ADDENDUM No. 1

ITB No. 4606

Lift Stations Replacement Project Phase I

Due: December 5, 2019 by 2:00 p.m. (local time)

The following changes, additions, and/or deletions shall be made to the Invitation to Bid (ITB) for Astor & Franklin Lift Stations Replacement Project, ITB No. 4606, on which proposals will be received on/or before the date and time listed above.

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. **This Addendum includes 3 pages, plus the Attachments.**

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgement of receipt of this addendum may be considered non-conforming.

The following forms provided within the ITB Document must be included in submitted proposal:

- **Prevailing Wage Declaration of Compliance**
- **Living Wage Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these forms listed above upon proposal opening will be rejected as non-responsive and will not be considered for award.

I. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the ITB. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

1. Are there any domestic requirements for the project?
RESPONSE: No, there are no domestic requirements for the project.

2. Where is the HDPE spec for the 8" HDPE force main and fittings?
RESPONSE: The specification for the 8" HDPE force main and fittings is included in the new Specification 02035 Horizontal Directional Drilling, which is attached.

3. Where the proposed 8" HDPE force main line ties into the 12" existing, what type of line is the existing?
RESPONSE: The Astor 8" HDPE force main ties into the manhole along the 21" existing sewer (not directly into the sewer), see re-issued sheet AC-04.

4. Is there a domestic requirement in regards to the ductile iron flange and mechanical joint fittings, and the ductile iron pipe flanges?
   RESPONSE: No, there are no domestic requirements for the project.

5. Is there a sign-in sheet or list of contractors that attended the pre-bid meeting?
   RESPONSE: Yes, a copy of the sign-in sheet is attached.

6. Can the buried mechanical joint fittings be AWWA C153?
   RESPONSE: Yes, AWWA C153 Compact Fittings are acceptable.

7. Please provide spec section 02661 called out in Specification 15060 – Pipe and Pipe Fittings.
   RESPONSE: Section 15060, 2.02 A. Omit the last sentence referencing specification section 02661.

8. Are there any specs for the HDPE pipe & fittings?
   RESPONSE: The specification for the 8" HDPE force main and fittings is included in the new Specification 02035 Horizontal Directional Drilling, which is attached.

9. Do the pumps need to run in the dry for 24 hours and is a cooling jacket required?
   Response: No, we have deleted this requirement (see Part II below)

10. I represent a firm that could do the vibration monitoring for your project. I found the job on ISQFT, but only see 2 contractors listed. Do you have a formal list of whom is bidding your project as a General Contractor? Could you please forward that information to me, so I can send them my proposal for the vibration monitoring?
    Response: We have eliminated the need for vibration monitoring (see Part II below), but the list of potential bidders attending the pre-bid meeting is attached.

11. Is there a domestic requirement in regards to the ductile iron flange and mechanical joint fittings, and the ductile iron pipe flanges? Are AWWA C-153 ductile iron mechanical joint fittings acceptable?
    Response: Domestic iron is not required. Yes, AWWA C153 Compact Fittings are acceptable.

12. Do you have had time to consider the OBIC Liner system for lining the wet wells on the Lift Stations Replacement Project. I have received several calls from contractors we have worked with, asking if we were going to provide numbers.
    Response: No, we do not have time, but may consider this as a change through the substitution process during construction

13. Please consider this a formal request, per Specification Section 1600 1.7, to add EJ as an approved equal, for the aluminum access hatches for the referenced project. This would be Section 8305/Access Hatches in the documents. Upon my review of the documents, the hatches noted would be our Model CHS with SafeHatch. We also manufacture the ladders and ladder up posts.
    Response: Per the noted section, the EJ hatch will need to be included on the Bid Form, Section 2. As noted in the spec, the substitution will be evaluated following the bid opening.

II. REISSUED PLANS AND SPECIFICATIONS

Plans:

1. Sheet GC-01 has been reissued and is attached.
2. Sheet AC-01 has been reissued and is attached.
3. Sheet AC-02 has been reissued and is attached.
4. Sheet AC-04 has been reissued and is attached.
5. Sheet AE-02 has been reissued and is attached.
6. Sheet FC-01 has been reissued and is attached.
7. Sheet FC-02 has been reissued and is attached.
8. Sheet FC-03 has been reissued and is attached.
9. Sheet FE-02 has been reissued and is attached.

Specifications:

10. Table of Contents:

After Section 02031, add "02035 Horizontal Directional Drilling, pages 1 through 8" (Specification is not re-issued)

11. Specification Section 02200 – Earthwork: omit Section 3.4 D. from the specification as a Vibration Consultant is not required. (Specification is not re-issued)

12. Specification 11390- Pumping Station Equipment

2.2 E. Eliminate the first sentence: "The pump shall be capable of running with the motor exposed for a period of 24 hours in a Class 1, Division I, Group D hazardous atmosphere."

2.2 J. In the fourth sentence, eliminate the words "or non-", so the sentence now reads: "The motor shall also have cooling characteristics suitable for continuous operation in a totally or partially submerged condition in a hazardous atmosphere." Eliminate the fifth sentence "The pump shall be capable of running dry for a period of 24 hours without damage or overheating."

13. Specification Section 15060 – Pipe and Pipe Fittings: omit the last sentence from Section 2.02 A. "Below grade ductile iron pipe and fittings shall be specified in <Section 02661>.". (Specification is not re-issued)

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

Attachments:

Pre-Bid Sign-in Sheet
Sheet GC-01 Civil Legend, Notes, and Abbreviations
Sheet AC-01 Astor L.S. Existing Site Plan
Sheet AC-02 Astor L.S. Proposed Site Plan
Sheet AC-04 Astor Directionally Drilling Plan
Sheet AE-01 Astor L.S. Proposed Site Plan
Sheet AE-02 Astor L.S. Electrical Details
Sheet FC-01 Franklin L.S. Existing Site Plan
Sheet FC-02 Franklin L.S. Proposed Site Plan
Sheet FC-03 Franklin L.S. Landscaping Plan
Sheet FE-01 Franklin L.S. General Notes, Power Plan & One-Line Diagram
Sheet FE-02. Franklin L.S. Electrical Details
02035 Horizontal Directional Drilling, pages 1 through 8

End of Addendum No. 1

1/2

LIFT STATION REPLACEMENT PROJECT - PHASE I
Astor and Franklin Lift Stations
Mandatory Pre-Bid Meeting - ITB 4606
November 12, 2019 - 10:00 am
Sign In Sheet

Name	Company	Phone / Email
Kedar Kapsikar RYAN SLY	Sorensen Gross Company	KKAPSIKAR@SGCS.NET RSLY3@SGCS.NET
BRAD TRENT	DETROIT PUMP	810-210-4767 BRAD.TRENT@DETROITPUMP.COM
GARY MALEY	DETROIT PUMP	248-388-1389 GARY.MALEY@DETROITPUMP.COM
Total Energy Systems, LLC Ann Watson awatson@totalenergysystems.com 888-548-1400 Ext. 3436 KOHLER Generators		
Gage Agin	J. Ranck Electric, Inc.	800-792-3422 / gagin@jranck.com
Brett Lara	SpenceBrothers	734-213-6033 / a2bids@spencebrothers.com
JERRY HEINRICH	TSP ENVIRONMENTAL	248-866-3621 / JHEINRICH@TSPENVIRONMENTAL.COM
Robert Brenner	Sherwin-Williams	SW1184@sherwin.com
Randy Piehler	Total Energy Systems	248-249-3325 RPiehler@totalEnergySystems.com

LIFT STATION REPLACEMENT PROJECT - PHASE I
Astor and Franklin Lift Stations
Mandatory Pre-Bid Meeting - ITB 4606
November 12, 2019 - 10:00 am
Sign In Sheet

Name	Company	Phone / Email
Paige Hammerl	HRC	phammerl@hrcengr.com 313-530-4272
JOHN NIEMIEC	E.T. MACKENZIE COMPANY	734.761.5050 jniemiec@mackenzieco.com
[signature]	HRC	TSULLIVAN@HRCENGR.COM
Brandon Ethinger	A2 Shrimp Inc	bee@a2shrimp.com
DARREN DOSENBERY	M-K	734-558-0883 DARREN@MKCONSTRUCTIONCORP.COM
KEVIN APPEL	ART	419-553-7047 (cell) KAPPEL@ARTCOATINGTECH.COM

GENERAL

THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE M.D.O.T. 2012 STANDARD SPECIFICATIONS FOR CONSTRUCTION EXCEPT AS NOTED HEREIN AND IN THE SPECIFICATIONS.

THE CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE LOCAL FIRE AND POLICE DEPARTMENTS 24 HOURS IN ADVANCE OF PROPOSED ROAD CLOSURES.

THE CONTRACTOR AND/OR HIS SUBCONTRACTOR SHALL NOTIFY "MISS DIG", (1-800-482-7171 OR 811).

CONTRACTOR TO PROTECT EXISTING ABOVE GROUND AND BELOW GROUND FACILITIES INCLUDING: UTILITIES, POLES, TREES, SHRUBS AND OTHER VEGETATION UNLESS NOTED FOR REMOVAL ON THE PLANS; AND SHALL REPAIR OR REPLACE DAMAGED FACILITIES AT NO COST TO THE OWNER. TREES SHALL BE NEATLY TRIMMED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT AND MAINTAIN EXISTING SERVICES TO EXISTING HOMES, INCLUDING SANITARY, WATER, GAS, CABLE AND OTHER UTILITIES.

CONTRACTOR SHALL PROTECT ALL OTHER SITE FEATURES SUCH AS PLANTERS, MAIL BOXES, FENCES, LANDSCAPING, WALLS, WALKS, PORCHES, ETC, AND RESTORE TO ORIGINAL CONDITION IF DAMAGED EXCEPT AS NOTED. NO ADDITIONAL PAYMENT WILL BE ALLOWED FOR THIS WORK.

ALL CONSTRUCTION STAGING AREAS SHALL BE APPROVED BY THE CITY OF ANN ARBOR, AND LAND OWNER(S) PRIOR TO START OF CONSTRUCTION. ANY AREAS BEYOND CONSTRUCTION RIGHTS-OF-WAY SECURED BY THE CONTRACTOR FOR USE AS CONSTRUCTION STAGING SHALL BE AT HIS OWN EXPENSE. THE RESTORATION OF ALL STAGING AREAS SHALL BE COMPLETED PRIOR TO FINAL ACCEPTANCE OF THE WORK OF THIS PROJECT. NO ADDITIONAL PAYMENT WILL BE ALLOWED FOR THIS WORK.

THE CONTRACTOR MUST REPAIR OR REPLACE ANY SPRINKLER HEADS, LINES, ETC. THAT HE MAY DAMAGE DURING THE COURSE OF CONSTRUCTION.

UNDER CONSTRUCTION

WHEN EXCAVATING FOR CONSTRUCTION, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES.

ALL SEWER TRENCHES SHALL BE BACKFILLED OR OTHERWISE PROTECTED OVERNIGHT AS DIRECTED BY THE ENGINEER. PAYMENT IS INCLUDED IN THE LUMP SUM COST FOR CONSTRUCTION.

SOIL BORINGS

THE SOIL BORING LOGS DEPICT POINT LOCATIONS AND DO NOT INFER THAT THE SURFACE CONDITIONS ARE THE SAME IN OTHER AREAS. BORINGS AND PAVEMENT CORE LOCATIONS ARE SHOWN ON THE PLANS. SOIL BORINGS AND THE GEOTECHNICAL INVESTIGATION IS BY: PROFESSIONAL SERVICE INDUSTRIES, INC. FARMINGTON HILLS, MICH. SOIL BORING LOCATIONS ARE SHOWN ON THE LIFT STATION SPECIFIC CIVIL SHEET AND THE SOIL BORING LOGS ARE APPENDED TO THE SPECIFICATIONS.

UTILITIES

THE EXISTING UTILITIES LISTED BELOW AND SHOWN ON THESE PLANS REPRESENT THE BEST INFORMATION AVAILABLE AS OBTAINED FROM SURVEYS AND FROM UTILITY RECORD MAPS. THIS INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO NOTIFY THE PROPER UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR IS RESPONSIBLE TO VERIFY ALL EXISTING UTILITIES AND THEIR LOCATIONS AS PART OF THE CONSTRUCTION OF THIS PROJECT. ANY OMISSION OR VARIATION FROM THE LOCATIONS SHOWN. PURSUANT TO ACT 53 OF THE PA OF 1974 AS A CONDITION OF THIS CONTRACT NOTICE SHALL BE GIVEN TO MISS DIG PRIOR TO UNDERGROUND WORK TO BE PERFORMED.

THE CONTRACTOR SHALL, BEFORE EACH DAYS WORK, OR WHEN MOVING TO A NEW AREA OF WORK, DETERMINE AND EVALUATE THE LOCATION OF ALL UNDERGROUND FACILITIES IN THE AREA. IF LOCATION STAKES HAVE BEEN MOVED OR DO NOT APPEAR CORRECT, THE CONTRACTOR SHALL NOT EXCAVATE UNTIL ALL UTILITIES HAVE HAD AN OPPORTUNITY TO CHECK OR RESTAKE THEIR LOCATIONS. ANY DELAYS INCURRED DUE TO CHECKING OR RESTAKING OF UTILITIES SHALL NOT BE A BASIS FOR ADDITIONAL COMPENSATION.

ALL GAS FACILITIES SHALL BE PROTECTED AND SUPPORTED PER DISTRIBUTION STANDARDS AND REQUIREMENTS.

PRIOR TO WORK ON FACILITIES BELONGING TO THE ABOVE AGENCIES, A MINIMUM OF 72 HOURS NOTICE MUST BE GIVEN IN ORDER TO INSURE PROPER INSPECTION BY THE RESPECTIVE AGENCIES.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK, AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO INSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

FOR PROTECTION OF UNDERGROUND UTILITIES, THE CONTRACTOR SHALL DIAL (800) 482-7171, OR 811 A MINIMUM OF 3 FULL WORKING DAYS, EXCLUDING SATURDAY, SUNDAY AND HOLIDAYS, PRIOR TO EXCAVATING IN THE VICINITY OF UTILITY LINES. ALL "MISS DIG" PARTICIPATING MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

RESTORATION

RESTORE AND STABILIZE ALL SLOPES IN ACCORDANCE WITH THE PLANS AND AS DESCRIBED IN THE SPECIFICATIONS.

ALL FINAL GRADES SHALL SLOPE TO DRAIN TOWARD CATCH BASINS, DITCHES, SWALES, CURBS, AND DRAINAGEWAYS UNLESS OTHERWISE NOTED.

THE CONTRACTOR SHALL NOT PERFORM ANY SIDE WORK CONTRACTED PRIVATELY WITHIN THE CONSTRUCTION AREA.

MAINTAINING TRAFFIC

TRAFFIC/PARKING SHALL BE MAINTAINED AS SHOWN ON THE PLANS AND AS DETAILED IN THE SPECIAL PROJECT REQUIREMENTS AND SEQUENCE OF CONSTRUCTION SPECIFICATION. ALL WORK THAT HAS NOT BEEN ACCOUNTED FOR IN A PARTICULAR BID ITEM SHALL BE INCLUDED IN THE COST OF THE PROJECT.

ALL EXCAVATED AREAS SHALL BE DELINEATED BY PLASTIC DRUMS AT THE CLOSE OF EACH DAY ALONG THE ENTIRE LENGTH OF ANY EXCAVATION. PLASTIC DRUMS TO BE PLACED OVER ALL EXPOSED CASTINGS IN ROADWAY AT CLOSE OF EACH DAY. TYPE II'S ON THE PROJECT TO BE PLASTIC DRUMS, HIGH INTENSITY FURNISHED AND MAINTAINED BY THE CONTRACTOR.

CONTRACTOR SHALL MAINTAIN SAFE, DUST FREE CONDITIONS ON EXISTING STREETS WHICH SHALL REQUIRE DAILY REMOVAL OF EARTH TRACKED OR SPILLED ON ROAD SURFACE, AND OTHER DUST CONTROL MEASURES AS REQUIRED BY THE PROJECT ENGINEER. EXCESSIVE DUST WILL NOT BE TOLERATED AT ANY TIME DURING CONSTRUCTION. PAYMENT FOR DUST CONTROL SHALL BE INCLUDED IN THE COST OF THE PROJECT.

EARTHWORK AND GRADING

ALL SLOPES SHALL BE FINISHED AS CLASS 'A' SLOPES.

SOIL EROSION AND SEDIMENTATION CONTROL: IN ADDITION TO THE GENERAL SOIL EROSION AND SEDIMENTATION CONTROL REQUIREMENTS IN THE PROPOSAL THE FOLLOWING MEASURES SHALL BE INCORPORATED INTO THIS PROJECT:

1. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO MINIMIZE THE AREAS LEFT BARREN DURING CONSTRUCTION AND TO DISTURB ONLY THOSE AREAS ABSOLUTELY REQUIRED FOR THE CONSTRUCTION OF THE PROJECT.
2. EROSION CONTROL ITEMS (CB INSERTS, SILT FENCE, ETC.) AS CALLED OUT ON PLAN AND/OR AS DIRECTED BY THE ENGINEER SHALL BE INSTALLED AND MAINTAINED ACCORDING TO THE SPECIFICATIONS, AND SHALL BE REMOVED WHEN THEY ARE NO LONGER EFFECTIVE AS DETERMINED BY THE ENGINEER. NO SEPARATE PAYMENT SHALL BE ALLOWED FOR EITHER MAINTENANCE OR REMOVAL OF THE EROSION CONTROL ITEMS.
3. THE CONTRACTOR SHALL REMOVE SEDIMENT COLLECTED IN CATCH BASINS. THE ENGINEER WILL INSPECT CATCH BASINS AFTER STORMS AND DIRECT THE CONTRACTOR TO CLEANOUT CATCH BASINS TO PROVIDE SEDIMENTATION CONTROL. SEDIMENT COLLECTIONS CLEARING SUMPS AND CULVERTS FOR SEDIMENTATION CONTROL SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE PROJECT.
4. THE CONTRACTOR SHALL FOLLOW LOCAL RULES AND REGULATIONS FOR SOIL EROSION AND SEDIMENTATION CONTROL FOR ALL MATERIALS THAT ARE DISPOSED OF OFF THE PROJECT SITE.

