILLISECOND	RPLCOR	PLC OVERRIDE
DO	DISCRETE OUTPUT	MTH	MOTOR TEMPERATURE SWITCH	RPLM	PLC PUMP RUN RELAY
ETM	ELAPSED TIME METER	MTS	MANUAL TRANSFER SWITCH	RPLMP	BACKUP SYSTEM RUN RELAY
G.E.	GENERAL ELECTRIC			RR	RUN RELAY
				RRST	PUMP RESET AUX RELAY
				RRST5	MODEM RESET RELAY
				RTAH	TEMPERATURE ALARM AUX RELAY
				RUV	UNDERVOLTAGE AUX RELAY
				RVSS	REDUCED VOLTAGE SOFT STARTER
				RWD	WATCHDOG RELAY
				SEC	SECONDS
				SL	SEAL LEAK SWITCH
				SN	SOLID NEUTRAL
				SP	SURGE PROTECTOR
				SPD	SURGE PROTECTION DEVICE
				SPST	SINGLE POLE SINGLE THROW
				SS	SELECTOR SWITCH
				S.S.	STAINLESS STEEL
				SW	SWITCH
				TEMP	TEMPERATURE
				TD	TIME DELAY RELAY
				TDLP	LOSS OF POWER TIME DELAY RELAY
				TDRM	PUMP TIME DELAY RELAY
				TSP	TWISTED SHIELDED PAIR
				UPS	UNINTERRUPTIBLE POWER SUPPLY
				V	VOLTS
				VA	VOLT–AMP
				VAC	VOLTS ALTERNATING CURRENT
				VDC	VOLTS DIRECT CURRENT
				W	WATT OR WIRE
				WM	WATT MISER (HIGH EFFICIENCY LAMP)
				WP	WEATHER PROOF
				XFMR	TRANSFORMER

NOTES:

1. All construction shall comply with local and national codes and requirements.
2. Conduits shall not be routed across walkways, paths of access, travel, or egress. Route beneath gratings, in concrete structures, or around equipment. Do not route in conflict with other piping, conduits, equipment, or structures. Conduits imbedded in structural concrete (floor slabs, ETC.) shall be so located as not to unduly impair the strength of the construction and shall be spaced not less than two times the conduit OD between adjacent conduits except where crossing or otherwise approved by the engineer.
3. Field verify exact location of all underground pipes, conduits, and structures before digging. Repair any damage done to original condition.
4. Contractor shall be responsible for obtaining any and all permits associated with the work. The costs of the permits, if any, shall be borne by the Contractor.
5. This contract includes field installation and completion of vendor supplied components. All solenoids, float switches, transducers, motor operated valves, drive motors, alarm contacts, run lights, etc. are to be wired to vendor's panel or site motor controls as required. Contractor is to verify vendor–supplied components and provide a complete and operable system.
6. All exterior above grade conduit, duct bank elbows, and risers are to be PVC coated rigid galvanized steel conduit. Conduits within the Chemical Building are to be schedule 80 PVC. All conduits in duct banks shall be schedule 40 PVC. All mounting hardware to be stainless steel.
7. The cost of connecting new service shall be provided by the Owner. Contractor shall provide and install all necessary slabs, conduits, conductors, fittings, and other equipment necessary to energize the lift station. Installation shall meet all utility company requirements, local and national codes. Review this project's service requirements of location, ratings, and methods with power company prior to beginning construction. Contractor shall coordinate all service requirements with electric utility company. Notify the Plant Operator and the Quiddity Construction Department (713–777–5337) a minimum of one week in advance of any scheduled power outage(s).
8. For all demolition work, remove all conductors and remove all conduit to 6–inches below grade and cap.
9. Items in bold are proposed, all others are existing.
10. Repair all damage to existing roads and sidewalks related to this construction to pre–existing conditions or better.
11. Any proposed underground duct banks crossing existing duct banks and pipes shall be routed underneath existing or proposed obstructions.
12. Support all outdoor above ground conduit every 6 ft w/stainless steel mounting hardware.
13. Wiring for lighting, receptacles and other miscellaneous circuits shall conform to the circuiting indicated on the drawings with arrangement and routing as required. The wiring shall be so arranged that no more than 4 current carrying conductors shall be installed per conduit and and circuits of different panels shall be installed in separate raceways.
14. Any conduit without further designation indicates 3–#10 and 1–#12 GND in 1" conduit.

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ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL LEGENDS, SYMBOLS, AND NOTES

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: TRB
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JOB NO. 16759–0010–09 DWG. NO. _____
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STATE OF TEXAS C. J. TROUTT 41075 LICENSED PROFESSIONAL ENGINEER 4/8/2024

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SHEET NO. 18 OF 25

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0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

ASHLAND CONDUIT SIZE & WIRE

CONDUIT SIZE & WIRE						DESCRIPTION	ORIGIN	DESTINATION
NO.	SIZE	POWER	GROUND	CONTROL	INSTRUMENTATION			
1	2 1/2"	3-#4/0 + #2 NEU	#2			UTILITY POWER	UTILITY COMPANY POWER ROLE	METER DISCONNECT
2	2 1/2"	3-#4/0 + #2 NEU	#2			INCOMING SERVICE	METER DISCONNECT	MAIN DISCONNECT
3	2 1/2"	3-#4/0 + #2 NEU	#2			INCOMING SERVICE	MAIN DISCONNECT	AUTOMATIC TRANSFER SWITCH
4	2 1/2"	3-#4/0	#2			LIFT STATION CONTROL PANEL POWER	AUTOMATIC TRANSFER SWITCH	LIFT STATION CONTROL PANEL
5	2"	3-#1 + #6 NEU	#6			GENERATOR POWER	GENERATOR	AUTOMATIC TRANSFER SWITCH
6	1 1/4"	3-#4	#8			GENERATOR MISCELLANEOUS POWER	LIFT STATION CONTROL PANEL	GENERATOR
7	2"				ANNUNCIATOR CABLE	GENERATOR ANNUNCIATOR	GENERATOR	AUTOMATIC TRANSFER SWITCH
8	1"		#12	4-#14		GENERATOR MISCELLANEOUS CONTROLS	GENERATOR	AUTOMATIC TRANSFER SWITCH
9	1"	3-#10	#10			LIFT PUMP No. 1 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 1 TERMINAL BOX
10	1"		#12	4-#14		LIFT PUMP No. 1 CONTROLS	LIFT STATION CONTROL PANEL	LIFT PUMP No. 1 TERMINAL BOX
11	1"	3-#10	#10			LIFT PUMP No. 2 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 2 TERMINAL BOX
12	1"		#12	4-#14		LIFT PUMP No. 2 CONTROLS	LIFT STATION CONTROL PANEL	LIFT PUMP No. 2 TERMINAL BOX
13	1"	3-#10	#10			LIFT PUMP No. 3 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 3 TERMINAL BOX
14	1"		#12	4-#14		LIFT PUMP No. 3 CONTROLS	LIFT STATION CONTROL PANEL	LIFT PUMP No. 3 TERMINAL BOX
15	3"				SUBMERSIBLE PUMP CABLES	LIFT PUMP No. 1 POWER & CONTROL	LIFT PUMP No. 1 TERMINAL BOX	LIFT PUMP No. 1
16	3"				SUBMERSIBLE PUMP CABLES	LIFT PUMP No. 2 POWER & CONTROL	LIFT PUMP No. 2 TERMINAL BOX	LIFT PUMP No. 2
17	3"				SUBMERSIBLE PUMP CABLES	LIFT PUMP No. 3 POWER & CONTROL	LIFT PUMP No. 3 TERMINAL BOX	LIFT PUMP No. 3
18	2"		#12		1-#16 TSP	TRANSDUCER CONTROLS	LIFT STATION CONTROL PANEL	TRANSDUCER TERMINAL BOX
19	1"		#12	8-#14		FLOAT CONTROLS	LIFT STATION CONTROL PANEL	FLOAT TERMINAL BOX
20	2"				TRANSDUCER CABLE	TRANSDUCER CONTROLS	TRANSDUCER TERMINAL BOX	LIFT STATION WET WELL
21	2"				FLOAT CABLE	FLOAT CONTROLS	FLAOT TERMINAL BOX	LIFT STATION WET WELL
22	1"		#12	6-#14		GENERATOR MISCELLANEOUS CONTROLS	AUTOMATIC TRANSFER SWITCH	LIFT STATION CONTROL PANEL
23	1"	2-#10	#12			FLOODLIGHT No. 1 POWER	LIFT STATION CONTROL PANEL	FLOODLIGHT
24	1"	2-#10	#12			FLOODLIGHT No. 2 POWER	LIFT STATION CONTROL PANEL	FLOODLIGHT
25	3"	PULL STRING				ULTIMATE LIFT PUMP No. 1 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 1
26	3"	PULL STRING				ULTIMATE LIFT PUMP No. 2 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 2
27	3"	PULL STRING				ULTIMATE LIFT PUMP No. 3 POWER	LIFT STATION CONTROL PANEL	LIFT PUMP No. 3

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	VOLTAGE	MOUNTING	LAMPS NO.	LAMPS TYPE	REMARKS
FL-1	APPLETON AMLED77-BUI1-D W/POLE TOP SLIPFITTER AND VANDAL SHIELD (G-AM-6-VS)	120	SLIP-FITTER	1	LED 13,500 LUMENS	AREAMASTER W/VANDAL SHIELD, SEE DETAIL SHT. E7

SPECIAL DEVICE SCHEDULE

ITEM	DESCRIPTION
1	PHASE FAILURE RELAY – MACROMATIC PMPU-FA8 SERIES, 480 VOLT, 3 PHASE
2	SURGE SUPRESSOR – SEE SPECIFICATIONS
3	SIEMENS/MILLTRONICS HYDRO RANGER 200 LEVEL CONTROLLER WITH ECHOMAX XPS-15 ULTRASONIC TRANSDUCER WITH ALL ACCESSORIES
4	TIME DELAY RELAY – WITH 2 S.P.D.T. SWITCHES RATED 7 AMPS AT 120 VOLT, CONTACTS AND COIL, PLUG IN BASE AND SOCKET, 3 RANGES, 0.1 TO 100 SEC. ATC, MODEL #319D-134
5	CONTROL RELAY – WITH 4 S.P.D.T. SWITCHES RATED 10 AMPS AT 120 VOLT, 120 VOLT COIL, PLUG IN BASE AND SOCKET
6	INDICATING LIGHT – PUSH TO TEST – LED TYPE, ALLEN BRADLEY BULLETIN 800 TYPE, 120 VOLT, 60HZ – COLOR AS INDICATED
7	ELAPSED TIME METER – CRAMER #635G/HRS., 120 VOLT
8	FLASHING BEACON – 65FPM, 120 VOLT, RED ACRYLIC DOME LENS, EDWARDS #105XBRMR120A
9	VENT FAN – HOFFMAN CAT. #A-PA4AXFN, 21 WATT, 120 VOLT (WITH RAIN SHIELD GRILL)
10	CELLULAR AUTODIALER – SEE SPECIFICATIONS
11	EVOQUA MODEL 9G DIRECT ACTING FLOAT SWITCH WITH 40 FOOT OF CABLE
12	EXHAUST GRILLE – HOFFMAN CAT. #A-VK66 LOUVER WITH #A-FLT66 FILTER K.T. (WITH RAIN SHIELD GRILL)
13	DIVERSIFIED ELECTRONICS CAT. #150-120-AFN LOW CURRENT ISOLATION SWITCH, 5 AMPS, 120 VOLT CONTACTS. (INTRINSICALLY SAFE CIRCUIT TO FLOAT SWITCH)
14	FLYGT MINICAS II/FUS PUMP PROTECTION MODULE OR EQUAL UNIT MUST PROVIDE SEAL LEAK AND WINDING OVERTEMP ALARM, INDICATION, AND PROTECTION AS SHOWN
15	PHOTOELECTRIC SWITCH – INTERMATIC SERIES K1100, 120-VOLT – MODEL #K1121
16	CABINET HEATER – HOFFMAN NO. DAH1001A, 115 VAC, 100 WATT

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ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL SCHEDULES

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41075
LICENSED PROFESSIONAL ENGINEER
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E2
SHEET NO. 19 OF 25

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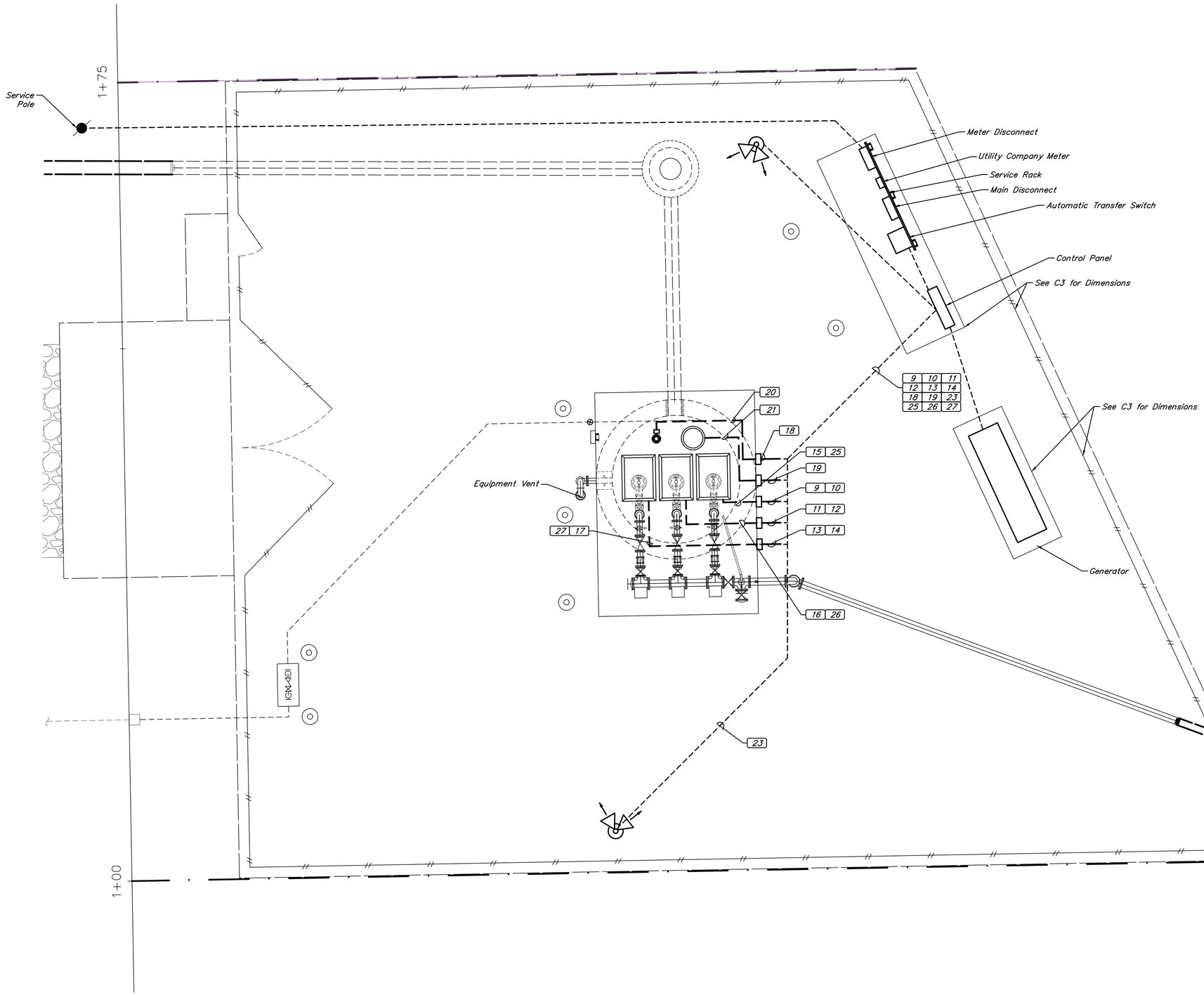
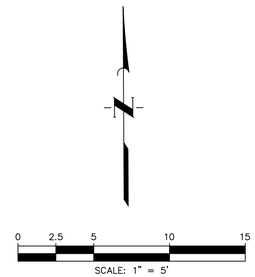
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS





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ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL SITE LAYOUT

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SHEET NO. 20 OF 25

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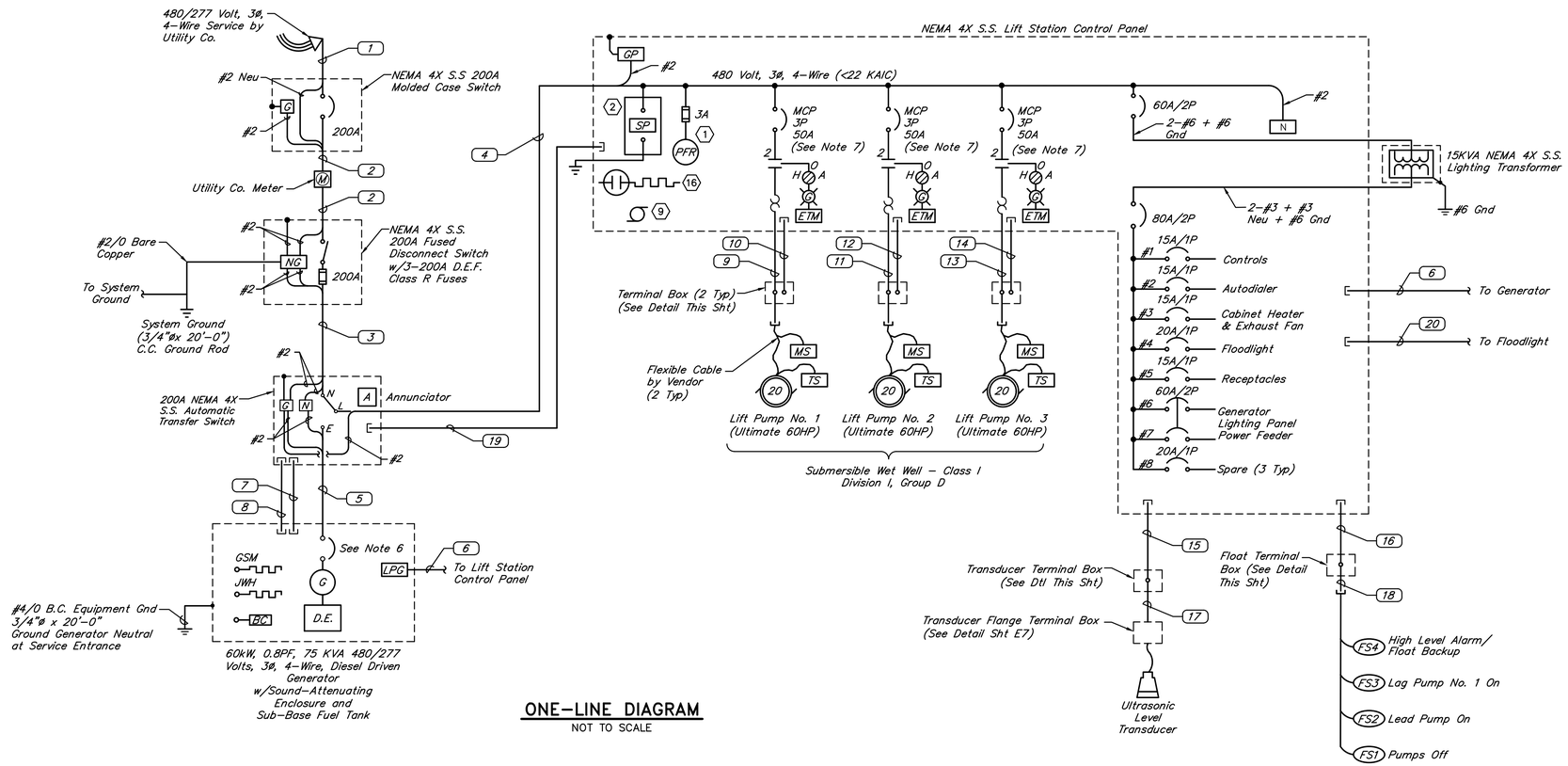
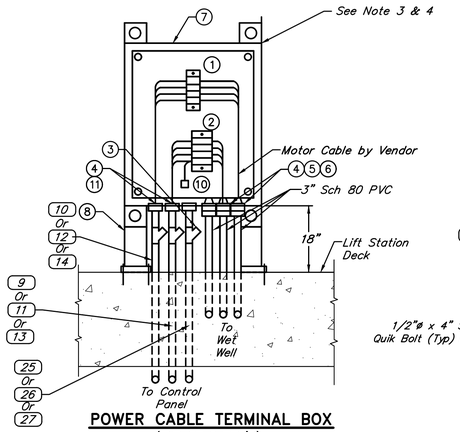
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



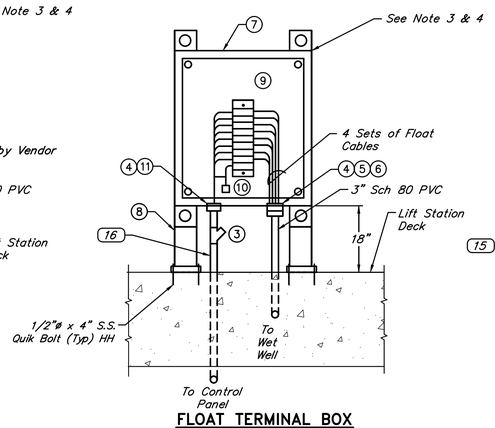
ONE-LINE DIAGRAM
NOT TO SCALE

NOTES:

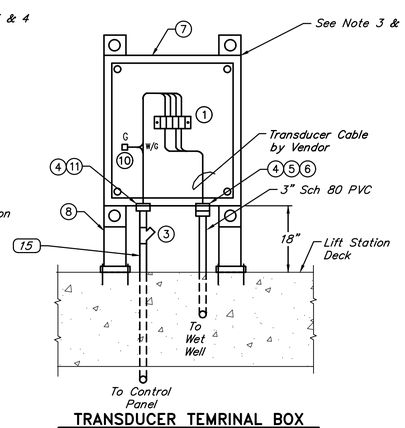
1. Adjust MCP for submitted motor load.
2. Verify pump protection conductor requirements. Furnish accordingly. If pump is supplied with separate cable for protection ckts., then provide additional conduit into terminal box and control panel. Verify pump cable diameter for insertion in 3" conduit shown, increase size if required.
3. All terminal boxes to be NEMA 4X stainless steel. Terminal boxes must be a minimum of 1'-0" apart from each other.
4. Contractor to provide terminal boxes with nameplates constructed from laminated plastic material a minimum of 1/16" thick. Letters shall be gothic 3/16" high minimum, use two lines if description will cause length to exceed 2-1/2". Nameplates shall be white letters on black background. Affix nameplates to face of terminal box, using adhesive material.
5. Floats and intrinsically safe relays are part of an intrinsically safe circuit that requires 3" spacing from non-intrinsically safe circuits in both the field terminal box and control cabinet. Label circuits as intrinsically safe.
6. Provide and size per generator manufacturer's requirements.
7. Size control panel to accommodate for future 200A/3P/MCP type breaker and corresponding equipment for all Lift Pumps



POWER CABLE TERMINAL BOX
(TYP OF 2 REQ'D)



FLOAT TERMINAL BOX



TRANSDUCER TEMRINAL BOX

1. 4 POINT, 30A, 300 VOLT TERMINAL BLOCK
2. 4 POINT, 100A, 600 VOLT TERMINAL BLOCK
3. C.H. EYD SEAL W/CHICO (TYPICAL)
4. MYERS HUB
5. OZ GEDNEY CSBE TYPE CONDUIT SEALING BUSHING
6. RIGID TO PVC ADAPTER
7. HOFFMAN #CSD16126SS W/#CP1612 PAINTED STEEL BACK PANEL (16"x12"x6") & PADLOCK KIT #CWHPTO S.S.
8. STAINLESS STEEL P1000 UNISTRUT SUPPORT W/P2072 POST BASE ANCHOR W/4-1/2"ø S.S. ANCHOR SETS
9. 12 POINT, 30A, 300 VOLT TERMINAL BLOCK
10. GROUND LUG
11. DUCT SEAL

TERMINAL BOX DETAIL
NOT TO SCALE

ELECTRICAL LOAD ANALYSIS

DESCRIPTION	LOAD	AMPS ØA	AMPS ØB	AMPS ØC	S.B. KW
LIFT PUMP No. 1	20 HP	27	27	27	17.2
LIFT PUMP No. 2	20 HP	27	27	27	17.2
LIFT PUMP No. 3(Stand by)	20 HP	27	27	27	-
Transfomer	15 KVA	22.5	22.5	-	15
DEMAND FACTOR (25% OF LARGEST MOTOR KVA)		6.8	6.8	6.8	
TOTAL DEMAND LOAD (AMPS AT 480 VAC, 3-PHASE)		110.3	110.3	87.8	49.4
PROPOSED SERVICE ENTRANCE RATING (MAIN DEVICE AMPS)		200	200	200	
SPARE AMPACITY		90	90	112	
CALCULATED FAULT CURRENT					<22 KAIC

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ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL ONE-LINE DIAGRAM

