ADDENDUM #1
March 11, 2022

PROJECT: ***Beck Road Lift Station and Force Main Improvements***

OWNER: City of Commerce

BID DATE: Bid Date – Thursday, March 24, 2022 at 2:00 P.M.

Please be advised the following has changed:

1. **CONTRACT DOCUMENTS, SECTION 00410 - BID FORM**

    a. A new Bid Form has been issued.

2. **CONSTRUCTION PLANS, SHEETS C0.0, C1.0, C3.0, E1.1, & E2.1**

    a. See attached Plan Sheets.

3. **TECHNICAL SPECIFICATIONS, SECTION 02530 – SANITARY SEWER COLLECTION SYSTEM**

    a. Force main pipe shall be Class 250 ductile iron pipe and shall be one of the following products compatible with gaskets for restraint: "Fastite" DIP with "Fast-Grip" gaskets (by American) or "Tyton" joint DIP with "Field-Lok" gaskets (by US Pipe). Gaskets shall be colored for visibility (not black).

    b. All ductile iron pipe, valves, and fittings shall be lined with 401 Protecto lining or Tnemec 431 lining.

4. **TECHNICAL SPECIFICATIONS, SECTION 01020 – ALLOWANCES**

    a. A Supplemental Work Allowance (SWA) of $35,000.00 shall be required by the contractor in their bid proposal as shown on the attached revised Bid Form.

5. **TECHNICAL SPECIFICATIONS, ELECTRICAL**

    a. Electrical Technical Specifications have been included in this addendum.

6. CLARIFICATIONS & MISCELLANEOUS INFORMATION

a. Minor site grading at the lift station will be required for installation of the concrete slab for electrical controls and shall be included under the line item in the Bid Form for Lift Station Improvements Complete.

All bidders shall acknowledge receipt of all addenda issued where indicated on the bid sheets. (SECTION 00410 – Bid Form, Page 2)

ATTENTION

ALL BIDDERS SHALL SIGN IN THE SPACE PROVIDED ON THE ENCLOSED REVISED BID SHEET(S) TO INDICATE RECEIPT OF THIS ADDENDUM.

BIDDERS ARE ADVISED THAT IT IS THEIR RESPONDIBILITY TO VERIFY THAT ANY AND ALL ADDENDA HAVE BEEN RECEIVED PROPR TO SUBMISSION OF THE BID. IN CASE ANY BIDDER FAILS TO ACKNOWLEDGE RECEIPT OF ANY SUCH ADDENDA IN THE SPACE PROVIDED ON THE BID FORM, THE BID WILL NEVERTHELESS BE CONSTURED AS THOUGH THE BIDDER HAS RECEIVED AND ACKNOWLEDGED ALL SUCH ADDENDA, AND THE SUBMISSION OF THE BID WILL CONSTITUTE ACKNOWLEDGEMENT AND RECEIPT OF SAME.

END ADDENDUM

SECTION 00410
BID FORM

PROJECT IDENTIFICATION:

Beck Road Lift Station and Force Main Improvements

CONTRACT IDENTIFICATION AND NUMBER:

C3000.110

THIS BID IS SUBMITTED TO:

City of Commerce
27 Sycamore St.
Commerce, GA 30529

THIS BID IS SUBMITTED FROM:

Bidder: _____

Address: _____

_____

Phone: _____

State of Georgia Business License No.: _____

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the day of Bid opening. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of Owner's Notice of Award.

3. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

(a) Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date	Addendum Number

(b) Bidder has familiarized themself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

(c) Bidder has carefully studied all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in paragraph 4.2 of the General Conditions, and accepts the determination set forth in paragraph 4.2.1 of the Supplementary Conditions of the extent of the technical data contained in such reports and drawings upon which Bidder is entitled to rely.

(d) Bidder has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as Bidder considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by Bidder for such purposes.

(e) Bidder has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of

said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by Bidder in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.3 of the General Conditions.