PAVING

ALL PAVING OPERATIONS SHALL BE COMPLETED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS NOTED ON THE PLANS.

BITUMINOUS BOND COAT WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE PROJECT.

THE CONSTRUCTION OF ALL LONGITUDINAL JOINTS IN THE BITUMINOUS LEVELING AND WEARING COURSES SHALL BE CONSTRUCTED WITH THE USE OF A JOINT MATCHING SHOE.

ANY RANDOM, IRREGULARLY CRACKED NEW CONCRETE CURB & GUTTER THAT OCCURS BEFORE THE PAVEMENT IS OPENED TO TRAFFIC SHALL BE REMOVED AND REPLACED PRIOR TO OPENING THE PAVEMENT TO TRAFFIC AT THE SOLE EXPENSE OF THE CONTRACTOR.

SAWING FOR PAVEMENT REMOVAL AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER, TO THE DEPTH REQUIRED FOR CLEAN REMOVAL OF PAVEMENTS OR CURBS, SHALL BE INCLUDED IN THE COST OF THE PROJECT. SAWING DEPTH SHALL BE ADEQUATE TO PREVENT SPALLING, CHIPPING, OR DAMAGE TO EXISTING PAVEMENT EDGES LEFT IN PLACE AS DIRECTED BY THE ENGINEER.

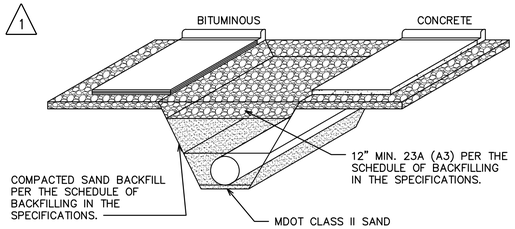
MISCELLANEOUS

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE PROPERTY BEYOND THE SLOPE STAKE LINE, INCLUDING EXISTING LAWN, TREES AND SHRUBBING.

WHEN THE FOLLOWING ITEMS OF WORK ARE SPECIFIED ON THE PLANS OR REQUIRED BY THE ENGINEER IN THE CONSTRUCTION OF THE PROJECT, THE ITEM WILL NOT BE PAID FOR SEPARATELY, UNLESS A PAY ITEM FOR THESE ITEMS IS PROVIDED.

- HMA BOND COAT
- ROCK EXCAVATION
- SWEEPING PAVEMENT
- SAWING, FOR PAVEMENT AND CURB REMOVAL
- CONCRETE ADMIXTURES
- REMOVING EDGEDRAIN, UNDERDRAIN, FRENCHDRAINS, OR DRAIN TILE

1



SPECIAL REQUIREMENTS FOR OPEN CUTTING HARD SURFACE AND/OR GRAVEL ROADS

NO SCALE

NOTES:

1. THE CONTRACTOR SHALL ACQUIRE A SPECIAL OPEN CUT APPROVAL FROM THE AGENCY HAVING AUTHORITY OVER THE ROADWAYS.
2. THE CONTRACTOR SHALL SUPPLY CONTINGENT LIABILITY INSURANCE FOR THE AGENCY HAVING AUTHORITY OVER THE ROADWAYS.
3. THE PROTECTION OF THE WORK SHALL BE IN ACCORDANCE WITH THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, PART 6", BARRICADES, WARNING AND LIGHTING NECESSARY FOR PUBLIC SAFETY TO BE APPROVED BY THE ENGINEER AND THE AGENCY HAVING AUTHORITY OVER THE ROADWAYS PRIOR TO STARTING CONSTRUCTION.
4. CONTRACTOR SHALL EXCAVATE ALL MATERIAL TO PROPOSED GRADE.
5. THE WATERMAIN SHALL BE PLACED ON MDOT CLASS II SAND (A5) BEDDING.
6. ALL BACKFILL SHALL BE MDOT CLASS II SAND (A5), PLACED PER THE SCHEDULE OF BACKFILLING.
7. THE SAND BACKFILL SHALL EXTEND FROM THE OUTSIDE EDGE OF SHOULDER TO OUTSIDE EDGE OF SHOULDER, OR FOR CURB AND GUTTER SECTIONS, SHALL BE EXTENDED 5' FROM THE OUTSIDE EDGE OF THE CURB TO THE OUTSIDE EDGE OF THE GUTTER.
8. THE FINAL 12" OF ALL BACKFILL SHALL BE 22A LIMESTONE (A2) SUBBASE MODIFIED PER THE AGENCY HAVING AUTORITY'S SPECIFICATIONS. ALL SHOULDERS SHALL BE REPAIRED PER THE AGENCY HAVING AUTHORITY OVER THE ROADWAYS.
9. THE CONTRACTOR SHALL REPLACE THE ROAD SURFACE WITH THE AGENCY HAVING AUTHORITY OVER THE ROADWAYS APPROVED MATERIAL.
10. CONTRACTOR SHALL MAINTAIN TEMPORARY ACCESS TO ALL AREAS DURING CONSTRUCTION. A PUBLIC ROAD MAY BE CLOSED FOR 1/2 WIDTH CONSTRUCTION WITH AGENCY HAVING AUTHORITY OVER THE ROADWAYS APPROVAL BUT THE CLOSING TIME CANNOT EXCEED 8 HOURS. CONTRACTOR MAY USE SHOULDERS AND TEMPORARY PATCHES TO KEEP A ROAD OPEN.

ABBREVIATIONS

HORIZONTAL CURVES

D	DEGREE OF CURVATURE
R/RAD.	RADIUS
Δ	CENTRAL ANGLE
T/TAN.	TANGENT
L	ARC LENGTH
CH. BRG.	CHORD BEARING (LONG CHORD)
L.C.	CHORD LENGTH
P.C.	POINT OF CURVATURE
P.C.C.	POINT OF COMPOUND CURVATURE
P.I.	POINT OF INTERSECTION
P.T.	POINT OF TANGENCY
P.O.C.	POINT ON CURVE
P.R.C.	POINT OF REVERSE CURVATURE

VERTICAL CURVES

P.V.C.	POINT OF VERTICAL CURVE
P.V.I.	POINT OF VERTICAL INTERSECTION
P.V.T.	POINT OF VERTICAL TANGENCY
L.V.C.	LENGTH OF VERTICAL CURVE
H.C.P.	HORIZONTAL CONTROL POINT
BVCS	BEGINNING, VERTICAL TANGENT-CURVE INTERSECTION STATION
BVCE	BEGINNING, VERTICAL TANGENT-CURVE INTERSECTION ELEVATION
EVCS	END, VERTICAL TANGENT-CURVE INTERSECTION STATION
EVCE	END, VERTICAL TANGENT-CURVE INTERSECTION ELEVATION

GENERAL

ADA	AMERICAN DISABILITIES ACT
ASPH.	ASPHALT
AVG.	AVERAGE
BC/BC	BACK-OF-CURB TO BACK-OF-CURB
B.M.	BENCH MARK
C.I.	CAST IRON
C.I.P.	COMPACTED IN PLACE
℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
CONC.	CONCRETE
CONST.	CONSTRUCTION
C.S.B.	COMPACTED SAND BACKFILL
D.I.	DUCTILE IRON
ELEV.	ELEVATION
ESMT.	EASEMENT
EST.	ESTIMATE
EX./EXIST.	EXISTING
F.F.	FIRST FLOOR
F.G.	FINISHED GRADE
F.J.	HYDRANT FROST JACKET ELEVATION
F.O.	FIBER OPTIC
G	GUTTER
GRVL.	GRAVEL
H.D.D.	HORIZONTAL DIRECTIONAL DRILLING
H.D.P.E.	HIGH DENSITY POLYETHYLENE PIPE
M.S.E.	MECHANICALLY STABILIZED EMBANKMENT
P-MP	PLASTIC - MEDIUM PRESSURE
P.C.	PAVEMENT CORE
P.G.	PLAN GRADE
P.O.B.	POINT OF BEGINNING
P.O.E.	POINT OF ENDING
P.O.R.	POINT OF ROTATION
PROP.	PROPOSED
PT.	POINT
REM.	REMOVE
R.O.W.	RIGHT-OF-WAY
S-MP	STEEL - MEDIUM PRESSURE
S-HP	STEEL - HIGH PRESSURE
SAN. SWR.	SANITARY SEWER
S.B.	SOIL BORING
S.E.	SOMAT ENGINEERING, INC. (SOIL BORINGS)
S.S.L.	SLOPE STAKE LINE
STA.	STATION
STM. SWR.	STORM SEWER
T	TOP OF CURB
T.C.	TOP OF STRUCTURE COVER
T.R.	TOP OF RAIL
T.W.	TOP OF WALL
TYP.	TYPICAL
U.G.	UNDERGROUND
W.C.A.A.	WAYNE COUNTY AIRPORT AUTHORITY
W.M.	WATER MAIN

LEGEND

BUILDING
EX. ASPHALT SURFACE
EX. CONCRETE SURFACE
EX. GRAVEL
STORM (ST)
SANITARY (SN)
WATERMAIN (W)
GAS
UND. TELEPHONE
UND. ELECTRICAL
WCAA COMMUNICATION
CATV COMCAST (CATV)
TRAVERSE LINE & TRAVERSE POINT
BENCH MARK SYMBOL
PARKING BOLLARD
FENCE
MANHOLE - TELEPHONE (T)
MANHOLE - ELECTRIC (E)
CALL BOX (CB)
GAS METER (GM)
ELECTRIC OUTLET (EO)
GAS TANK ABOVE GROUND (GT)
SQ. & RD. CATCH BASINS & INLETS IN PAVEMENT (C.B., I.P., S.S.P.)
STORM MANHOLE & PIPE END (ST)
UNSPECIFIED MH. (UN)
RISER & DOWN SPOUT (ST, DS)
PUMP STATION (UN)PS
FIRE HYDRANT
GATE & VALVE, & WELL (GV, GW)
CISTERN & WELL (CI, WELL)
WATER STOP BOX & SPRINKLER HEAD (W.S.B., S.H.)
WATER TOWER BASE & METER PIT (W.T.B., M.P.)
UTILITY POLE (UP)
LIGHT POLE (LP)
GUY WIRE ANCHOR (GUY)
UNDERGROUND MARKER (UM)
RISER (R)
GAS BOX & BLOW OFF (GB, BO)
BUILD. CORNER & 1st FLOOR ELEV. (BC, FF)
℄ OF DITCH & TOE OF SLOPE (TS, TO)
TOP OF BANK & RIDGE (TB, RB)
TOP OF BERM & TOE OF BERM (TB, TB)
EDGE OF WATER & WATER SURFACE (EW, WS)
HEADWALL & RETAINING WALL (HW, R)
SIGNS & SIGN POST (S, SP)
LOCAL LOW POINT & LOCAL HIGH POINT (LP, HP)
FOUND IRON ROD (FIR)
FOUND MONUMENT (FM)
SET IRON ROD (SIR)
WATER DISTRIBUTION BOX (WB)
SANITARY CLEANOUT (SC)
DECIDUOUS TREE
DECIDUOUS SHRUB
CONIFEROUS TREE
CONIFEROUS SHRUB
STUMP

Know what's below. Call before you dig. 811

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
1	ISSUED FOR ADDENDUM	NOV. 26, 2019	AAU	AAU
	ISSUED FOR BIDS	OCT. 25, 2019		
	ISSUED FOR 90% REVIEW	SEPT. 27, 2019	AAU	AAU
	ISSUED FOR 50% REVIEW	AUGUST 30, 2019	AAU	AAU

CITY OF ANN ARBOR
301 EAST HURON STREET
P.O. BOX 8647
ANN ARBOR, MI 48107-8647
734-794-6410
www.a2gov.org

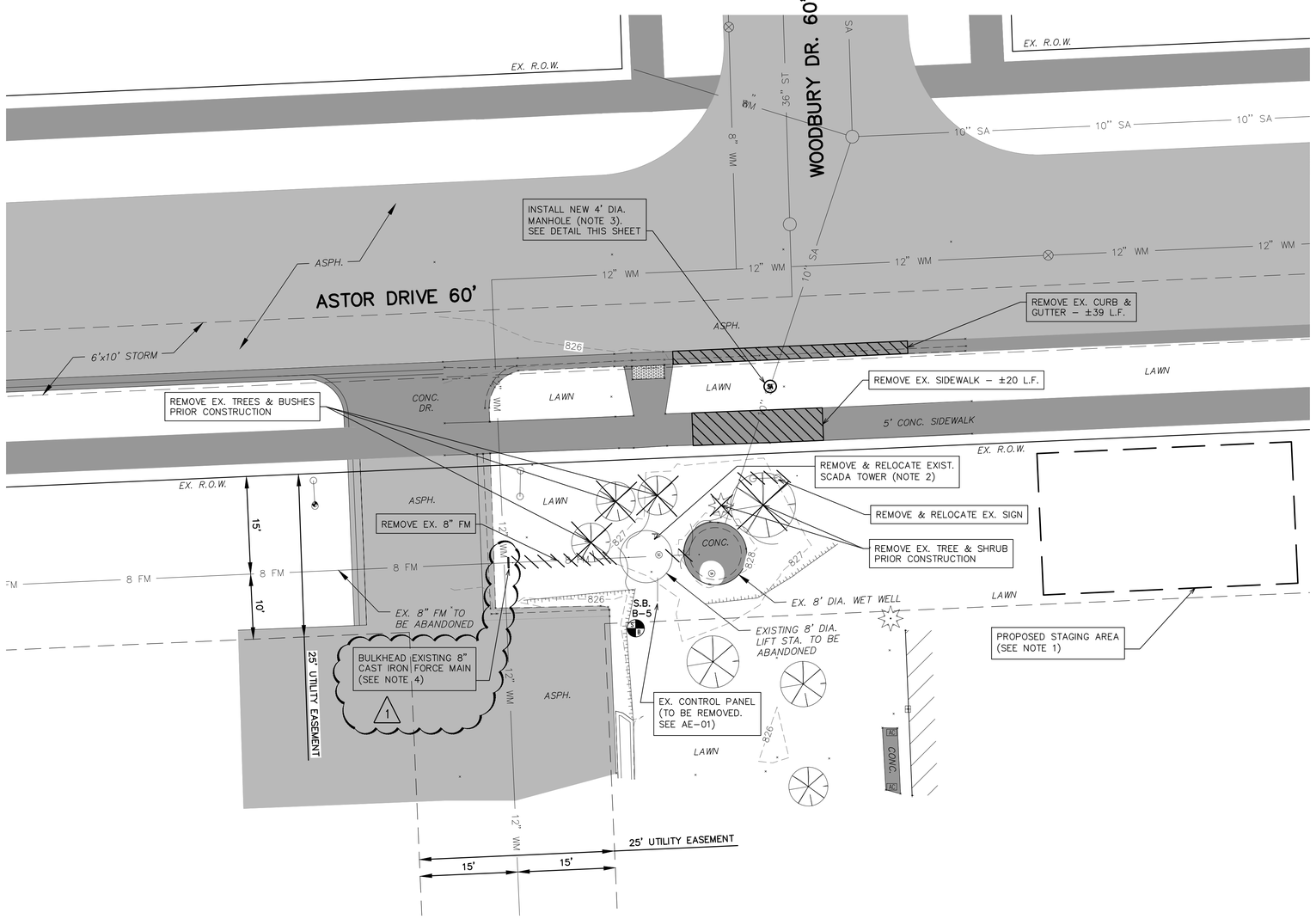
PROJECT MANAGEMENT - PUBLIC SERVICES - CITY OF ANN ARBOR

CIVIL LEGEND, NOTES AND ABBREVIATIONS

SCALE NO SCALE

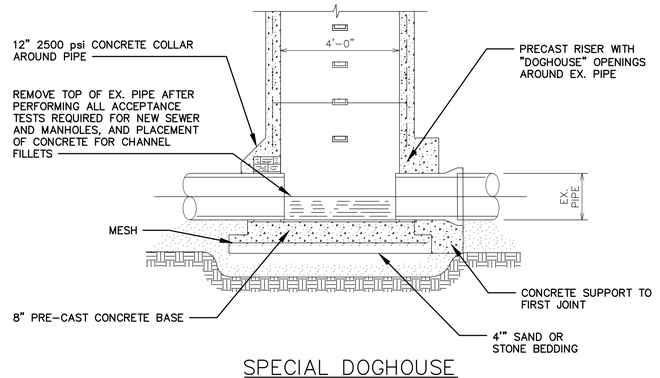
DRAWING No. GC-01

SHEET No.



GENERAL NOTES

1. CONTRACTOR TO CONFINE HIS OPERATIONS TO WITHIN THE UTILITY EASEMENT AND OUTSIDE OF THE RIGHT OF WAY WHENEVER POSSIBLE.
2. TEMPORARILY RELOCATE EXISTING SCADA TOWER TO STAGING AREA DURING CONSTRUCTION.
3. NEW MANHOLE IS TO FACILITATE TEMPORARY BYPASS PUMPING. MANHOLE RIM ELEVATION SHALL MATCH NEW ACCESS DRIVE GRADE (SEE SHEET AC-02).
4. BULKHEAD EXISTING 8" CAST IRON FORCE MAIN BOTH ENDS USING BRICKS AND SEAL WITH NON-SHRINK GROUT.