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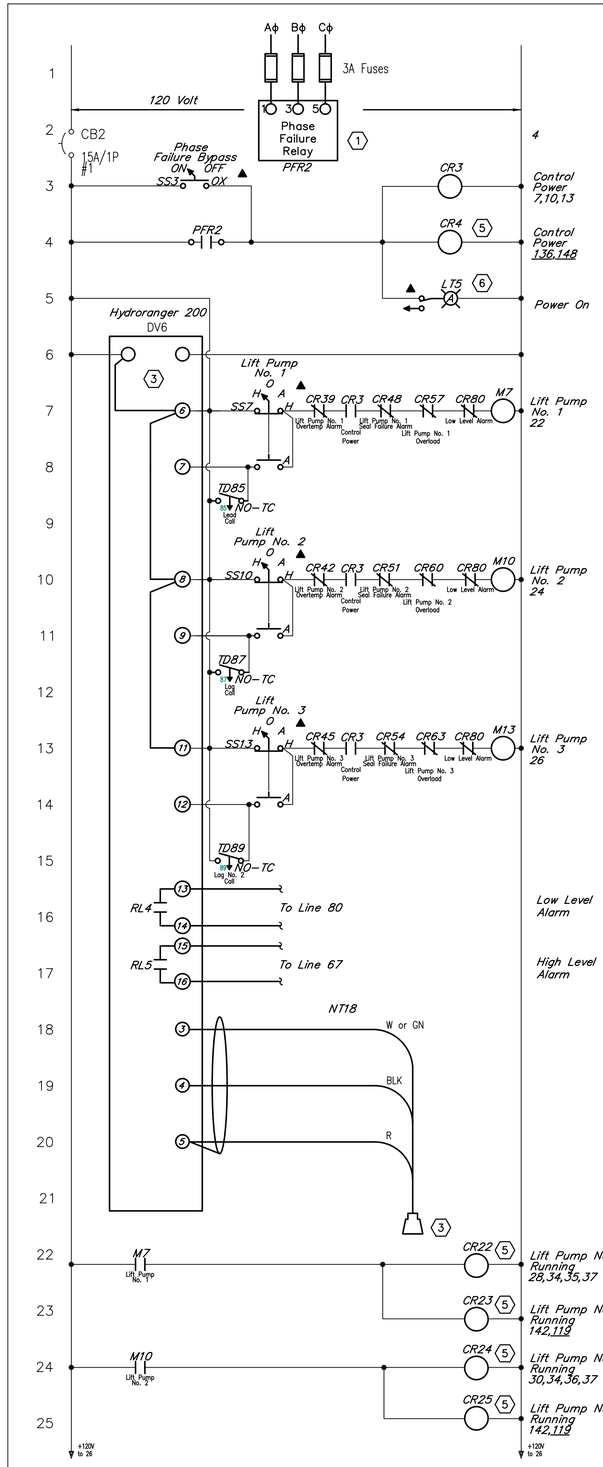
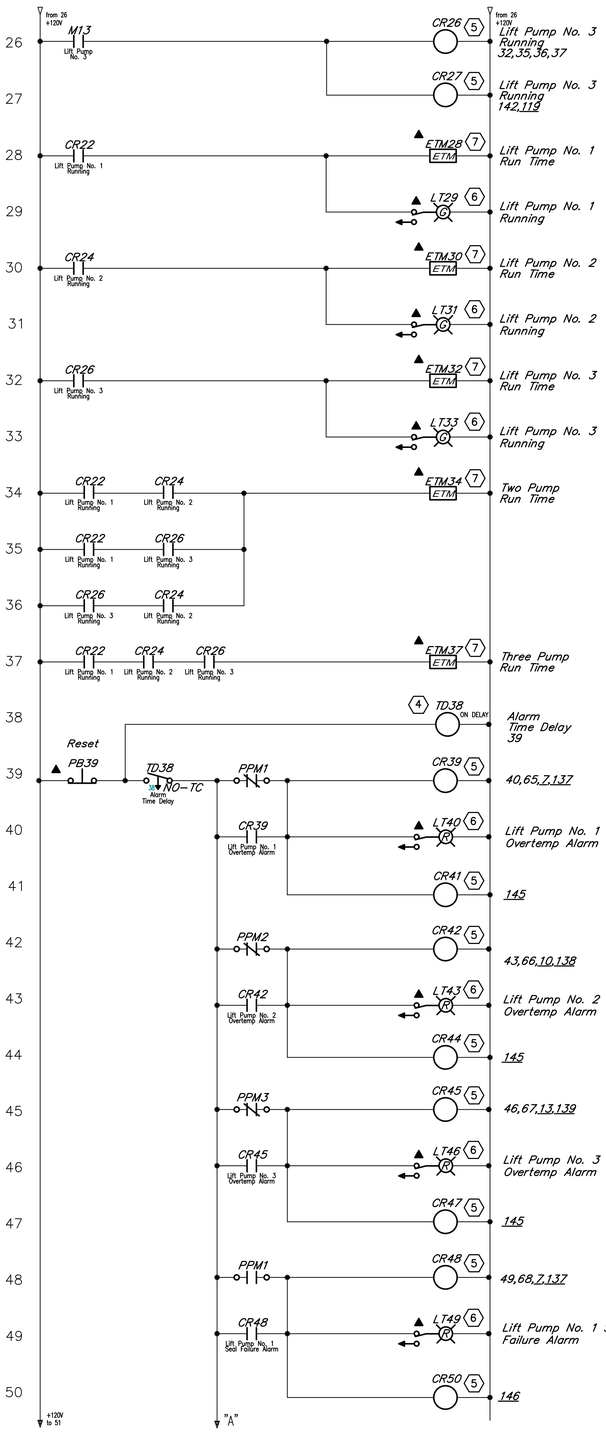
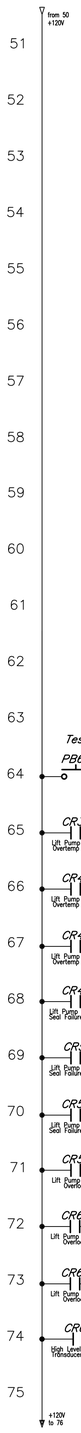
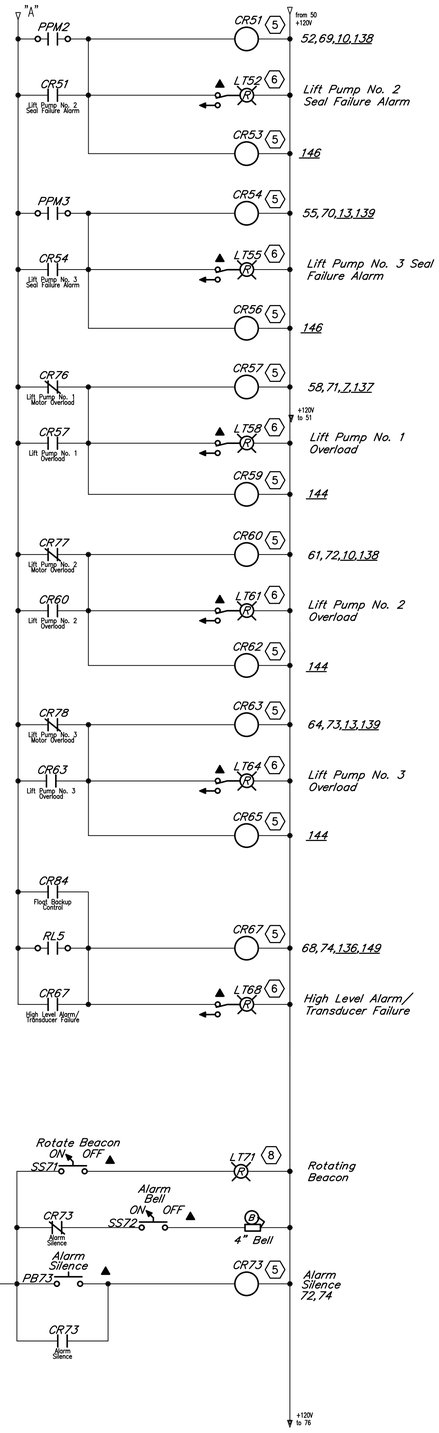
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS









NOTES:

1. Floats and intrinsically safe relays are part of an intrinsically safe circuit that requires 3" spacing from non–intrinsically safe circuits in both the field terminal boxes and control cabinet. Label circuits as intrinsically safe.
2. Add M coil auxiliary relay if required.

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ASHTON GRAY DEVELOPMENT
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ASHLAND LIFT STATION NO. 1

ELECTRICAL CONTROL DIAGRAM SHEET 1 OF 2

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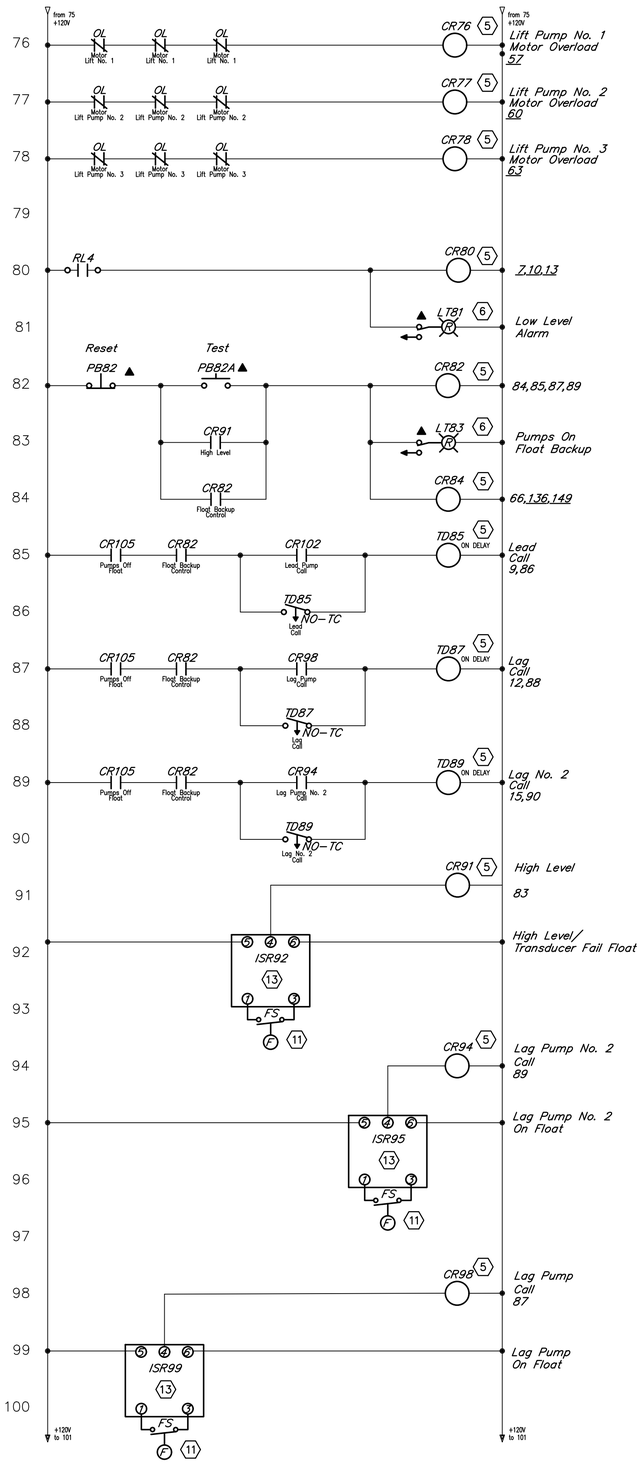
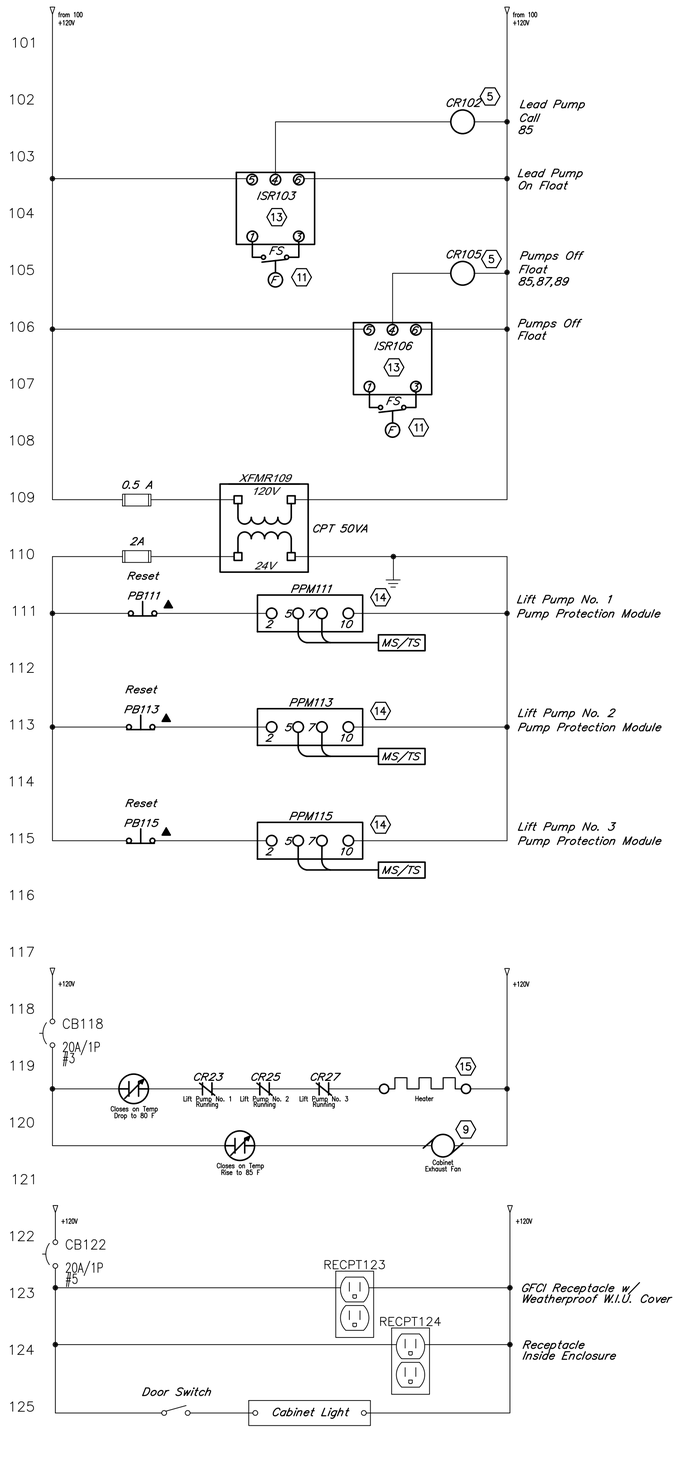
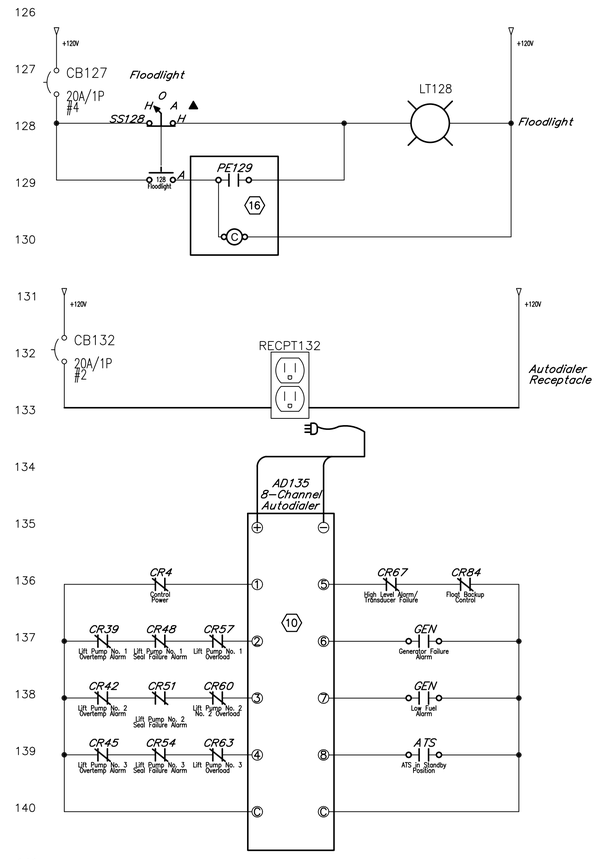
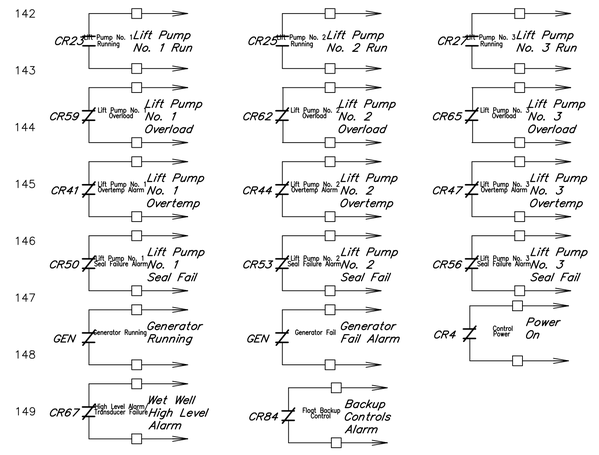
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS









FUTURE LIFT STATION PLC CONTACTS

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL CONTROL DIAGRAM SHEET 2 OF 2

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
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SCALE: _____ DGN. BY: TRB
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F.B. NO. _____

STATE OF TEXAS
C. J. TROUTT
41075
LICENSED PROFESSIONAL ENGINEER
4/8/2024

E6
SHEET NO. 23 OF 25

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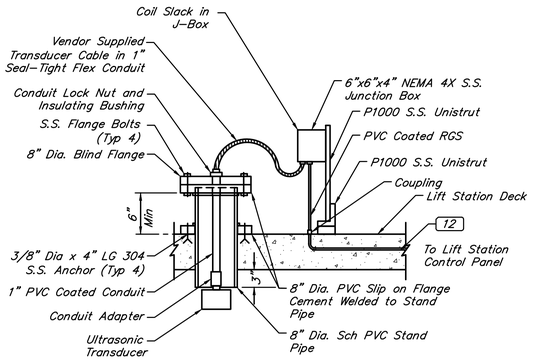
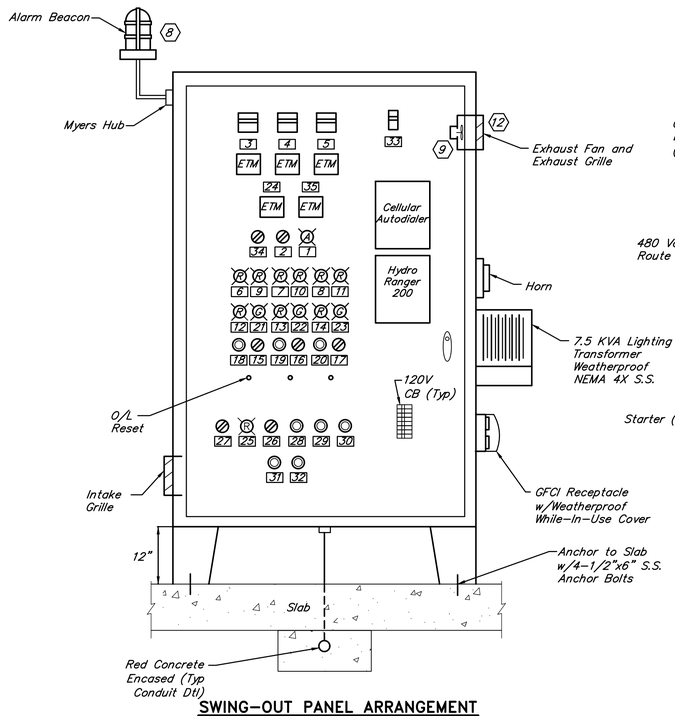
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



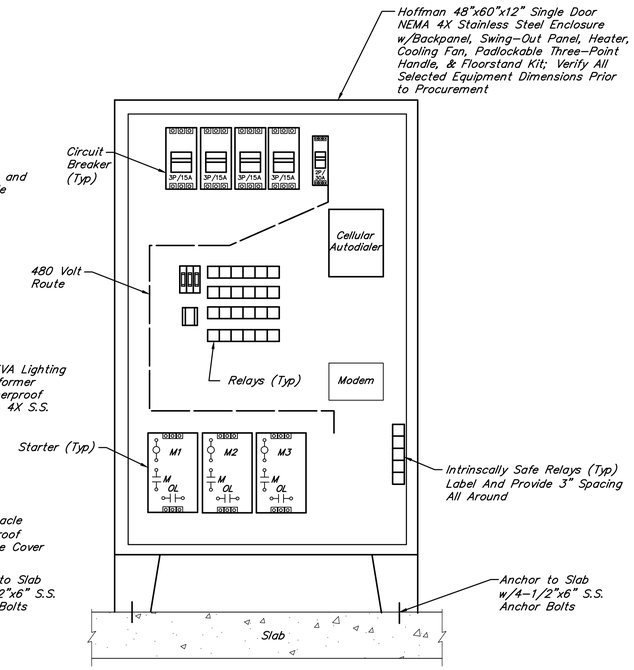
TRANSDUCER MOUNTING DETAIL

NOT TO SCALE



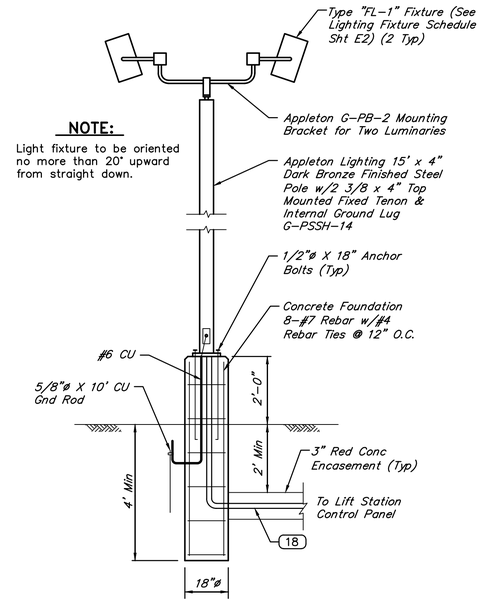
SWING-OUT PANEL ARRANGEMENT

NOT TO SCALE



BACK PANEL ARRANGEMENT

(SHOWN WITH DOOR REMOVED)
NOT TO SCALE



NOTE:

Light fixture to be oriented no more than 20° upward from straight down.

FLOODLIGHT DETAIL

NOT TO SCALE

LIFT STATION CONTROL PANEL ELEVATION

NOT TO SCALE

CONTROL PANEL NAMEPLATE SCHEDULE

No.	TITLE	No.	TITLE
1	MAIN POWER ON	19	NO. 2 PUMP PROTECTION MODULE RESET
2	PHASE FAILURE BYPASS OFF-ON	20	NO. 3 PUMP PROTECTION MODULE RESET
3	LIFT PUMP No. 1 DISCONNECT	21	PUMP NO. 1 RUN
4	LIFT PUMP No. 2 DISCONNECT	22	PUMP NO. 2 RUN
5	LIFT PUMP No. 3 DISCONNECT	23	PUMP NO. 3 RUN
6	LIFT PUMP No. 1 OVERTEMP	24	THREE PUMP RUN
7	LIFT PUMP No. 2 OVERTEMP	25	WET WELL HIGH LEVEL
8	LIFT PUMP No. 3 OVERTEMP	26	BEACON OFF-ON
9	LIFT PUMP No. 1 SEAL FAILURE	27	HORN OFF-ON
10	LIFT PUMP No. 2 SEAL FAILURE	28	ALARM RESET
11	LIFT PUMP No. 3 SEAL FAILURE	29	ALARM SILENCE
12	LIFT PUMP No. 1 OVERLOAD	30	ALARM TEST
13	LIFT PUMP No. 2 OVERLOAD	31	TEST HIGH ALARM BACKUP
14	LIFT PUMP No. 3 OVERLOAD	32	RESET FLOATS
15	LIFT PUMP No. 1 H-O-A	33	LIGHTING PANEL
16	LIFT PUMP No. 2 H-O-A	34	FLOODLIGHT H-O-A
17	LIFT PUMP No. 3 H-O-A	35	TWO PUMP RUN
18	NO. 1 PUMP PROTECTION MODULE RESET		

NAMEPLATE NOTE:

Nameplates shall be constructed from laminated plastic material a minimum of 1/16" thick. Letters shall be gothic 3/16" high minimum, use two lines if description will cause length to exceed 2 1/2". Alarm nameplates shall be white letter on red background; others shall be white letters on black background. Affix nameplates to panel using adhesive. Submit details with shop drawings.

For Civil Only:

STATE OF TEXAS — David A. Olf — 133819 — LICENSED PROFESSIONAL ENGINEER — 4/8/2024

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL DETAILS
SHEET 1 OF 2

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

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STATE OF TEXAS — C. J. TROUTT — 41075 — LICENSED PROFESSIONAL ENGINEER — 4/8/2024

E7
SHEET NO. 24 OF 25

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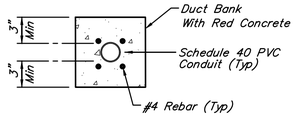
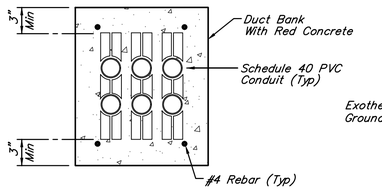
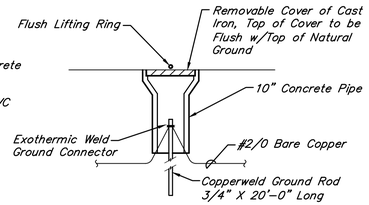
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS



TYPICAL ONE-WAY DUCT BANK
NOT TO SCALE



TYPICAL SIX-WAY DUCT BANK
NOT TO SCALE



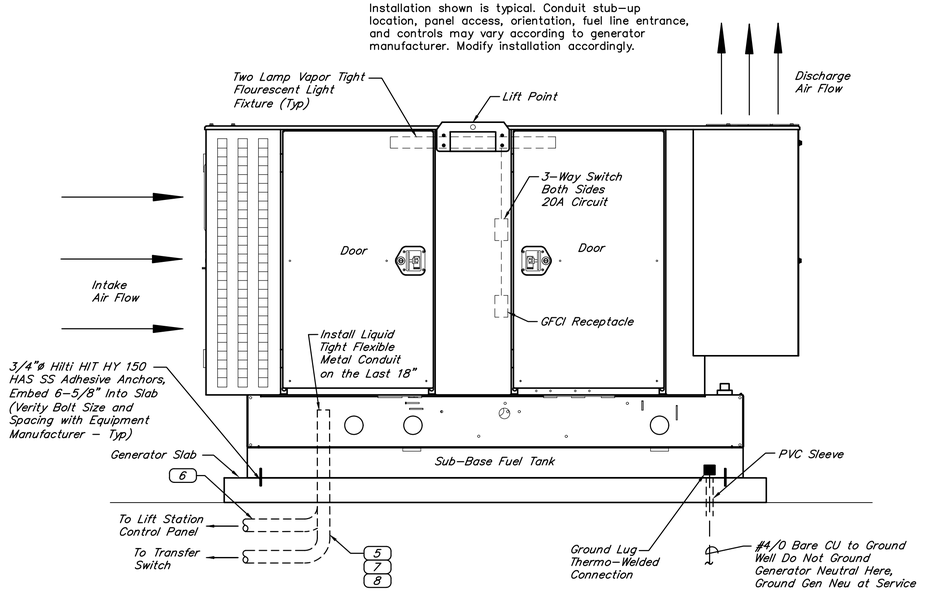
GROUND WELL DETAIL
NOT TO SCALE

DUCTBANK NOTES:

1. All power and instrumentation conductors shall be installed in separate conduits. Instrumentation & power conduits must have a minimum of 12" of spacing. Route power and instrumentation conductors in separate pull boxes.
2. If conduits inside duct bank does not match a typical detail shown, use next largest duct bank and remove conduits from top row as necessary.