(f) Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

Bidder has given Engineer written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder.

(g) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with an agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

(h) Bidder agrees to commence work under this Agreement on or before a date to be specified in a written "Notice to Proceed" of the Owner.

(i) Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

4. Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID FORM BEGINS ON PAGE 4

A) BASE BID: Beck Road Lift Station and Force Main Improvements

The Contractor is directed to Section 01025 "Measurement and Payment" for the methods and limits for payment to the Contractor for the pay items listed below:

BID FORM					
Item No.	**Qty**	**Unit**	**Description**	**Unit Price**	**Total Price**
1	1	LS	Lift Station Improvements Complete		
2	2500	LF	12" DIP San. Sewer Force Main - Open Cut Cross Country		
3	11	EA	12" RJ DIP 45-Degree Bend		
4	2	EA	12" RJ DIP 22.5-Degree Bend		
5	3	EA	3" Combination Air Release Valve (includes precast manhole, frame, and cover)		
6	1	EA	Connection to Existing Force Main – Line Stop, 10"x10" Wye, 10"x12" Reducer		
7	1	LS	Clearing & Grubbing		
8	1	LS	Erosion & Sediment Control		
9	1	LS	Supplemental Work Allowance (SWA)	$ 35,000.00	$ 35,000.00
				Construction Total	

Bidder agrees to furnish all labor, materials, and equipment necessary to construct the Beck Road Lift Station and Force Main Improvements for the City of Commerce for the sum of:

_____Dollars

($_____).

6. Bidder agrees that the Work will be substantially complete and ready for final payment in accordance with paragraph 14.13 of the General Conditions within 180 calendar days after the date when the Contract Times commence to run.

7. Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

8. The following documents are attached to and made a condition of this Bid:
   a. Required Bid Security in the form of 5% of the Bid Total Price.

9. The undersigned further agrees that in case of failure on his part to execute the said contract and the Bond within fifteen (15) consecutive calendar days after written notice being given

of the award of the contract, the check or bid bond accompanying this bid, and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure, otherwise, the check or bid bond accompanying this proposal shall be returned to the undersigned.

10. Communications concerning this Bid shall be addressed to:

ESG Engineering, Inc.
6400 Peake Rd
Macon, GA 31210
Attn: Margaret Hildebrand
mhildebrand@esgengineering.com

11. Terms used in this Bid which are defined in the General Conditions or Instructions to Bidders will have the meanings indicated in the General Conditions of Instructions.

SUBMITTED on _____, 20___.

BIDDER: _____

BY: _____

TITLE: _____

STATE CONTRACTOR
LICENSE NO. _____

ADDRESS: _____

_____

_____

PHONE: _____

Seal: (if bid by a Corporation)