SPECIAL DOGHOUSE MANHOLE DETAIL
NOT TO SCALE

Know what's below. Call before you dig. 811

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
	ISSUED FOR ADDENDUM 1	NOV. 26, 2019		AAU
	ISSUED FOR BIDS	OCT. 25, 2019		AAU
	ISSUED FOR 90% REVIEW	SEPT. 27, 2019		AAU
	ISSUED FOR 50% REVIEW	AUGUST 30, 2019		AAU

CITY OF ANN ARBOR
PUBLIC SERVICES
301 EAST HURON STREET
P.O. BOX 8647
ANN ARBOR, MI 48107-8647
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PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

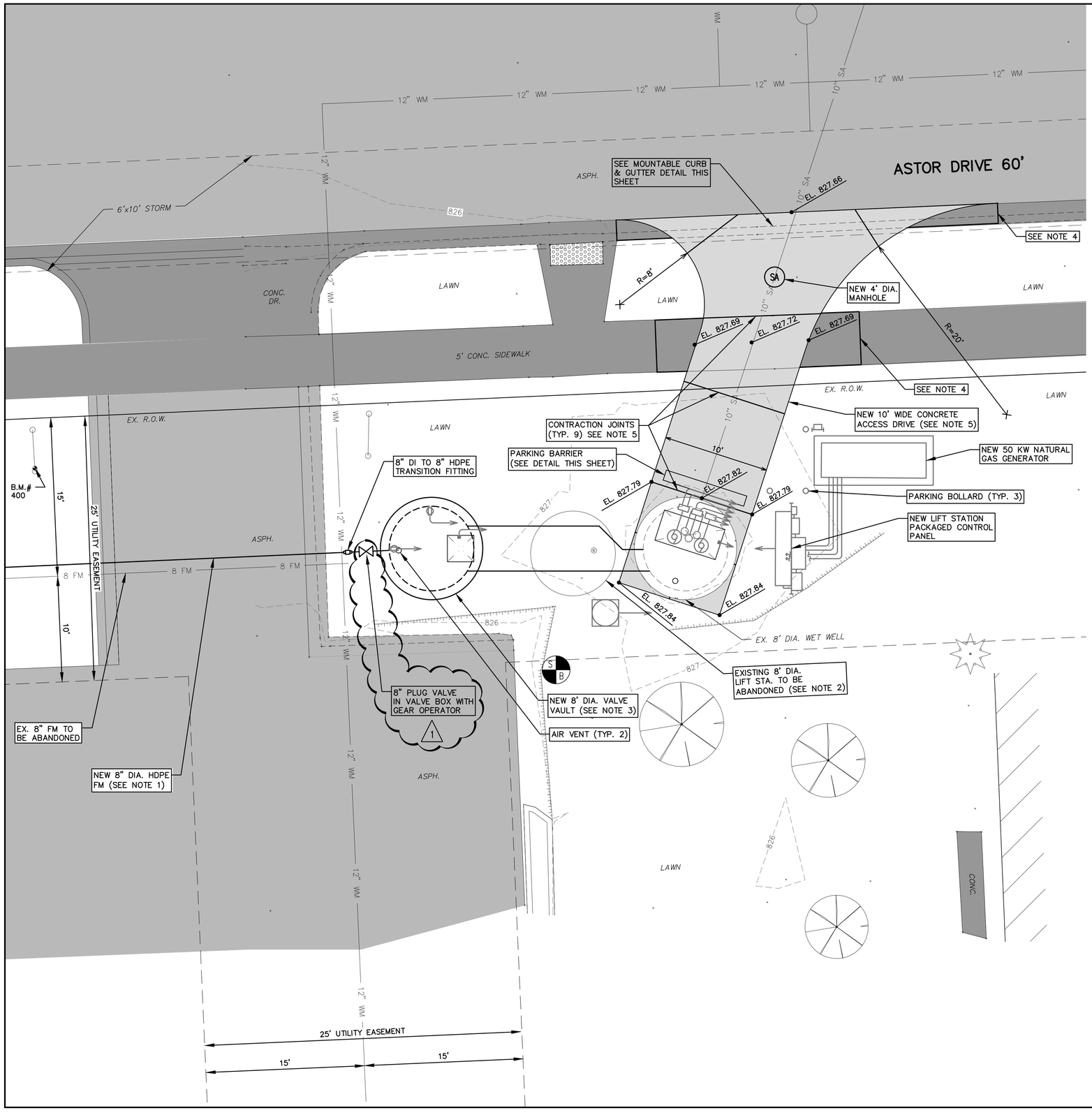
ASTOR LIFT STATION

EXISTING SITE PLAN

SCALE PLAN: 1"=10'

DRAWING No. AC-01

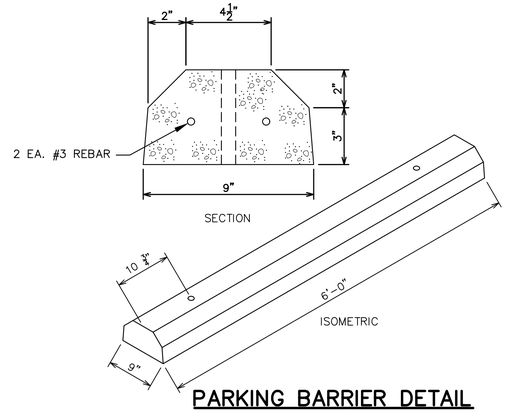
SHEET No.



N

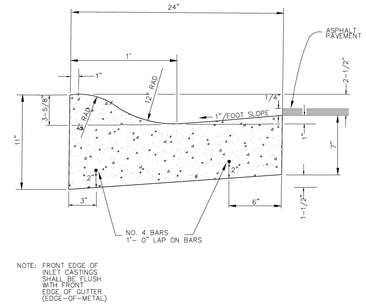
GENERAL NOTES:

1. EXISTING 8" CI FM TO BE ABANDONED IN PLACE. NEW 8" HDPE FM TO BE DIRECTIONALLY DRILLED PARALLEL TO THE EXISTING FM LINE. SEE SPECIFICATION 02035 "HORIZONTAL DIRECTIONAL DRILLING" FOR MORE INFORMATION.
2. EXISTING LIFT STATION CAN TO BE ABANDONED IN PLACE. ALL ELECTRICAL AND MECHANICAL EQUIPMENT IS TO BE DEMOLISHED (SEE SHEET AE-01). AFTER DEMOLITION AND LIFT STATION CAN DRAINAGE CORING ARE COMPLETE THE LIFT STATION CAN IS TO BE CUT OFF 9' BELOW GRADE & FILLED WITH PEA STONE.
3. TREES AND VEGETATION SURROUNDING THE NEW VALVE VAULT AND EXISTING WET WELL MUST BE REMOVED PRIOR TO CONSTRUCTION.
4. CONTRACTOR TO TRANSITION EXISTING SIDEWALK AND CURB & GUTTER TO NEW ACCESS DRIVE.
5. INSTALL ACCESS DRIVE JOINTS PER MDOT STANDARDS.
6. CONTRACTOR TO COORDINATE GAS UTILITY WORK AND METER AS INDICATED ON SHEET AE-01.
7. CONTRACTOR TO RELOCATE EXISTING SCADA TOWER TO ORIGINAL LOCATION AT THE END OF CONSTRUCTION.



PARKING BARRIER DETAIL

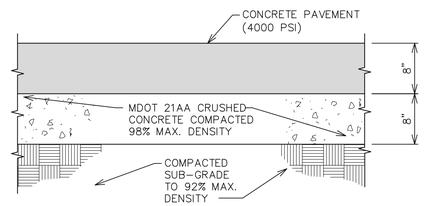
NOT TO SCALE



NOTE: FRONT EDGE OF INLET CASTINGS SHALL BE FLUSH WITH FRONT EDGE OF GUTTER (EDGE-OF-METAL)

MOUNTABLE CURB & GUTTER (SD-R-2)

NOT TO SCALE



TYPICAL CONCRETE PAVEMENT

NOT TO SCALE

Know what's below. Call before you dig. 811

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	ISSUED FOR ADDENDUM 1	NOV. 26, 2019	AAU	
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PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

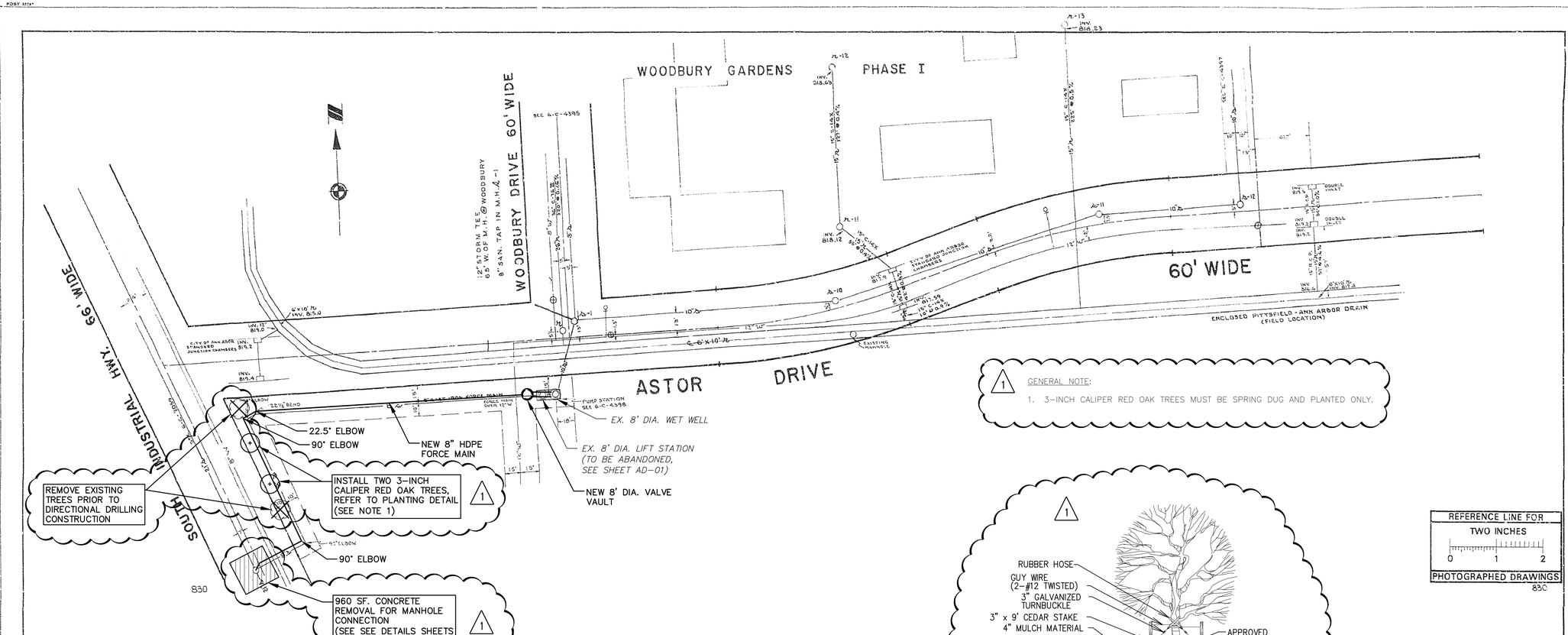
ASTOR LIFT STATION

PROPOSED SITE PLAN

SCALE PLAN: 1" = 5'

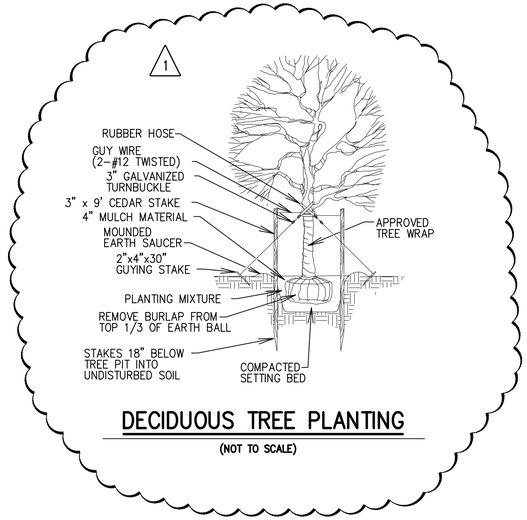
DRAWING No. AC-02

SHEET No.



1 GENERAL NOTE:

1. 3-INCH CALIPER RED OAK TREES MUST BE SPRING DUG AND PLANTED ONLY.



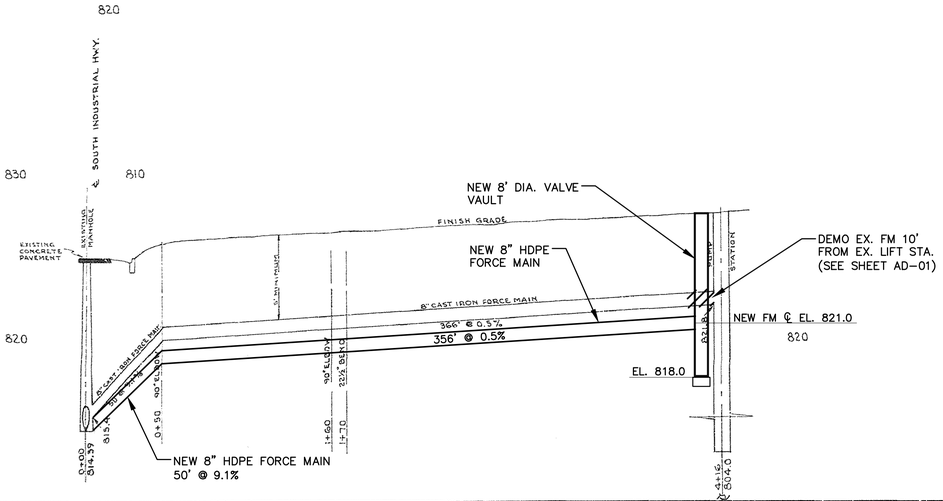
DECIDUOUS TREE PLANTING

(NOT TO SCALE)

REFERENCE LINE FOR TWO INCHES

0 1 2

PHOTOGRAPHED DRAWINGS 830



LEGEND:

UNDERGROUND UTILITIES	EXISTING SANITARY	EXISTING STORM
	PROPOSED SANITARY	PROPOSED STORM
PROFILES	CENTER LINE	RIGHT PROPERTY LINE
	LEFT PROPERTY LINE	

EXISTING GAS
EXISTING WATER

REFERENCES:

BENCH MARK US C&GS 11-1 ELEV 838.06
PROFILES BY ATWELL-HICKS, INC.
DRAWINGS M.D.P.H. PERMIT NO. 690202 4/10/69
FIELD BOOK 179 f X262

JOB 3737 S DIST. PRIVATE
JOB 3738 R DIST. PRIVATE
JOB DIST.
JOB DIST.

PREPARED BY ATWELL-HICKS, INC.
APPROVED BY

	DATE	SHEET NO.
DR. BY C.P.M.	3-69	INDEX NO. 6700
TR. BY C.P.M.	3-69	SHELF NO.
CH. BY J.L.S.	3-69	6-C-4394
REVISIONS AS BUILT DEC., 1971		SCALE: HORIZONTAL 1"=40' VERTICAL 1"=8'

STORM & SANITARY SEWERS
ASTOR DRIVE
SOUTH INDUSTRIAL HWY. TO M.H. A-12

FREDRICK A. MAMMEL SUPERINTENDENT OF PUBLIC WORKS

PUBLIC WORKS DEPARTMENT — ANN ARBOR, MICHIGAN

811 Know what's below. Call before you dig.

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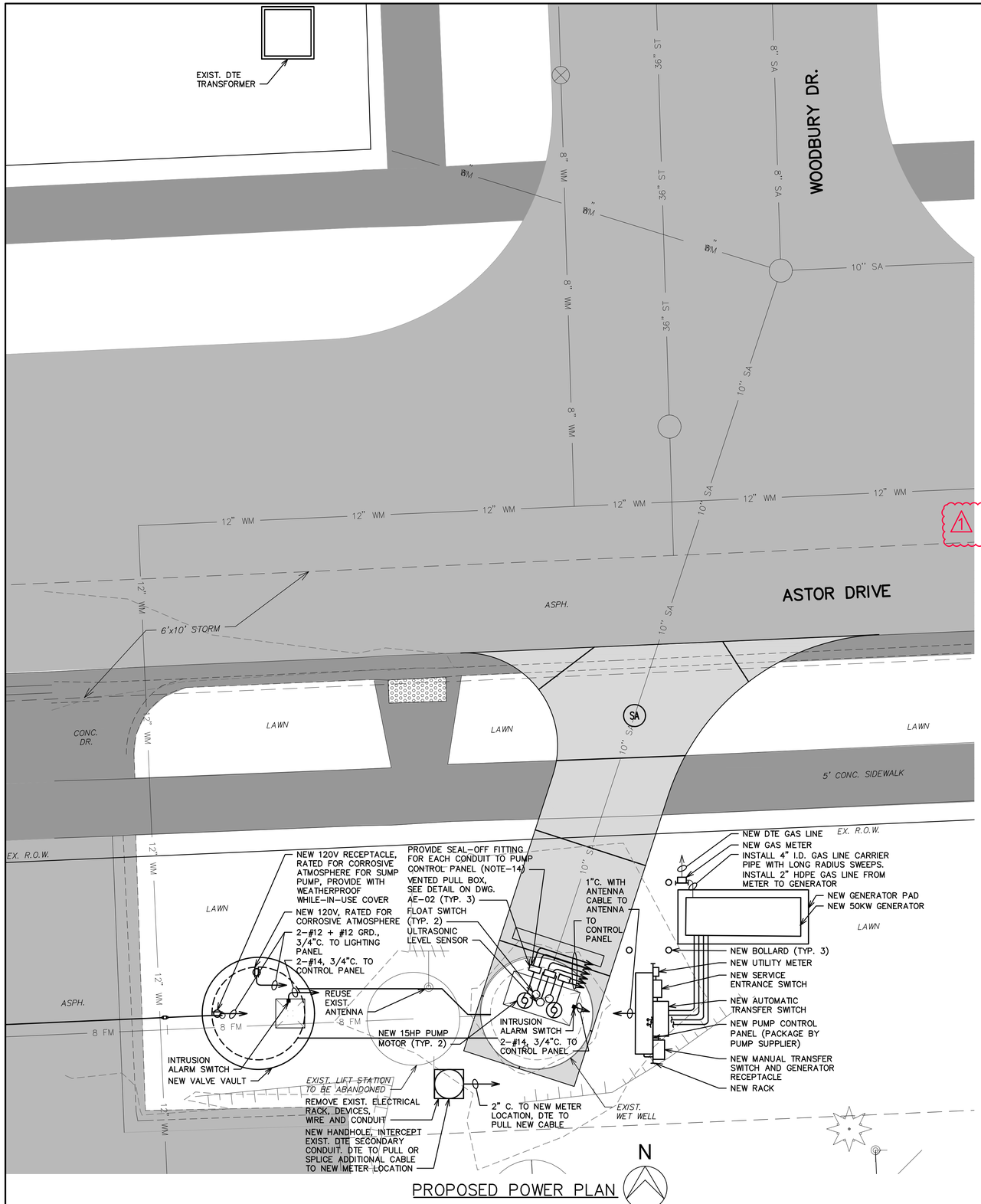
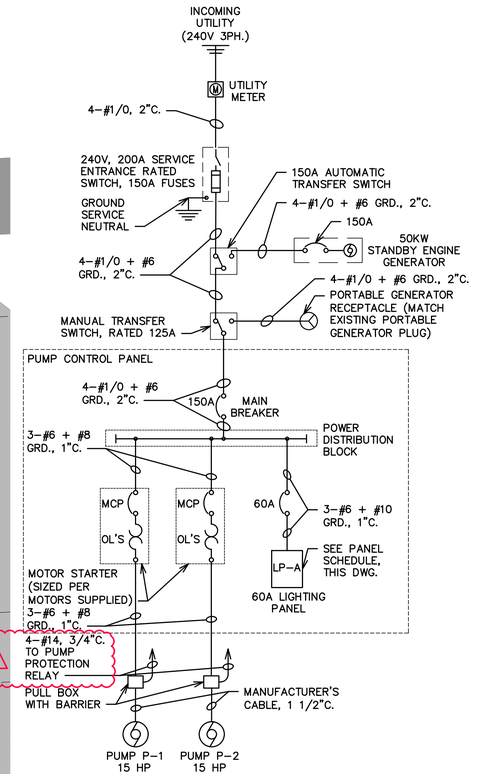
PROJECT MANAGEMENT — PUBLIC SERVICES — CITY OF ANN ARBOR

ASTOR LIFT STATION
DIRECTIONAL DRILLING PLAN

SCALE NO SCALE
DRAWING No. AC-04
SHEET No.