NOTE:

Installation shown is typical. Conduit stub-up location, panel access, orientation, fuel line entrance, and controls may vary according to generator manufacturer. Modify installation accordingly.

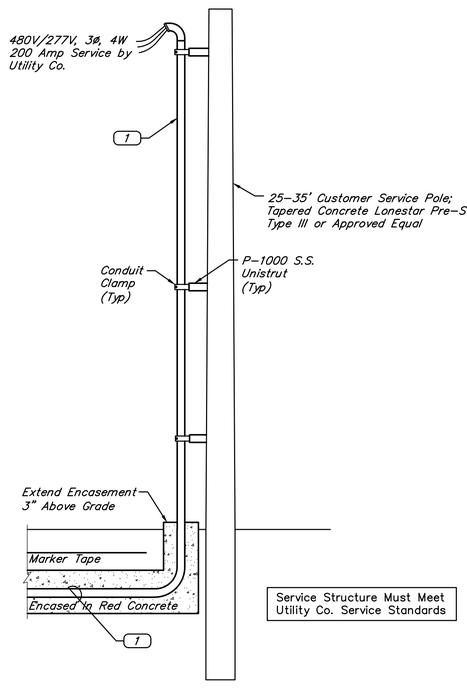


GENERATOR INSTALLATION DETAIL
NOT TO SCALE

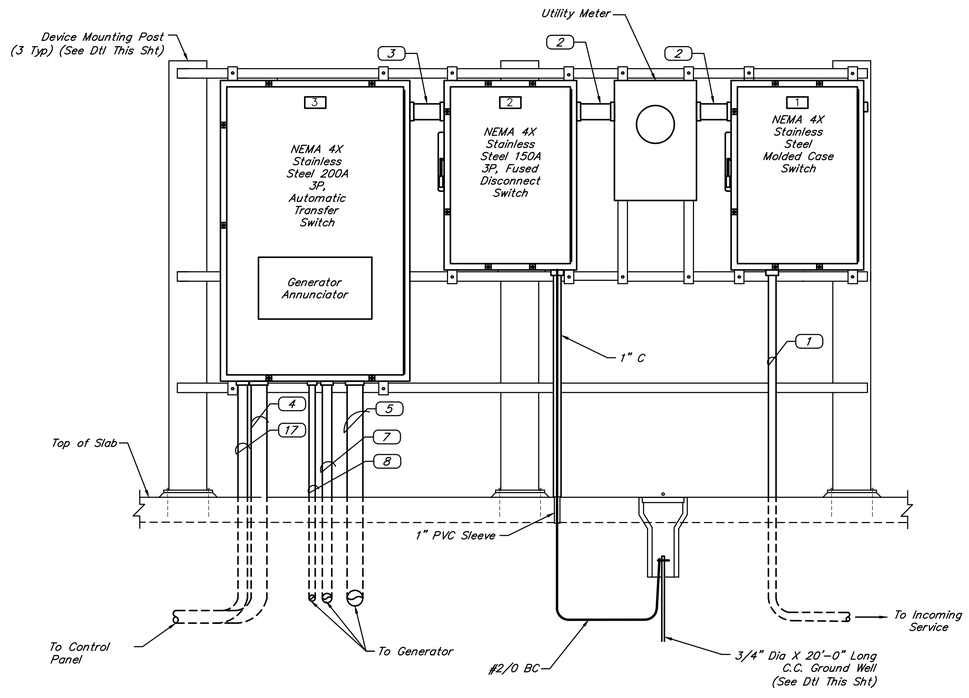
SERVICE RACK NAMEPLATE SCHEDULE	
No.	TITLE
1	METER DISCONNECT
2	MAIN SERVICE DISCONNECT
3	AUTOMATIC TRANSFER SWITCH

NAMEPLATE NOTE:

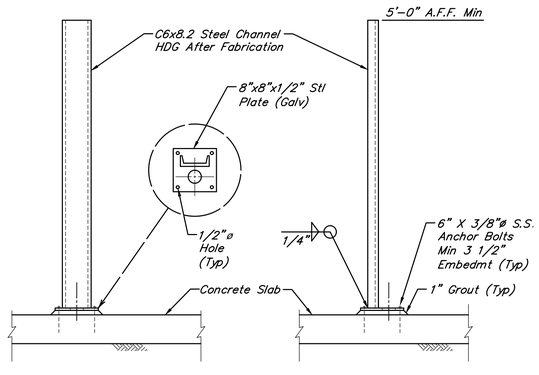
Nameplates shall be constructed from laminated plastic material a minimum of 1/16" thick. Letters shall be gothic 3/16" high minimum, use two lines if description will cause length to exceed 2 1/2". Alarm nameplates shall be white letter on red background; others shall be white letters on black background. Affix nameplates with adhesive material. Submit details with shop drawings.



SERVICE POLE DETAIL
NOT TO SCALE



LIFT STATION ELECTRICAL SERVICE RACK
SCALE: 1" = 1'-0"



FRONT VIEW SIDE VIEW

NOTE:

For mounting posts not mounted on concrete slab, bury in 3'x12'ø hole and fill with concrete.

DEVICE MOUNTING POST DETAIL
NOT TO SCALE

NO.	DATE	REVISIONS	APP.

ASHTON GRAY DEVELOPMENT
BRAZORIA COUNTY, TEXAS

ASHLAND LIFT STATION NO. 1

ELECTRICAL DETAILS
SHEET 2 OF 2

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STATE OF TEXAS
C. J. TROUTT
41075
LICENSED PROFESSIONAL ENGINEER
4/8/2024

E8
SHEET NO. 25 OF 25

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DESIGN REPORT

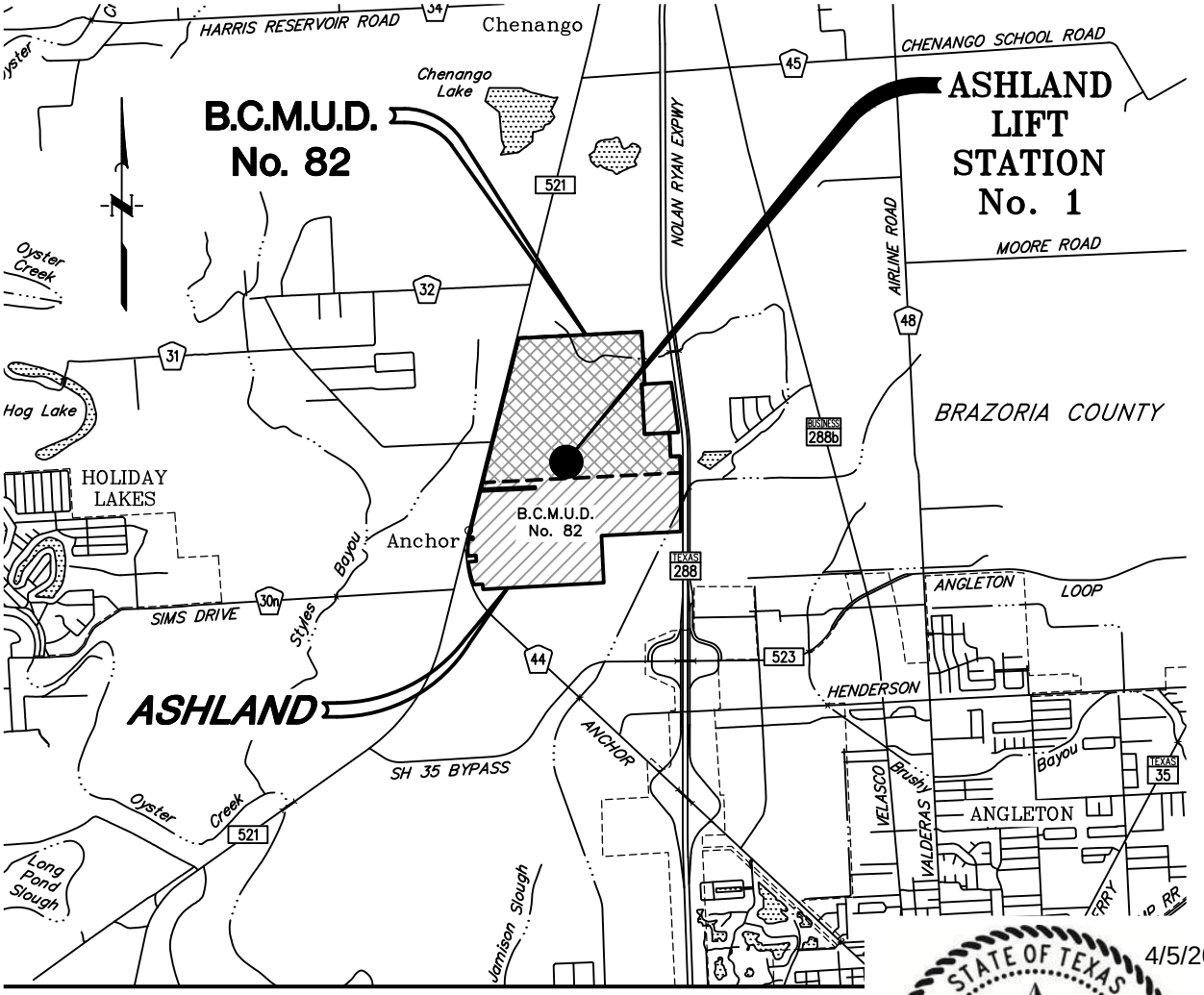
FOR CONSTRUCTION OF

ASHLAND LIFT STATION NO. 1

FOR

ASHTON GRAY DEVELOPMENT
ON BEHALF OF
BRAZORIA COUNTY
MUNICIPAL UTILITY DISTRICT NO. 82

BRAZORIA COUNTY, TEXAS



APRIL 2024

Quiddity Job No. 16759–0010–09

STATE OF TEXAS
David A. Olf
133819
LICENSED PROFESSIONAL ENGINEER
4/5/2024

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 ● Bellaire, TX 77401 ● 713.777.5337

DESIGN REPORT

FOR

ASHLAND LIFT STATION NO. 1

FOR

ASHTON GRAY DEVELOPMENT, LLC

ON BEHALF OF BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NO. 82

IN

BRAZORIA COUNTY, TEXAS

APRIL 2024

Job No. 16759-0010-09

QUIDDITY

Texas Board of Professional Engineers and Land Surveyors Registration Nos. F-23290 & 10046100

TABLE OF CONTENTS

I. SCOPE

The following is a design report for the Ashland Lift Station No. 1 to serve the Ashland Development. The facility is located within unincorporated Brazoria County, Texas but in the extra-territorial jurisdiction of the City of Angleton and Angleton Drainage District jurisdictional authority (BC Key Map No. 795-T). The project includes the construction of a submersible pump lift station to serve future residential development.

The lift station will pump through approximately 3,130 linear feet (3,130') of new eight-inch (8") diameter PVC force main and will discharge directly into the headworks at the Ashland 0.2 MGD Wastewater Treatment Plant. The proposed force main will be constructed under a separate contract. The WWTP is permitted to discharge treated wastewater under TPDES Permit No. WQ0016176001.

The project includes a twelve-foot (12') diameter epoxy-lined concrete wet well complete with three (3) submersible pumps and six-inch (6") diameter ductile iron (DI) riser piping and valves, coatings, 3,130 linear feet (3,130') of eight-inch (8") diameter PVC force main, one (1) 60 kW diesel generator, sub-base fuel tank, automatic transfer switch, motor control panel, electrical service disconnect switches, conduit, wire, and associated piping, electrical, and site work.

II. DESCRIPTION OF SURROUNDING LAND AREA

The surrounding land near the lift station is predominantly undeveloped grassy and wooded areas. The site will be bounded by a roadway on the west, an electrical utility facility on the north, a drainage channel on the east, and a residential lot to the south.

III. FLOODPLAIN COMPLIANCE

The site is located within Shaded Zone "X", as depicted by the Flood Insurance Rate Map Number 48039C0430K dated December 30, 2020. Proposed structures are located in areas protected by levees from 1% annual chance flood. The FIRM map can be found in Exhibit B. The nearest 100-year and 500-year flood plain elevations are 27.8 feet and 28.2 feet, respectively. The 100-year water surface elevation in the Ashland Phase 1A detention pond is 34.30 feet. Elevations of proposed structures are a minimum of 2 feet higher than the 100-year water surface elevation in the detention pond.

IV. DESIGN PARAMETERS – Phase I

Unless otherwise noted, the design of this facility conforms to the current Texas Commission on Environmental Quality design criteria promulgated under 30 TAC Chapter 217- *Design Criteria for Domestic Wastewater Systems* and the City of Sugarland (CoSL) Department of Public Works and Engineering's *Engineering Design Manual for Submersible Lift Stations*, as required by City of Angleton development ordinance. The City of Angleton will perform reviews to determine general compliance with their design requirements.

A. Design Flow – Phase I

631 ESFCs @ 315 gpd/connection:	=	198,765 gpd
Average Daily Flow (ADF) (Q): 198,765 gpd	=	138 gpm
Two (2) Hour Peak Flow (4Q): (4.0 x 139 gpm)	=	552 gpm

B. <u>Wet Well Analysis</u>

1. <u>Future Ultimate Phase II (1,094 connections)</u>

1,094 ESFCs @ 315 gpd/connection:	=	344,610 gpd
Average Daily Flow (ADF) (Q): 344,610 gpd	=	239 gpm
Two (2) Hour Peak Flow (4Q): (4.0 x 246 gpm)	=	957 gpm

a. Effective Volume Calculation:

$$V = \frac{Q*t}{4n}$$

Where:

V	=	Effective wet well volume (gal)
t	=	Minimum cycle time (min)
Q	=	Pumping rate of two (2) pumps (gpm)
n	=	Number of pumps with largest out of service

$$V = \frac{(957\ \text{gpm})(6\ \text{min})}{4(1)}$$

Q	=	957 gpm (2 pumps running)
t	=	6 min (motors < 50 HP)
n	=	1 (pump alternation credit not included)

V = 1,436 gallons

b. Effective Depth Calculation

The proposed twelve-foot (12') diameter wet well has an effective area of 113.10 ft². The required effective depth is calculated as:

$$d_{eff} = \frac{(1{,}436\ gal)}{(7.48\frac{gal}{ft^3})(113.10 ft^2)}$$

d_{eff} = effective depth

d_{eff} = 1.70 ft

c. Wet Well Finished Floor:

Incoming Sanitary Sewer Elevation	=	12.20 ft
Minimum Water Depth	=	3.00 ft
Additional Depth for Safety Factor	=	1.00 ft
Required Effective Depth	=	1.70 ft
Required Bottom Slab Depth	=	6.50 ft
Proposed Bottom Slab Elevation	=	5.20 ft

The proposed wet well has adequate volume to accommodate a firm capacity of 957 gpm. The City of Sugarland *Engineering Design Manual for Submersible Lift Stations* requires a minimum depth between level controls of 1.00 feet (1.00'). Level controls will be set with a minimum effective depth of 1.00 feet (1.00') to provide an adequate cycle time for the pumps.

2. Proposed Phase I (631 Connections)

a. Effective Volume Calculation:

$$V = \frac{Q*t}{4n}$$

Where:

V	=	Effective wet well volume (gal)
t	=	Minimum cycle time (min)
Q	=	Pumping rate of two (2) pumps (gpm)
n	=	Number of pumps with largest out of service

$$V = \frac{(552 \text{ gpm})(6 \text{ min})}{4(1)}$$

Q	=	552 gpm (2 pumps running)
t	=	6 min (motors < 50 HP)
n	=	1 (pump alternation credit not included)

V = 828 gallons

b. Effective Depth Calculation

The proposed twelve-foot (12') diameter wet well has an effective area of 113.10 ft². The required effective depth is calculated as:

$$d_{eff} = \frac{(828\ gal)}{(7.48\frac{gal}{ft^3})(113.10 ft^2)}$$

d_{eff} = effective depth

d_{eff} = 0.98 ft

c. Wet Well Finished Floor:

Incoming Sanitary Sewer Elevation	=	12.20 ft
Minimum Water Depth	=	3.00 ft
Additional Safety Factor Depth	=	1.00 ft
Required Effective Depth	=	0.98 ft
Required Bottom Slab Depth	=	7.22 ft
Proposed Bottom Slab Elevation	=	5.20 ft

The proposed wet well has adequate volume to accommodate a firm capacity of 552 gpm. The City of Sugarland *Engineering Design Manual for Submersible Lift Stations* requires a minimum depth between level controls of 1.00 feet (1.00'). Level controls will be set with a minimum effective depth of 1.00 feet (1.00') to provide an adequate cycle time for the pumps.

C. Pump Static Head – Phase I

1. Lead Pump On (Firm Capacity)

Highest Elevation Pumped (At Elevated Headworks at WWTP)	=	52.09 ft
Calculated "Lead Pump On" Elevation (5.20 + 3.00 + 0.72)	=	8.92 ft
Design "Lead Pump On" Elevation	=	9.20 ft
Design Static Head	=	42.89 ft

2. 1st Lag Pump On

Highest Elevation Pumped (At Elevated Headworks at WWTP)	=	52.09 ft
Calculated "Lag Pump On" Elevation (9.20 + 0.49)	=	9.69 ft
Design "Lag Pump On" Elevation	=	10.20 ft
Design Static Head	=	41.89 ft

3. 2nd Lag Pump On

Highest Elevation Pumped (At Elevated Headworks at WWTP)	=	52.09 ft
Calculated "Lag Pump On" Elevation (10.20 + 0.36)	=	10.56 ft
Design "Lag Pump On" Elevation	=	11.20 ft
Design Static Head	=	40.89 ft

4. All Pumps Off

Highest Elevation Pumped (At Elevated Headworks at WWTP)	=	52.09 ft
Calculated "All Pumps Off" Elevation (5.20 + 3.00)	=	8.20 ft
Design "All Pumps Off" Elevation	=	8.20 ft
Design Static Head	=	43.89 ft

5. Flooded Wet Well

Highest Elevation Pumped (At Elevated Headworks at WWTP)	=	52.09 ft
Wet Well Ceiling Elevation	=	33.70 ft
Design Static Head	=	18.39 ft

D. Piping Analysis – Phase I

The proposed piping system will consist of a six-inch (6") diameter DI riser piping, an eight-inch (8") diameter DI header pipe, and an eight-inch (8") diameter PVC force main.

1. Riser Piping

Approximately 39 linear feet (39′) of six-inch (6″) diameter DI riser piping is proposed. The riser losses are calculated using the Hazen-Williams formula for friction losses and K factors for minor losses. To simulate pipe conditions, Hazen-Williams friction constants C=100 and 140 will be used for design, to represent old and new pipe conditions respectively. Riser pipe head loss will be added to system head loss to calculate total system head loss for designing the pumps.

Six-inch (6") Diameter Riser Pipe K Factors [(1)]:

Fitting	Quantity	K-factor	Total K
Entrance	1	0.50	0.50
90° Bend	3	0.45	1.35
45° Bend	2	0.24	0.48
Tee, Branch	1	0.90	0.90
Tee, Run	2	0.30	0.60
Check Valve	1	1.50	1.50
Plug Valve	2	0.27	0.54
4" x 6" Expansion	1	0.31	0.31
		Total	6.18

(1) *K Factors from Cameron Hydraulic Data*

Six-inch (6") Diameter Riser Losses:

Flow (Q)	**Riser Pipe Velocity (V)**	**Minor Loss KV2/2g**	**Major Loss Design C=100**	**Major Loss C = 140**
GPM	Fps	ft.	ft	ft
0	0.00	0.00	0.00	0.00
50	0.57	0.03	0.02	0.01
100	1.13	0.12	0.07	0.04
150	1.70	0.28	0.14	0.08
200	2.27	0.49	0.24	0.13
250	2.84	0.77	0.37	0.20
276	3.13	0.94	0.42	0.21
300	3.40	1.11	0.51	0.28
350	3.97	1.51	0.68	0.37
400	4.54	1.98	0.87	0.47
450	5.11	2.50	1.09	0.58
500	5.67	3.09	1.32	0.71
550	6.24	3.74	1.57	0.84
600	6.81	4.45	1.85	0.99
650	7.38	5.22	2.14	1.15
700	7.94	6.05	2.46	1.32
750	8.51	6.95	2.79	1.50

2. Force Main Piping

Approximately 3,130 linear feet of eight-inch (8") diameter PVC force main will be constructed in this project. The system curves for the force main are calculated using the Hazen-Williams formula for friction losses and K factors for minor losses. To simulate pipe conditions, Hazen-Williams friction constants C = 100 and 140 (per City of Sugar Land requirements) will be used for design to represent old and new pipe conditions respectively.

Eight-inch (8") Diameter Force Main K Factors [(1)]:

Fitting	Quantity	K-factor	Total K
90° Bend	5	0.42	2.10
45° Bend	16	0.21	3.36
8"x12" Expansion	1	0.31	0.31
Plug Valve	1	0.25	0.25
Exit	1	1.00	1.00
		Total	7.02

(1) *K Factors from Cameron Hydraulic Data*

Eight-inch (8") Diameter Force Main Losses:

Flow (Q)	**FM Pipe Velocity (V)**	**Minor Loss KV2/2g**	**Major Loss Design C=100**	**Major Loss C = 140**	**Total System Head-C=100**	**Total System Head-C=140**
GPM	Fps	ft.	ft	ft	ft.	ft
0	0.00	0.00	0.00	0.00	41.89	41.89
50	0.32	0.01	0.37	0.20	42.29	42.12
100	0.64	0.04	1.33	0.71	43.31	42.69
150	0.96	0.10	2.81	1.51	44.92	43.60
200	1.28	0.18	4.79	2.57	47.05	44.80
250	1.60	0.28	7.24	3.88	49.71	46.31
300	1.91	0.40	10.14	5.44	52.85	48.09
350	2.23	0.54	13.49	7.24	56.50	50.16
400	2.55	0.71	17.27	9.27	60.61	52.49
450	2.87	0.90	21.47	11.52	65.20	55.11
500	3.19	1.11	26.09	14.00	70.23	57.97
550	3.51	1.34	31.13	16.70	75.74	61.11
552	3.52	1.35	31.34	16.82	75.96	61.24
600	3.83	1.60	36.56	19.62	81.68	64.50
650	4.15	1.88	42.40	22.75	88.08	68.15
700	4.47	2.18	48.63	26.09	94.89	72.04
750	4.79	2.50	55.25	29.65	102.16	76.20

*System head includes the calculated design static head of 41.89 ft for the "1st Lag Pump On".

E. Pump Operation Conditions

1. 1st Lag Pump On:

Design "1st Lag Pump On" Static Head	=	41.89 ft	
Calculated Losses (Q_{total} = 552 gpm)	=	34.07 ft	
Calculated TDH for "1st Lag Pump On"	=	75.96 ft	

F. Pumps

Three (3) Flygt NP 3153 HT 3~ 465 (12 hp), KSB Amarex D-max 80-170/068F2YSG (9.12 hp), Grundfos SE.A40.175.2.52S.C.EX.61R.A.Z (17.5 hp), or ABS Sulzer XFP submersible pumps are proposed, two in operation and one on standby. These pumps will utilize three-phase power. The manufacturer's performance curve is plotted along with the system curves for C = 100 and C = 140. The proposed pumping capacity was determined from the system and pump curves at 556 gpm at the design C condition (C = 100 for old PVC pipe material, per City of Sugar Land requirements) for the force main with the largest pump out of service. The system curve is attached to the report as Exhibit C.

G. Net Positive Suction Head (NPSH) Calculations

1. All Pumps Off

Surface Pressure (Per CoSL Requirements)	=	33.40 ft	
Vapor Pressure @ 25° C (23.8 mmHg)	=	-1.40 ft	
Static Head from All Off El. to Impeller Elevation	=	2.50 ft	min depth over intake
Head Loss in Suction Piping (1)	=	-0.08 ft	
NPSH Available	=	34.42 ft	
NPSH Required (Flygt)	=	13.40 ft	
NPSH Required (KSB)	=	32.00 ft	
NPSH Required (Grundfos)	=	15.31 ft	
NPSH Required (ABS Sulzer)	=	6.60 ft	

2. Lead Pump On

Surface Pressure (Per CoSL Requirements)	=	33.40 ft	
Vapor Pressure @ 25° C (23.8 mmHg)	=	-1.40 ft	
Static Head from Lead On El. to Impeller Elevation	=	3.50 ft	min depth over intake
Head Loss in Suction Piping (1)	=	-0.08 ft	
NPSH Available	=	35.42 ft	
NPSH Required (Flygt)	=	13.40 ft	
NPSH Required (KSB)	=	32.00 ft	
NPSH Required (Grundfos)	=	15.31 ft	
NPSH Required (ABS Sulzer)	=	6.60 ft	

3. 1st Lag Pump On

Surface Pressure (Per CoSL Requirements)	=	33.40 ft	
Vapor Pressure @ 25° C (23.8 mmHg)	=	-1.40 ft	
Static Head from Lag On El. to Impeller Elevation	=	4.50 ft	min depth over intake
Head Loss in Suction Piping (1)	=	-0.08 ft	
NPSH Available	=	36.42 ft	
NPSH Required (Flygt)	=	13.40 ft	
NPSH Required (KSB)	=	32.00 ft	
NPSH Required (Grundfos)	=	15.31 ft	
NPSH Required (ABS Sulzer)	=	8.50 ft	

4. 2nd Lag Pump On

Surface Pressure (Per CoSL Requirements)	=	33.40 ft	
Vapor Pressure @ 25° C (23.8 mmHg)	=	-1.40 ft	
Static Head from Lag On El. to Impeller Elevation	=	5.50 ft	min depth over intake
Head Loss in Suction Piping (1)	=	-0.08 ft	
NPSH Available	=	37.42 ft	
NPSH Required (Flygt)	=	13.40 ft	
NPSH Required (KSB)	=	32.00 ft	
NPSH Required (Grundfos)	=	15.31 ft	
NPSH Required (ABS Sulzer)	=	9.40 ft	

5. Flooded Wet Well

Surface Pressure (Per CoSL Requirements)	=	33.40 ft	
Vapor Pressure @ 25° C (23.8 mmHg)	=	-1.40 ft	
Static Head from Flooded El. to Impeller Elevation	=	28.00 ft	min depth over intake
Head Loss in Suction Piping (1)	=	-0.08 ft	
NPSH Available	=	59.92 ft	
NPSH Required (Flygt)	=	13.40 ft	
NPSH Required (KSB)	=	32.00 ft	
NPSH Required (Grundfos)	=	15.31 ft	
NPSH Required (ABS Sulzer)	=	15.70 ft	

(1) Head loss calculated based on entrance minor loss into pump.