END OF SECTION

BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS

FOR THE

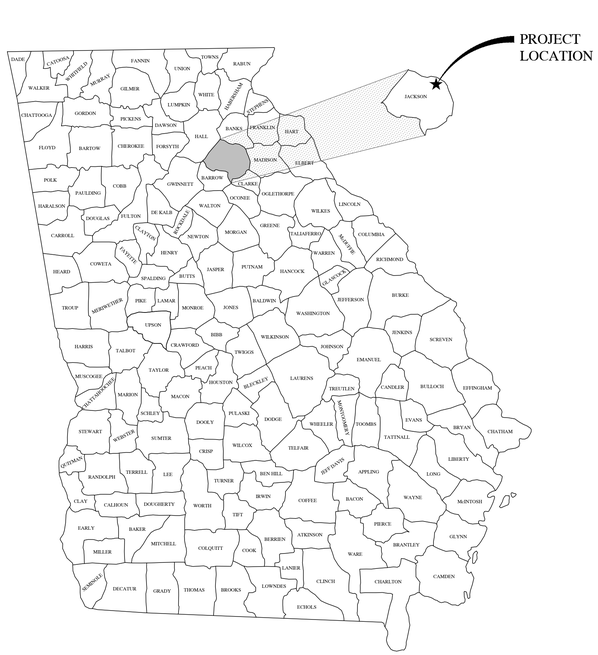
CITY OF COMMERCE

JACKSON COUNTY, GEORGIA

FEBRUARY 2022

CITY COUNCIL

J. CLARK HILL III	MAYOR
KEITH BURCHETT	MAYOR PRO-TEM
ARCHIE CHANEY	WARD 1 COUNCILMAN
DARREN OWENSBY	WARD 2 COUNCILMAN
MARK FITZPATRICK	WARD 3 COUNCILMAN
BOBBY REDMON	WARD 4 COUNCILMAN
JOHNNY EUBANKS	WARD 5 COUNCILMAN



VICINITY MAP

INDEX TO DRAWINGS

SHEET NO.	TITLE
C0.0	COVER SHEET
C0.1	GENERAL NOTES & PROJECT LOCATION MAPS
C1.0	LIFT STATION IMPROVEMENTS PLAN
C2.0	FORCE MAIN PLAN & PROFILE (STA. 0+00 - 15+00)
C2.1	FORCE MAIN PLAN & PROFILE (STA. 15+00 - 25+00)
C3.0	CONSTRUCTION DETAILS
E1.1	ELECTRICAL LEGEND, NOTES & DETAILS
E2.1	ELECTRICAL SITE PLAN

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ESG ENGINEERING
6400 Peake Rd
Macon, GA 31210
Ph: (478) 474-4996
Fax: (478) 474-5045

BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS
FOR THE
CITY OF COMMERCE

REVISIONS NO.	DESCRIPTION	DATE
1	ADDENDUM #1	3/1/2022

BID SET

GEORGIA REGISTERED No. PE046341 PROFESSIONAL ENGINEER ANDREW D SWICEGOOD

DRAWN BY: ADS
CHECKED BY: ABG
DATE: FEB 2022
SCALE: N.T.S.

CONTENT:

COVER SHEET

SHEET NO:

C0.0

Last Saved By: ENGESG222401 Plotted: 3/10/2022 5:15 PM
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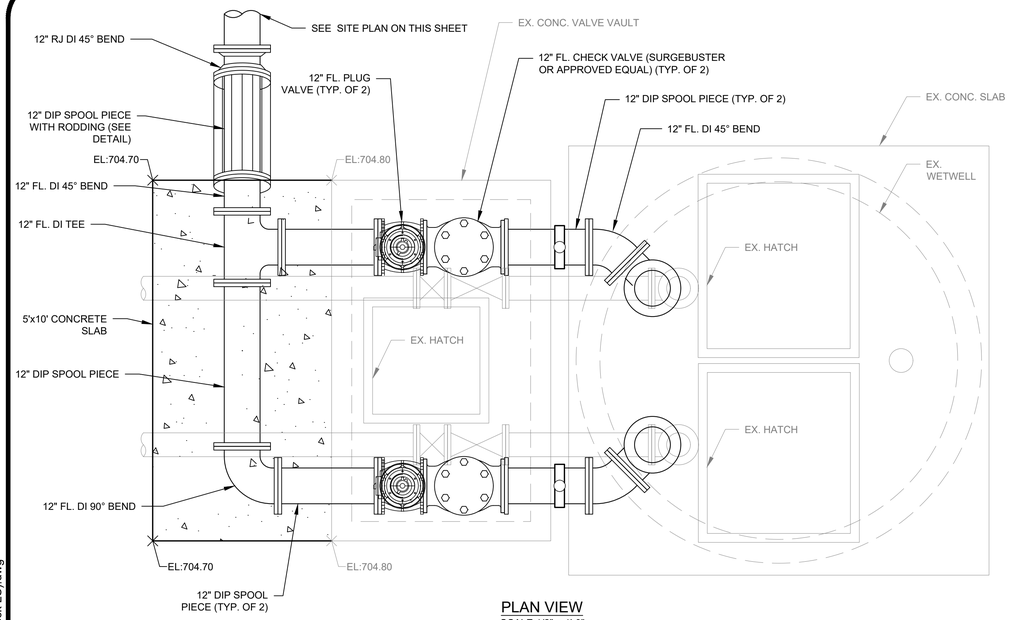
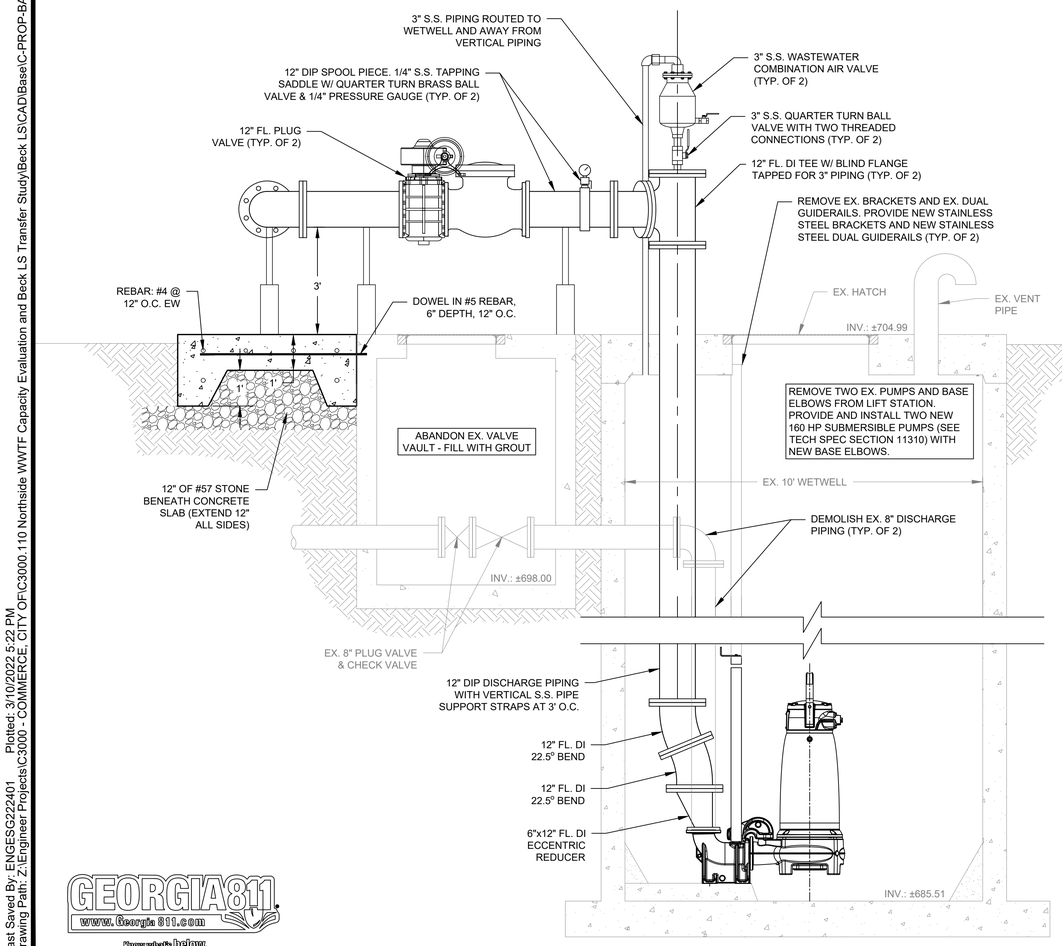


PLAN VIEW
SCALE:1/2" = 1'-0"



SECTION Ⓐ
SCALE:1/2" = 1'-0"