PROPOSED POWER PLAN



PROPOSED ONE-LINE DIAGRAM - ASTOR PUMP STATION

LOAD SUMMARY		
240V. 3PH. 4W. SERVICE		
ITEM	DESCRIPTION	F.L.A.
PUMP	(2) 15HP SUBMERSIBLE	84A
STATION MISC.	LIGHTING PANEL	40A
	TOTAL CONNECTED LOAD	124A

LIGHTING PANEL "LP-A" SCHEDULE

120/240 V., 1PH., 3W., WITH 60 AMP. MAIN BKR, NEUTRAL BUS, & GRD. BUS

CIRC. NO.	BRKR. SIZE	ITEM SERVED	LOAD (WATTS) øX	LOAD (WATTS) øY
1	20A	GENERATOR HEATERS	1000	
3	20A	GENERATOR BATTERY CHARGER		360
5	20A (GFI)	VALVE VAULT CONVENIENCE RECEPTACLE	180	
7	20A	VALVE VAULT SUMP PUMP RECEPTACLE		1200
9	20A	SPARE		
11	20A	SPARE		
13		SPACE		
15		SPACE		
17		SPACE		
2	20A	PUMP CONTROL PANEL LIGHTS	100	
4	20A	PUMP CONTROL PANEL RECEPTACLE		180
6	20A	PUMP CONTROL PANEL CONTROL POWER	600	
8	20A	PUMP CONTROL PANEL HEATERS		500
10	20A	SPARE		
12	20A	SPARE		
14		SPACE		
16		SPACE		
18		SPACE		
		TOTAL CONNECTED LOAD	1880	2240

GENERAL ELECTRICAL NOTES:

(APPLIES TO AE-01 AND AE-02)

1. THE CONTRACTOR SHALL VISIT THE JOB SITE AND THOROUGHLY CHECK THE EXISTING FIELD CONDITIONS PRIOR TO SUBMITTING A BID.
2. ALL WORK SHALL BE COORDINATED WITH THE OWNER.
3. THE CONTRACTOR SHALL PAY ALL UTILITY COMPANY COSTS AND FEES FOR INSTALLATION OF THE NEW NATURAL GAS SERIVCE AND MODIFICATIONS TO THE EXISTING ELECTRICAL SERVICE.

   DTE ENERGY COMPANY
   W.O. #55317243
   734-544-7844
4. SITE ADDRESS IS 1150 ASTOR AVENUE, ANN ARBOR, MI 48104.
5. COORDINATE ALL UNDERGROUND WORK WITH NEW AND EXISTING UNDERGROUND UTILITIES BEFORE INSTALLATION. CALL MISS DIG 1-800-482-7171, 72 HOURS BEFORE ANY UNDERGROUND WORK IS DONE.
6. THE SECONDARY UNDERGROUND CONDUIT AND WIRE SHALL MEET THE REQUIREMENTS OF THE DTE ENERGY COMPANY.
7. ALL CONDUIT FROM WETWELL TO PULL BOX SHALL BE SCHEDULE 80 PVC. ALL OTHER CONDUIT SHALL BE PVC COATED RIGID GALVANIZED STEEL, UNLESS OTHERWISE NOTED. CONDUIT INSTALLED UNDERGROUND SHALL BE 30" BELOW FINISH GRADE (MINIMUM). CONTRACTOR SHALL PROVIDE A 1/4" DIAMETER POLYETHYLENE PULL ROPE IN ALL EMPTY CONDUITS.
8. ALL EXPOSED CONDUIT SHALL BE RIGID GALVANIZED STEEL, INSTALLED WITH WATER-TIGHT CONDUIT FITTINGS. EXPANSION FITTINGS SHALL BE PROVIDED AT ALL TRANSITIONS FROM UNDERGROUND TO EXPOSED CONDUIT.
9. PROVIDE A PANEL DRAIN AND BREATHER, CROUSE-HINDS "ECD" UNIVERSAL SERIES OF EQUAL, MOUNTED TO THE TOP AND BOTTOM OF ALL NEMA 4 ENCLOSURES. THE BREATHER SHALL BE MOUNTED TO THE TOP OF THE PANEL ON A WATER-TIGHT HUB AND THE DRAIN SHALL BE MOUNTED TO THE BOTTOM OF THE PANEL ON A BOLT-ON TYPE HUB, SEALED WATER-TIGHT.
10. ALL ELECTRICAL EQUIPMENT, CONDUIT, AND WIRING WITHIN THE WET WELL SHALL BE INSTALLED IN ACCORDANCE WITH THE N.E.C. REQUIREMENTS FOR CLASS I, DIVISION I, GROUP D HAZARDOUS LOCATIONS.
11. ALL EXPOSED, METALLIC ELECTRICAL CONDUIT, SUPPORTS, BRACKETS, HANGERS, ETC., LOCATED WITHIN THE WET WELL SHALL BE P.V.C. COATED WITH 40 MILS (MINIMUM) COVERING. WHERE FACTORY P.V.C. COATING IS NOT AVAILABLE, FACTORY OR FIELD COATING WITH A CORROSION-RESISTANT EPOXY PAINT SHALL BE PROVIDED.
12. FOR ALL EQUIPMENT MOUNTED WITHIN THE WET WELL, USE STAINLESS STEEL AND 1/2" STAINLESS STEEL SPACERS ON STAINLESS STEEL BOLTS IN ORDER TO PROVIDE A 1/2" AIR SPACE BETWEEN EQUIPMENT AND WALL.
13. ALL CONDUITS AND/OR SLEEVES THAT PASS THROUGH WALLS OR FLOORS SEPARATING HAZARDOUS AREAS FROM NON-HAZARDOUS AREAS SHALL BE SEALED GAS-TIGHT WITH NON-SHRINK GROUT AFTER CONDUIT IS INSTALLED.
14. PUMP POWER CABLES, PUMP CONTROL CABLES, AND FLOAT SWITCH CONTROL CABLES SHALL BE SPLICED TO PANEL WIRING WITHIN A J-BOX. PROVIDE SEAL-OFF FITTING BETWEEN THE PULL BOX AND THE PUMP CONTROL PANEL.
15. ALL THREADED ELECTRICAL EQUIPMENT (CONDUIT, FITTINGS, BOLTS, SCREWS, ETC.) INSTALLED OUTDOORS SHALL BE COATED WITH ANTI-SEIZE COMPOUND PRIOR TO INSTALLATION.
16. THE EXACT HEIGHT, WIDTH, AND DEPTH OF THE SERVICE ENTRANCE EQUIPMENT SUPPORT BACK SHALL BE DETERMINED BY SIZE AND NUMBER OF ELECTRICAL DEVICES MOUNTED UPON IT.
17. SUPPORT RACK TO HAVE EDGES, ABRASIONS, ETC. CLEANED AND TOUCHED UP WIH A HOT GALVANIZED COMPOUND, SUCH AS GALVAWELD, IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
18. FOR EACH INTRINSICALLY SAFE CIRCUIT, RUN 2-#14 AWG (MINIMUM), OR 1 PAIR-#18 FOIL SHIELDED, IN 3/4" R.G.S. (MINIMUM). INTRINSICALLY SAFE (I.S.) CIRCUITS MAY BE RUN WITH OTHER I.S. CIRCUITS IN THE I.S. CONDUIT SYSTEM, BUT SHALL NOT BE RUN IN THE SAME CONDUIT, RACEWAY, WIRE DUCT, ETC., WITH ANY NON-INTRINSICALLY SAFE CIRCUITS, NOR SHALL I.S. CONDUCTORS COME IN CONTACT IN ANY FASHION WITH NON-INTRINSICALLY SAFE CONDUCTORS. I.S. CIRCUIT INSTALLATION SHALL MEET ALL REQUIREMENTS OF THE LATEST REVISIONS OF N.E.C. ARTICLE 504, ANSI/ISA RP-12.06, AND ANSI/UL 913.
19. ALL ELECTRICAL WORK SHALL COMPLY WITH THE N.E.C., AND THE LOCAL CODES, ORDINANCES, AND REGULATIONS INCLUDING MIOSHA.
20. CONTRACTOR SHALL PROVIDE 1 1/4" HIGH X 3" WIDE (MINIMUM) NAMEPLATES ON ALL DEVICES ON THE SERVICE ENTRANCE EQUIPMENT RACK. NAMEPLATES SHALL BE WHITE LAMINATED PLASTIC WITH 1/8" HIGH (MINIMUM) BLOCK LETTERS ENGRAVED TO A BLACKCORE, AN SHALL BE ATTACHED WITH CORROSION-RESISTANT SCREWS.
21. ALL EXISTING EQUIPMENT ASSOCIATED WITH THE SCADA SYSTEM SHALL BE DISCONNECTED AND REUSED. ALL SCADA SYSTEM COMPONENTS ARE TO BE SUBPLATE MOUNTED INSIDE THE PUMP CONTROL PANEL. ADDITIONAL SPACE SHALL BE PROVIDED IN THE PUMP CONTROL PANEL FOR MOUNTING OF THE EQUIPMENT. SCADA INTEGRATION WILL BE BY UIS AND WILL BE PAID FOR DIRECTLY BY THE OWNER. SEE DRAWING AE-02 FOR I/O LIST.
22. RECONNECT EXISTING SCADA EQUIPMENT TO EXISTING ANTENNA. PROVIDE NEW ANTENNA CABLE IN CONDUIT FROM PUMP CONTROL PANEL TO ANTENNA LOCATION AS REQUIRED.
23. SALVAGE THE EXISTING MILLTRONICS LEVEL SENSOR, CABLE, AND TRANSDUCER FROM THE EXISTING STATION AND TURN OVER TO THE OWNER. (1)
24. IN AREA WITH EXISTING TREES, THE CONTRACTOR SHALL CAREFULLY EXCAVATE THE CONDUIT RUNS SO AS NOT TO DAMAGE MAIN ROOTS OF TREES. DO NOT CUT OR REMOVE MAIN ROOTS OF TREES, BUT RUN CONDUIT AROUND ROOTS AS MAY BE REQUIRED BY FIELD CONDITIONS.
25. PROVIDE BACKFILL PER SPECIFICATION. PROVIDE COMPACTED SAND BACKFILL UNDER PAVED AREAS. THE CONTRACTOR IS REQUIRED TO REPAIR ANY DAMAGE TO EXISTING PAVING TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.

Know what's below. Call before you dig. 811

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	ISSUED FOR ADDENDUM NO.1	NOV. 26, 2019	MJR	AAU
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	ISSUED FOR 90% REVIEW	SEPT. 27, 2019	MJR	AAU
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PROJECT MANAGEMENT - PUBLIC SERVICES - CITY OF ANN ARBOR

ASTOR LIFT STATION

PROPOSED SITE PLAN

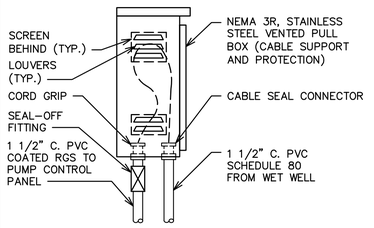
SCALE PLAN: 1" = 5'

DRAWING No. AE-01

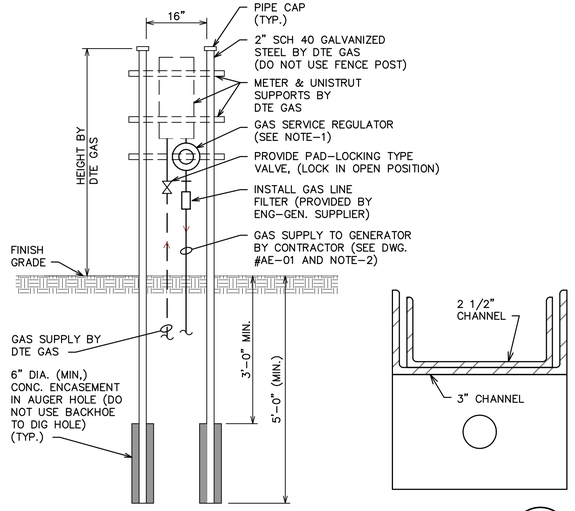
SHEET No.

GAS METER NOTES:

1. CONTRACTOR SHALL SUPPLY FINAL REGULATOR AND SHALL BE AS REQUIRED TO DELIVER GAS AT 11" W.C. TO THE GENERATOR. REGULATOR SHALL BE FISHER MODEL TYPE HSR OR EQUAL.
2. BELOW GRADE GAS PIPING SHALL BE ASTM D2513 POLYETHELYNE PIPE (PE). TRANSITION TO ABOVE GRADE ASTM A53 STEEL PIPING SHALL BE PROVIDED
3. PROVIDE REDUCER, IF REQUIRED FROM SUPPLY GAS PIPING FOR CONNECTION TO GENERATOR.
4. COORDINATE ALL WORK WITH DTE GAS.

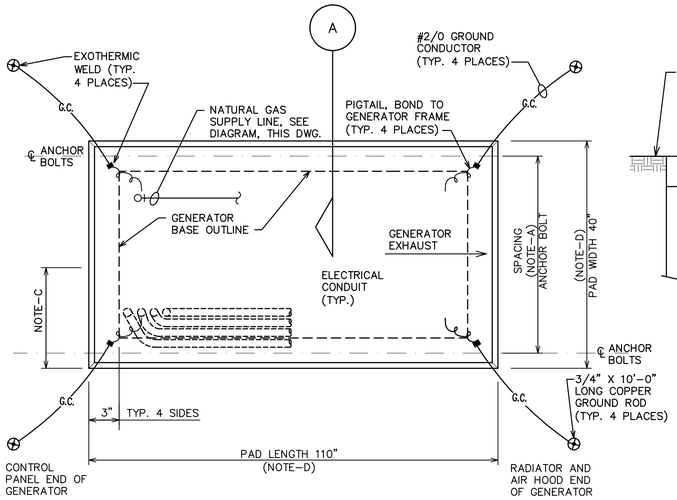


PULL BOX DETAIL
N.T.S.



GAS METER SUPPORT DETAIL
N.T.S.

SECTION B
NO SCALE



PLAN – PROPOSED GENERATOR PAD
NO SCALE

NOTES:

A. BASIS OF DESIGN IS CUMMINS, MODEL C50 D6 WITH LEVEL 2 SOUND ATTENUATED ENCLOSURE. DIMENSIONS AND STUB-UP LOCATIONS MUST BE ADJUSTED FOR THE SUPPLIED GENERATOR. SUBMIT SHOP DRAWING SHOWING FINAL PLAN OF FOUNDATION FOR ENGINEER REVIEW.

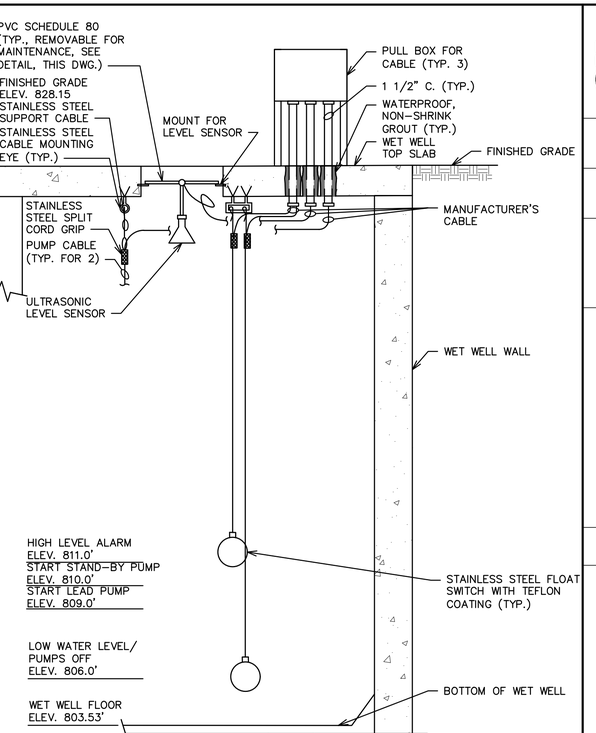
B. REFER TO MANUFACTURER SHOP DRAWINGS FOR ANCHOR BOLTS LOCATIONS. ANCHORS SHALL BE SUPPLIED BY THE CONTRACTOR AND SHALL BE 12" LONG 3/8" DIA. HOOK BOLTS CAST IN PLACE.