Under all design considerations, the system operates as a flooded suction intake. The head losses were determined from the corresponding estimated flow for each condition as described previously in this report. The static head conditions measure from the centerline of the impeller on the lift pump to the control elevation in the wet well. The required NPSH is available at all design conditions.

H. Odor Considerations

To comply with the rules and regulations of 30 TAC Chapter 217- Design Criteria for Sewerage System, odor control must be considered.

1. Wet Well Criteria

Firm Capacity Flow Rate	=	552	gpm
Wet Well Diameter	=	12	feet
Calculated Effective Depth	=	0.49	feet
Design Minimum Depth	=	3.00	feet
Water Volume	=	4,230	gallons

2. Wet Well Detention Time

	Flow (gpm)	Detention Time (min)
Peak	552	8
ADF	138	31
½ ADF	69	61
¼ ADF	35	123
⅛ ADF	17	245

3. Wet Well Turnovers

	Flow (gpm)	Turnovers/Day
Peak	552	188
ADF	138	47
½ ADF	69	23
¼ ADF	35	12
⅛ ADF	17	6

The wet well turns over 6 times per day at ⅛ Average Daily Flow. Based on this, odor at the wet well will not be an issue. Should odor become an issue, provisions may be taken at that time.

4. Force Main Criteria

Firm Capacity Flow Rate	=	552	gpm
Force Main Diameter	=	8	inches
Force Main Length	=	3,130	feet
Force Main Volume	=	8,172	gallons

5. Force Main Detention Time

	Flow (gpm)	Detention Time (min)
Peak	552	15
ADF	138	59
½ ADF	69	118
¼ ADF	35	237
⅛ ADF	17	474

6. Force Main Turnovers

	Flow (gpm)	Turnovers/Day
Peak	552	96
ADF	138	24
½ ADF	69	12
¼ ADF	35	6
⅛ ADF	17	3

The force main turns over 3 times per day at low flow. Based on this information, it is not anticipated that a force main odor control system will be necessary for the force main. Should odor become an issue, provisions may be taken at that time.

I. Wet Well Ventilation Calculations

Typical max velocity through vent pipe not to exceed 600 fpm

$$\text{Velocity} = \frac{4Q}{\pi(D)^2}$$

Proposed Eight-Inch (8'') Ventilation Pipe:

$$\text{Ultimate Flow Rate} = 957 \text{ gpm} = 127.93 \text{ cfm}$$

$$\text{Velocity} = \frac{4*(127.93 \text{ cfm})}{\pi*(8/12)^2}$$

$$\text{Velocity} = 366 \text{ fpm}$$

The calculated 376.83 fpm is less than the maximum 600 fpm, an eight-inch (8") stainless steel air vent is proposed.

J. Force Main Surge Calculations

Since the regulating jurisdictions do not have any published surge calculation requirements, the City of Houston's were utilized. Force main surges occur during intermittent on/off pump operation and during power failure. At firm capacity, the station operates at approximately 32.88 psi (~75.96 ft TDH). In force mains of this size and length, surge wave velocity and water hammer often pose threats to the integrity of the system especially the check valves. Calculations to determine the pressure wave velocity, time period and associated surge pressure for the eight-inch (8") diameter force main are as follows:

1. Pressure Wave Velocity

$$a = [1 / [(w/g) * [(1/K) + (D/e) * (C/E)]]]^{1/2}$$

Where:

a	=	Pressure wave velocity (ft/s)
w/g	=	Mass density of water (slugs/cf)
K	=	Bulk modulus of water (lb/sf)
D/e	=	Dimensionless ratio of pipeline diameter to its wall thickness
C	=	Coefficient of pipe support condition (dependent on Poisson's ratio)
E	=	Young's Modulus of Elasticity for pipe material (lb/sf)

$$a = [1 \div [(1.938) \times [(1 \div 43{,}200{,}000) + (9.05 \div 0.503) * (0.85 \div 70{,}560{,}000)]]]^{1/2}$$

$$a = 1{,}467 \text{ ft/s}$$

2. Surge Pressure – Sudden Flow Stoppage

$$h = \frac{av}{g}$$

Where:

h	=	surge pressure (psi)
v	=	flow velocity (ft/s)
g	=	gravity (ft/s^2)

$$h = \frac{1{,}467 \text{ ft/s} \times (3.52 \text{ ft/s})}{32.2 \text{ ft/s}^2 \times 2.31 \text{ ft/psi}}$$

$$h = 69.41 \text{ psi}$$

3. Pressure Wave Critical Period

$$t = \frac{2L}{a}$$

Where:

t	=	time for pressure wave to cycle entire force main (s)
L	=	length of force main (ft)
a	=	pressure wave velocity (ft/s)

$$t = \frac{2 \times 3{,}130 \text{ ft}}{1{,}467 \text{ ft/s}}$$

$$t = 4.27 \text{ s}$$

4. Change in Pressure Wave Velocity (each run of force main)

$$\Delta v = \frac{Gh}{a}$$

Where:

h = surge pressure (ft)

G = gravity (ft/s^2)

a = pressure wave velocity (ft/s)

$$\Delta v = \frac{32.2\ ft/s^2 \times 69.41\ psi}{1{,}467\ ft/s}$$

$$\Delta v = 1.52\ ft/s$$

1.	Is "Critical Period" greater than 1.5 seconds	Y
2.	Is the maximum flow velocity in the force main greater than 4.0 ft/sec?	N
3.	Will any check valve in the force main close in less than the "Critical Period" (2L/a)?	Y
4.	Will the pump or motor be damaged if allowed to run backwards, up to full speed?	N
5.	Is the factor of safety for the force main less than 3.5 under normal operating conditions?	N
6.	Are there any automatic quick closing valves in the force main set to open/close in less than 5 seconds?	N
7.	Are there any automatic valves within the pumping system that become inoperative due to loss of pumping system pressure?	N
8.	Will the pump(s) be tripped off prior to full closure of the discharge valve?	N
9.	Will the pump(s) be started with the discharge valve open?	N

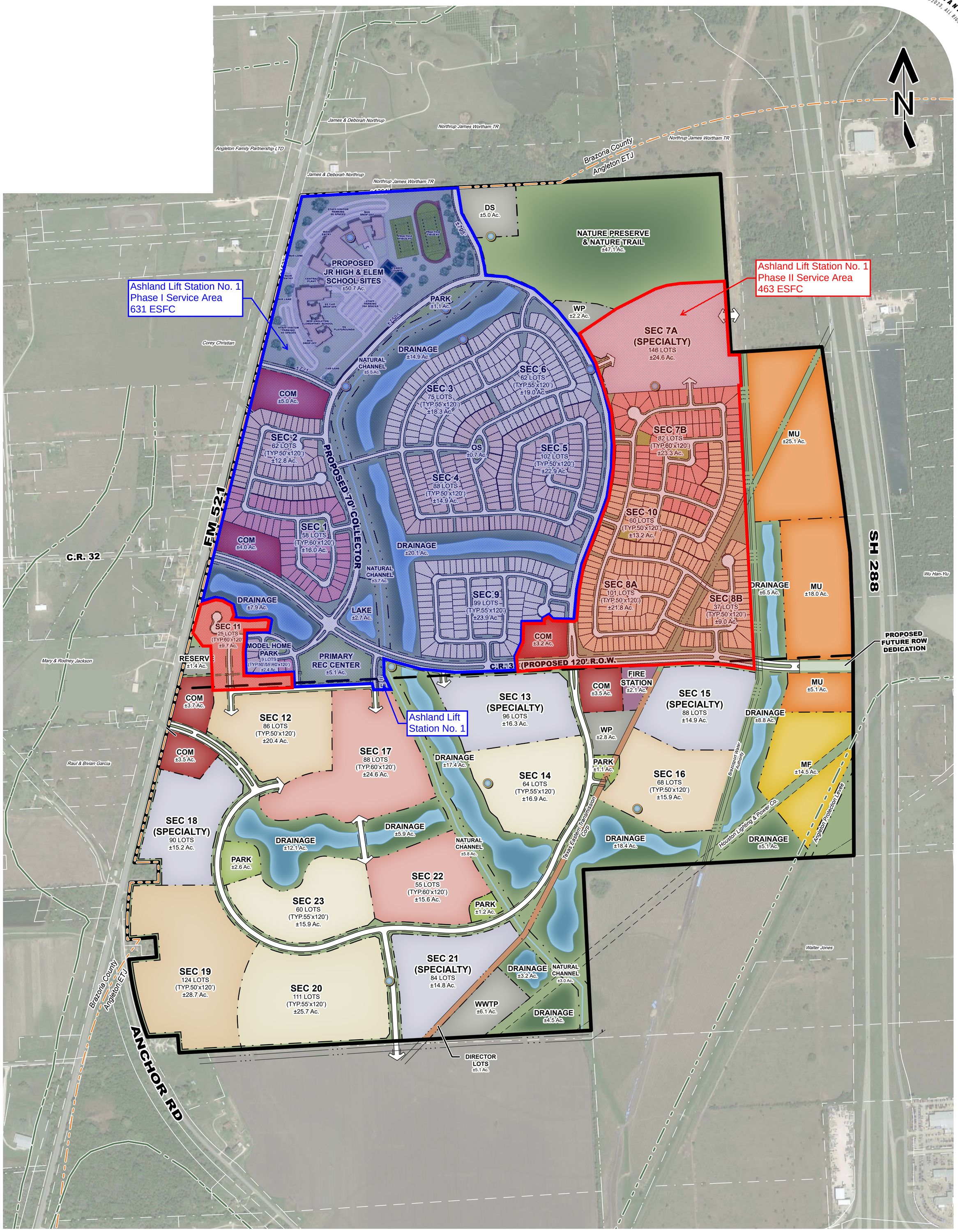
Based on the table above, surge concerns exist. Air-cushioned check valves on the header piping are proposed.

K. Emergency Provisions

To comply with the rules and regulations of 30 TAC Chapter 217- *Design Criteria for Wastewater Systems,* the lift station will be equipped with an autodialer with battery backup to alert the operator to conditions affecting various pieces of equipment critical to the function of the lift station.

A 60 kW diesel engine drive emergency generator with an automatic transfer switch capable of operating all critical lift station equipment during all three phases will be constructed in this project. (Critical equipment includes two (2) 20 HP pumps and all lighting panel loads.)

META PLANNING + DESIGN



OVERALL LAND USE ANALYSIS

TRADITIONAL RESIDENTIAL				**±368.8 Ac.**
SF	TYP. 50'x120'	±733 LOTS	36%	±160.4 Ac.
SF	TYP. 55'x120'	±473 LOTS	24%	±118.4 Ac.
SF	TYP. 60'x120'	±310 LOTS	15%	±90.0 Ac.
	TOTAL	±1,516 LOTS		
SPECIALITY RESIDENTIAL				**±85.8 Ac.**
SP	R1 - SPECIALTY - TYP. VARIES	±504 LOTS	25%	±85.8 Ac.
TOTALS		**±2,020 LOTS**		**±454.6 Ac.**
NON-RESIDENTIAL				**±138.4 Ac.**
COM	COMMERCIAL			±22.9 Ac.
FS	FIRE STATION			±2.1 Ac.
ISD	PROPOSED SCHOOL SITES			±50.7 Ac.
MF	MULTI FAMILY			±14.5 Ac.
MU	MIXED USE			±48.2 Ac.

= WELL SITE

PARKS / RECREATION / OPEN SPACE		**±230.8 Ac.**
PARK	REC. CENTER & PARKS	±12.8 Ac.
	DRAINAGE / DETENTION / CHANNEL	±145.5 Ac.
	LEVEE	±4.6 Ac
	PRESERVATION AREA	±47.1 Ac.
	LANDSCAPE / OPEN SPACE	±20.8 Ac.
UTILITIES & EASEMENTS		**±34.4 Ac.**
	PIPELINE EASEMENTS	±15.0 Ac.
	POWER EASEMENTS	±3.3 Ac.
WP	WATER PLANT	±5.0 Ac.
WWTP	WASTEWATER TREATMENT PLANT	±6.1 Ac.
DS	DRILL SITE	±5.0 Ac.
CONSTRAINTS		**±58.7 Ac.**
	MAJOR THOROUGHFARES	±15.7 Ac.
	COLLECTOR STREETS	±43.0 Ac.
PROJECT TOTAL		**±916.9 Ac.**

a schematic development plan for

ASHLAND

±916.9 ACRES OF LAND

prepared for

ASHTON GRAY DEVELOPMENT

META PLANNING + DESIGN
24285 Katy Freeway, Ste. 525
Katy, Texas 77494
Tel: 281-810-1422

SCALE
0 200 400 800

MTA-78006
OCTOBER 3, 2023

META PLANNING + DESIGN

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Central Zone (FIPS zone 4204). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to North American **Vertical Datum** of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Texas Natural Resources Information Systems (TNRIS) StratMap; National Oceanic and Atmospheric Administration (NOAA), National Geodetic Survey (NGS); Velasco Drainage District; and the Brazoria County Appraisal District.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

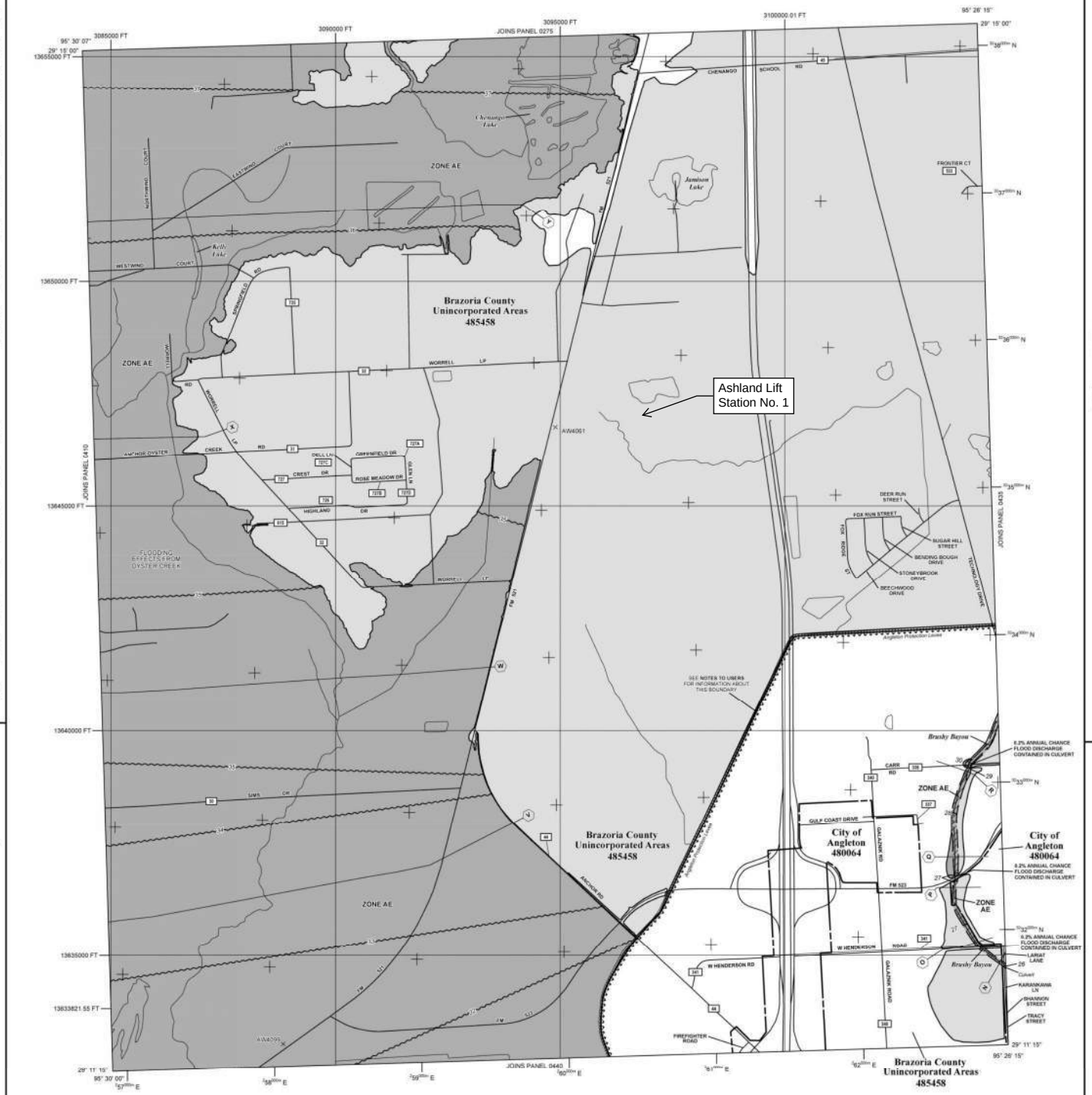
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the Flood Mapping and Insurance eXchange (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/business/nfip.

ATTENTION: The levee, dike, or other structure that impacts flood hazard areas inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure.

The flood hazard data inside the boundary on the FIRM panel has been republished from the previous effective (historic) FIRM for this area, after being converted from NGVD 29 to NAVD 88.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	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.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

Floodplain boundary
Floodway boundary
Zone D boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
Limit of Moderate Wave Action
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
Cross section line
Transect line
Culvert, Flume, Penstock or Aqueduct
Road or Railroad Bridge
Footbridge
87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3276000 N — 1000-meter Universal Transverse Mercator grid values, zone 15N
600000 FT — 5000-foot grid values: Texas State Plane coordinate system, South Central zone (FIPS ZONE 4204), Lambert Conformal Conic projection
DX5510 x — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP PANEL
JUNE 5, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
MAY 4, 1992
NOVEMBER 17, 1993
SEPTEMBER 22, 1999
DECEMBER 30, 2020

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0430K

FIRM
FLOOD INSURANCE RATE MAP

BRAZORIA COUNTY, TEXAS AND INCORPORATED AREAS

PANEL 430 OF 925

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANGLETON, CITY OF	480064	0430	K
BRAZORIA COUNTY	485458	0430	K

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48039C0430K

MAP REVISED
DECEMBER 30, 2020

Federal Emergency Management Agency

EXHIBIT B

ASHTON GRAY DEVELOPMENT
ASHLAND LIFT STATION NO. 1

The pump curves shown are based on Flygt NP 3153 HT 3~ 465. The system curve represents approximately 3,130 linear feet (3,130') of 8-inch (8") PVC force main and approximately 39 linear feet (39') of 6-inch (6") DI riser piping. The design static head was calculated based on the pump "on" elevations and the maximum water surface elevation at the discharge.

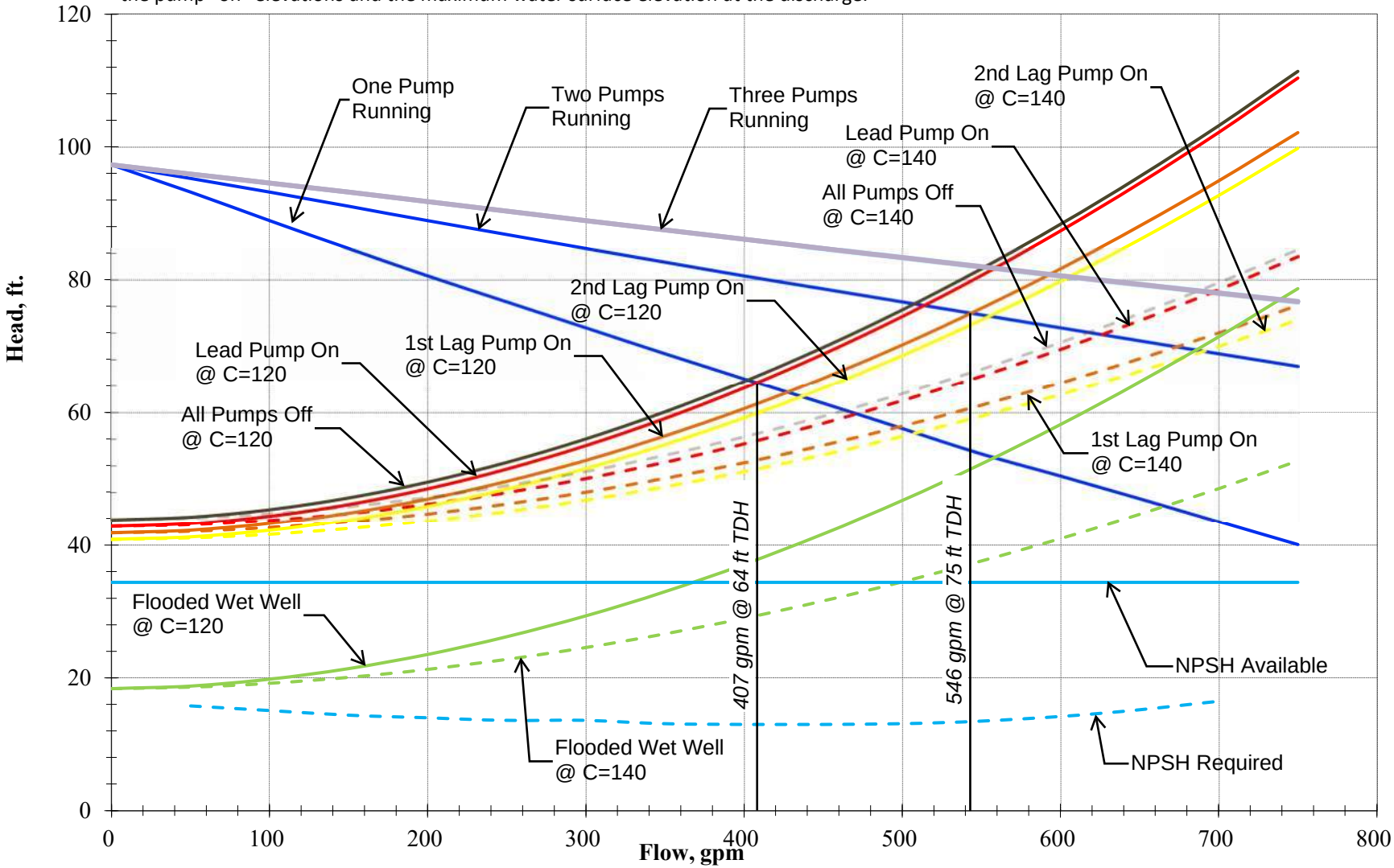


EXHIBIT C

ASHTON GRAY DEVELOPMENT
ASHLAND LIFT STATION NO. 1

The pump curves shown are based on KSB Amarex D-max 80-170/068F2YSG. The system curve represents approximately 3,130 linear feet (3,130') of 8-inch (8") PVC force main and approximately 39 linear feet (39') of 6-inch (6") DI riser piping. The design static head was calculated based on the pump "on" elevations and the maximum water surface elevation at the discharge.

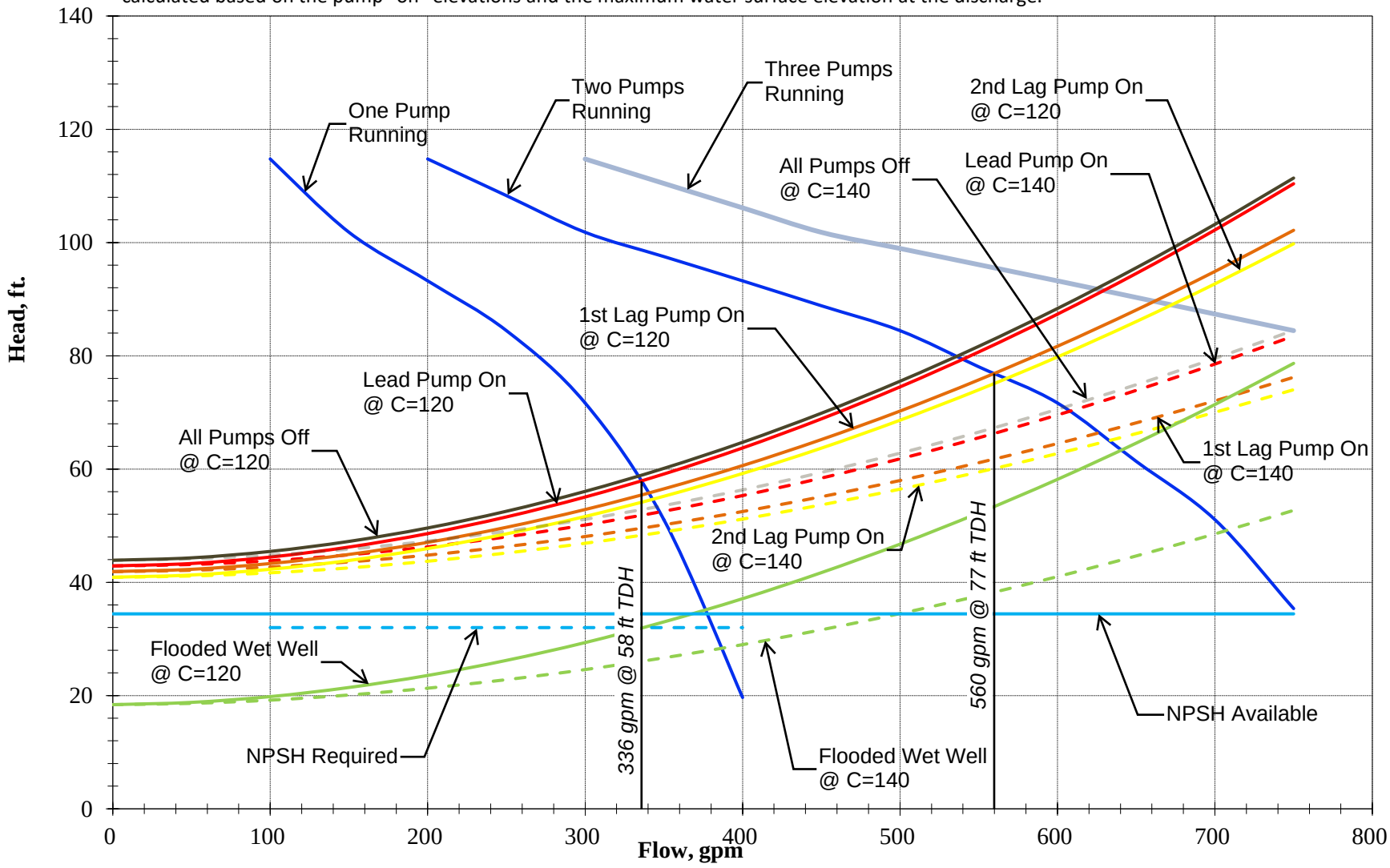


EXHIBIT D

ASHTON GRAY DEVELOPMENT
ASHLAND LIFT STATION NO. 1

The pump curves shown are based on Grundfos SE.A40.175.2.52S.C.EX.61R.A.Z. The system curve represents approximately 3,130 linear feet (3,130') of 8-inch (8") PVC force main and approximately 39 linear feet (39') of 6-inch (6") DI riser piping. The design static head was calculated based on the pump "on" elevations and the maximum water surface elevation at the discharge.