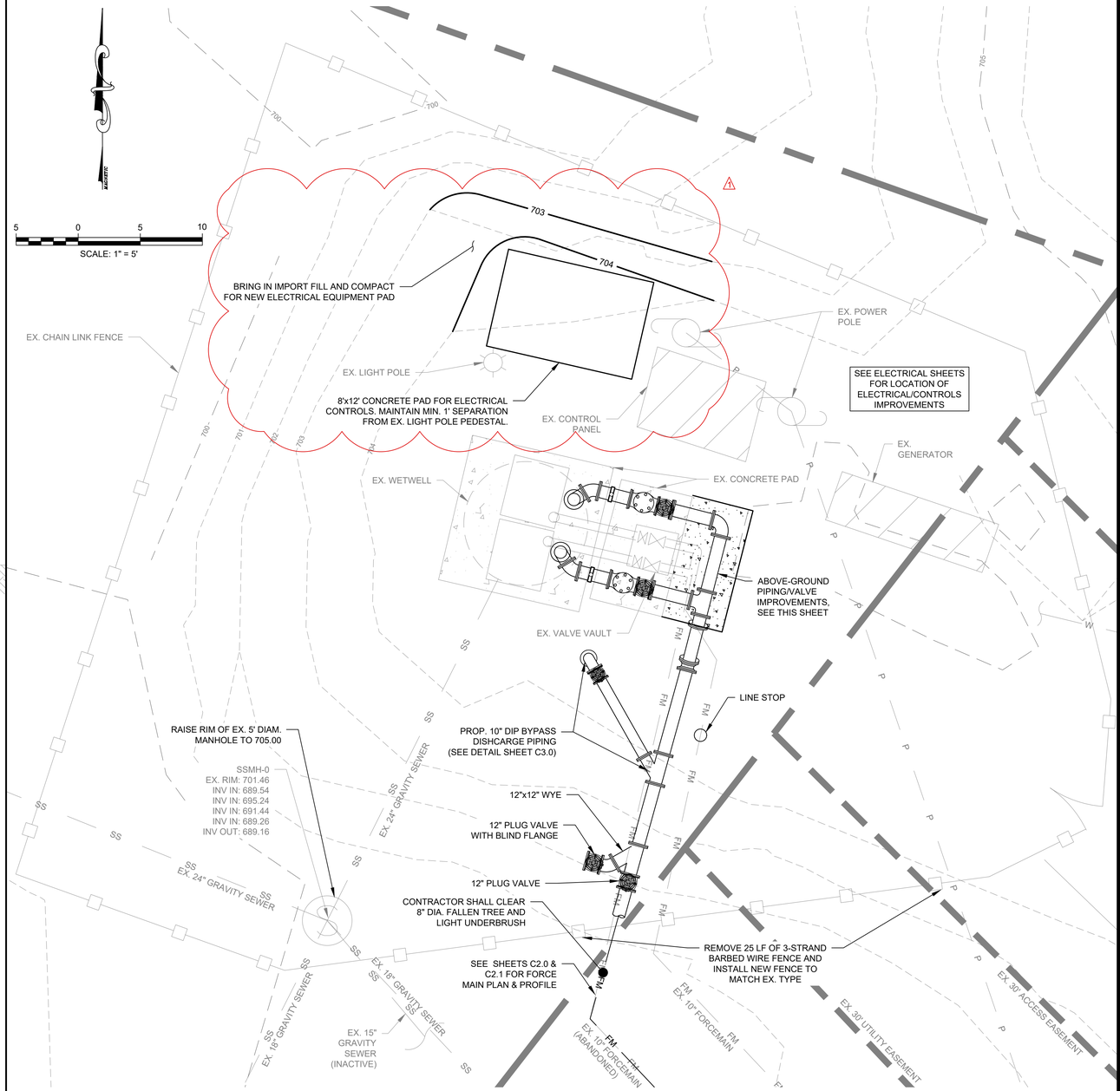
LIFT STATION CONSTRUCTION NOTES:

1. ALL DUCTILE IRON PIPE, VALVES, & FITTINGS SHALL BE LINED WITH 401 PROTECTO LINING OR TNEMEC 431 LINING.
2. PROVIDE "STANDON S89" PIPE SUPPORTS AS NECESSARY TO SUPPORT ABOVE-GROUND PIPING, FITTINGS, AND VALVES. SEE DETAIL SHEET.
3. REQUIREMENTS FOR EXTERIOR PAINTING OF ABOVE-GROUND DUCTILE IRON STEEL PIPES, FITTINGS, AND VALVES:

PROP. SYSTEM TYPE:	EPOXY/EPOXY/URETHANE.
PROP. SURFACE PREPARATION:	SSPC-SP 6.
PROP. PRIMER:	SERIES N68-1255 BEIGE POXIPRIME II. DFT 3.0 TO 5.0 MILS.
PROP. INTERMEDIATE COAT:	SERIES 66 HI-BUILD EPOXOLINE. DFT 2.0 TO 3.0 MILS.
PROP. FINISH COAT:	SERIES 1075 ENDURA-SHIELD II. DFT 2.0 TO 5.0 MILS.
PROP. TOTAL DFT:	7.0 TO 13.0 MILS.
PROP. FINISH COLOR:	[AS SELECTED BY ENGINEER] FROM MANUFACTURER'S STANDARD COLORS.

CONSTRUCTION SEQUENCING NOTES:

1. CONSTRUCT NEW 12" FORCE MAIN. CONNECTION OF NEW FORCE MAIN TO EX. FORCE MAIN TO BE PERFORMED AT NIGHT DURING OFF-PEAK HOURS:
2. INSTALL LINESTOP, TEMPORARILY TURN OFF EX. PUMPS, CUT-IN WYE ON EX. FORCE MAIN, AND INSTALL NEW PLUG VALVES ON BOTH THE NEW 12" FORCE MAIN AND EX. 10" FORCE MAIN.
3. RESUME PUMPING OPERATIONS AT EX. LIFT STATION.
4. CONSTRUCT NEW ABOVE-GROUND IMPROVEMENTS AT EX. LIFT STATION.
5. SETUP/STAGE TEMPORARY BYPASS PUMP AND PIPING. PLUG INFLUENT GRAVITY PIPE AND STOP STANDARD PUMPING OPERATIONS. PUMP REMAINING WATER FROM WETWELL INTO SSMH-0. BEGIN BYPASS PUMPING FROM SSMH-0 INTO NEW FORCE MAIN VIA BYPASS DISCHARGE QUICK-CONNECT.
6. PERFORM DEMOLITION WORK, INSTALL NEW PUMPS, AND CONNECT TO NEW, ABOVE-GROUND PIPING.
7. TEST NEW PUMPS.
8. UNPLUG EX. INFLUENT GRAVITY AND END BYPASS PUMPING.
9. BEGIN STANDARD PUMPING OPERATIONS.



SITE PLAN
SCALE:1" = 5'

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BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS

FOR THE

CITY OF COMMERCE

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	3/11/2022

BID SET

GEORGIA REGISTERED No. PE046341 PROFESSIONAL ENGINEER ANDREW D SWICEGOOD

DRAWN BY: ADS
CHECKED BY: ABG
DATE: FEB 2022
SCALE: AS NOTED

CONTENT:

LIFT STATION IMPROVEMENTS PLAN

SHEET NO:

C1.0

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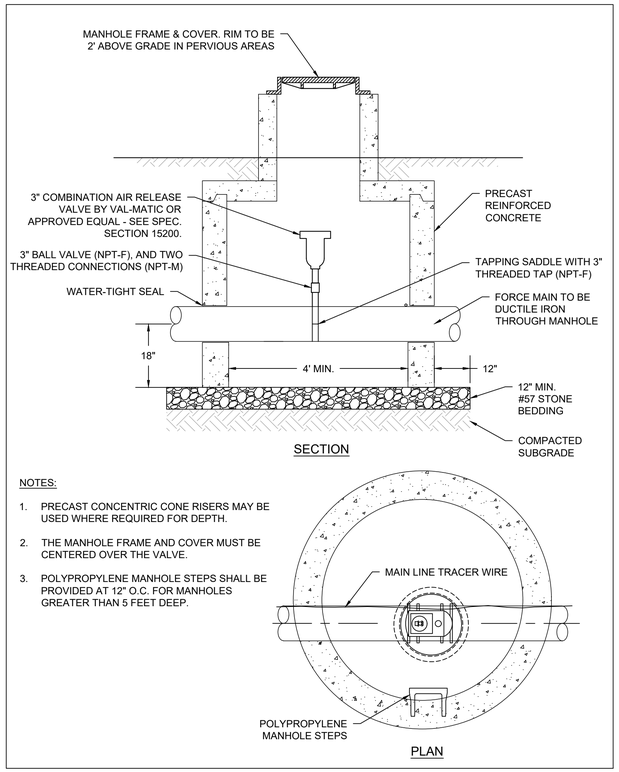


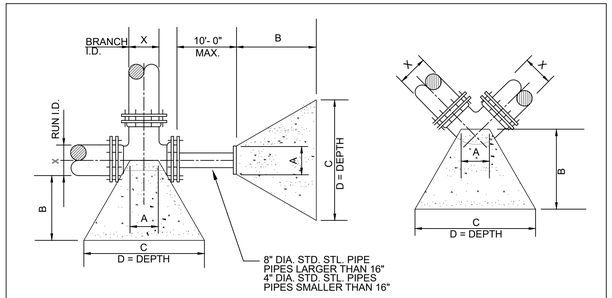
SECTION

NOTES:

1. PRECAST CONCENTRIC CONE RISERS MAY BE USED WHERE REQUIRED FOR DEPTH.
2. THE MANHOLE FRAME AND COVER MUST BE CENTERED OVER THE VALVE.
3. POLYPROPYLENE MANHOLE STEPS SHALL BE PROVIDED AT 12" O.C. FOR MANHOLES GREATER THAN 5 FEET DEEP.

PLAN

COMBINATION AIR/VACUUM - AIR RELEASE VALVE
NTS



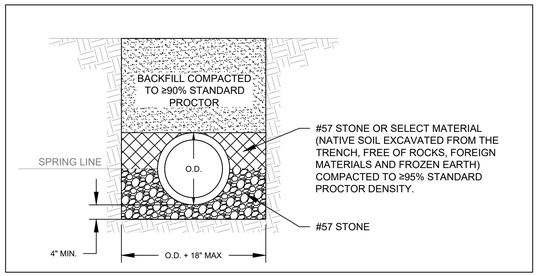
	BENDS				
	X	A	B	C	D
1/4 BEND	30"	2'-0"	11'-6"	15'-3"	6'-0"
	24"	2'-0"	7'-9"	10'-9"	5'-6"
	20"	1'-9"	6'-0"	8'-6"	5'-0"
	16"	1'-3"	4'-0"	6'-0"	4'-6"
	12"	10"	2'-9"	4'-0"	4'-0"
	10"	10"	2'-6"	3'-9"	3'-0"
	8"	8"	1'-9"	2'-6"	2'-6"
	6"	6"	1'-3"	2'-0"	2'-0"
	4"	4"	1'-0"	1'-6"	1'-6"
	3"	3"	1'-0"	1'-6"	1'-6"
	2"	2"	1'-0"	1'-6"	1'-6"
1/8 BEND	30"	1'-6"	7'-6"	10'-0"	5'-0"
	24"	1'-3"	5'-9"	8'-0"	4'-0"
	20"	1'-0"	4'-9"	6'-8"	3'-6"
	16"	1'-3"	3'-3"	5'-0"	3'-3"
	12"	10"	1'-9"	3'-0"	2'-9"
	10"	10"	1'-9"	3'-0"	2'-0"
	8"	8"	1'-6"	2'-0"	2'-0"
	6"	6"	1'-3"	1'-6"	1'-6"
	4"	4"	1'-0"	1'-0"	1'-0"
	3"	3"	1'-0"	1'-6"	1'-6"
	2"	2"	1'-0"	1'-6"	1'-6"
1/16 BEND	30"	1'-0"	4'-8"	6'-4"	4'-0"
	24"	1'-0"	3'-0"	5'-0"	3'-6"
	20"	1'-0"	2'-6"	4'-4"	3'-0"
	16"	1'-0"	1'-9"	3'-0"	2'-6"
	12"	10"	1'-3"	2'-3"	2'-0"
	10"	10"	1'-0"	2'-0"	1'-6"
	8"	8"	1'-0"	1'-9"	1'-9"
	6"	6"	1'-0"	1'-6"	1'-6"
	4"	4"	1'-0"	1'-3"	1'-3"
	3"	3"	1'-0"	1'-6"	1'-6"
	2"	2"	1'-0"	1'-6"	1'-6"