C. REFER TO GENERATOR SHOP DRAWINGS FOR LOCATION AND DIMENSIONS OF STUB UP AREA. PROVIDE SLEEVES FOR RUNNING CONDUIT THROUGH FOUNDATIONS. ORIENT EXIT FROM PAD AS REQUIRED TO COORDINATE WITH SITE PLAN.

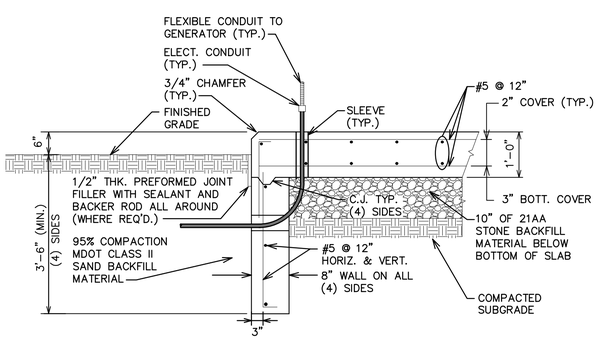
D. PROVIDE MIN. 6" CONCRETE ENCASEMENT FOR FUEL SUPPLY PIPING. REFER TO GENERATOR SHOP DRAWINGS FOR FUEL STUB UP LOCATIONS FOR EACH GENERATOR. ORIENT EXIT FROM PAD AS REQUIRED TO COORDINATE WITH SITE PLAN.

E. DIMENSIONS SHOWN ARE ASSOCIATED WITH THE BASIS OF DESIGN. CONTRACTOR TO COORDINATE PAD SIZE AND STUB UP LOCATIONS WITH PROVIDED GENERATOR PER MANUFACTURER SHOP DRAWINGS.

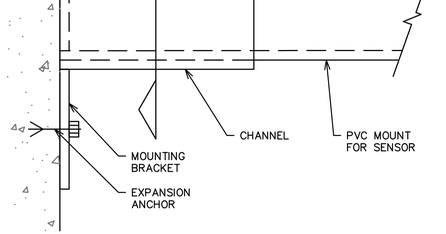
F. APPROXIMATE WEIGHT FOR ENGINE-GENERATOR SET: 50 KW: 1626 lbs. (WET)



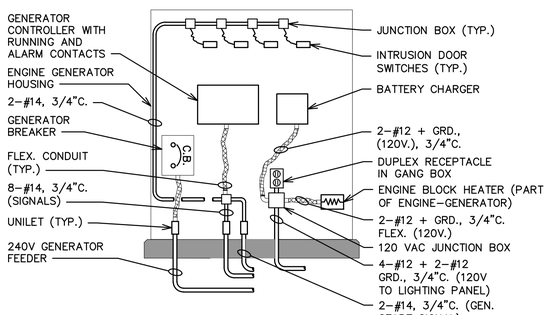
WET WELL FLOAT SWITCH, LEVEL TRANSDUCER AND PUMP CABLE MOUNTING
N.T.S.
(ALL HARDWARE IN WET WELL SHALL BE 316 S.S.)



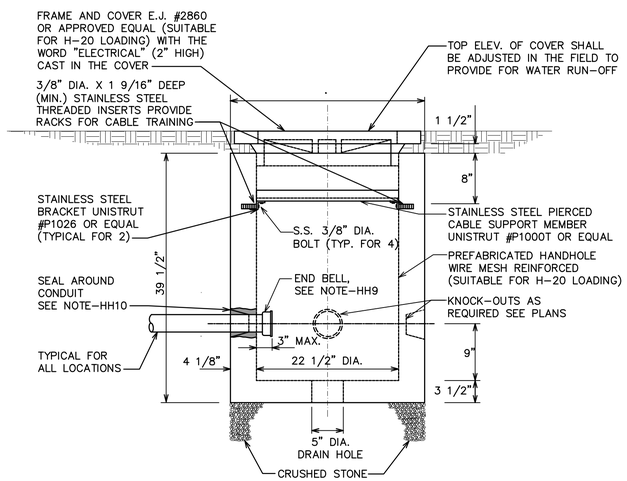
SECTION A
NO SCALE



ULTRASONIC LEVEL SENSOR SUPPORT DETAIL
NO SCALE



ENGINE-GENERATOR TYPICAL CONNECTIONS
(CONTRACTOR SHALL COORDINATE ACTUAL GENERATOR CONNECTION LOCATIONS WITH EQUIPMENT SUPPLIED)



PRECAST HANDHOLE WITH FLOOR

PRECAST HANDHOLE NOTES:

HH1. ALL CONCRETE SHALL BE GRADE 30M.

HH2. THE INNER SURFACE OF THE HANDHOLE SHALL BE SMOOTH.

HH3. HEAVY DUTY COVERS SHALL BE CASTINGS WHICH MEET THE REQUIREMENTS OF THE CURRENT SPECIFICATIONS FOR GRAY IRON CASTINGS ASTM DESIGNATION A48 AND SHALL HAVE A MINIMUM STRENGTH AS PROVIDED FOR CLASS NO. 30 GRAY IRON CASTINGS.

HH4. THE SEATING FACE OF THE GROUND COVER AND THE SEAT FOR THE SAME ON THE FRAME IF REQUIRED, SHALL BE GROUND OR MACHINED SO THAT THE COVER SHALL HAVE AN EVEN BEARING ON IT'S SEAT TO PREVENT ROCKING OR TILTING.

HH5. THE CASTING SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS, AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED AND SHALL BE COATED WITH TAR PITCH VARNISH.

HH6. THE HEAVY DUTY COVER & FRAME SHALL BE EAST JORDAN IRON WORKS #2860 TYPE "A" NEENAH FOUNDRY #R-1740-D FOR CIRCULAR COVER OR AN APPROVED EQUAL.

HH7. HANDHOLE SHALL BE EQUIPPED WITH STAINLESS STEEL CABLE RACK AND HOOKS TO TRAIN CABLE.

HH8. SEAL AROUND CONDUIT ENTRIES WATERTIGHT WITH NON-SHRINK GROUT.

HH9. PROVIDE END BELLS FOR ALL CONDUITS PRIOR TO INSTALLATION OF FISH LINE AND WIRE.

HH10. PROVIDE SUFFICIENT SLACK CABLE AT ALL SPLICES FOR COMPLETE REMOVAL FROM HANDHOLE FOR FUTURE MAINTENANCE.

HH11. THE PRECAST HANDHOLE SHALL BE ADVANCED CONCRETE OR APPROVED EQUAL.

RTU PANEL INPUTS AND OUTPUTS LIST

(THIS LIST PROVIDED TO INDICATE WHAT SIGNALS FROM STATION AND CONTROL PANEL ARE TO BE CONNECTED TO THE SCADA SYSTEM. CONTRACTOR TO SALVAGE ALL EXISTING EQUIPMENT ASSOCIATED WITH THE SCADA SYSTEM, INCLUDING MOSCAD PLC, RADIO, POWER SUPPLY, AND ASSOCIATED DEVICES AND WIRING. ANTENNA FOR COMMUNICATION TO BE REUSED. UIS TO PROVIDE ALL PROGRAMMING OF SCADA PLC. COMMUNICATION BETWEEN PUMP CONTROL PANEL AND SCADA PLC TO BE OVER MODBUS)

DISCRETE INPUTS

1. PUMP 1 RUNNING (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
2. PUMP 2 RUNNING (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
3. WET WELL LEVEL HIGH (SIGNAL FROM FLOAT SWITCH VIA INTERPOSING RELAY)
4. WET WELL LEVEL LOW (SIGNAL FROM FLOAT SWITCH VIA INTERPOSING RELAY)
5. STATION INTRUSION (SIGNAL FROM INTRUSION SWITCHES)
6. GENERATOR RUNNING (SIGNAL FROM GENERATOR CONTROL PANEL)
7. GENERATOR FAULT (SIGNAL FROM GENERATOR CONTROL PANEL)
8. GENERATOR SUPPLYING POWER (SIGNAL FROM AUTO. TRANSFER SWITCH)
9. PUMP 1 SEAL FAILURE (SIGNAL FROM PUMP PROTECTION RELAY)
10. PUMP 2 SEAL FAILURE (SIGNAL FROM PUMP PROTECTION RELAY)
11. PUMP 1 OVERTEMPERATURE (SIGNAL FROM PUMP PROTECTION RELAY)
12. PUMP 2 OVERTEMPERATURE (SIGNAL FROM PUMP PROTECTION RELAY)
13. SPARE
14. SPARE
15. SPARE
16. SPARE

1

DISCRETE OUTPUTS

1. START PUMP 1 (DRY CONTACT OUTPUT)
2. START PUMP 2 (DRY CONTACT OUTPUT)
3. SPARE
4. SPARE

ANALOG INPUTS

1. WETWELL LEVEL (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
2. SPARE
3. SPARE
4. SPARE

MISCELLANEOUS VALUES

1. AC POWER FAIL (PUMP CONTROL PANEL VIA MODBUS)
2. COMMS FAIL (PUMP CONTROL PANEL VIA MODBUS)
3. PUMP 1 HOURS DAILY (PUMP CONTROL PANEL VIA MODBUS)
4. PUMP 1 HOURS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
5. PUMP 1 STARTS DAILY (PUMP CONTROL PANEL VIA MODBUS)
6. PUMP 1 STARTS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
7. PUMP 2 HOURS DAILY (PUMP CONTROL PANEL VIA MODBUS)
8. PUMP 2 HOURS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
9. PUMP 2 START DAILY (PUMP CONTROL PANEL VIA MODBUS)
10. PUMP 2 STARTS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
11. INTERROGATE STATION (PUMP CONTROL PANEL VIA MODBUS)
12. UPDATE STATION (PUMP CONTROL PANEL VIA MODBUS)
13. PUMP 1 RELAY BACK (PUMP CONTROL PANEL VIA MODBUS)
14. PUMP 2 RELAY BACK (PUMP CONTROL PANEL VIA MODBUS)

811 Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
	ISSUED FOR ADDENDUM NO.1	NOV. 26, 2019	MJR	AAU
	ISSUED FOR BIDS	OCT. 25, 2019	MJR	AAU
	ISSUED FOR 90% REVIEW	SEPT. 27, 2019	MJR	AAU
	ISSUED FOR 50% REVIEW	AUGUST 30, 2019	MJR	AAU

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CITY OF ANN ARBOR MICHIGAN

PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

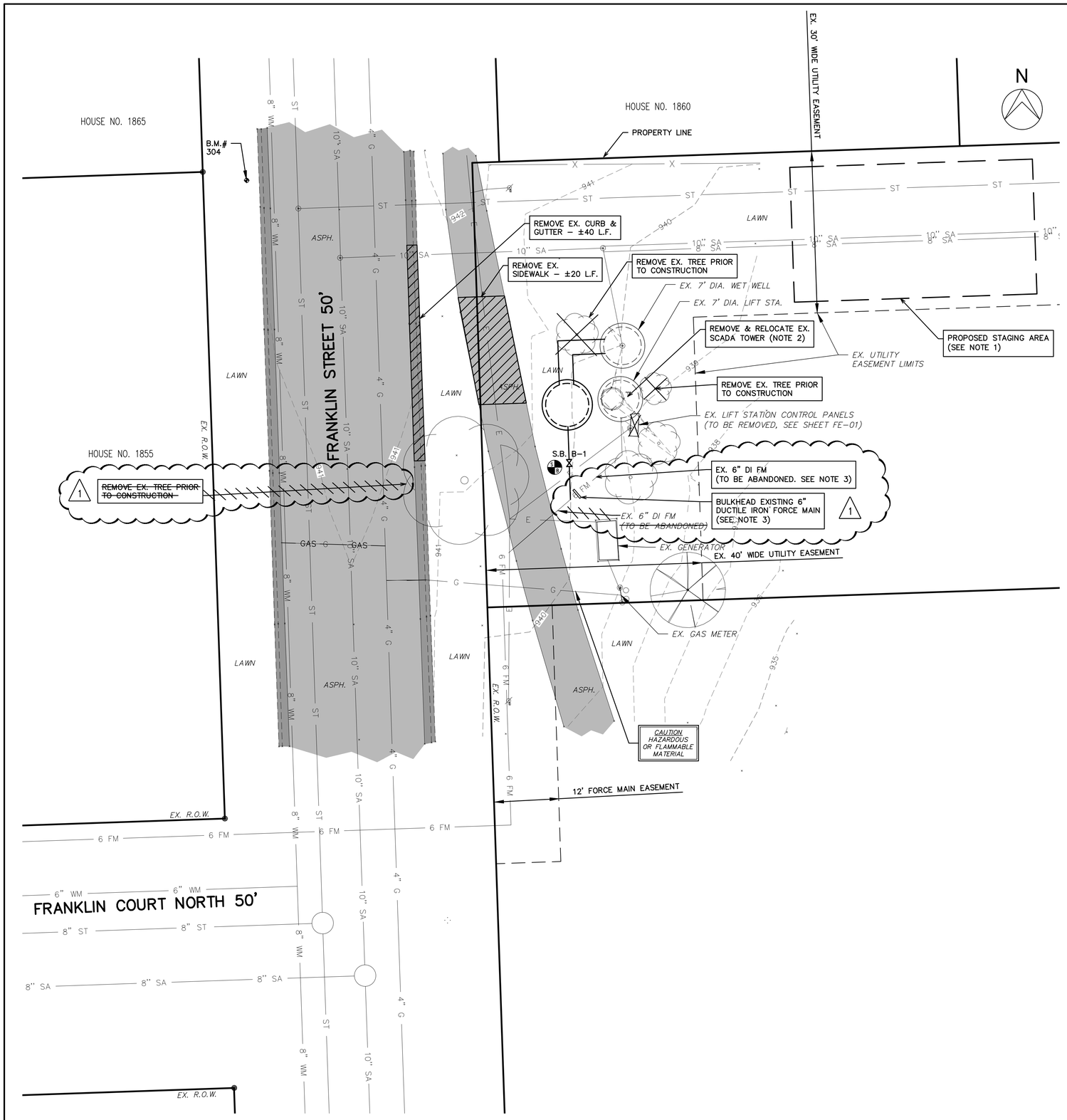
ASTOR LIFT STATION

ELECTRICAL DETAILS

SCALE: NO SCALE

DRAWING No.: AE-02

SHEET No.



GENERAL NOTES

1. CONTRACTOR TO CONFINE HIS OPERATIONS TO WITHIN THE UTILITY EASEMENT AREA AND OUTSIDE OF THE RIGHT OF WAY WHENEVER POSSIBLE.
2. TEMPORARILY RELOCATE SCADA TOWER TO STAGING AREA DURING CONSTRUCTION.
3. BULKHEAD EXISTING 6" DUCTILE IRON FORCE MAIN USING BRICKS AND SEAL WITH NON–SHRINK GROUT.

Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
1	ISSUED FOR ADDENDUM 1	NOV. 26, 2019	AAU	AAU
	ISSUED FOR BIDS	OCT. 25, 2019	AAU	AAU
	ISSUED FOR 90% REVIEW	SEPT. 27, 2019	AAU	AAU
	ISSUED FOR 50% REVIEW	AUGUST 30, 2019	AAU	AAU

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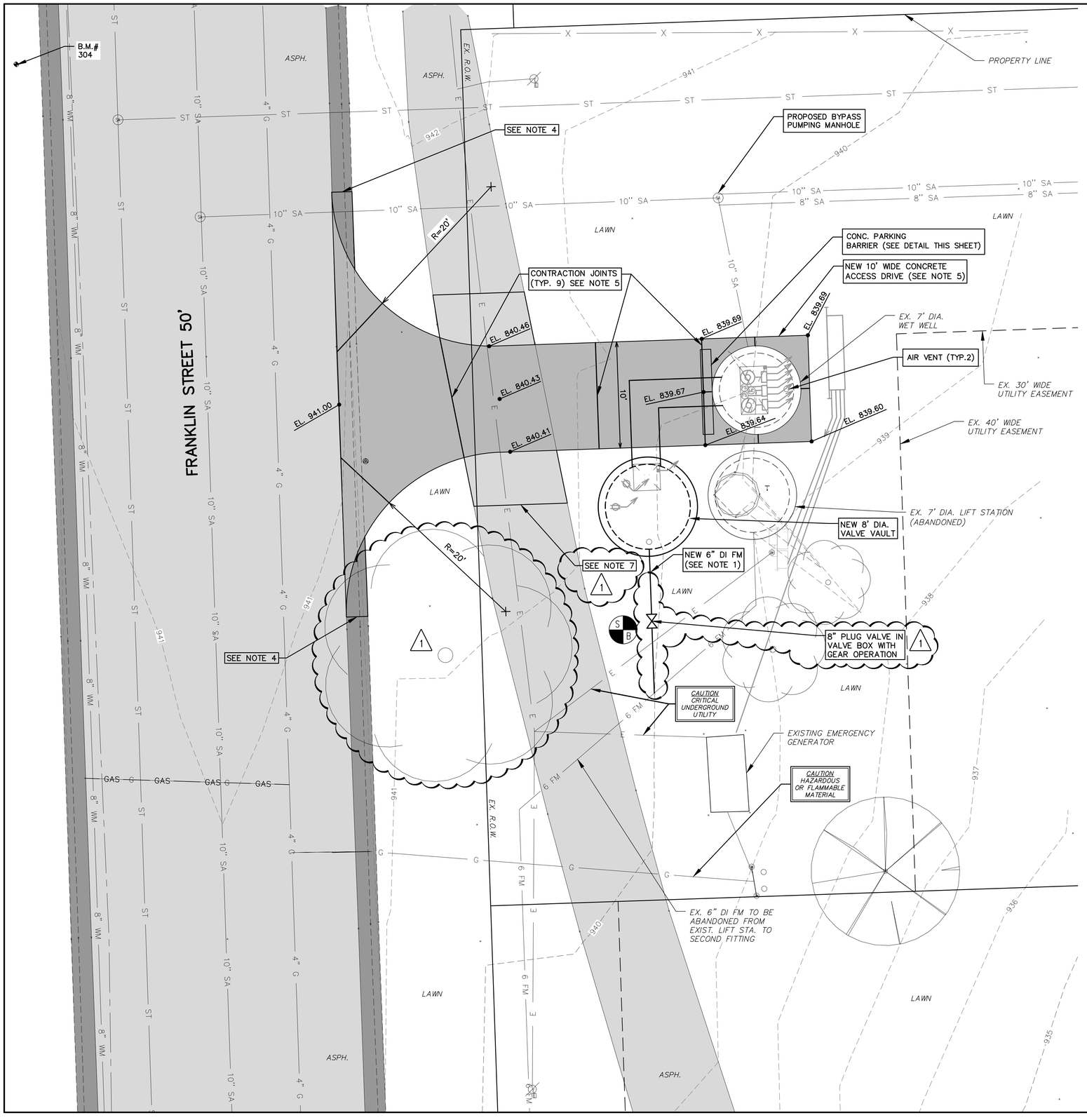
PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

FRANKLIN LIFT STATION
EXISTING SITE PLAN

SCALE PLAN: 1"=10'

DRAWING No. FC–01

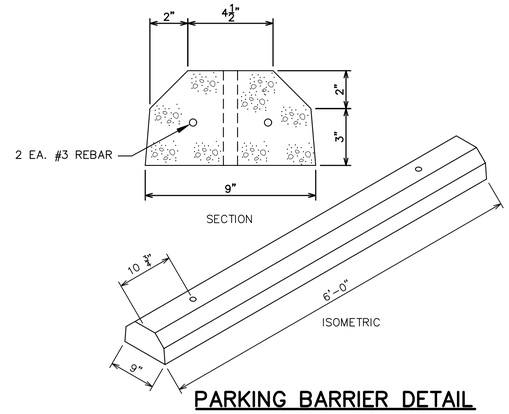
SHEET No.