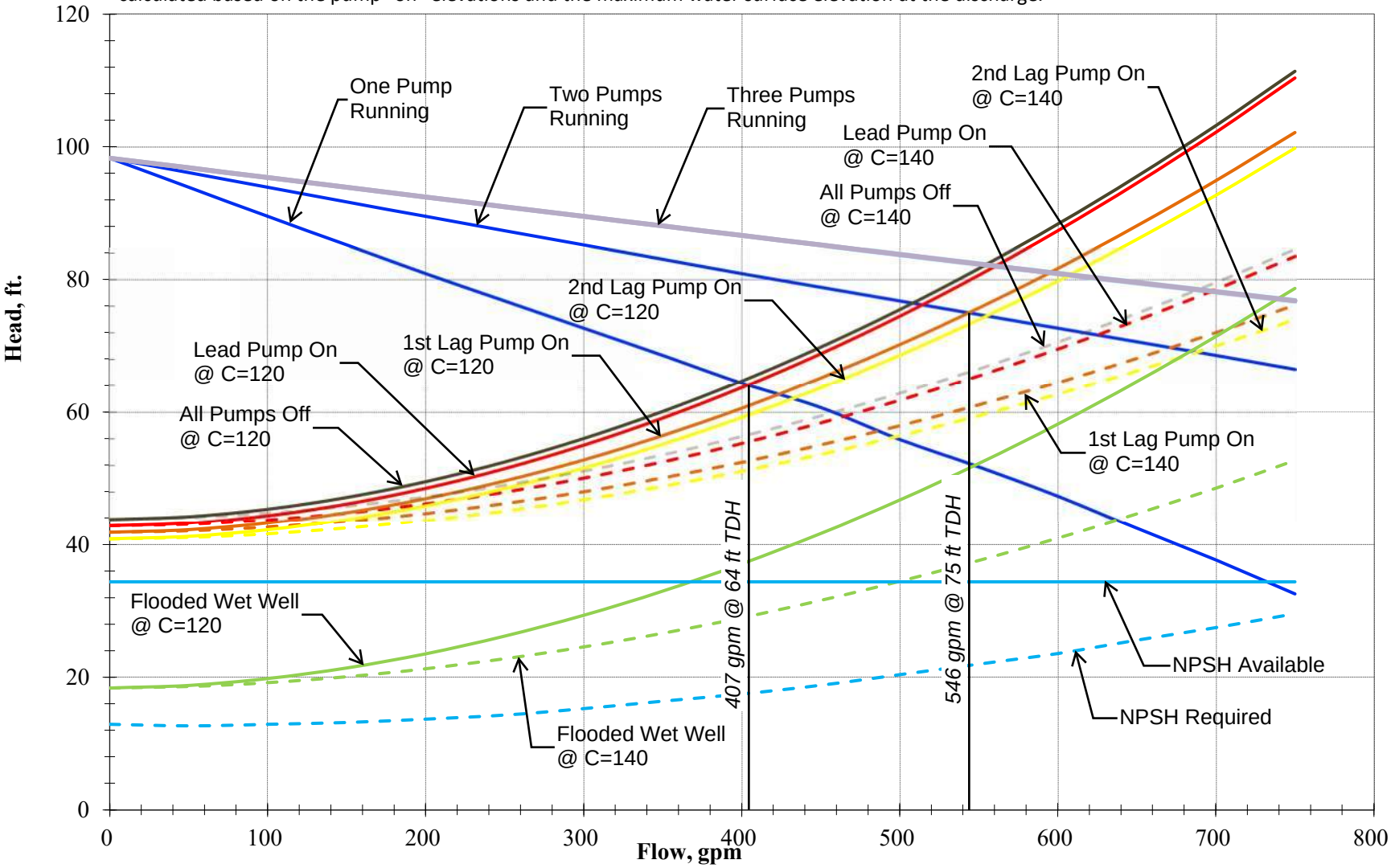


EXHIBIT E

ASHTON GRAY DEVELOPMENT
ASHLAND LIFT STATION NO. 1

The pump curves shown are based on ABS Sulzer XFP100E CB1 PE1-2. The system curve represents approximately 3,130 linear feet (3,130') of 8-inch (8") PVC force main and approximately 39 linear feet (39') of 6-inch (6") DI riser piping. The design static head was calculated based on the pump "on" elevations and the maximum water surface elevation at the discharge.

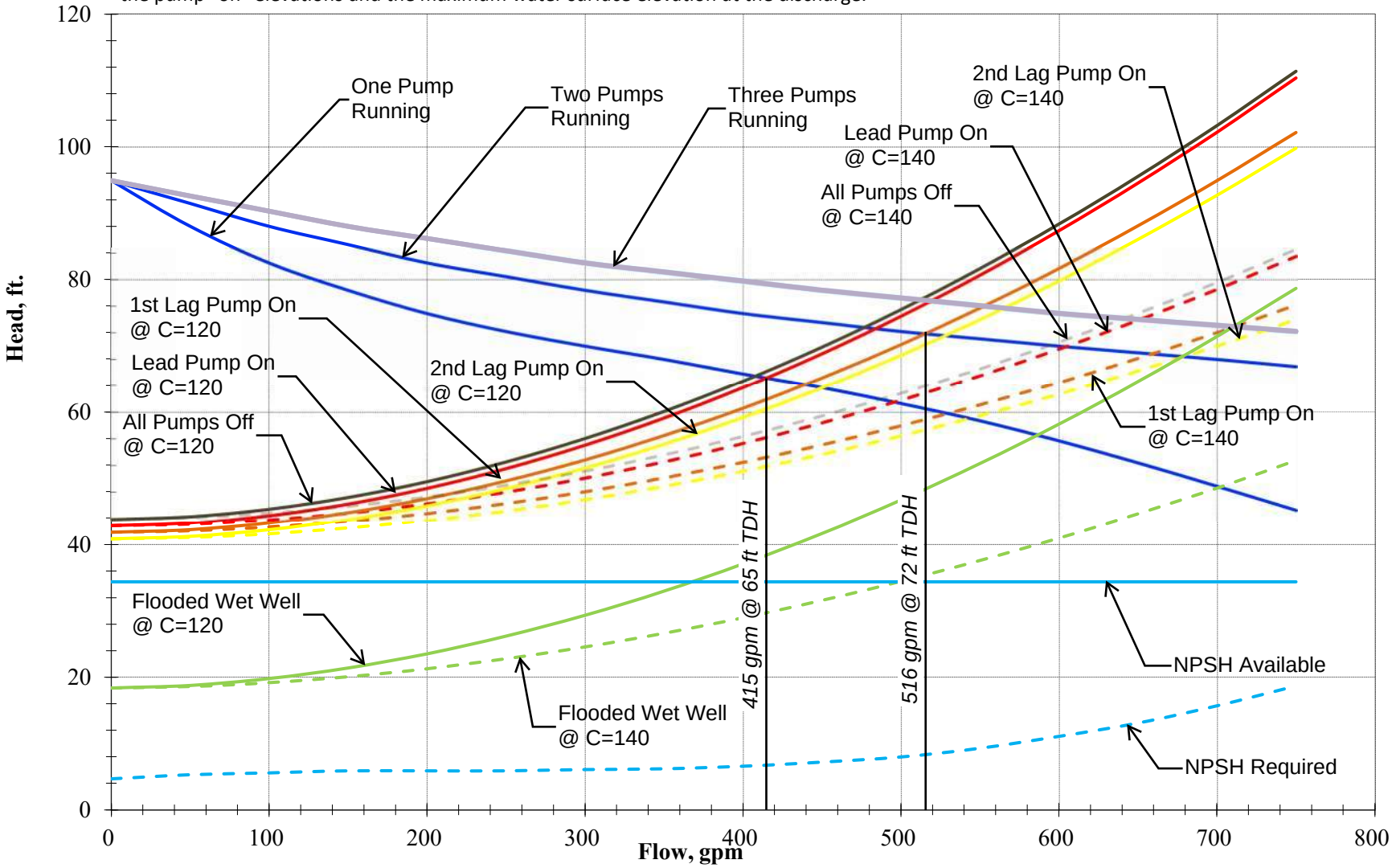


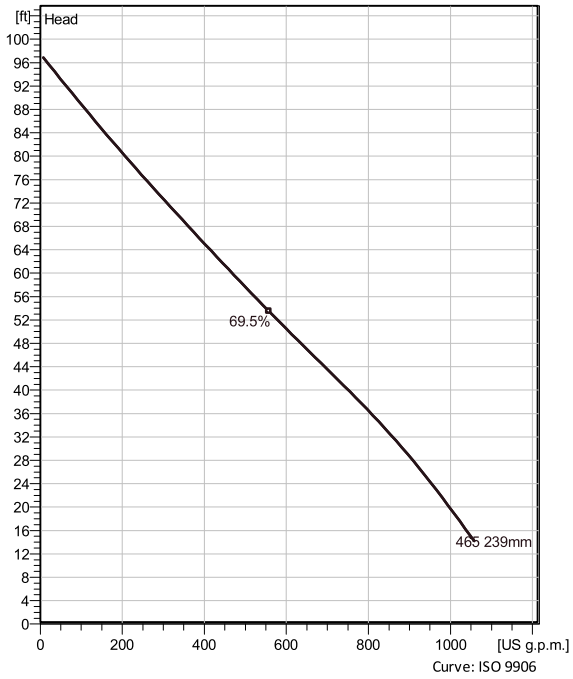
EXHIBIT F

NP 3153 HT 3~ 465

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number
N3153.660 21-15-4AA-W 12hp

Installation type
P - Semi permanent, Wet

Impeller diameter
239 mm

Discharge diameter
4 inch

Pump information

Impeller diameter
239 mm

Discharge diameter
4 inch

Inlet diameter
150 mm

Maximum operating speed
1765 rpm

Number of blades
2

Max. fluid temperature
40 °C

Configuration

Material

Impeller
Stainless steel

Project	Xylect-20135634	**Created by**	Eric Prescott		
Block		**Created on**	2/13/2023	**Last update**	2/13/2023

NP 3153 HT 3~ 465

Technical specification

Motor - General

Motor number N3153.660 21-15-4AA-W 12hp	**Phases** 3~	**Rated speed** 1765 rpm	**Rated power** 12 hp
ATEX approved No	**Number of poles** 4	**Rated current** 16 A	**Stator variant** 5
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 660			

Motor - Technical

Power factor - 1/1 Load 0.78	**Motor efficiency - 1/1 Load** 88.6 %	**Total moment of inertia** 1.94 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.71	**Motor efficiency - 3/4 Load** 88.7 %	**Starting current, direct starting** 114 A	
Power factor - 1/2 Load 0.58	**Motor efficiency - 1/2 Load** 87.3 %	**Starting current, star-delta** 38 A	

Project	Xylect-20135634	**Created by**	Eric Prescott		
Block		**Created on**	2/13/2023	**Last update**	2/13/2023

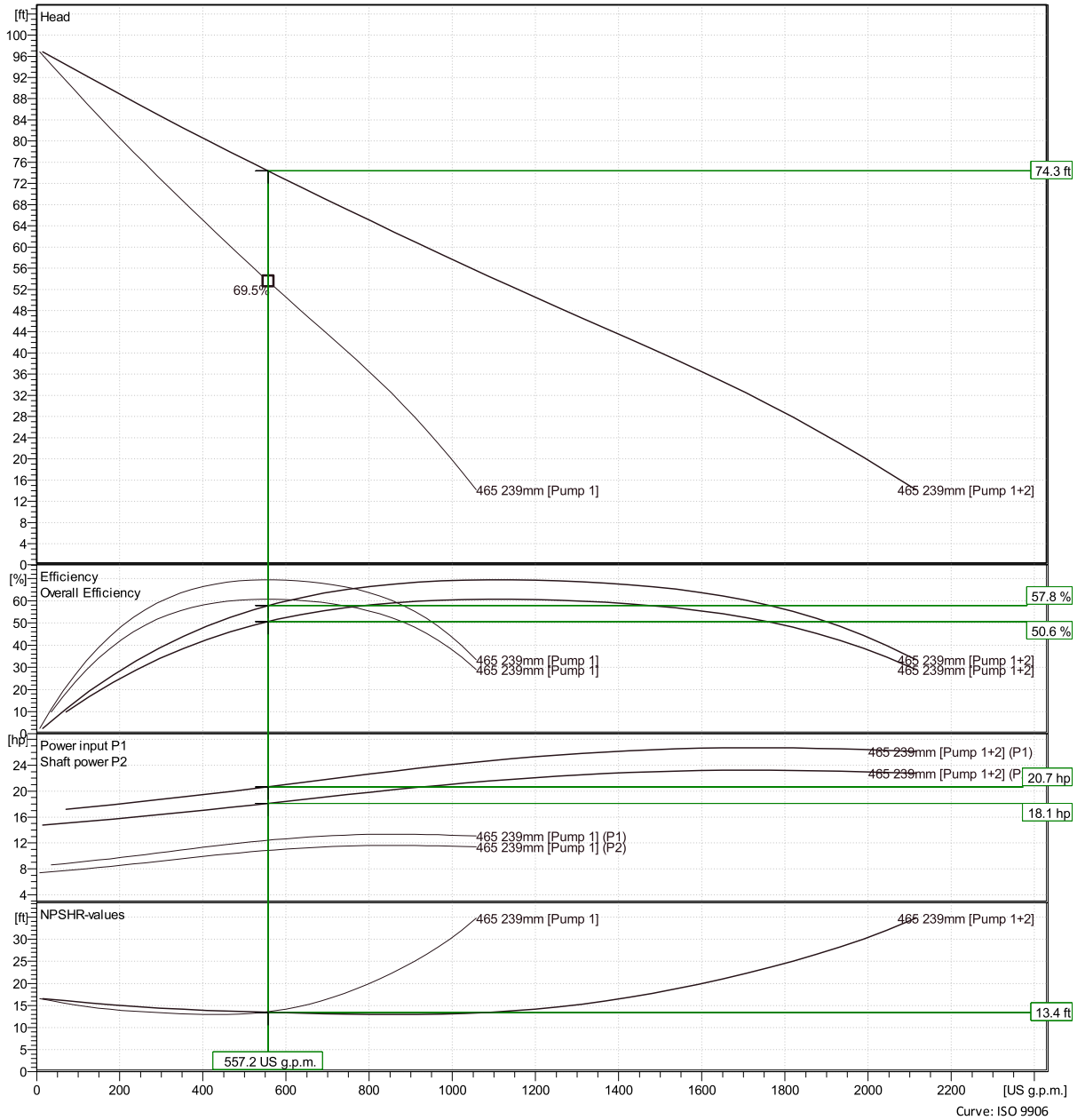
NP 3153 HT 3~ 465

Performance curve

Duty point

Flow	Head
279 US g.p.m.	74.3 ft

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



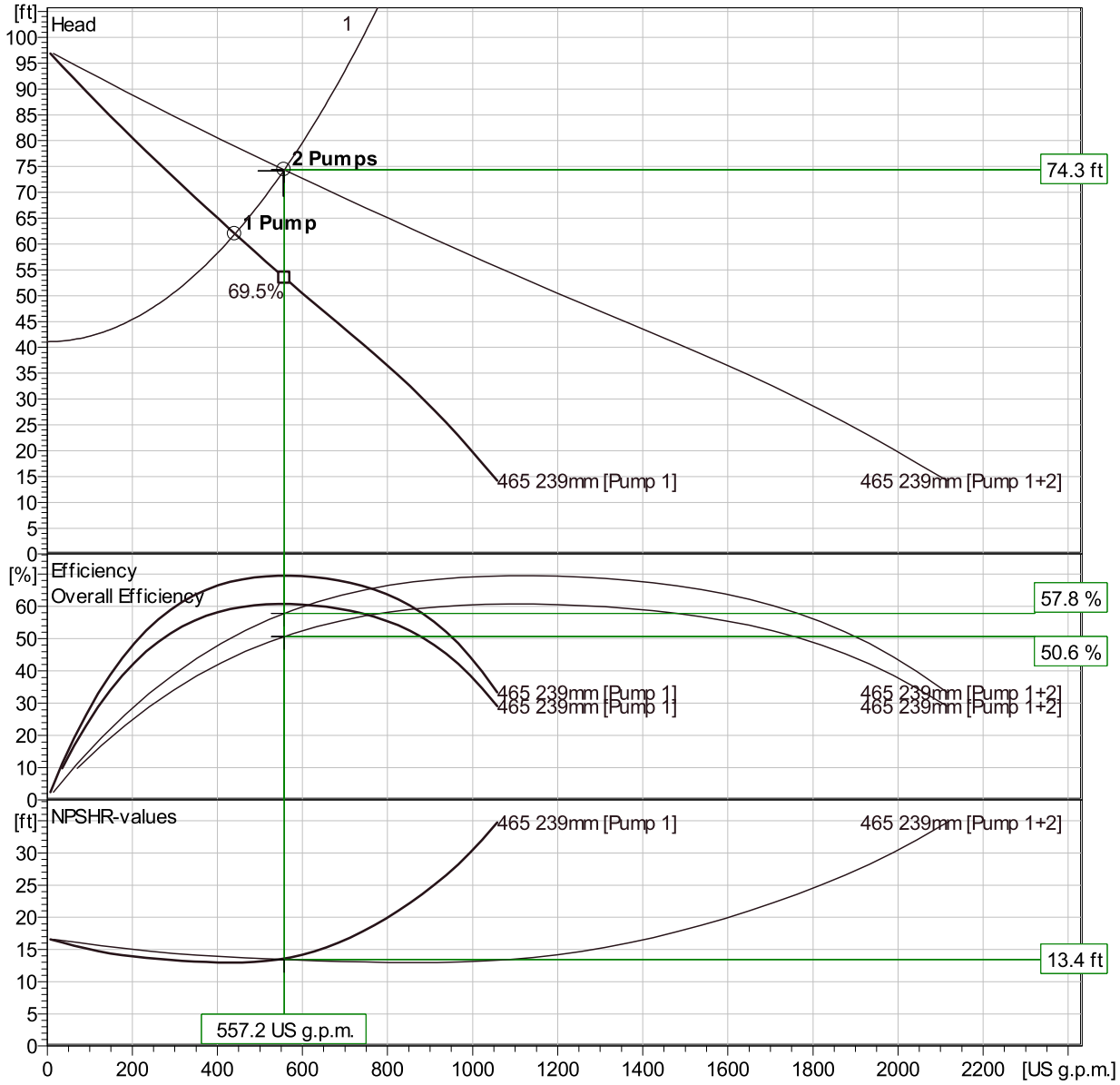
Curve: ISO 9906

Xylect-20135634		Eric Prescott	
	Created on	2/13/2023	**Last update** 2/13/2023

NP 3153 HT 3~ 465

Duty Analysis

Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



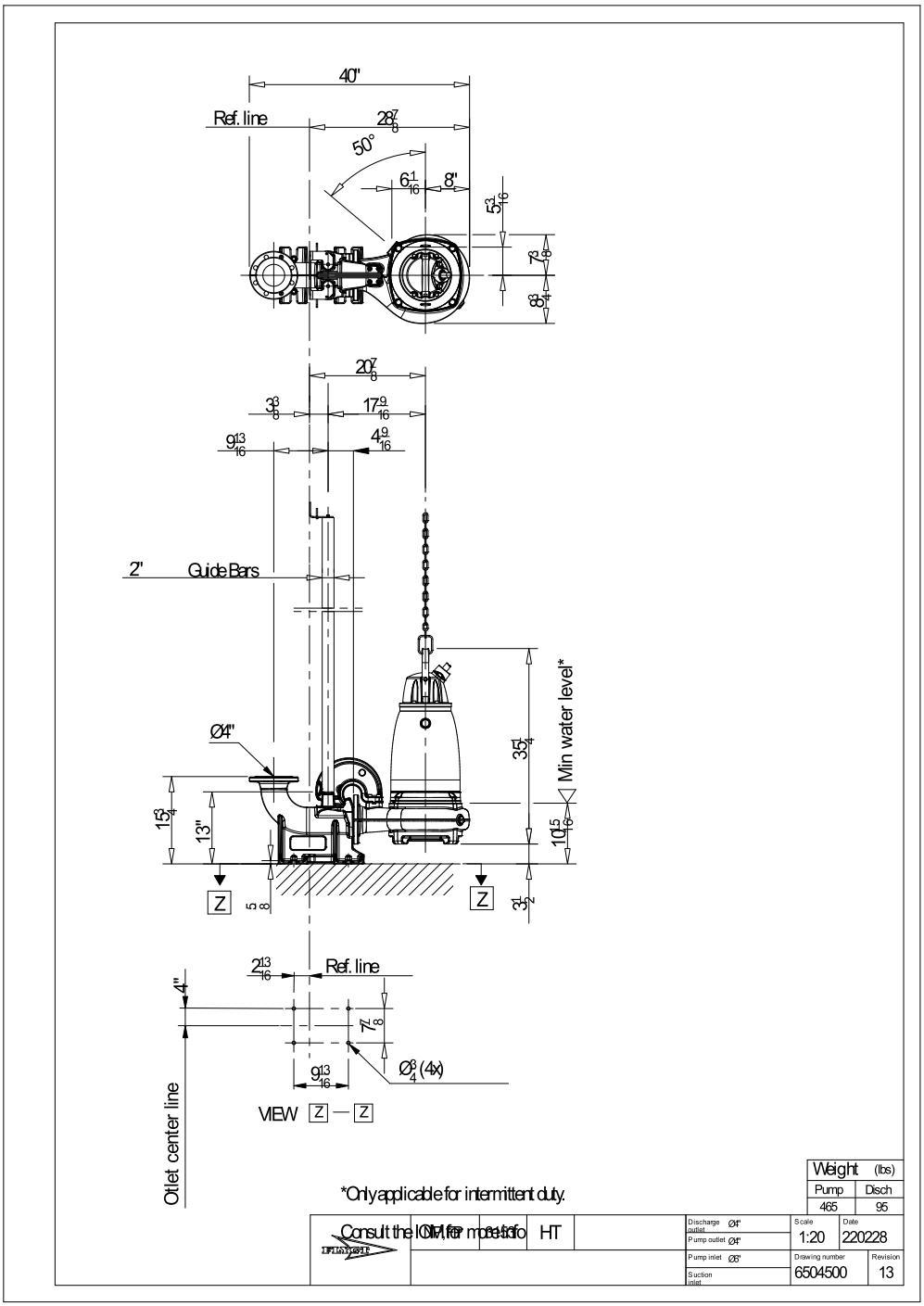
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
2 / 1	279	74.3	9.06	557	74.3	18.1	57.8 %	461	13.4
1 / 1	441	62	10.2	441	62	10.2	68 %	328	13

Project		**Created by**	Eric Prescott		
Block	Xylect-20135634	**Created on**	2/13/2023	**Last update**	2/13/2023

NP 3153 HT 3~ 465

Dimensional drawing



Project	Xylect-20135634	**Created by**	Eric Prescott		
Block		**Created on**	2/13/2023	**Last update**	2/13/2023

Project	**Quiddity**
Customer pos.no	
Project ID	**Ashland Lift Station No. 1**
Created by	
Pos.no	**1**

Data sheet

Pump type Amarex D-max 80-170/068F2YSG

Operating data

Flow	285	US g.p.m.	Fluid			
Head	76	ft	Density of fluid	62.3	lb/ft³	
Operating speed	3,462	rpm	Viscosity	1.08E-5	ft²/s	
Shaft power	8.55	hp	Temperature	68	°F	
Efficiency	64	%	Hydraulic acceptance acc.			
Required pump NPSH		ft				
Head H(Q=0)	121	ft				
Application range	Head		Flow			
From	121	ft	82.6	US g.p.m.		
To	13	ft	409	US g.p.m.		