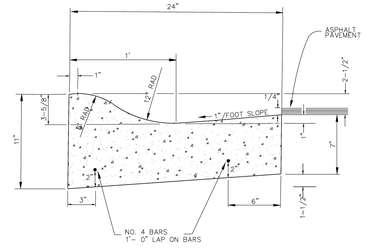
N

GENERAL NOTES:

1. EXISTING 6" DI FORCE MAIN TO BE ABANDONED FROM EXISTING PUMP STATION TO SECOND FITTING. NEW 6" DI FORCE MAIN TO CONNECT TO EXISTING FORCE MAIN AT SECOND EXISTING FORCE MAIN FITTING.
2. IF 45° FITTING IS ECASED IN CONCRETE THRUST BLOCK, REMOVE THRUST BLOCK, AND CONNECT TO EXISTING PIPE WHERE ACCESSIBLE WITH MECHANICAL THRUST RESTRAINING FITTING.
3. EXISTING LIFT STATION CAN TO BE ABANDONED IN PLACE. ALL ELECTRICAL AND MECHANICAL EQUIPMENT IS TO BE DEMOLISHED (SEE SHEET FE-01). AFTER DEMOLITION AND LIFT STATION CAN DRAINAGE CORING ARE COMPLETE THE LIFT STATION CAN IS TO BE CUT OFF 5' BELOW GRADE & FILLED WITH PEA STONE.
4. CONTRACTOR TO TRANSITION EXISTING SIDEWALK AND CURB & GUTTER TO NEW ACCESS DRIVE.
5. INSTALL ACCESS DRIVE JOINTS PER MDOT STANDARDS.
6. CONTRACTOR TO COORDINATE GAS UTILITY WORK AND METER AS INDICATED ON SHEET FE-01.
7. HMA TRANSITION TO DRIVEWAY PER MDOT CONSISTING OF 12 INCHES 21AA AGGREGATE BASE (CIP) AND 4 INCHES HMA, 13A APPLIED IN TWO EQUAL LIFTS.

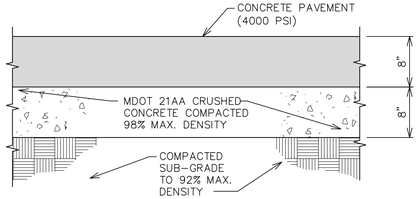


PARKING BARRIER DETAIL
NOT TO SCALE



NOTE: FRONT EDGE OF INLET CASTINGS SHALL BE FLUSH WITH FRONT EDGE OF GUTTER (EDGE-OF-METAL)

MOUNTABLE CURB & GUTTER (SD-R-2)
NOT TO SCALE



TYPICAL CONCRETE PAVEMENT
NOT TO SCALE

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	ISSUED FOR ADDENDUM 1	NOV. 26, 2019	AAU	
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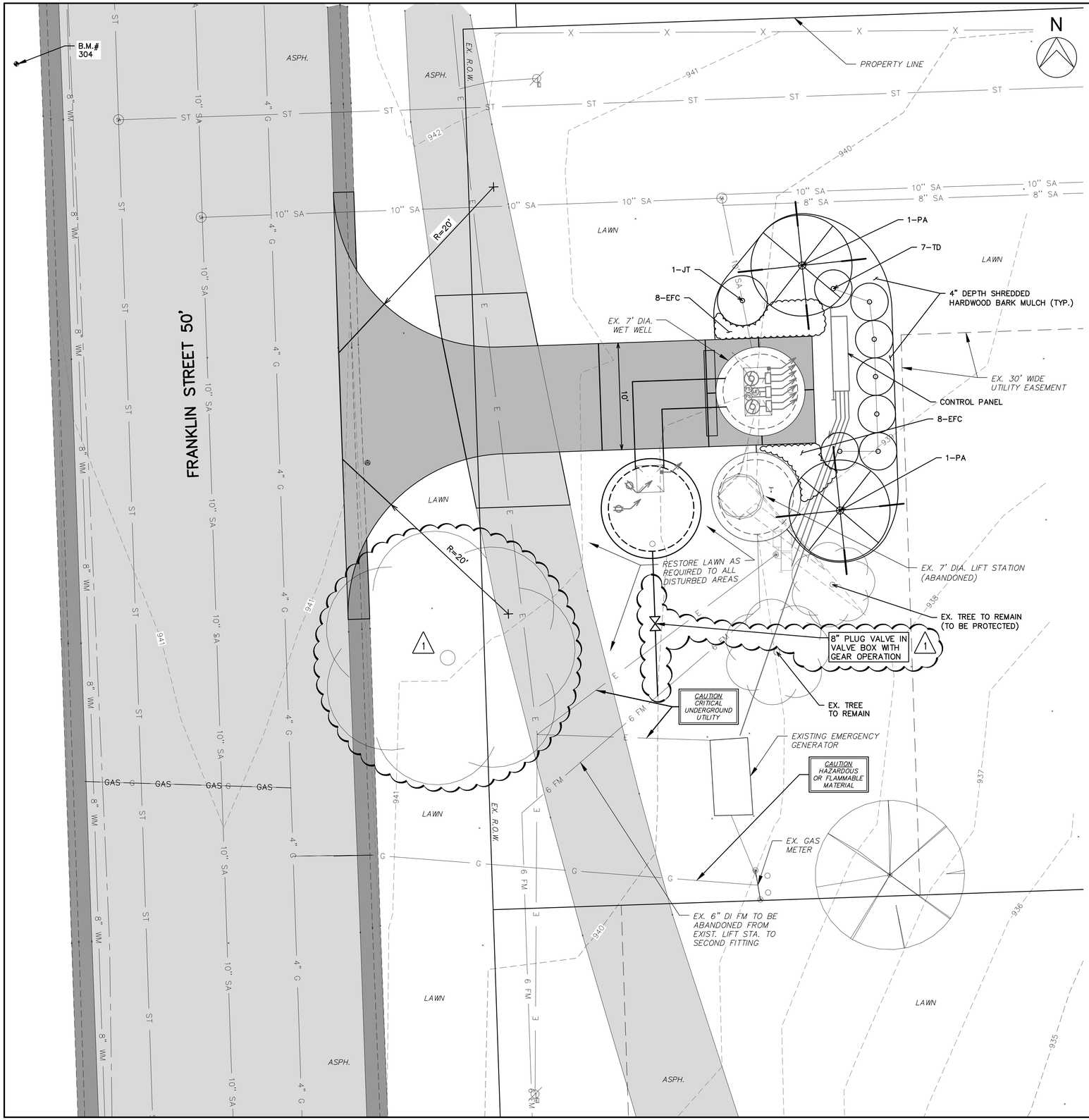
PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

FRANKLIN LIFT STATION
PROPOSED SITE PLAN

SCALE PLAN: 1" = 5'

DRAWING No. FC-02

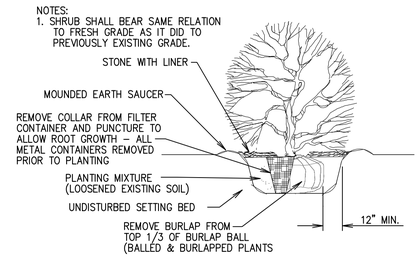
SHEET No.



PLANT LIST/QUANTITY

KEY	QT.	BOTANIC NAME	COMMON NAME	SIZE	NOTES
PA	2	PICEA ABIES	NORWAY SPRUCE	8' HT.	B & B
TD	7	TAXUS DENSIFORMUS	DENSE YEW	24" HT.	B & B
JT	1	JUNIPERUS TAMISERIFOLIA	TAMMY JUNIPER	24" SPD.	B & B
EFC	16	EVONYMUS FORTUNEI COLORATUS	WINTER CREEPER	1 GAL.	POTS

4" DEPTH HARDWOOD BARK MULCH – ALL BEDS



TYPICAL SHRUB PLANTING

(NOT TO SCALE)

LANDSCAPE NOTES

1. VERIFY ALL CONDITIONS ON SITE PRIOR TO COMMENCING CONSTRUCTION AND REPORT ANY DISCREPANCIES IMMEDIATELY TO ENGINEER OR OWNER.
2. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND SERVICES PRIOR TO COMMENCING WORK. CONTRACTOR IS RESPONSIBLE FOR ANY COST INCURRED DUE TO DAMAGED UTILITIES.
3. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES REFLECTED ON THE PLANT LIST. IF A DISCREPANCY EXISTS BETWEEN THE LIST AND THE PLAN, THE PLAN SHALL BE HELD VALID.
4. INSTALLATION AND SIZE OF ALL PLANT MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARDS SET FORTH BY THE AMERICAN ASSOCIATION OF NURSERY MEN OR AS SPECIFIED IN THE WRITTEN SPECIFICATIONS.
5. THE LANDSCAPE CONTRACTOR SHALL CONTACT THE ENGINEER OR OWNER'S REPRESENTATIVE PRIOR TO BEGINNING CONSTRUCTION. DISCREPANCIES BETWEEN THE PLANS AND ACTUAL SITE CONDITIONS, OR OTHER PROBLEM AREAS, SHALL BE RESOLVED AT THIS TIME.
6. THE LOCATION OF ALL PLANTS SHALL BE SCALED FROM THE DRAWINGS OR INTERPRETED FROM THE PLANT LIST. PRIOR TO PLANT INSTALLATION THE LANDSCAPE CONTRACTOR SHALL CONTACT THE OWNER'S REP. 2 WORKING DAYS BEFORE INSTALLATION TO ALLOW THE OWNER'S REP. THE OPTION TO REVIEW PLANT LOCATIONS.
7. IF ROUGH GRADE IS DONE BY OTHERS, CONTRACTOR SHOULD REVIEW THAT GRADE AND ADDRESS ANY PROBLEMS WITH THE OWNER. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL GRADING AND SITE SURFACE DRAINAGE, DRAIN TO PAVING, CATCH BASIN ETC. NO LOW SPOTS THAT HOLD STANDING WATER WILL BE ACCEPTED.
8. ANY RAISED EARTH BERMS SHOWN ON THE PLANS SHALL BE MADE ENTIRELY OF LIGHT ORGANIC SOILS AND SHALL BLEND SMOOTHLY INTO EXISTING TOPOGRAPHY
9. WATER-IN ALL PLANT MATERIAL IMMEDIATELY AFTER INSTALLATION.
10. MULCH CIRCLES FOR ALL TREES SHALL COVER ENTIRE PLANTING PIT. IF SOIL HAS HEAVY CLAY CONTENT, PLANTING THE TREE 6" HIGH IS ACCEPTABLE. ADVISE ENGINEER PRIOR TO PLANTING.
11. SUBMIT SAMPLES OF MULCH, TOPSOIL, PRE-EMERGENT, STONE, ETC., AS REQUIRED BY THE PROJECT.
12. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR SUPPLY AND PLACEMENT OF TOPSOIL PER SPECIFICATIONS.
13. ALL TREES SHALL HAVE CLAY LOAM ROOT BALLS – NO SAND BALLS ACCEPTED.
14. SNOW/TREE PROTECTION FENCING NEEDS TO BE INSTALLED AROUND PERIMETER OF WORK AREA TO PROTECT EXISTING TREES AND PROPERTY.
15. PRIOR TO ANY LAND CLEARING OR CONSTRUCTION , TREE PROTECTION FENCING IS TO BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE OWNER. THIS FENCING SHALL BE INSTALLED AT THE DRIP LINE OF ALL TREES AND SHRUBS, IN ACCORDANCE WITH THE OWNER'S TREE PROTECTION DETAIL, AND MUST BE MAINTAINED AS APPROVED FOR THE DURATION OF THE PROJECT. NO CUTTING, FILLING OR TRESPASSING SHALL OCCUR INSIDE THE FENCED AREAS WITHOUT PRIOR APPROVAL FROM THE OWNER.
16. PLANT TREES AND SHRUBS NO CLOSER THAN THE FOLLOWING MINIMUM DISTANCES FROM SIDEWALKS, CURBS AND PARKING STALLS UNLESS AS SHOWN ON THE PLANS:

A. SHADE/CANOPY TREES	5 FEET
B. ORNAMENTAL/FLOWERING TREES	5 FEET
C. EVERGREEN TREES	10 FEET
D. EVERGREEN/FLOWERING SHRUBS	4 FEET

17. DIG SHRUB PIT A MINIMUM OF 1' LARGER THAN SHRUB ROOT BALLS AND TREE PITS 2' LARGER THAN ROOT BALLS. BACKFILL WITH TWO PARTS TOP SOIL, TWO PARTS SOIL FROM EXCAVATED PLANTING HOLE AND ONE PART PEAT. PLANT TREES AND SHRUBS AT THE SAME GRADE LEVEL AT WHICH THEY WERE PLANTED AT THE NURSERY. IF WET CLAY SOILS ARE EVIDENT, PLANT TREES AND SHRUBS HIGHER.
18. REMOVE ALL TWINE, WIRE AND BURLAP FROM THE TOP 1/3 OF TREE AND SHRUB EARTH BALLS AND FROM TREE TRUNKS. REMOVE ALL NON-BIODEGRADABLE MATERIAL SUCH AS PLASTIC OR NYLON COMPLETELY.
19. SHRUB BEDS ARE TO BE MULCHED WITH SHREDDED HARDWOOD BARK MULCH TO A MINIMUM DEPTH OF 4". ONLY NATURAL-COLORED SHREDDED HARDWOOD BARK MULCH WILL BE ACCEPTED.
20. UPON FINAL COMPLETION, ALL PLANT MATERIALS MUST BE PRUNED AND INJURIES REPAIRED. THE AMOUNT OF PRUNING SHALL BE LIMITED TO THE MINIMUM NECESSARY TO REMOVE DEAD OR INJURED TWIGS AND BRANCHES AND TO COMPENSATE FOR THE LOSS OF ROOTS FROM TRANSPLANTING. ALL CUTS SHALL BE MADE FLUSH, LEAVING NO STUBS. PAINT ALL CUTS OVER 1"DIA. WITH TREE PAINT.
21. EXISTING LAWN THAT THE OWNER INTENDS TO SAVE AND AREAS THAT ARE DAMAGED DURING CONSTRUCTION MUST BE INSPECTED BY THE OWNER'S REP. TO DETERMINE VIABILITY. IF THE EXISTING LAWN IS FOUND TO BE LEVEL, HEALTHY, DENSE & FREE FROM WEEDS, LAWN MAY NOT REQUIRE REPLACEMENT OR RENOVATION. IF RENOVATION IS REQUIRED OR IS PART OF THE APPROVED PLAN, THEN THE FOLLOWING REQUIREMENTS WILL APPLY:
    A. EXISTING LAWN FOUND TO BE GENERALLY IN GOOD CONDITION BUT WITH BARE, SPARSE OR WEEDY AREAS MUST BE RENOVATED BY FILLING IN LOW AREAS, RAKING, OVERSEEDING AND TOP DRESSING ALL SPARSE AND BARE SPOTS AND BY INITIATING A WEED AND FEED PROGRAM.
22. BACKFILL DIRECTLY BEHIND ALL CURBS AND SIDEWALKS AND COMPACT TO THE TOP OF CURB OR WALK TO SUPPORT VEHICLE AND PEDESTRIAN WEIGHT WITHOUT SETTLING.
23. THE CONTRACTOR AGREES TO GUARANTEE ALL PLANTS FOR ONE YEAR FROM THE TIME OF PLANTING AND FINAL APPROVAL & INSPECTION BY THE OWNER'S REPRESENTATIVE. THIS GUARANTEE INCLUDES FURNISHING NEW PLANTS AS WELL AS THE LABOR AND MATERIALS FOR THE INSTALLATION OF REPLACEMENTS. ALL REPLACEMENT PLANTS SHALL BE GUARANTEED FOR AN ADDITIONAL PERIOD OF ONE YEAR.
24. PLANT MATERIAL WITH 25% OR GREATER DIE BACK, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, SHALL BE REPLACED AS STIPULATED ABOVE.
25. TOPSOIL SHALL BE FERTILE, FRIABLE NATURAL TOPSOIL OF CLAY LOAM CHARACTER CONTAINING AT LEAST 5% BUT NOT MORE THAN 20% BY WEIGHT OF ORGANIC MATTER WITH A PH RANGE FROM 6.0 TO 7.0. SOIL SHALL BE FREE OF CLAY LUMPS, COURSE SAND, STONES, PLANT ROOTS, STICKS OR OTHER FOREIGN MATERIAL.
26. SOD SHALL BE A MIX OF THE FOLLOWING TYPES IN THE PORTIONS SHOWN. APPLY SEED AT A RATE OF 250LBS./ACRE(6LBS./1000 SF)
    KENTUCKY BLUEGRASS 'BARON/CHERI/ADELPI'.....20%
    CHEWING FESCUE.....15%
    TURF TYPE TALL FESCUE (K-31).....40%
    PERENNIAL RYE GRASS (MANHATTAN).....40%

WEED CONTENT SHALL NOT EXCEED 0.30 OF 1%

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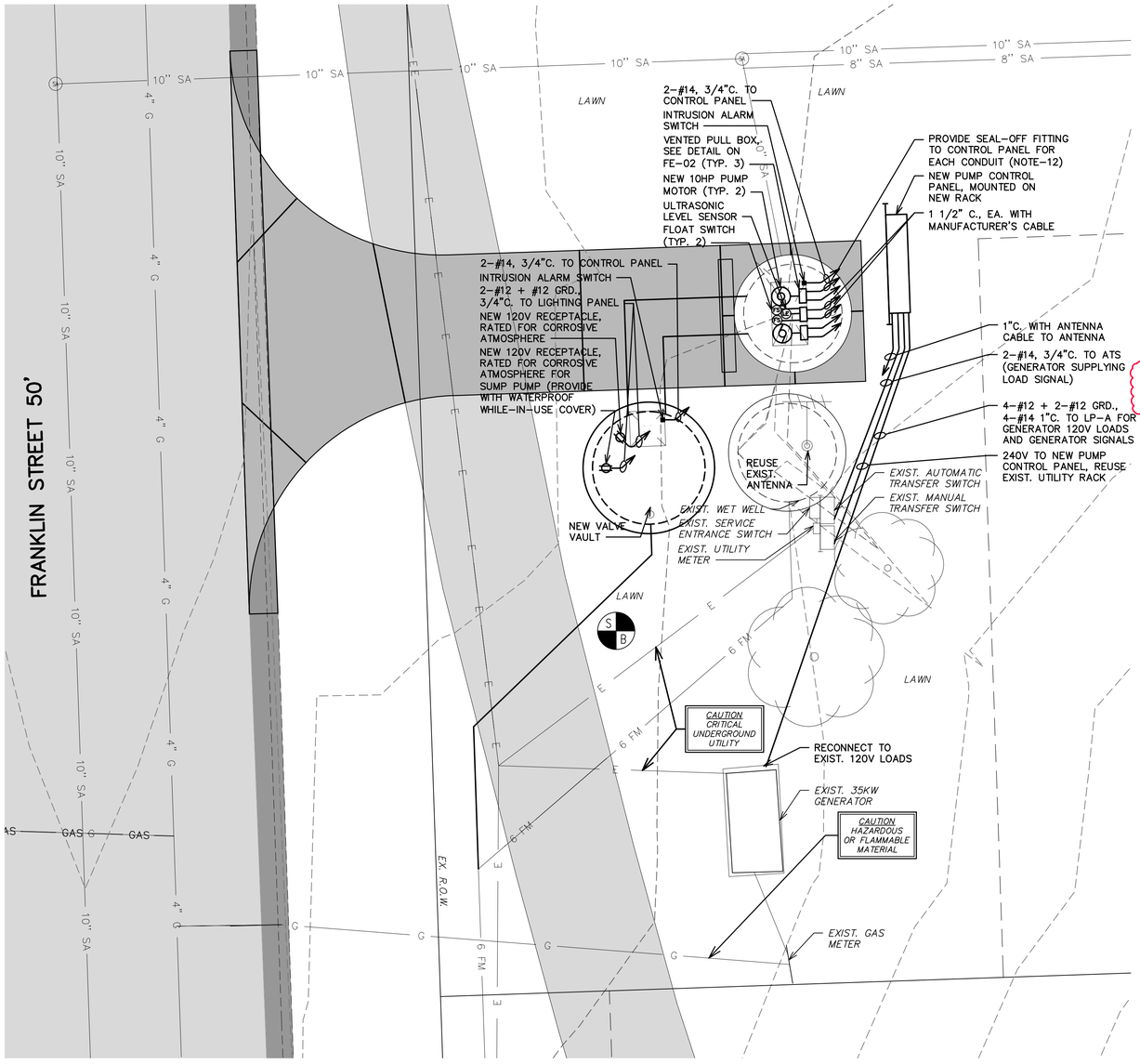
PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

FRANKLIN LIFT STATION
LANDSCAPING PLAN

SCALE PLAN: 1" = 5'

DRAWING No. FC-03

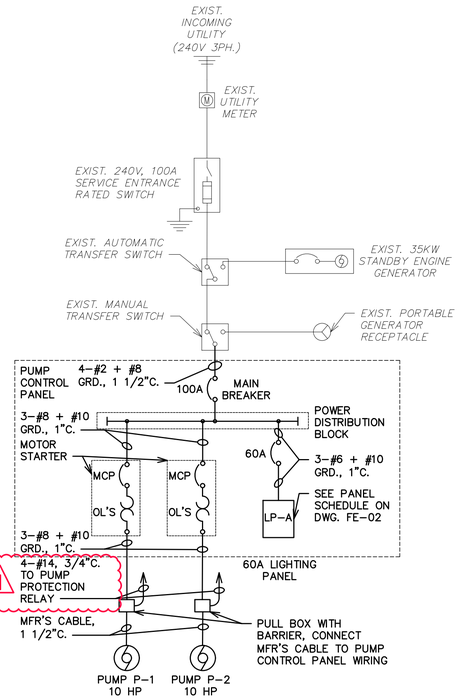
SHEET No.



FRANKLIN LIFT STATION – POWER PLAN

1" = 5'- 0"

0 5 10 20



REVISED ONE-LINE DIAGRAM – FRANKLIN PUMP STATION

LOAD SUMMARY		
240V. 3PH. 4W. SERVICE		
ITEM	DESCRIPTION	F.L.A.
PUMP	(2) 10HP SUBMERSIBLE	56A
STATION MISC.	LIGHTING PANEL	40A
	TOTAL CONNECTED LOAD	96A

GENERAL ELECTRICAL NOTES:

1. THE CONTRACTOR SHALL VISIT THE JOB SITE AND THOROUGHLY CHECK THE EXISTING FIELD CONDITIONS PRIOR TO SUBMITTING A BID.
2. ALL WORK SHALL BE COORDINATED WITH THE OWNER.
3. COORDINATE ALL UNDERGROUND WORK WITH NEW AND EXISTING UNDERGROUND UTILITIES BEFORE INSTALLATION. CALL MISS DIG 1-800-482-7171, 72 HOURS BEFORE ANY UNDERGROUND WORK IS DONE.
4. SITE ADDRESS IS 1800 FRANKLIN STREET, ANN ARBOR, MI 48103
5. ALL CONDUIT FROM WETWELL TO PULL BOX SHALL BE SCHEDULE 80 PVC. ALL OTHER CONDUIT SHALL BE PVC COATED RIGID GALVANIZED STEEL, UNLESS OTHERWISE NOTED. CONDUIT INSTALLED UNDERGROUND SHALL BE 30" BELOW FINISH GRADE (MINIMUM). CONTRACTOR SHALL PROVIDE A 1/4" DIAMETER POLYETHYLENE PULL ROPE IN ALL EMPTY CONDUITS.
6. EXPANSION FITTINGS SHALL BE PROVIDED AT ALL TRANSITIONS FROM UNDERGROUND TO EXPOSED CONDUIT.
7. PROVIDE A PANEL DRAIN AND BREATHER, CROUSE-HINDS "ECD" UNIVERSAL SERIES OF EQUAL, MOUNTED TO THE TOP AND BOTTOM OF ALL NEMA 4 ENCLOSURES. THE BREATHER SHALL BE MOUNTED TO THE TOP OF THE PANEL ON A WATER-TIGHT HUB AND THE DRAIN SHALL BE MOUNTED TO THE BOTTOM OF THE PANEL ON A BOLT-ON TYPE HUB, SEALED WATER-TIGHT.
8. ALL ELECTRICAL EQUIPMENT, CONDUIT, AND WIRING WITHIN THE WET WELL SHALL BE INSTALLED IN ACCORDANCE WITH THE N.E.C. REQUIREMENTS FOR CLASS I, DIVISION I, GROUP D HAZARDOUS LOCATIONS.
9. ALL EXPOSED, METALLIC SUPPORTS, BRACKETS, HANGERS, ETC., LOCATED WITHIN THE WET WELL SHALL BE P.V.C. COATED WITH 40 MILS (MINIMUM) COVERING. WHERE FACTORY P.V.C. COATING IS NOT AVAILABLE, FACTORY OR FIELD COATING WITH A CORROSION-RESISTANT EPOXY PAINT SHALL BE PROVIDED.
10. FOR ALL EQUIPMENT MOUNTED WITHIN THE WET WELL, USE STAINLESS STEEL AND 1/2" STAINLESS STEEL SPACERS ON STAINLESS STEEL BOLTS IN ORDER TO PROVIDE A 1/2" AIR SPACE BETWEEN EQUIPMENT AND WALL.
11. ALL CONDUITS AND/OR SLEEVES THAT PASS THROUGH WALLS OR FLOORS SEPARATING HAZARDOUS AREAS FROM NON-HAZARDOUS AREAS SHALL BE SEALED GAS-TIGHT WITH NON-SHRINK GROUT AFTER CONDUIT IS INSTALLED.
12. PUMP POWER CABLES, PUMP CONTROL CABLES, AND FLOAT SWITCH CONTROL CABLES SHALL BE SPLICED TO PANEL WIRING WITHIN A PULL BOX. PROVIDE SEAL-OFF FITTING BETWEEN THE PULL BOX AND THE PUMP CONTROL PANEL.
13. ALL THREADED ELECTRICAL EQUIPMENT (CONDUIT, FITTINGS, BOLTS, SCREWS, ETC.) INSTALLED OUTDOORS SHALL BE COATED WITH ANTI-SEIZE COMPOUND PRIOR TO INSTALLATION.
14. THE EXACT HEIGHT, WIDTH, AND DEPTH OF THE SERVICE ENTRANCE EQUIPMENT SUPPORT BACK SHALL BE DETERMINED BY SIZE AND NUMBER OF ELECTRICAL DEVICES MOUNTED UPON IT.
15. SUPPORT RACK TO HAVE EDGES, ABRASIONS, ETC. CLEANED AND TOUCHED UP WIH A HOT GALVANIZED COMPOUND, SUCH AS GALVAWELD, IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
16. FOR EACH INTRINSICALLY SAFE CIRCUIT, RUN 2-#14 AWG (MINIMUM), OR 1 PAIR-#18 FOIL SHIELDED, IN 3/4" R.G.S. (MINIMUM). INTRINSICALLY SAFE (I.S.) CIRCUITS MAY BE RUN WITH OTHER I.S. CIRCUITS IN THE I.S. CONDUIT SYSTEM, BUT SHALL NOT BE RUN IN THE SAME CONDUIT, RACEWAY, WIRE DUCT, ETC., WITH ANY NON-INTRINSICALLY SAFE CIRCUITS, NOR SHALL I.S. CONDUCTORS COME IN CONTACT IN ANY FASHION WITH NON-INTRINSICALLY SAFE CONDUCTORS. I.S. CIRCUIT INSTALLATION SHALL MEET ALL REQUIREMENTS OF THE LATEST REVISIONS OF N.E.C. ARTICLE 504, ANSI/ISA RP-12.06, AND ANSI/UL 913.
17. ALL ELECTRICAL WORK SHALL COMPLY WITH THE N.E.C., AND THE LOCAL CODES, ORDINANCES, AND REGULATIONS INCLUDING MIOSHA.
18. ALL EXISTING EQUIPMENT ASSOCIATED WITH THE SCADA SYSTEM SHALL BE DISCONNECTED AND REUSED. ALL SCADA SYSTEM COMPONENTS ARE TO BE SUPLATE MOUNTED INSIDE THE PUMP CONTROL PANEL. ADDITIONAL SPACE SHALL BE PROVIDED IN PUMP CONTROL PANEL FOR MOUNTING OF THE EQUIPMENT. SCADA INTEGRATION WILL BE BY UIS AND WILL BE PAID FOR DIRECTLY BY THE OWNER. SEE DRAWING FE-02 FOR I/O LIST.
19. RECONNECT EXISTING SCADA EQUIPMENT TO EXISTING ANTENNA. PROVIDE NEW ANTENNA CABLE IN CONDUIT FROM PUMP CONTROL PANEL TO ANTENNA LOCATION AS REQUIRED.
20. SALVAGE THE EXISTING MILLTRONICS LEVEL SENSOR, CABLE, AND TRANSDUCER FROM THE EXISTING STATION AND TURN OVER TO THE OWNER. 1
21. IN AREA WITH EXISTING TREES, THE CONTRACTOR SHALL CAREFULLY EXCAVATE THE CONDUIT RUNS SO AS NOT TO DAMAGE MAIN ROOTS OF TREES. DO NOT CUT OR REMOVE MAIN ROOTS OF TREES, BUT RUN CONDUIT AROUND ROOTS AS MAY BE REQUIRED BY FIELD CONDITIONS.
22. PROVIDE BACKFILL PER SPECIFICATION. PROVIDE COMPACTED SAND BACKFILL UNDER PAVED AREAS. THE CONTRACTOR IS REQUIRED TO REPAIR ANY DAMAGE TO EXISTING PAVING TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.

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PROJECT MANAGEMENT – PUBLIC SERVICES – CITY OF ANN ARBOR

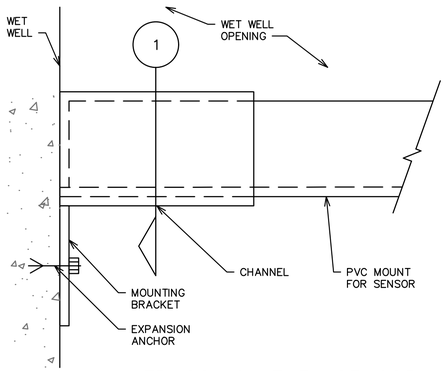
FRANKLIN LIFT STATION

GENERAL NOTES, POWER PLAN & ONE-LINE DIAGRAM

SCALE PLAN: 1" = 5'

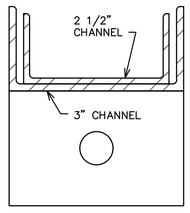
DRAWING No. FE-01

SHEET No.



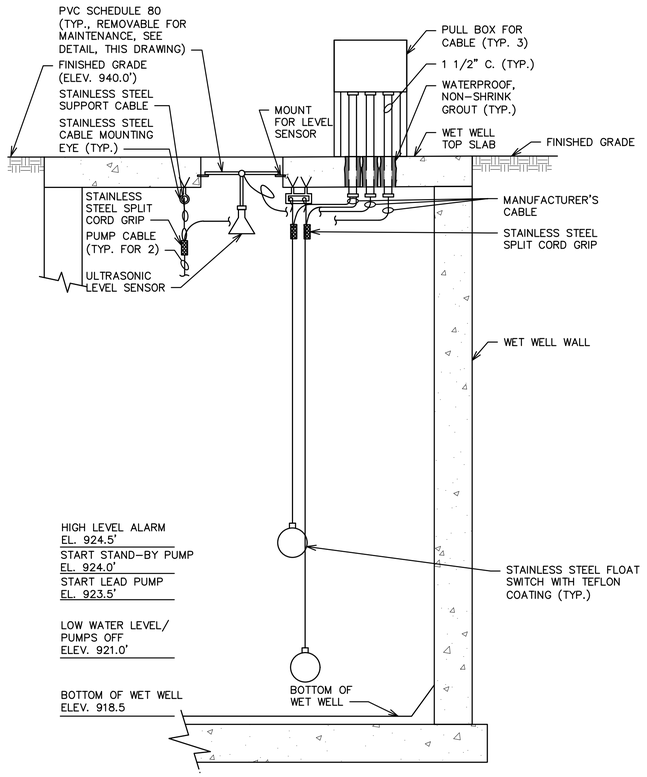
ULTRASONIC LEVEL SENSOR SUPPORT DETAIL

NO SCALE



SECTION 1

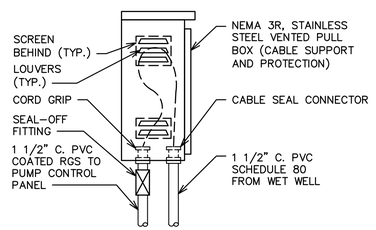
NO SCALE



WET WELL FLOAT SWITCH, LEVEL TRANSDUCER AND PUMP CABLE MOUNTING

N.T.S.

(ALL HARDWARE IN WET WELL SHALL BE 316 S.S.)



PULL BOX DETAIL

N.T.S.