Design

Make	KSB	Impeller type	Single vane impeller		
Design	Submersible pump		Open		
Series	Amarex D	Impeller size		5 11/16	inch
Frame size	80-170		Max.	6	inch
Stages	1		Min.	4 13/16	inch
Curve number	K2573-62-080170D				

Type of bearings	Antifriction		
Nos. of bearings	1 / 1		
Lubrication	Grease lubrication. lubricated for lifetime		
Suction port	Pressure rating		PN 16
	Flange size	DN0	---
	Nennweite	DN1	
	Standard		DIN EN 1092-2
Discharge port	Pressure rating		PN 16
	Nennweite	DN2	DN 80
	Flange size	DN3	DN 100
	Standard		EN 1092-2
			Discharge port: discharge elbow (DN3)

Materials

Casing	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Cover	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Suction cover	D-flector
Suction cover material	Ductile cast iron EN-GJS-600-3
Discharge cover	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Shaft	Stainless steel EN-1.4021+QT800 (A 276 Type 420)
Impeller	Ductile cast iron EN-GJS-600-3
O-Rings	Nitrile-butadiene-rubber NBR

Data sheet

Pump type Amarex D-max 80-170/068F2YSG

Shaft seal

Type of seal	Double mechanical seal
Arrangement:	Tandem
Seal on medium side	With protected spring
Mechanical seal. pump-side	Silicon carbide / Silicon carbide
Mechanical seal. bearing-side	Carbon / Silicon carbide
Elastomers	Nitrile rubber (NBR)
Cable Entry	Resin grouted cable gland

Monitoring

Thermal winding protection	By temperature sensitive switches
Explosion proof protection	By temperature sensitive switches
Motor housing monitoring	By conductive moisture sensor electrode

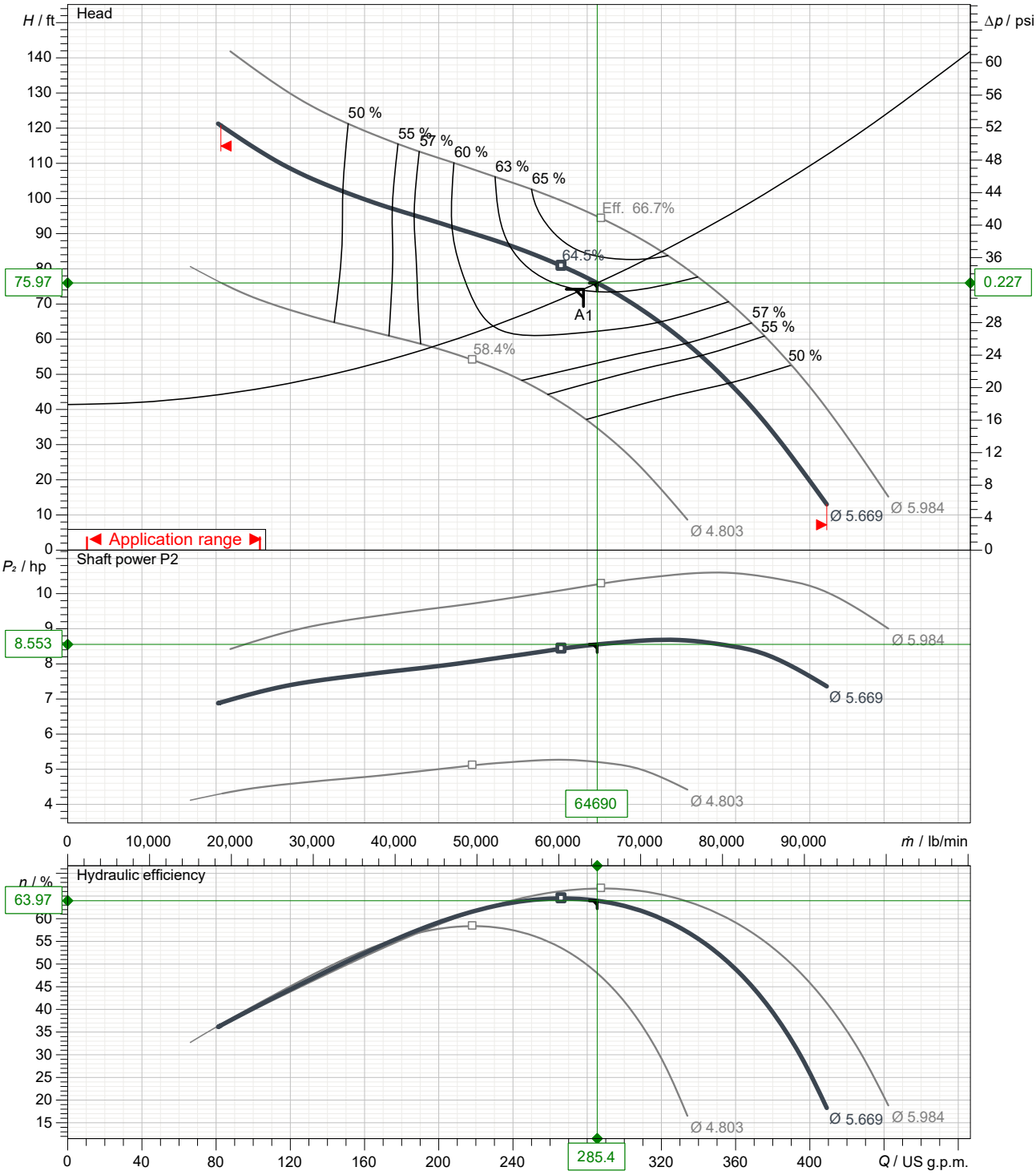
Coating

Preparatory treatment	SSPC near white SP 10
Blasting method	Steel grit blasting
Primer	Zinc phosphate or Zinc dust
Dry film thickness primer	> 1 1/2 mils (35 microns)
Top coat	2-component epoxy resin
Solids content	> 82 %
Dry film thickness top coat	> 3 mils (80 microns)
Color	Ultramarine Blue (RAL 5002 to DIN 6174)

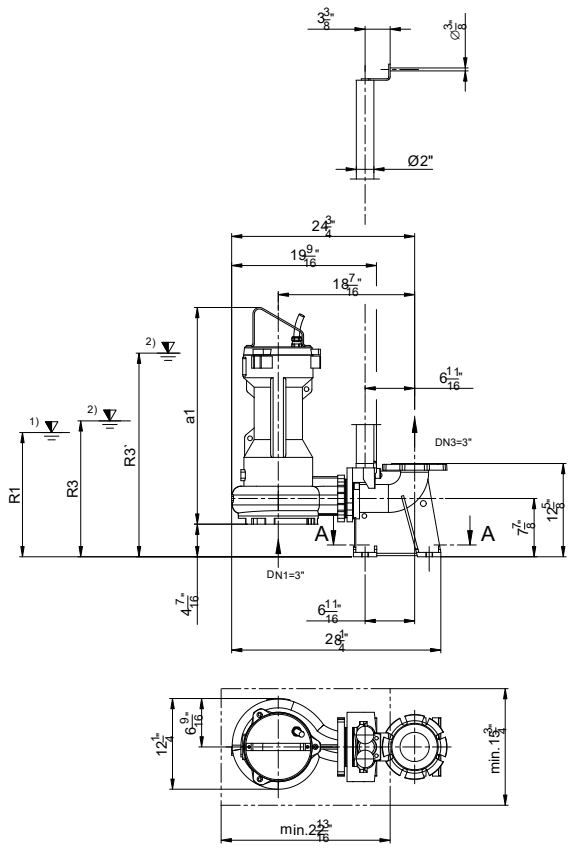
Installation

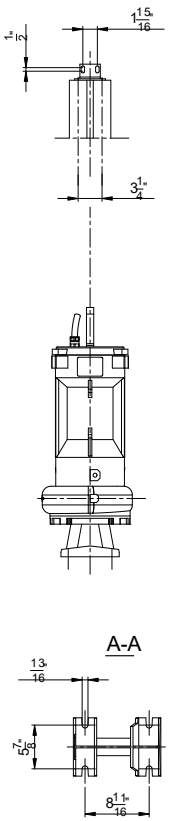
Performance curve

Pump type **Amarex D-max 80-170/068F2YSG**



Impeller type	Single vane impeller, Open			Curve number	K2573-62-080170D/0
Impeller size	5 11/16 inch	Density of fluid	62.322 lb/ft³	Frequency	60 Hz
		Viscosity	1.082E-5 ft²/s	Speed	3,461.9 1/min





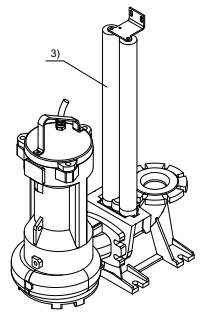
Laufrad Impeller	Motor Engine	50 Hz	60 Hz	Effizienzklasse Efficiency class	Motorausführung Motor version	inch a1	inch R1	inch R3	inch R3`	lbs A1
D	45 2 NG10L	X	-	C	U	29 4/16		20 7/16	-	...
	45 2 NG10L	X	-	C	Y	29 10/16		20 7/16	-	...
	46 2 NG10L	-	X	C	U	29 4/16		20 7/16	-	...
	46 2 NG10L	-	X	C	Y	29 10/16		20 7/16	-	...
	66 2 NG10L	-	X	F	U	29 4/16	15 5/16	-	28 6/16	...
	66 2 NG10L	-	X	F	Y	29 10/16		-	28 11/16	...
	68 2 NG10L	-	X	F	U	29 4/16		-	28 6/16	...
	68 2 NG10L	-	X	F	Y	29 10/16		-	28 11/16	...
	73 2 NG10L	X	-	F	U	29 4/16		-	28 6/16	...
	73 2 NG10L	X	-	F	Y	29 10/16		-	28 11/16	...

1) Tiefster Ausschaltpunkt bei Automatikbetrieb
Lowest shut-off point for automatic operation

2) Mindestüberdeckung bei Dauerbetrieb
Minimum submergence for continuous operation

3) Nicht im KSB-Lieferumfang enthalten
Not included in KSB's scope of supply

A1 Gewicht Pumpenaggregat (Werkstoffausführung G) mit 10 m elektrischer Anschlussleitung
Weight of pump set (Material variant G) with 10 m power cable



aus CADENAS-Model entstanden
emerged from CADENAS-model

NUR FÜR ANFRAGE/ANGEBOT
technische Änderungen vorbehalten
FOR INQUIRY/OFFER ONLY
technical modifications reserved

Maßstab/Scale/Echelle 1:10				stationäre Aufstellung / stationary installation
CAD A 2				
KSB				Baureihe-Größe/Type-Size: Amarex D 80-170 / NG10
	0	30.04.2021	emmrpat	KSB -Nr./KSB No./N° KSB: ----------
KSB SE & Co. KGaA Urmstraße 92-100 D-06110 Halle (Saale)	Änderung/Revision Modification	Datum/Date	Name/Nom	Zeichnungs-Nr./Drawing No./N° Plan
	CAD-BEZEICHNUNG			
	SCHUTZVERMERK DIN 34-1-D			

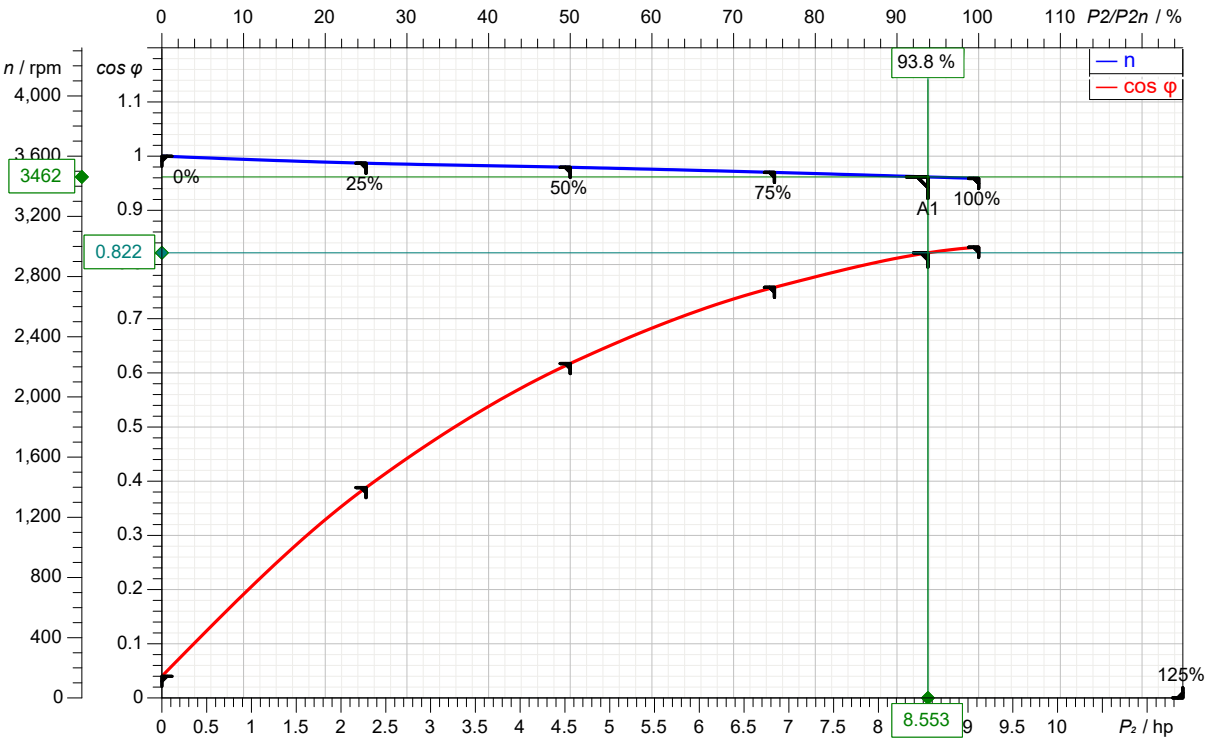
Data sheet: Motor data

Motor type **682YSG**

Motor manufacturer	KSB SE & Co. KGaA	Rated voltage	230	V
Design acc. standard	-	Rated frequency	60	Hz
Degree of protection	IP68	Rated HP (D.O.L) or VFD	9.12	hp
Insulation class		Rated current	23.5	A
Coolant temperature	< / = 104 °F (40 °C)	Nominal speed	3,452	rpm
Starting mode	Direct starting	Starting to rated current	9.7	
No. starts / h	30	Starting current	227.9	A
		Max. voltage	242	V
		Min. voltage	219	V
Discharge cover	Grey cast iron EN-GJL-250 (A 48 Class 35B)			
Explosion protection	Class I, Div. 1, Groups C&D T4			
Pump type	Amarex D-max 80-170/068F2YSG			

Load	P1 kW	P2 hp	eta %	cos phi	I A
4/4	7.79	9.1	87.3	0.83	23.5
3/4	5.74	6.8	88.9	0.76	19.0
2/4	3.81	4.6	89.2	0.62	15.5
1/4	2.03	2.3	83.9	0.39	13.1

Main cable	1 x AWG 13-7+16-3	Diameter	0.73 inch...0.77 inch
Control cable	---	Diameter	
Cable. outer sheath	Waterproof synthetic rubber compound		
Cable length	26 ft (8 m)		



GRUNDFOS

SUBMITTAL

Grundfos Series SE Sewage Pump with Open S-Tube Impeller

QUOTE NUMBER / ID 1400588	**UNIT TAG 001**	**QUANTITY 1**
	SERVICE	
REPRESENTATIVE	**SUBMITTED BY**	**DATE**
ENGINEER	**APPROVED BY**	**DATE**
CONTRACTOR	**ORDER #**	**DATE**

SE.A40.175.2.52S.C.EX.61R.A.Z
3569 rpm

Part Number 99966116 Ref. Only

Conditions of Service		Pump Data		Motor Data	
Flow	278.0 USgpm	Impeller Diameter	5.67 in	Motor HP	17.5 HP
Head	74.50 ft	Cooling Jacket	YES	BHP	9.33 HP
Liquid	Cold Water	Efficiency	56.06 %	Enclosure	Explosion Proof
Temperature	68.00 deg F	Suction	4 in.	Voltage	460 V
NPSHr	15.31 ft	Discharge	4 in.	Phase	3 Phase
Viscosity	1.00 cP			Cycle	60
Specific Gravity	1.000 SG			Full Load Amps	23
				Locked Rotor Amps	213
				Nema Code Ltr	H

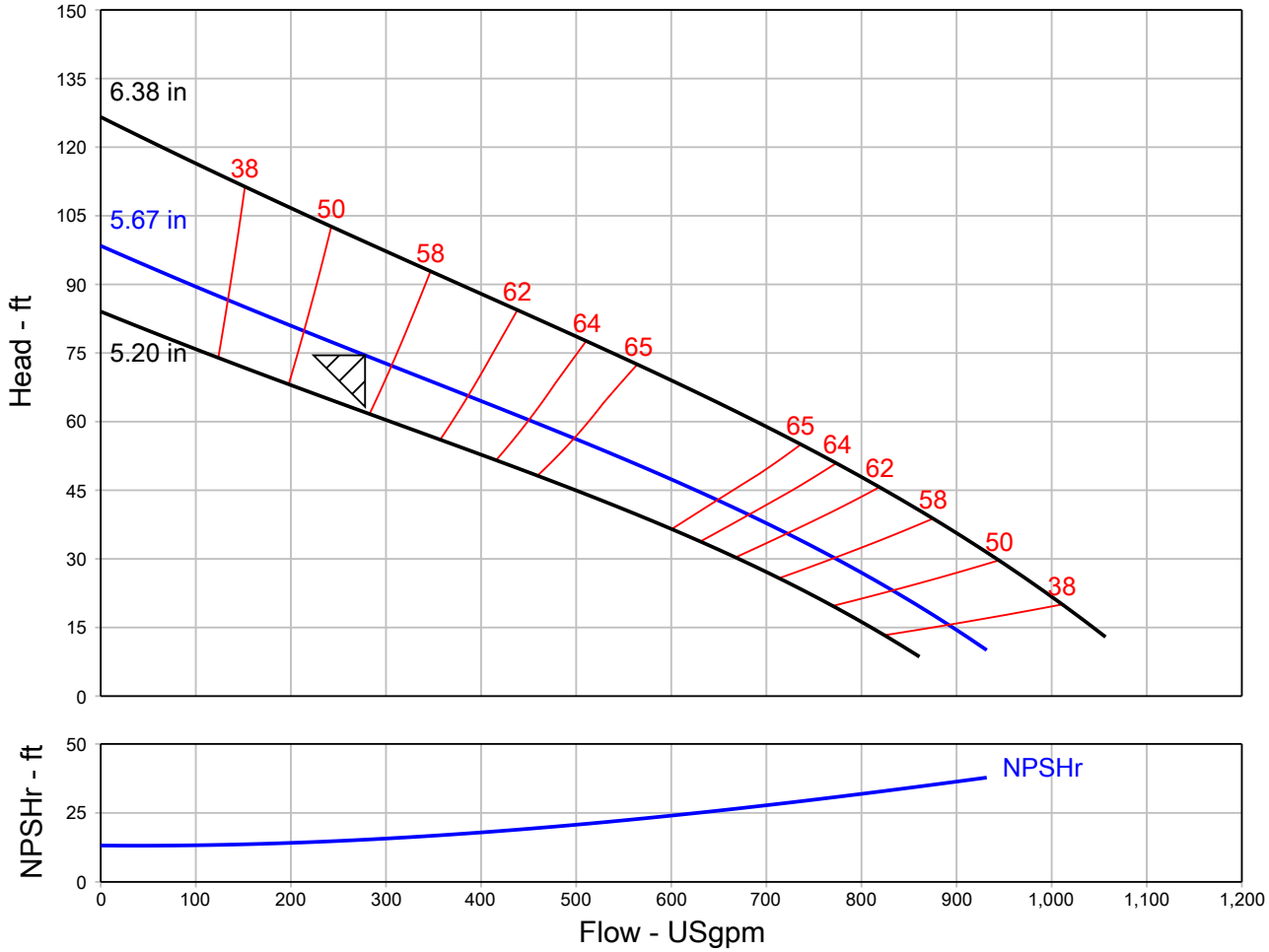


EXHIBIT I

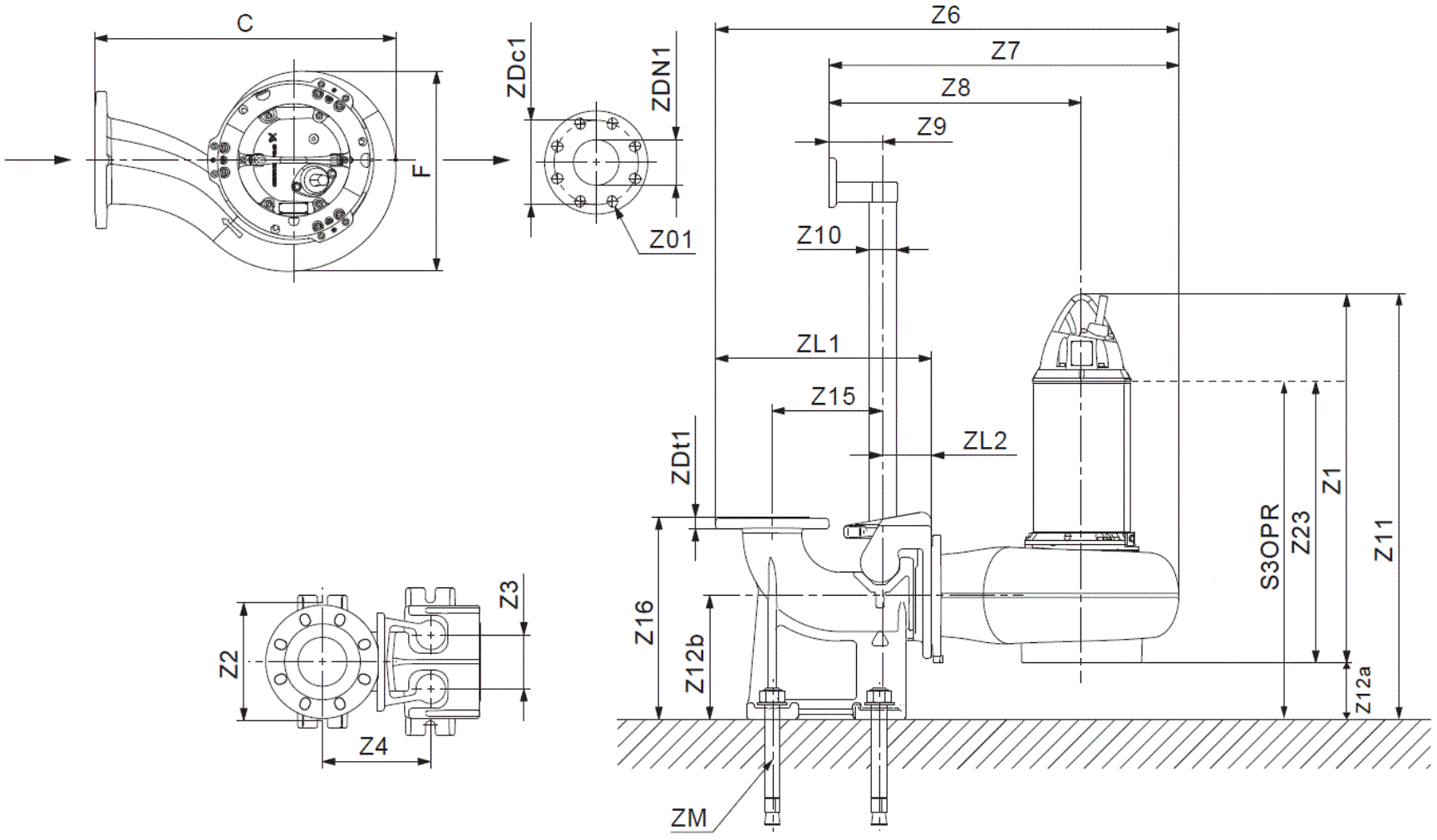
GRUNDFOS

GRUNDFOS

SUBMITTAL

QUOTE NUMBER / ID 1400588 **UNIT TAG 001** **SE.A40.175.2.52S.C.EX.61R.A.Z**

Grundfos Series SE Sewage Pump with Open S-Tube Impeller



NOT FOR CONSTRUCTION, unless certified and referenced on order

Units	C	F	ZØ1	Z1	Z2	Z3	Z4	Z6	Z7	Z8	Z9	Z10	Z11	Z12a	Z12b	Z15	Z16	ZDC1	ZDN1	ZDT1	ZL1	ZL2	ZM	Z23 EX	S3OPR EX
inches	18.70	15.00	8 X M20	44.90	9.10	4.30	8.70	36.20	27.30	19.80	4.30	2.40	48.50	3.60	9.50	8.70	16.30	7.50	ANSI 4"	0.80	17.40	4.20	4 X M16	12.20	15.80

Product description

SULZER

Pos.no	Description	Item no.	Quant.
1	**XFP100E CB1 60HZ (wet pit)**		
1.1	Centrifugal pump: XFP100E CB1 (wet pit)		2

XFP PE1-3
Type: XFP100E CB1 (wet pit)

Submersible sewage pump type ABS XFP is designed for municipal and industrial wastewater equipped with Premium Efficiency (IE3 level) motor for:

Main applications

- Water and wastewater
- Sewage containing solids and fibrous material
- Sewage with sludge and high content of rags
- Industrial raw water
- Municipal combined sewage and storm water systems.