RTU PANEL INPUTS AND OUTPUTS LIST

(THIS LIST PROVIDED TO INDICATE WHAT SIGNALS FROM STATION AND CONTROL PANEL ARE TO BE CONNECTED TO THE SCADA SYSTEM. CONTRACTOR TO SALVAGE ALL EXISTING EQUIPMENT ASSOCIATED WITH THE SCADA SYSTEM, INCLUDING MOSCAD PLC, RADIO, POWER SUPPLY, AND ASSOCIATED DEVICES AND WIRING. ANTENNA FOR COMMUNICATION TO BE REUSED. UIS TO PROVIDE ALL PROGRAMMING OF SCADA PLC. COMMUNICATION BETWEEN PUMP CONTROL PANEL AND SCADA PLC TO BE OVER MODBUS)

DISCRETE INPUTS

1. PUMP 1 RUNNING (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
2. PUMP 2 RUNNING (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
3. WET WELL LEVEL HIGH (SIGNAL FROM FLOAT SWITCH VIA INTERPOSING RELAY)
4. STATION INTRUSION (SIGNAL FROM INTRUSION SWITCHES)
5. WET WELL LEVEL LOW (SIGNAL FROM FLOAT SWITCH VIA INTERPOSING RELAY)
6. GENERATOR RUNNING (SIGNAL FROM GENERATOR CONTROL PANEL)
7. GENERATOR FAULT (SIGNAL FROM GENERATOR CONTROL PANEL)
8. GENERATOR SUPPLYING POWER (SIGNAL FROM ATS)
9. PUMP 1 SEAL FAILURE (SIGNAL FROM PUMP PROTECTION RELAY)
10. PUMP 2 SEAL FAILURE (SIGNAL FROM PUMP PROTECTION RELAY)
11. PUMP 1 OVERTEMPERATURE (SIGNAL FROM PUMP PROTECTION RELAY)
12. PUMP 2 OVERTEMPERATURE (SIGNAL FROM PUMP PROTECTION RELAY)
13. SPARE
14. SPARE
15. SPARE
16. SPARE

DISCRETE OUTPUTS

1. START PUMP 1 (DRY CONTACT OUTPUT)
2. START PUMP 2 (DRY CONTACT OUTPUT)
3. SPARE
4. SPARE

ANALOG INPUTS

1. WETWELL LEVEL (SIGNAL FROM PUMP CONTROL PANEL VIA MODBUS)
2. SPARE
3. SPARE
4. SPARE

MISCELLANEOUS VALUES

1. AC POWER FAIL (PUMP CONTROL PANEL VIA MODBUS)
2. COMMS FAIL (PUMP CONTROL PANEL VIA MODBUS)
3. PUMP 1 HOURS DAILY (PUMP CONTROL PANEL VIA MODBUS)
4. PUMP 1 HOURS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
5. PUMP 1 STARTS DAILY (PUMP CONTROL PANEL VIA MODBUS)
6. PUMP 1 STARTS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
7. PUMP 2 HOURS DAILY (PUMP CONTROL PANEL VIA MODBUS)
8. PUMP 2 HOURS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
9. PUMP 2 START DAILY (PUMP CONTROL PANEL VIA MODBUS)
10. PUMP 2 STARTS TOTAL (PUMP CONTROL PANEL VIA MODBUS)
11. INTERROGATE STATION (PUMP CONTROL PANEL VIA MODBUS)
12. UPDATE STATION (PUMP CONTROL PANEL VIA MODBUS)
13. START PUMP 1 (PUMP CONTROL PANEL VIA MODBUS)
14. STOP PUMP 1 (PUMP CONTROL PANEL VIA MODBUS)
15. START PUMP 2 (PUMP CONTROL PANEL VIA MODBUS)
16. STOP PUMP 2 (PUMP CONTROL PANEL VIA MODBUS)
17. PUMP 1 RELAY BACK (PUMP CONTROL PANEL VIA MODBUS)
18. PUMP 2 RELAY BACK (PUMP CONTROL PANEL VIA MODBUS)
19. START LEAD SETPOINT (PUMP CONTROL PANEL VIA MODBUS)
20. START LAG SETPOINT (PUMP CONTROL PANEL VIA MODBUS)
21. STOP ALL PUMPS (PUMP CONTROL PANEL VIA MODBUS)

LIGHTING PANEL "LP-A" SCHEDULE

120/240 V., 1PH., 3W., WITH 60 AMP. MAIN BREAKER, NEUTRAL BUS, & GRD. BUS

CIRC. NO.	BRKR. SIZE	ITEM SERVED	LOAD (WATTS) ØX	LOAD (WATTS) ØY
1	20A	GENERATOR HEATERS	1000	
3	20A	GENERATOR 120V LOADS		360
5	20A (GFI)	VALVE VAULT CONVENIENCE RECEPTACLE	180	
7	20A	VALVE VAULT SUMP PUMP		1200
9	20A	SPARE		
11	20A	SPARE		
13		SPACE		
15		SPACE		
17		SPACE		
2	20A	PUMP CONTROL PANEL LIGHTS	100	
4	20A	PUMP CONTROL PANEL CONVENIENCE RECEPTACLE		180
6	20A	PUMP CONTROL PANEL CONTROL POWER	600	
8	20A	PUMP CONTROL PANEL HEATERS		500
10	20A	SPARE		
12	20A	SPARE		
14		SPACE		
16		SPACE		
18		SPACE		
		TOTAL CONNECTED LOAD	1880	2240

811 Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
	ISSUED FOR BIDS	OCT. 25, 2019	MJR	AAU
	ISSUED FOR 90% REVIEW	SEPT. 27, 2019	MJR	AAU
	ISSUED FOR 50% REVIEW	AUGUST 30, 2019	MJR	AAU
1	ISSUED FOR ADDENDUM NO.1	NOV. 26, 2019	MJR	AAU

CITY OF ANN ARBOR
PUBLIC SERVICES
301 EAST HURON STREET
P.O. BOX 8647
ANN ARBOR, MI 48107-8647
734-794-6410
www.a2gov.org

PROJECT MANAGEMENT - PUBLIC SERVICES - CITY OF ANN ARBOR

FRANKLIN LIFT STATION

ELECTRICAL DETAILS

SCALE: NO SCALE

DRAWING No.: FE-02

SHEET No.

SECTION 02035

HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The installation of sanitary pressure sewer force main by horizontal directional drilling, including pre-qualification installation experience requirements, drilling equipment, procedures and materials.

1.02 DESCRIPTION

A. The Horizontal Directional Drilling (HDD) shall be a trenchless technology construction method utilizing a surface launched steering tool system controlled from a mobile drilling unit, which is comprised of a self contained field power unit, a mud mixing system, and mobile spoils cleaning, and recycling system.

B. The drilling unit is strategically positioned behind an excavated access pit. A high-pressure fluidjet toolhead that uses a mixture of bentonite clay, water, and other necessary additives, is launched and guided to the correct invert elevation, line, and grade.

C. Using a real-time guidance system attached behind or within the toolhead, and which measures inclination, roll, and azimuth, the toolhead is guided through the soil to create a pilot tunnel. Upon reaching the pit dug at the end of the intended bore location, the toolhead is removed and a backreamer with the product pipe attached, is joined to the arm swing and pulled back through the pilot bore.

D. A vacuum spoils extraction system removes any excess spoils generated during the installation, and recycles the drilling mud for re-use.

1.03 QUALIFICATIONS

A. The HDD Contractor shall have actively engaged in the installation of pipe using horizontal directional drilling for a minimum of three years, during which time the contractor shall have completed at least 80,000 feet of guided boring installations from 6” to 24” inches in diameter in the last year. In addition, documentation shall be submitted to demonstrate horizontal directional drilling Contractor’s experience with installing a minimum 12” diameter utility at depths of 12’ to 18’, with continuous pullback of 2,000 feet.

B. Field supervisory personnel employed by the HDD Contractor shall have a minimum of three years experience in the performance of the work and tasks as stated in the contract document.

1.04 PRE-AWARD SUBMITTALS

A. The HDD Contractor shall submit documentation showing three years of guided boring experience with at least 80,000 feet of guided boring installation in the last year to include 6" to 24" diameter projects similar in the scope and value to the project specified in the contract documents. In addition, documentation shall be submitted to demonstrate horizontal directional drilling experience with installing a minimum 12" diameter utility at depths of 12' to 18', with continuous pullback of 2,000 feet. Information must include, but not be limited to, date and duration of work, location, pipe information (i.e. length, diameter, depth of installation, pipe material, etc.), project owner information (i.e. name, address, telephone number, contact person, etc.), and the contents handle by the pipeline (i.e. water, wastewater, conduit, gas, etc.).

B. The HDD Contractor shall submit a list of field supervisory personnel and their experience with guided boring operations. At least one of the field supervisors listed must be at the site and be responsible for all work at all times when guided boring operations are in progress. Guided boring operations will be postponed until the resume(s) of the Contractor's field supervisory personal have been received, reviewed, and approved by the Owner.

C. The HDD Contractor shall submit the following drawings and documents:

1. Working drawings and written procedures that demonstrate in detail the proposed method of installation. This will include, but not be limited to, size, capacity and setup requirements of all equipment (including drill rig thrust/pullback and rotary torque capacity as well as the mud pump motor size); method of fusion and type of equipment for joining pipe; type of cutting tool head; and method of monitoring and controlling line and grade.

2. If during construction, the Contractor determines that modifications to the method and equipment as stated in the original submittal is necessary, then the Contractor shall submit a plan describing such modifications, including the reasons for the modifications, to the Owner for review and concurrence prior to making the modification.

3. Bentonite drilling mud products information (MSDS); identification of any polymer enhancement or special additives to increase the suspension capability without increasing viscosity, any special precautions necessary; method of mixing; method of removing soils; and method of measuring and maintaining water and bentonite quality during bore progress.

D. All submittals shall be provided as requested by the Engineer.

1.05 SITE CONDITIONS

A. Drilling operations shall not interfere with, interrupt or endanger surface and activity upon the surface, and will be confined to the area of work as shown on the project drawings.

B. The HDD Contractor shall comply with all local applicable jurisdictional codes, including the City, and OSHA requirements.

C. When rock stratum, boulders, underground obstructions, or other soil conditions that impede the progress of drilling operations are encountered, the Contractor will review the situation with the Owner. The Owner and Contractor shall determine the feasibility of continuing drilling operations, making adjustments or switching to an alternative construction method if necessary.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers - Pipe

1. Performance Pipe
2. Or Approved Equal

B. Substitutions: Under provisions of Section 01600.

2.02 MATERIALS

A. Pipe and Fittings

1. High Density Polyethylene (HDPE) and fittings will be used in accordance with the materials specifications. All additional appurtenances will meet the minimum materials specifications. The HDD Contractor will supply all pipe, fittings, adapters, and special connections and cost shall be incidental to the unit bid price of HDPE pipe of the size indicated and installed by horizontal directional drilling. All pipes installed by directional drilling will be joined by an approved butt fusion or electrofusion technique according to the manufacturer's specifications and the resulting interior bead removed.

2. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408/PE3608, ASTM D3350 cell classification, PE345464C, and will meet the requirements of AWWA C901 and C906. Material taken from the HDPE pipe will meet the minimum stability requirements of ASTM D3360. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, appropriate legend such as SDR 11, ASTM D3035, AWWA C901, C906, dates of manufacture and point of origin. Pipe not marked as indicated above will be rejected.

3. Pipe shall be DrisoPlex, Series 4300 AWWA C906, or equivalent, IPS pipe sizing, with an SDR of 11. The pipe shall have a green color stripe on exterior.

B. Drilling Fluid

1. Drilling fluid shall primarily be a mixture of water and bentonite clay. The fluid will be inert. The fluid should remain in the tunnel to ensure the stability of the tunnel,

reduce drag on the pulled pipe, and provide backfill within the annulus of the pipe and tunnel.

2. Disposal of excess drilling fluid and spoils will be the responsibility of the Contractor who must comply with all relevant regulations, right-of-way, workspace, and permit agreements. Excess drilling fluid and spoils will be disposed at an approved location and shall be performed at no additional cost to the Owner. The contractor is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils will be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils will not be discharged into sanitary or storm drain systems, or waterways. All excess fluids must be removed from roadways immediately.

3. Drilling fluid returns (caused by fracturing or formations) at locations other than the entry and exit points will be minimized. The Contractor will immediately clean up any drilling fluid that surfaces through fracturing.

4. Mobile spoils removal equipment capable of quickly removing spoils from entry and exit pits and areas with return caused by fracturing will be present during operations to fulfill the requirements of paragraphs 2 and 3 above.

5. The HDD Contractor will be responsible for making provisions for a clean water supply for the mixing of drill fluid. All hydrant operation shall be performed by the Owner, or as otherwise approved by the Owner.

PART 3 - EXECUTION

3.01 GENERAL

A. The HDD Contractor shall be responsible for the submission of a detailed Sequence of Construction Plan to the Owner within thirty (30) days from the Notice to Proceed. The Contractor shall schedule his or her operations such that the Owner will be afforded a minimum of two (2) weeks to review the submitted detailed Sequence of Construction Plan. Any and all deviation from the submitted Sequence of Construction Plan must be re-submitted to the Owner for review a minimum of seven (7) working days in advance of scheduling the specific item of work. The Detailed Sequence of Construction Plan shall include:

1. Trenchless equipment, access pits, and materials storage layout plan.

2. Existing utility physical verification “pot holing” plan.

3. Materials submittals per related sections of these specifications.

4. Safety and mitigation plan including but not limited to: provisions for providing protection around equipment staging area and trenchless access pits; mitigation plan for containment of drilling or bursting fluid “frack-out” conditions; and emergency procedures for utility strikes

B. The Owner and Engineer must be notified immediately if any obstruction is encountered that stops forward progress of drilling operations. The Contractor and the Owner and Engineer must review the situation and jointly determine the feasibility of continuing drilling operations or switching to an alternative construction method. When it is determined that it is impossible to continue drilling operations, the Contractor will be directed how to proceed by the Owner and the Engineer.

C. Dewatering of pits and excavations must meet the general provision and specifications for this project. The type of dewatering method used by the Contractor, must be approved by the Owner, prior to commencing with the dewatering activity. When water is encountered, the Contractor must provide a dewatering system of sufficient capacity to remove water, keeping any excavations free of water until the backfill operation is in progress. Dewatering will be performed in such a manner that removal of soil particles is held to a minimum. The groundwater level is subject to change, and the contractor shall be responsible for making his own determination of water levels that may exist during construction. All dewatering work, if necessary, shall be considered incidental to the unit bid prices listed in the bid form.

3.02 PREPARATION

A. Excavate access and exit pits as necessary to horizontal directional drill the proposed utility alignment as shown on the project drawings.

B. The drilling procedures and equipment will provide protection of workers particularly against electrical shock. As a minimum, grounding mats, grounded equipment, hot boots, hot gloves, safety glasses and hard hats shall be used by crewmembers. The drilling equipment shall be equipped with an operational alarm system capable of detecting electrical current.

C. Removal of trees, landscaping, pavement or concrete will meet the general provisions and specifications for utility construction under the Owners jurisdiction.

D. The HDD Contractor shall be responsible for protecting all existing utilities. The Contractor shall call Miss Dig a minimum of 3 working days before any work is to begin. Existing utilities within the path of the proposed horizontal directional bore, shall be “pot holed”, to determine the depth. The costs of any “pot holing” will be born by the Contractor and included in the unit bid price for installing the new utility.

3.03 GUIDED BORING OPERATIONS

A. Equipment

1. The drilling equipment must be capable of placing the pipe within the planned line and grade without inverse slopes.

2. The drilling equipment must have a minimum thrust/pullback rating of 30,000 lbs and a minimum rotary torque rating of 4,000 ft lbs. and mud flow of 60 gallons per minute.

3. The guidance system must have the capability of measuring inclination, roll and azimuth. The guidance system must have an independent means to ensure the accuracy of the installation. The Contractor will demonstrate a viable method to eliminate accumulated error due to inclinometer (pitch or accelerometer). The guidance system will be capable of generating a plot of the borehole survey for the purpose of an as-built drawing. The guidance system must meet the following specifications.

Inclination:	Accuracy	“0.06
	Range	“90
	Repeatability	“0.09
Roll:	Accuracy	“0.1
	Range	0’ to 360’
Azimuth:	Repeatability	“0.1
	Range	0’ to 360’

4. The proposed equipment set up requirements, including but not limited to: proposed access and exit pit locations, are at the sole determination of the Contractor. Such information shall be submitted along with other required information per the specifications.

3.04 PILOT HOLE BORING

A. The entry angle or the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radius of the product pipe.

B. Alignment Adjustments and Restarts:

1. The Contractor shall follow the pipeline alignment as shown on the drawings, within the specifications stated. If adjustments are required, the Contractor shall notify the Engineer and Owner for approval prior to making the adjustments.

2. In the event of difficulties at any time during boring operations requiring the complete withdrawal from the tunnel, the Contractor may be allowed to withdraw and abandon the tunnel and begin a second attempt at a location approved by the Owner and Engineer. The Contractor may excavate at the point of the difficulty and install the

product pipe by trench method, at no additional cost to the Owner, per the general provisions and specification for construction.

3. The number of access pits shall be kept to a minimum. The equipment must be capable of boring and installing the proposed utility in a continuous run without intermediate pits, of a minimum distance of 1,200 feet.

3.05 TRACER WIRE

A. The Contractor shall furnish a 12 gauge single strand copper tracer wire, installed at the same time as the product pipe. The same type of wire may be used to hold the wire onto the top of the main. The wire shall be run to the top step of each utility structure or valve chamber. Tracer wire shall be terminated with a bolted connection stand off from a bolted flange connection where available. When splicing wire, a knot shall be placed in the wire to relieve stress at the connection. A grease filled underground splice kit shall be used for all connections.

3.06 INSTALLING PRODUCT PIPE

A. After the pilot hole is completed, the Contractor will install a swivel to the reamer and commence pullback operations. Should pre-reaming of the tunnel be necessary, it shall be performed at the option of the Contractor, and at no additional cost to the Owner.

B. The reaming diameter shall not exceed 1.4 times the diameter of the product pipe being installed. The gravity sewer sections will require the smallest reaming diameter possible to accurately install the produce pipe.

C. The product pipe being pulled into the bore shall be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation.

D. Pullback forces shall not exceed the allowable pulling forces for the product pipe.

E. The Contractor shall allow sufficient length of product pipe to extend past the termination point to allow connections to adjacent pipe sections or appurtenances. Pulled pipes will be allowed a minimum of 14 days of stabilization prior to making tie-ins.

3.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. Horizontal Directional Drilling, “HDD”, as specified, will be measured, in place, by length, in linear feet, and shall include all labor, equipment, and materials required to complete the work.

B. The cost associated to excavate, use, backfill, and restore access pits, will not be paid separately, but shall be included in the pay item “Horizontal Directional Drilling HDD.”

C. The costs associated with boring the pilot tunnel will not be paid for separate, but shall be include in the pay item “Horizontal Directional Drilling HDD.”

D. The costs associated with removing and disposing of the excess spoils using vacuum spoils extraction system will not be paid separately, but shall be included in the pay item "Horizontal Directional Drilling HDD."

E. The costs associated with connections to new and existing structures will not be paid separately, but shall be included in the pay item "Horizontal Directional Drilling HDD."

F. The costs associated with installing a 12 gauge single strand copper tracer wire at the same time as the product pipe will not be paid separately, but shall be included in the pay item "Horizontal Directional Drilling HDD."

END OF SECTION