Main design features

- Premium efficiency IE3 motors in acc. with IEC60034-30
- Approval for ATEX (Ex II 2G k Ex db IIB T4 GB), FM and CSA as standard
- Water pressure-tight encapsulated fully flood-proof motor
- Motor insulation according to Class H (140°C temperature sensors)
- Temperature rise according to NEMA Class A
- Continuously rated motor suitable for wet and dry installation as standard for PE1 and PE2 in 50Hz. Optional for 60Hz
- PE3 has the option of internal closed loop cooling system for dry installation
- EMC version as option for PE1-3
- Condition monitoring of temperature and water ingress.
- Solid passage min. 75 mm and greater for CB Plus
- Hydraulics with open CB Plus type single and multi-vane (PE3) or vortex impellers suitable for handling of water, polluted water, sewage containing solids, faecal slurry and sludge

50Hz
Capacity up to 750 m3/h
Head, max. 74 m

60Hz
Capacity up to 3500 US g.p.m.
Head, max. 330ft

Type: XFP100E CB1 (wet pit)
Technical data

Delivery rate	: 266.4 US g.p.m.
Delivery head	: 71.51 ft
Hydr. Efficiency	: 52.79 %
Total efficiency	: 48.66 %
Shaft power	: 9.34 hp
Speed	: 1771 rpm
Impeller type	: Contrablock Plus impeller, 1 vane
Motor output	: 14.08 hp
Voltage	: 460 V
Frequency	: 60 Hz
Suction outlet	: DN100
Discharge outlet	: DN100

Selected configuration of the pump:
Product code: GX6J

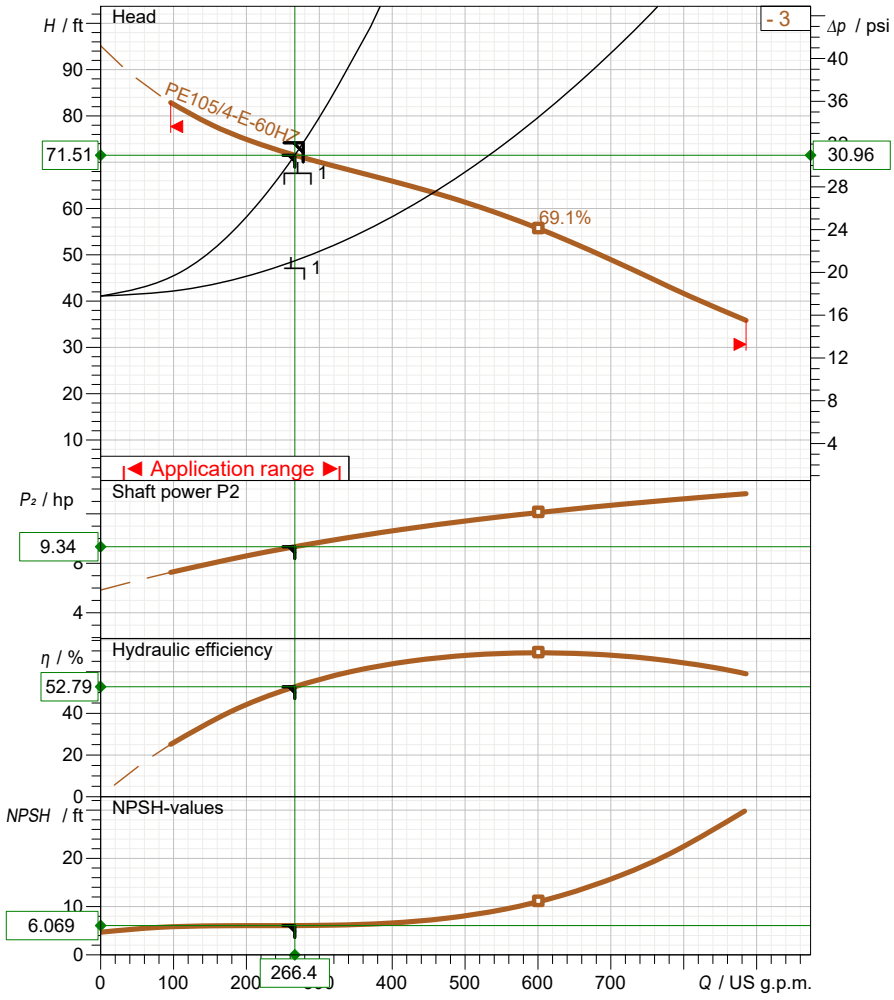
1-2 Factory and family -> static: GX
3 Hydraulic Type: 6 = XFP100E CB1 (wet pit)
4 Motor Size: J = PE105/4-E-60HZ
5 Explosion Proof / Di: =
6 Voltage: =
7 Impeller Size - Material: = .3
8 Cable Length: =
9 Shaft Material / Hydraulics: =
10 Seal type: =
11 Paint finish: =
12 2nd Mechanical option: =

Product description

SULZER

Pos.no	Description	Item no.	Quant.
	13 Installation type: = 14 Motor Oil Fill / Cooling: = 15 Blank / Bearing Monitor: =		

XFP100E CB1 60HZ (wet pit)



Testnorm
ISO9906:2012,HI 11.6/14.6≤10kW

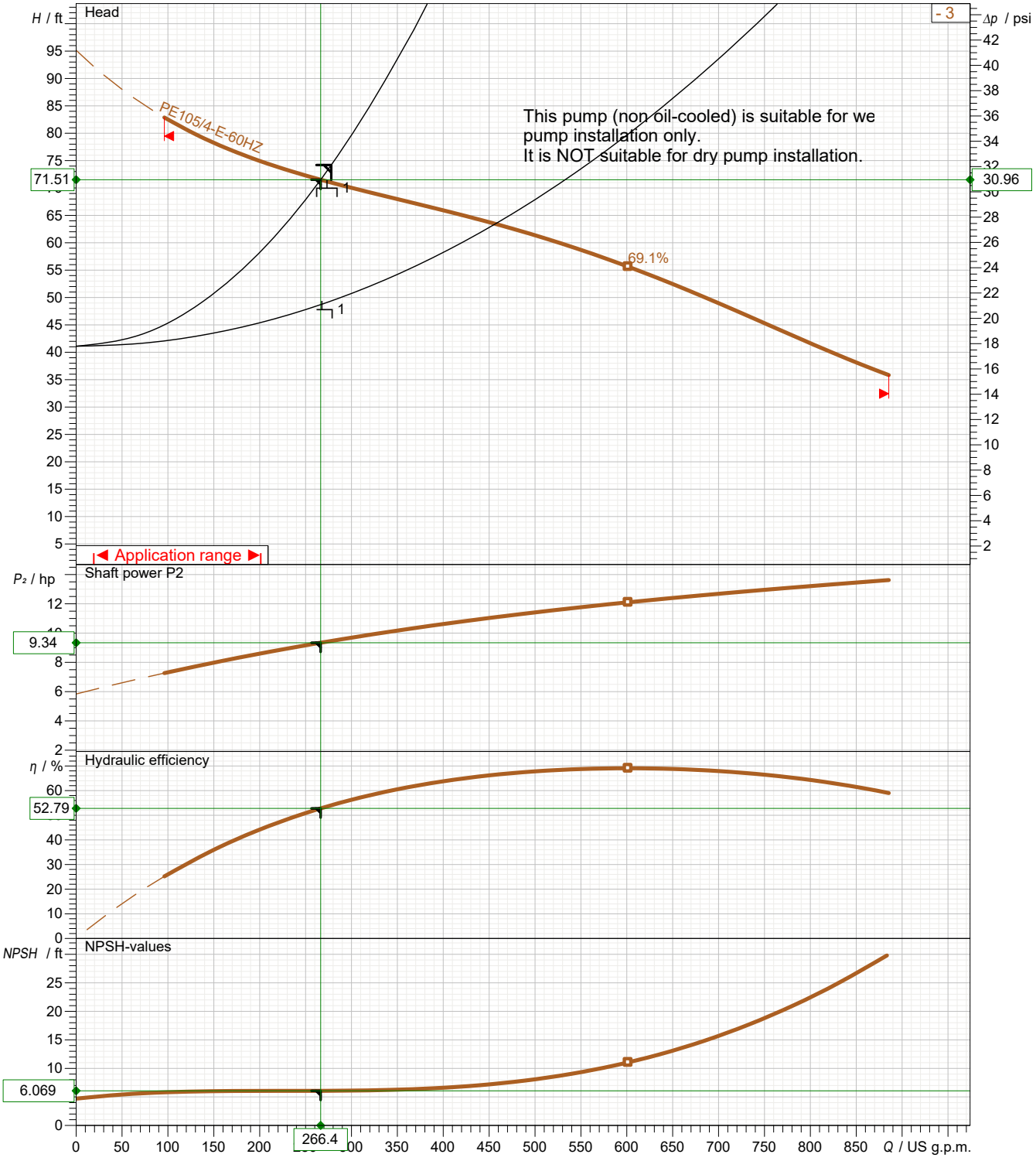
This pump (non oil-cooled) is suitable for w
pump installation only.
It is NOT suitable for dry pump installation.

2023-02-13

Operating data specification			
Flow	266.4 US g.p.m.	Power input	10.1 hp
Efficiency	52.8 %	Head	71.5 ft
NPSH	6.07 ft	Rated power	9.34 hp
Temperature	68 °F	Fluid	Water
No. of pumps	2	Nature of system	Single pumps as parallel circuit
Pump data			
Type	XFP100E CB1 60HZ (wet pit)	Make	SULZER
Series	XFP PE1-PE3	Impeller	Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size	9inch
Free passage	3.15 inch	Suction flange	DN100
Discharge flange	DN100	Type of installation	Wet Well installation with pedestal
Moment of inertia	0.71 lb ft²		
Motor data			
Rated voltage	460 V	Frequency	60 Hz
Rated power P2	14.1 hp	Nominal Speed	1750 rpm
Number of poles	4	Efficiency	92.4 %
Power factor	0.81	Rated current	17.7 A
Starting current	106 A	Rated torque	42.2 lbf ft
Starting torque	87.3 lbf ft	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

Curve number	Pump performance curves	SULZER
Reference curve XFP100E CB1 60HZ	**XFP100E CB1 60HZ (wet pit)**	

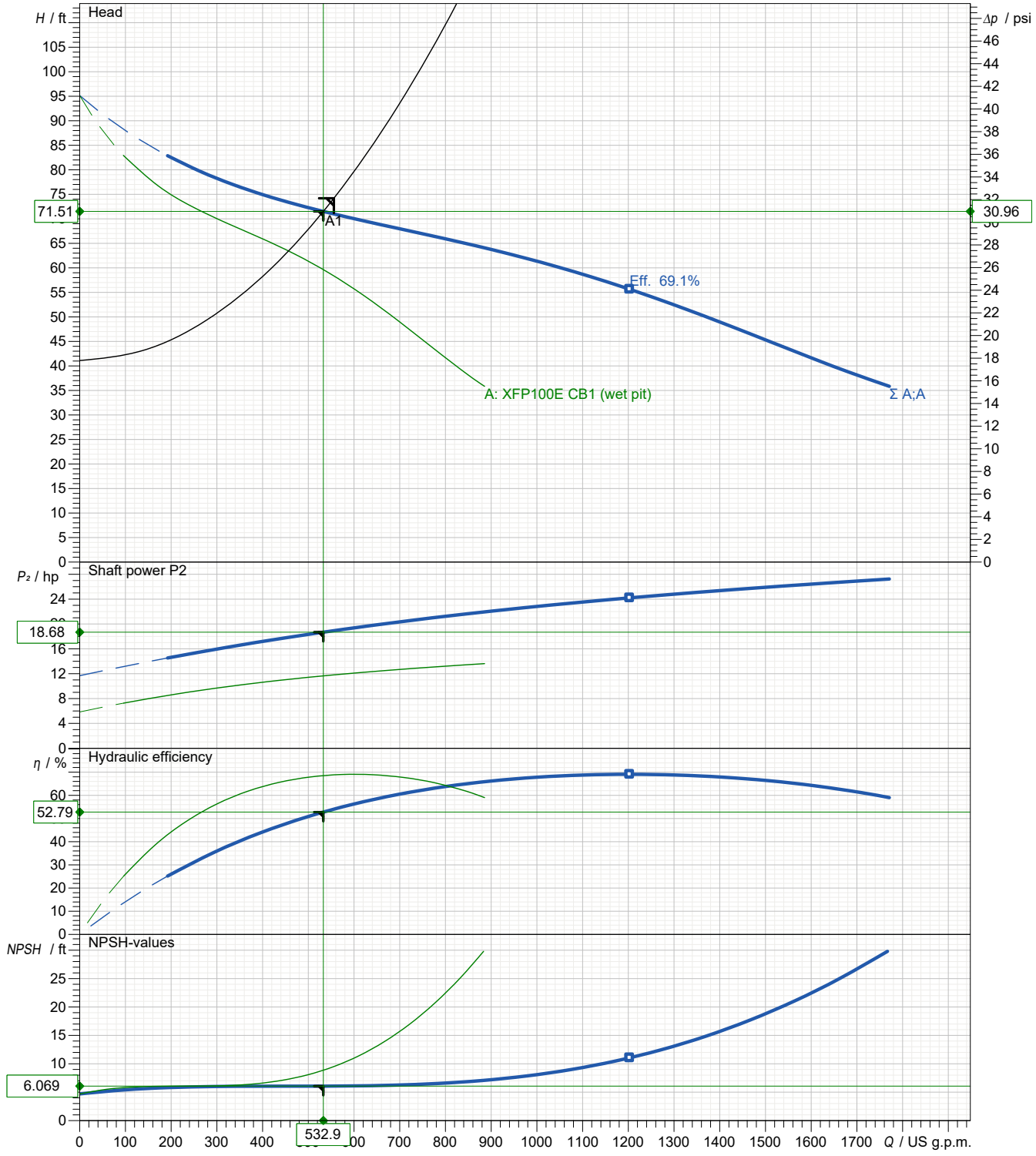
					Discharge	Frequency
					DN100	60 Hz
Density	Viscosity	Testnorm			Rated speed	Date
62.32 lb/ft³	1.005 mm²/s	ISO9906:2012,HI 11.6/14.6≤10kW			1771 rpm	2023-02-13
Flow	Head	Shaft power	Power input	Rated power P2	Hydraulic efficiency	NPSH
266.4 US g.p.r	71.5 ft	9.34 hp	10.1 hp	14.1 hp	52.8 %	6.07 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
9inch	1	Contrablock Plus impeller, 1 var	3.15 inch	

Curve number	Pump performance curves	SULZER
Reference curve XFP100E CB1 60HZ	**XFP100E CB1 60HZ (wet pit)**	

					Discharge	Frequency
					DN100	60 Hz
Density	Viscosity	Testnorm			Rated speed	Date
62.32 lb/ft³	1.005 mm²/s	ISO9906:2012,HI 11.6/14.6≤10kV			1771 rpm	2023-02-13
Flow	Head	Shaft power	Power input	Rated power P2	Hydraulic efficiency	NPSH
532.9 US g.p.m.	71.5 ft	9.34 hp	10.1 hp	14.1 hp	52.8 %	6.07 ft



Impeller size	N° of vanes	Impeller	Solid size	Revision
9inch	1	Contrablock Plus impeller, 1 var	3.15 inch	

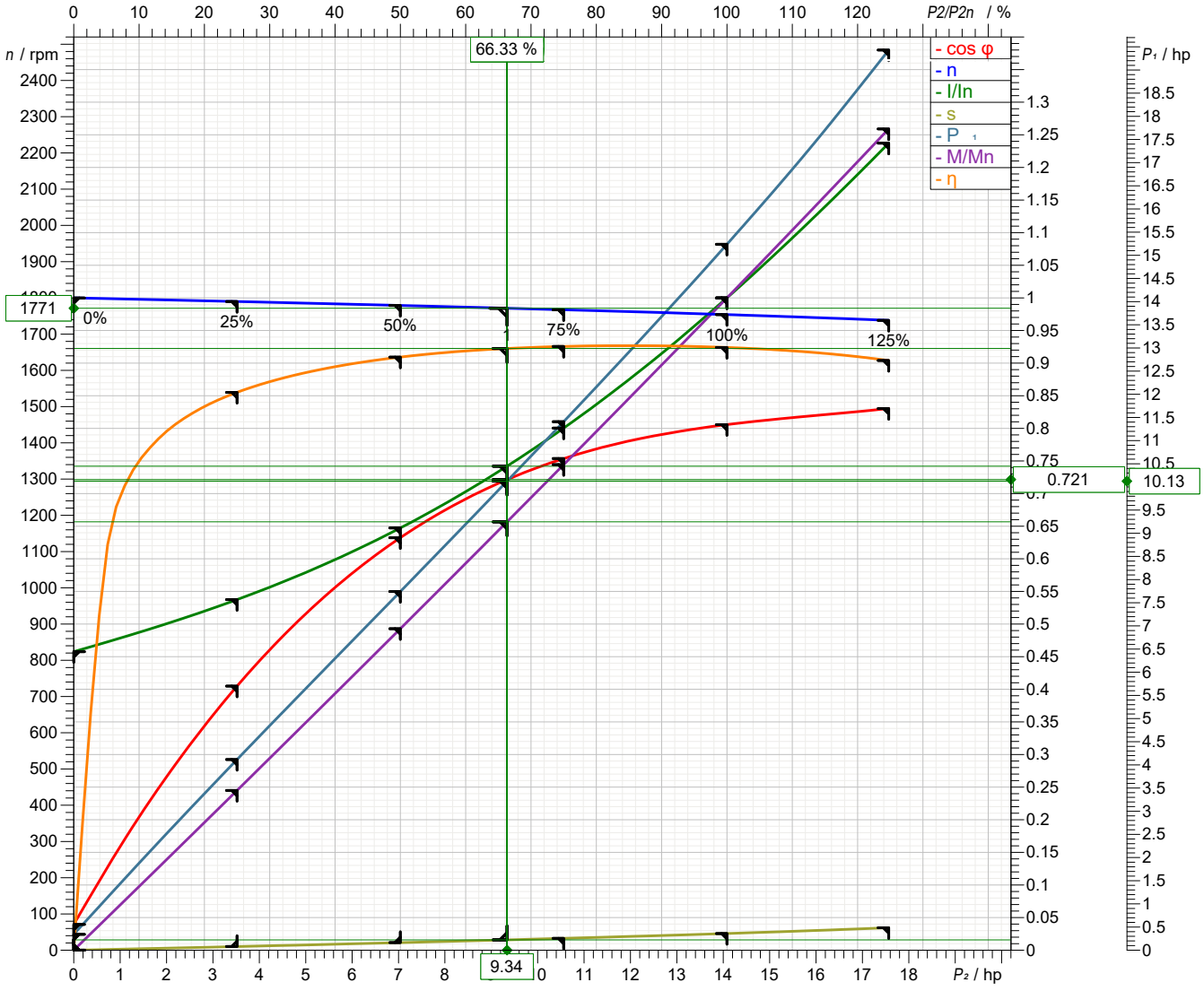
Frequency	PE2
60 Hz	

Motor performance curve

PE105/4-E-60HZ

SULZER

Rated power	Service factor	Nominal Speed	Number of poles	Rated voltage	Date
14.1 hp	1.3	1750 rpm	4	460 V	2023-02-13



Symbol	No load	25 %	50 %	75 %	100 %	125 %
P_2 / hp	0	3.52	7.04	10.56	14.08	
P_1 / hp	0.3424	4.116	7.743	11.41	15.24	
η / %	0	85.52	90.93	92.56	92.4	
n / rpm	1800	1790	1779	1767	1754	
cos φ	0.03956	0.4049	0.6324	0.7537	0.8057	
I / A	8.1	9.514	11.46	14.17	17.7	
s / %	0.0007998	0.5572	1.163	1.819	2.56	
M / lbf ft	0	10.33	20.79	31.39	42.17	

Tolerance according toVDE 0530 T1 12.84for rated power

Starting current	Starting torque	Moment of inertia	No. starts per hour
106 A	87.3 lbf ft	1.07 lb ft²	15

BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT No. 82

ASHLAND LIFT STATION No. 1

SAFETY CONSIDERATIONS

1. Provide a design resistant to a 1% annual chance flood.

2. Provide manual ventilation in the wet well to ensure fresh air always provided and stable pressure conditions.

3. Provide safety grating under access hatches at areas where open access is needed for pump removal.

4. Provide lockable gate and security fence around lift station perimeter to restrict access to unauthorized personnel.

5. Provide explosion proof motors on all equipment.

6. Provide warning signs on fence and electrical control panels.

7. Provide grounded front electrical control panels.

8. Color code piping to provide identification.

9. Provide tracer tape with label on force main.

EXHIBIT K

EXHIBIT L

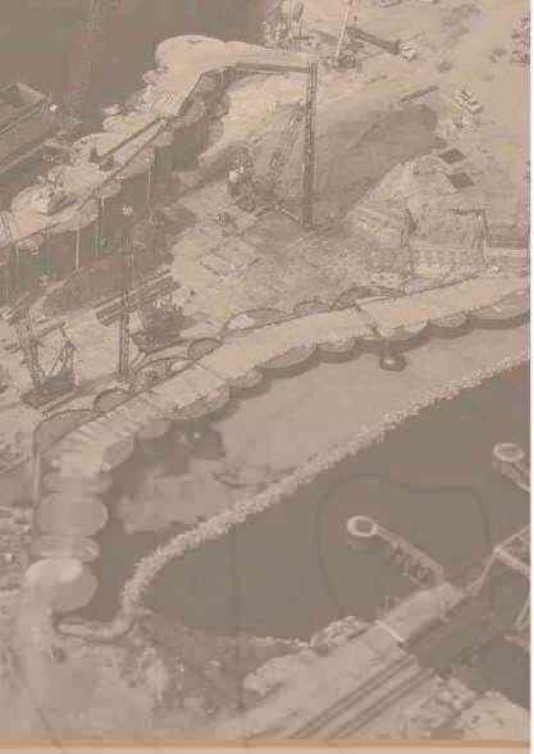
TCEQ SUMMARY TRANSMITTAL LETTER

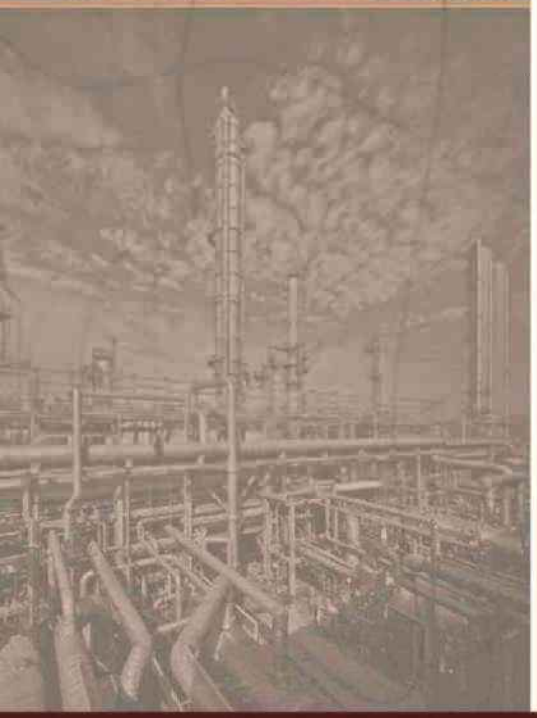
(PENDING)

EXHIBIT M

TCEQ APPROVAL LETTER

(PENDING)





Tolunay-Wong Engineers, Inc.

REPORT of GEOTECHNICAL CONSULTING SERVICES
Design Level Study
Phase I Angleton Tract – Lift Station
Angleton, Brazoria County, Texas

Prepared for:

Anchor MP Holdings, LLC
101 Parklane Boulevard, Suite 102
Sugar Land, Texas 77478

Prepared by:

Tolunay-Wong Engineers, Inc.
10710 S. Sam Houston Pkwy W., Suite 100
Houston, Texas 77031

July 7, 2022

TWE Project No. 22.14.070

EXHIBIT N

Tolunay-Wong Engineers, Inc.

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July 7, 2022

Anchor MP Holdings, LLC
101 Parklane Boulevard, Suite 102
Sugar Land, Texas 77478

Attn: Travis Janik, Project Manager - Land Development

Ref: **Report of Geotechnical Consulting Services – Design Level Study**
Phase I Angleton Tract – Lift Station
Angleton, Brazoria County, Texas
TWE Project No. 22.14.070

Dear Mr. Janik,

Tolunay-Wong Engineers is pleased to submit this geotechnical report for the referenced project. This report summarizes the field and laboratory testing programs and presents geotechnical recommendations for the lift station.

We appreciate the opportunity to work on this project and look forward to the opportunity to provide additional services as the project progresses. If you have any questions regarding this report or if we can be of further assistance, please contact our office.

Sincerely,

TOLUNAY-WONG ENGINEERS, INC.
TBPELS Firm Registration No. F-124

Carlos S. Aguirre, E.I.T.
Project Geotechnical Engineer

David Barreiro, P.E., D.GE, LM.ASCE
Vice President - Geotechnical Services

7-7-2022

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APPENDICES

1 INTRODUCTION

Anchor MP Holdings contracted Tolunay-Wong Engineers (TWE) to perform a geotechnical study for the design and construction of a lift station located within the planned Phase I Angleton Tract residential development.

The geotechnical study was performed in accordance with TWE Proposal No. P21-E391 dated June 16, 2022 and was authorized by Mark Janik as Vice President of Land Development with Anchor MP Holdings on June 16, 2022.

Phase I of the project tract covers approximately 510 acres bound by Texas State Highway 288 to the east and Farm to Market 521 Road, and approximately 1/2 mile to the north of the intersection of FM 523 and Anchor Road Angleton, Brazoria County, Texas.

We understand the lift station will be located near the planned recreation center and considered the design base slab bearing depth at approximately 35 to 40 feet below ground surface.

2 PURPOSE and SCOPE of SERVICES

The purpose of the geotechnical study was to explore the subsurface conditions at the project site to develop geotechnical design and construction recommendations for the proposed lift station.

The scope of services included the following:

1. Field exploration program consisting of 1 soil test boring (B-61) advanced to depth of 50 feet below ground surface to evaluate the subsurface soil and groundwater conditions.

2. Laboratory tests on recovered soil samples to evaluate soil index and strength properties.

3. Geotechnical report deliverable summarizing the findings and providing geotechnical design and construction recommendations.

The authorized scope of services did not include either an environmental site assessment or a geologic fault study.

3 EXPLORATION PROGRAM

3.1 Subsurface Exploration

The subsurface exploration program consisting of 1 soil test boring was performed on June 29, 2022. The approximate soil test boring location is shown on the appended Soil Boring Location Plan.

3.2 Drilling Methods

The field exploration was conducted using a geotechnical drilling rig. The borehole was initially advanced using dry-auger drilling methods and then completed with rotary wash methods once freewater was encountered.

Upon completion of the soil sampling activities and groundwater level measurements, the borehole was backfilled with soil cuttings to the ground surface.

3.3 Soil Sampling

Continuous soil sampling was conducted in the upper 10 feet of the boreholes, and then at 5-foot intervals to the soil test boring termination depths. Soil sampling was performed in accordance with the applicable ASTM Standards. Undisturbed soil samples were recovered using thin-walled Shelby tube samplers.

The TWE geotechnician initially visually classified the recovered soils in the field and obtained strength measurements of recovered undisturbed samples using pocket penetrometer equipment. Soil specimens were preserved in the field and transported to the TWE geotechnical laboratory. Recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards.

3.4 Boring Log

The engineering interpretations of the subsurface findings at the boring location are presented in the appended boring log. The soil classifications were developed in accordance with ASTM Standards and published correlations. The transitions between various soil strata could occur gradually. Actual subsurface soil conditions could vary away from the test boring location. When reviewing the boring log, reference should be made to the appended Key to Symbols and Terms.

3.5 Groundwater Level Measurements

The boring was initially dry-augered to evaluate the presence of perched groundwater or freewater conditions in the borehole. Freewater was encountered at 24 feet below ground surface and was measured to rise to approximately 17 feet after 15 minutes. Short-term groundwater level observations in open boreholes may not accurately reflect the stabilized groundwater conditions.

It is noted that the previous geotechnical exploration program performed on the project tract encountered groundwater levels within the upper 10 feet below ground surface, and as shallow as 2 feet below grade.

3.6 Laboratory Testing Program

Laboratory tests were conducted on selected soil samples to assist with the classification of the recovered soil specimens and with the evaluation of the soil index and strength properties. Laboratory tests were performed in general accordance with ASTM Standards. The undrained shear strengths of clay specimens were evaluated using unconfined compression tests and pocket penetrometer testing. Results of the laboratory testing are presented in the appended boring log.

4 SUBSURFACE CONDITIONS

Engineering interpretations of soil and groundwater conditions at the project site are based on information obtained from the soil test boring and TWE local experience. Subsurface conditions could vary away from the exploration test site. Significant subsurface variations that could be identified during the construction-phase of the project will warrant revisiting the engineering analyses and recommendations.

4.1 Regional Geology

The project tract is located in an area mapped with Beaumont Formation soils. Most of the tract is identified with predominantly clay soils, except for the northeastern areas of the tract which are identified with predominantly sand soils. The Beaumont Formation includes mainly stream channel, point-bar, natural levee, back swamp, and to a lesser extent coastal marsh and mud-flat deposits consisting of mostly clay, silt and sand.

4.2 Subsurface Conditions

The appended boring log should be reviewed for the field and laboratory test results. The subsurface profile at the lift station site consists of stiff to hard, fat clays (CH) to the boring termination depth of 50 feet. Sands seams may occur at various depths. While not observed in the recovered samples, fat clays in the greater Houston area are often slickensided.

4.3 Groundwater Conditions

Freewater was encountered at 24 feet during drilling operations and the water was observed to rise to 17 feet after 15 minutes. Of note, 3 piezometers were installed at the project tract for the previous geotechnical study (TWE 22.14.070, published June 6, 2022). The long-term groundwater readings at those piezometers suggest the natural groundwater levels to be at 2 to 3 feet below current site grades.

Fluctuations of the groundwater level may be expected to occur seasonally because of rainfall, surface runoff, and immediate area construction activities. Groundwater level conditions should be verified just prior to construction.

5 TECHNICAL DISCUSSION

5.1 Caisson Installation Method

We considered a base slab bearing depth of 35 to 40 feet below existing grade. Based on typical local practice, we assumed the caisson method will be utilized for the construction of the lift station.

The caisson is defined as the external walls of the reinforced concrete structure, erected at-grade or in a starter pit, and sunk by gravity to the final position through excavation inside the structure under dry or wet conditions. The complete caisson includes the structural base slab. The caisson walls provide lateral ground support during construction and for the permanent installation.

In the dry construction method, the groundwater level is maintained below the excavation bottom. In the wet construction the external hydrostatic groundwater pressure is counteracted by water or slurry within the excavation.

Bentonite slurry is often used as a lubricant within the annular space between the caisson wall and the surrounding soil to facilitate installation.

Sandy soils can collapse into the open excavation, especially if located below the groundwater table, as the caisson is advanced into the ground. Shallow groundwater levels can also impact the construction methods.

5.2 Bottom Instability

Excavation bottom instability can occur when excavation depths result in upward hydrostatic forces and groundwater flow at the base of the excavation. In general, the upward pressure from groundwater can cause loosening of sandy soils, with the worst-case scenario having the sandy soils boil upward into the open excavation.

The potential for bottom instability during lift station construction on this project is considered low considering the presence of very stiff fat clays at and below the planned base slab bearing depth.

We recommend the contract documents provide for the measurement of the prevalent groundwater level shortly prior to the time of construction. Excavation bottom instability can be mitigated by construction dewatering or using wet caisson construction methods, if needed.

5.3 Sidewall Instability

Sidewall instability or collapse can occur during caisson construction when the excavation progresses below the bottom of the caisson. The potential for sidewall instability at the lift station location is considered low in the presence of the stiff to hard, fat clay soil profile.

If necessary, sidewall instability can be addressed during construction by wet caisson construction methods, minimizing the distance between the bottom of the caisson and the excavation surface, and by use of construction dewatering.

5.4 Lateral Earth Pressure

The walls of the lift station where horizontal movements are restricted should be designed for the at-rest pressure (K_o) with an appropriate factor of safety considered by the structural designer. The clays can be considered with long-term drained condition $K_o = 0.7$. Hydrostatic pressure at depth should be considered in the analyses as appropriate. The K_o value presented above does not include a factor of safety.

Surcharge loads adjacent to below grade walls, if present, should be incorporated into the pressure diagrams. Long-term lateral earth pressures used for design should consider the extreme groundwater level condition for the site.

6 GEOTECHNICAL SITE PREPARATION

6.1 Subgrade Preparation

Project site areas planned for construction, including lift station, ancillary structures and access pavement footprints, should be cleared and grubbed to remove vegetation including trees, brush, and grasses. Clearing and grubbing should result in the exposure of competent subgrade.

The exposed subgrade soils in areas planned for access pavement and ancillary structure construction should be proofrolled with a pneumatic tire roller or fully loaded tandem-axle dump truck or similar equipment with a minimum weight of 15 tons under observation by the geotechnical engineer or his qualified representative. No less than two complete passes with the proofroll equipment should be completed over the entire project areas. Any soft, loose or saturated (pumping conditions) ground or areas that yield excessively during proofrolling should be properly mitigated at the direction of the geotechnical engineer.

6.2 Groundwater and Surface Water Control

The available piezometer data suggests the groundwater level should be expected below the caisson excavation depths. We recommend that the contract documents provide for determination of the depth to groundwater just prior to the start of construction and for any remedial dewatering which may be required.

Temporary groundwater control measures and techniques are determined by the contractor. Dewatering methods selected for the project should address bottom instability and limit disturbance of the foundation bearing soils. We recommend that the groundwater level be maintained at least 24 inches below all earthwork and compaction surfaces during construction.

The ground surface should be graded to maintain positive drainage away from the lift station structure, ancillary structure foundations and pavement subgrades, both during construction and during the life of the structure.

6.3 Fill Soils

Fill soils for general site grading, undercut replacements, ancillary structure foundation bearing, and pavement subgrades should consist of clayey sand (SC) or sandy lean clay (CL) material.

1. Fill soils should be free of organics, debris and otherwise deleterious materials. In general, suitable fill soils should have a liquid limit (LL) of less than 40, a plasticity index (PI) between 10 and 20, and at least 35% of the soil particles passing the No. 200 sieve.

2. Fill soils should be placed with horizontal loose lift thicknesses of not more than 6 inches. The full depth of each lift should be compacted to 95% of the Standard Proctor maximum dry density (ASTM D-698).

3. To facilitate obtaining in-place compaction, the moisture content of the fill soils should be maintained within 3% of the optimum moisture content based on ASTM D-698.

4. Fill compaction efforts should be implemented with surface roller equipment of appropriate size.

5. Representative samples of the fill soils should be collected for classification and compaction testing. The maximum dry density, optimum moisture content, gradation and plasticity should be determined. These tests are needed for quality control of the compacted fill.

6. Field density tests should be performed on the compacted fill at a frequency of one test for each 2,500 square feet of pavement area and one test at every ancillary structure foundation, per lift of fill.

7. Involvement of TWE geotechnical engineering personnel during all site work activities will help to verify that procedures and results are as specified and as anticipated. Any issues identified during this process should be addressed by the geotechnical engineer in the field.

6.4 Suitability of Excavated Material

The fat clays (CH) encountered in the soil test boring have the potential for moisture-induced shrink/swell behavior and should be confined to areas where settlement and heave will not cause problems for structures directly supported on them. The suitability for reuse of the fat clays can be improved with lime stabilization methods. We recommend excluding non-stabilized, high plasticity CH clays from the upper 3 feet directly below structures or pavements.

The excavated soils should be observed and documented by the geotechnical engineer or his qualified representative to determine suitability for project reuse. To facilitate suitability recommendations, representative samples of the excavated soils should be transported to the geotechnical laboratory for testing to include classification, index properties, Proctor compaction and strength testing.

7 LIFT STATION

Recommendations for the design and construction of the lift station foundation are based on the project information described herein, the available subsurface data, our engineering evaluation and TWE past local experience. If project information or design concepts change, we should be advised of the changes in writing and should be provided with an opportunity to review our recommendations as presented in this report considering the new design information.

7.1 Shallow Foundations for Ancillary Structures

Shallow foundations for ancillary project structures and equipment should be designed for an allowable bearing pressure of 2,000 psf and with minimum embedment depths of 18 inches below finished exterior grades. A minimum thickness of 6 inches of compacted fill conforming to Section 6.3 should be provided below those shallow foundation bases and extending a minimum of 12 inches laterally beyond the foundation perimeters.

7.2 Base Slab Bearing Capacity

Referencing soil test boring B-61, very stiff fat clays are anticipated at the planned base slab bearing depth zone. The fat clays are considered technically suitable for base slab support.

An average allowable bearing pressure of 4,000 psf can be used at the base of the lift station at approximately 35 to 40 feet below ground surface, provided the bearing soils are not disturbed during construction.

7.3 Uplift

From a broader perspective, uplift resistance against hydrostatic pressures may be provided by one or a combination of the following methods:

a. Dead load
b. Structural tie-in to the sewer/water lines
c. Anchor piers or piles
d. Frictional resistance between soil and lift station wall

Dead load: This is a simple design solution that is viewed as appropriate to resist moderate buoyancy forces. Wall and base slab thicknesses can be adjusted, as necessary. The uplift resistance should be provided only by the permanent dead loads of the empty lift station structure. A factor of safety considered appropriate to resist buoyancy forces is 1.1 for dead weight.

Another design approach is to include a base extension (or collar) at the foundation bearing level, which adds both the concrete dead weight and the buoyant weight (55 pcf) of soils above the base extension for calculating additional uplift resistance. A minimum FOS of 1.25 is suggested for the calculation of soil resistance provided by the wedge of soil extending on a 1:2 (H:V) slope line from the top of the collar to the ground surface.

The concrete collar should extend a minimum of 12 inches beyond the exterior face of the caisson. For ease of construction, the collar could be constructed at shallower depths below exterior finished grades.

Tie-in: For this design condition uplift resistance relies on the combined dead weight of the sewer/water line, any surrounding concrete details, and the soil overburden. Load transfer is via structural connections between the lines and the caisson structure.

Anchors: Tension anchors are considered appropriate for the design of deep-bearing units constructed using caisson techniques. The anchors are connected to the lift station base slab and provide uplift resistance via skin friction. Where buoyancy forces are significant, anchors are considered an effective solution.

Friction: This is the least reliable of all the design approaches because of uncertainties associated with (1) the potential for developing voids along the soil-wall interface during caisson excavation, (2) misalignment of the structure as it moves downward, and (3) the use of bentonite lubrication the annular space during caisson excavation. The concept of grouting the caisson structure in-place is not considered with 100% reliance.

We do not favor reliance on frictional resistance between the adjacent soils and the lift station for uplift resistance for caisson design. If considered in design, the total friction capacity in the clay profile should be calculated by multiplying an allowable adhesion value of 500 psf by the affected lift station wall area; the upper 5 feet of lift station wall below ground surface should be neglected for skin friction resistance. A factor of safety considered appropriate to resist buoyancy forces is 3.0 for soil friction

8 LIMITATIONS and PLAN REVIEW

8.1 Limitations

This report has been prepared for the use of Anchor MP Holdings, Quiddity and other members of the project design and construction teams for specific application to the project discussed herein. This report was prepared in accordance with generally accepted geotechnical engineering practices common to the local area. No other warranty is expressed or implied.

We request the opportunity to revisit and supplement, as necessary, our recommendations as provided in this report, if in fact our assumptions or understandings are incorrect or inaccurate. In such a case, we should be provided with appropriate site plans, and system installation procedures for our review and use.

The recommendations are based on the field and laboratory soil data summarized in the appended documents. The subsurface findings at the field exploration location may not necessarily reflect the actual soil strata vertical and horizontal variations throughout the lift station footprint. The analyses and recommendations are also based in part on the geotechnical engineer's engineering judgment and experience with similar project settings and conditions.

TWE recommendations presented in this report must be revisited if subsurface conditions exposed during construction vary significantly from those described in this report. If any changes in the nature, design or location of the project are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed, and the conclusions modified or verified in writing by TWE.

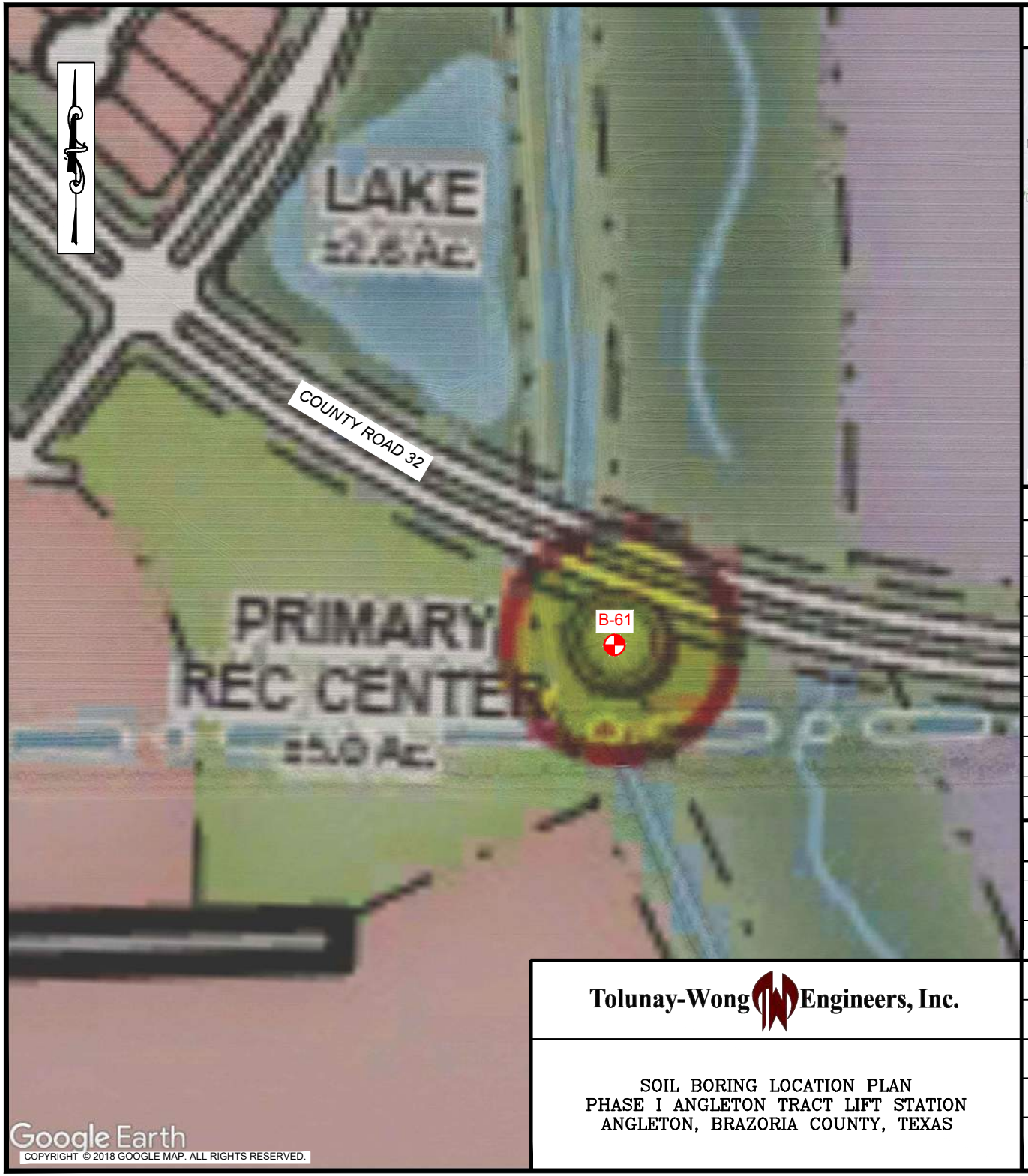
8.2 Plan Review and Construction Observations

TWE should be provided the opportunity to review the construction drawings to determine if those documents are in harmony with the intent of the geotechnical design and construction recommendations contained in this report.

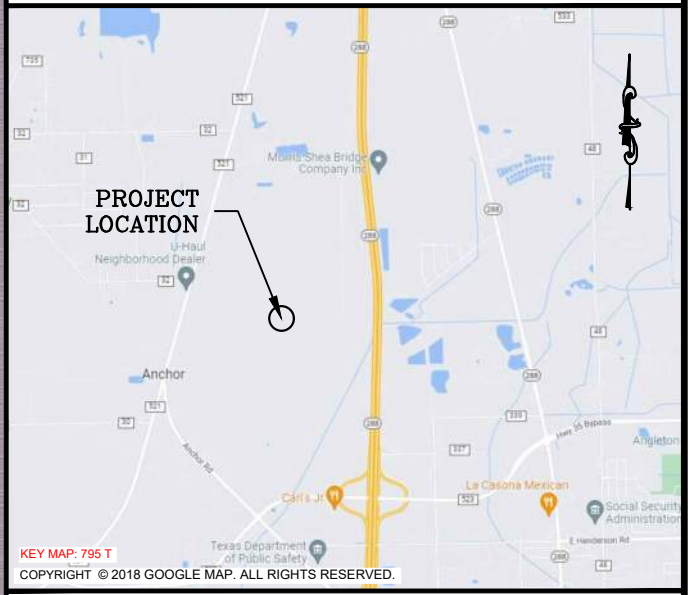
TWE should be provided the opportunity to observe and document the field conditions of exposed subgrade soils, geotechnical site preparation activities, placement and compaction of fill soils, and general foundation construction activities.

APPENDIX A

SOIL BORING LOCATION PLAN



VICINITY MAP



SOIL TEST BORING DEPTHS

BORING	DEPTH
B–61	50’

LEGEND

SYMBOL	DESCRIPTION
⊕	SOIL BORING LOCATION

Tolunay-Wong Engineers, Inc.

SOIL BORING LOCATION PLAN
PHASE I ANGLETON TRACT LIFT STATION
ANGLETON, BRAZORIA COUNTY, TEXAS

Drawn	*T.T.*	*07–06–2022*
Checked	*C.A.*	*07–06–2022*
Approved	*D.B.*	*07–06–2022*
Scale	*N.T.S.*	

TWE DRAWING NO. 22.14.070–2

APPENDIX B

BORING LOGS and KEY to SYMBOLS and TERMS

LOG OF BORING B-61 (Lift Station)

PROJECT: Phase I Angleton Tract - Project Infrastructure Study
Single-Family Residential Development

CLIENT: Anchor MP Holdings, LLC

COORDINATES: N 29° 12' 49.71"
W 95° 27' 57.36"

SURFACE ELEVATION: Not Available

DRILLING METHOD:
Dry Augered: 0 to 25'
Wash Bored: 25' to 50'

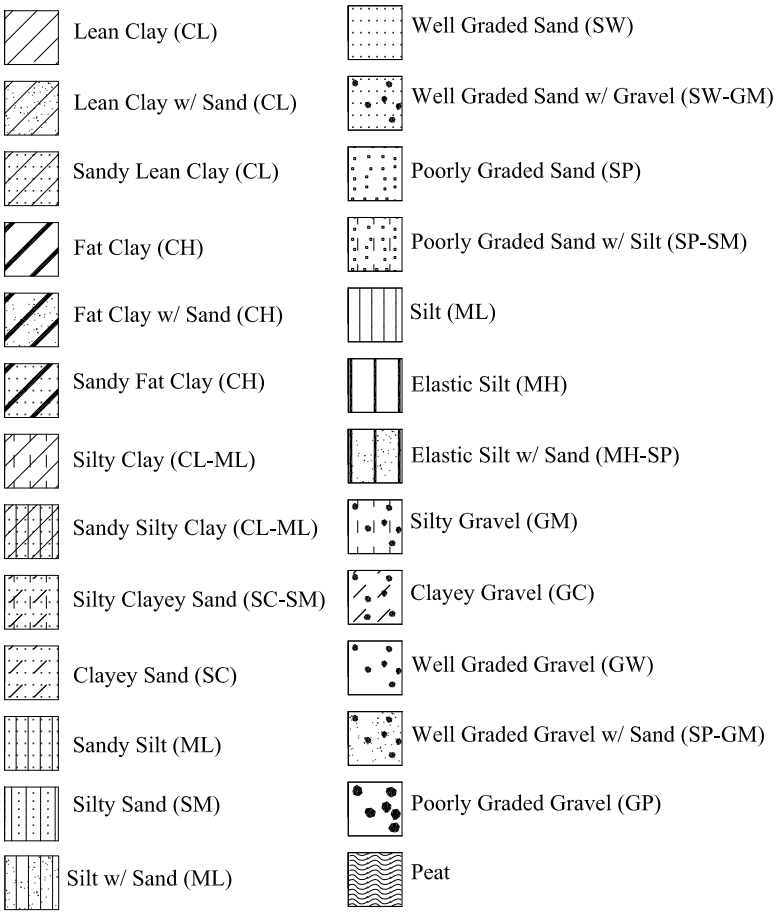
ELEVATION (FT) / DEPTH (FT)	SAMPLE TYPE	SYMBOL	MATERIAL DESCRIPTION	(P) POCKET PEN (tsf) (T) TORVANE (tsf)	STD. PENETRATION TEST BLOWCOUNT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	PASSING #200 SIEVE (%)	OTHER TESTS PERFORMED
0			Hard, dark brown-brown FAT CLAY (CH)	(P)4.50+										
						21	104	67	45	5.10	11		93	
			-stiff, tan from 4'	(P)2.75										
			-gray-light brown from 6'	(P)2.75										
8				(P)2.50										
				(P)3.00		31		76	51				100	
16														
			-very stiff to hard, light brown-tan from 18'	(P)4.50+										
24				(P)4.50+										
				(P)4.50+										
32														
			-tan from 33'			28	97	67	42	2.28	8		100	
			-sand seam from 34' to 34.5'											
			-sandy from 38' to 43'			21	105	53	31	2.58	15		67	
40														
			-reddish brown from 43'	(P)3.50										
48				(P)4.25										
			Bottom @ 50'											
56														

COMPLETION DEPTH: 50 ft
DATE BORING STARTED: 6/29/2022
DATE BORING COMPLETED: 6/29/2022
LOGGER: S. Dookeran
PROJECT NO.: 22.14.070

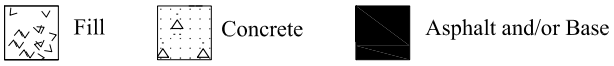
NOTES: 1. Freewater was encountered at 24' and rose to 17.2 after 15 minutes.
2. Borehole backfilled with soil cuttings to ground surface upon work completion.

KEY TO SYMBOLS AND TERMS USED ON BORING LOGS FOR SOIL

Most Common Unified Soil Classifications System Symbols



Miscellaneous Materials



Sampler Symbols	Meaning
	Pavement core
	Thin - walled tube sample
	Standard Penetration Test (SPT)
	Auger sample
	Sampling attempt with no recovery
	TxDOT Cone Penetrometer Test

Field Test Data

2.50	Pocket penetrometer reading in tons per square foot
(T)1.13	Torvane Measurement in tons per square foot
8/6"	Blow count per 6 - in. interval of the Standard Penetration Test
	Observed free water during drilling
	Observed static water level

Laboratory Test Data

Wc (%)	Moisture content in percent
Dens. (pcf)	Dry unit weight in pounds per cubic foot
Qu (tsf)	Unconfined compressive strength in tons per square foot
UU (tsf)	Compressive strength under confining pressure in tons per square foot
Str. (%)	Strain at failure in percent
LL	Liquid Limit in percent
PI	Plasticity Index
#200 (%)	Percent passing the No. 200 mesh sieve
( )	Confining pressure in pounds per square inch
*	Slickensided failure
**	Did not fail @ 15% strain

RELATIVE DENSITY OF COHESIONLESS & SEMI-COHESIONLESS SOILS

The following descriptive terms for relative density apply to cohesionless soils such as gravels, silty sands, and sands as well as semi-cohesive and semi-cohesionless soils such as sandy silts, and clayey sands.

Relative Density	Typical N_{60} Value Range*
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	Over 50

* N_{60} is the number of blows from a 140-lb weight having a free fall of 30-in. required to penetrate the final 12-in. of an 18-in. sample interval, corrected for field procedure to an average energy ratio of 60% (Terzaghi, Peck, and Mesri, 1996).

CONSISTENCY OF COHESIVE SOILS

The following descriptive terms for consistency apply to cohesive soils such as clays, sandy clays, and silty clays.

Typical Compressive Strength (tsf)	Consistency	Typical SPT "N_{60}" Value Range**
$q_u < 0.25$	Very soft	≤ 2
$0.25 \leq q_u < 0.50$	Soft	3-4
$0.50 \leq q_u < 1.00$	Firm	5-8
$1.00 \leq q_u < 2.00$	Stiff	9-15
$2.00 \leq q_u < 4.00$	Very Stiff	16-30
$q_u \geq 4.00$	Hard	≥ 31

** An "N_{60}" value of 31 or greater corresponds to a hard consistency. The correlation of consistency with a typical SPT "N_{60}" value range is approximate.

PRELIMINARY Lift Station Bouyancy Calculation Sheet

Project: Ashland Lift Station nO. 1

Given:

B= inside diameter of wet well (inches)	144.0	in
t= wall thickness of wet well (inches)	18.0	in
a= thickness of wet well top (inches)	24.0	in
b= Area of top slab	176.7	ft^2
y= unit weight of soil (pcf)	90.0	pcf
c= soil friction (psf) from report	100.0	psf
y = elevation of flood plain (ft)	35.10	ft
z = elevation of ground (ft)	35.10	ft
y'= elevation of wet well top (ft)	35.70	ft
y"= elevation of wet well bottom (ft)	5.20	ft
y'"= elevation of bottom of bottom (ft)	3.20	ft

Solution:

Buoyancy Force- Area*Depth*Unit Weight of Water

Depth-y-y"	29.90	ft
Area (pi*(OD/2)2)-	176.71	ft^2
Water (wt)	62.4	lbs/ft^3
Buoyancy Force-	329,706.73	lbs

Weight of Structure-

Weight of Wet Well-		
Depth-y'-y"	30.50	ft
Weight of wall-	9542.58	lb/ft
Weight of walls-	291,048.68	lbs
Weight of Bottom		
Thickness of Bottom-	2.00	ft
Area (pi*(OD/2)2)-	176.71	ft^2
Concrete weight	150	lbs/ft^3
Weight of bottom-	53,014.33	lbs
Weight of Top		
Area of top	176.71	ft2
Thickness of Top	2.00	ft
Concrete weight	150	lbs/ft^3
Weight of top-	53,014.33	lbs
Total Weight of wet well-	397,077.34	lbs

			Safety Factor
Wet Well Bearing Pressure (dry)-	2,247.00	lbs/ft^2	
Allowable Bearing Pressure (dry)-	4,500.00	lbs/ft^2	2.00
Wet Well Bearing Pressure (full)-	4,112.76	lbs/ft^2	
Allowable Bearing Pressure (full)-	4,500.00	lbs/ft^2	1.09

EXHIBIT O

Soil Friction Force-			
Depth of wet well (z-y''')	31.90	ft	
Distance to not include	5.00	ft	
Length of soil friction-	26.90	ft	
Distance around wet well	47.12	ft	
Soil Friction	100.0	lbs/ft^2	
Soil Friction Force-	126,763.16	lbs	
Weight of Concrete/1.1	360,979.40	lbs	
Friction Force divided by 3	42,254.39	lbs	
Total Resisting Force	403,233.79	lbs	
			Safety Factor
Buoyancy Force	329,706.73	lbs	1.22
Excess Resisting Force ✔	73,527.06	lbs	