	BENDS				
	X	A	B	C	D
1/32 BEND	30"	1'-0"	2'-10"	4'-3"	3'-0"
	24"	1'-0"	2'-6"	3'-8"	2'-6"
	20"	10"	2'-0"	3'-0"	2'-0"
	16"	16"	1'-8"	2'-6"	1'-6"
	12"	8"	1'-0"	1'-6"	1'-6"
	10"	10"	1'-0"	1'-6"	1'-0"
	8"	8"	1'-0"	1'-6"	1'-0"
	6"	6"	1'-0"	1'-0"	1'-0"
	4"	4"	1'-0"	1'-0"	9"
	3"	3"	1'-0"	1'-0"	1'-6"
	2"	2"	1'-0"	1'-6"	1'-6"

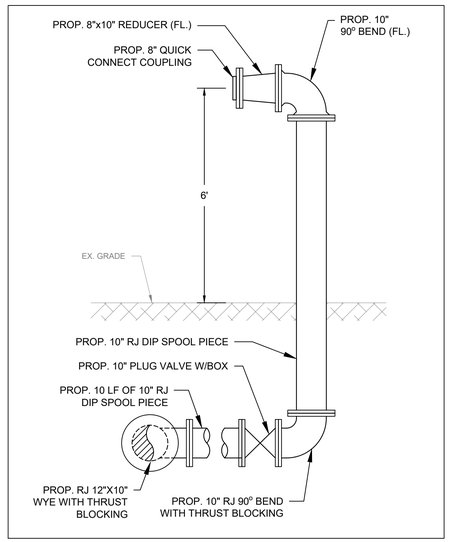
	TEES & DEAD ENDS				
	X	A	B	C	D
	30"	3'-0"	8'-9"	13'-0"	5'-0"
	24"	2'-6"	7'-3"	10'-8"	3'-9"
	20"	2'-0"	5'-3"	8'-0"	3'-6"
	16"	1'-0"	4'-8"	6'-4"	3'-0"
	12"	10"	2'-9"	4'-6"	2'-6"
	10"	10"	2'-0"	3'-3"	2'-6"
	8"	8"	1'-9"	2'-6"	2'-0"
	6"	6"	1'-3"	2'-0"	1'-6"

NOTE: 200 PSI TEST PRESSURE
SOIL BEARING OF 2500 P.S.F.
3000 PSI CONCRETE
PIPE LESS THAN 4" IN DIAMETER SHALL HAVE THE SAME REQUIREMENTS AS 4" DIAMETER PIPE

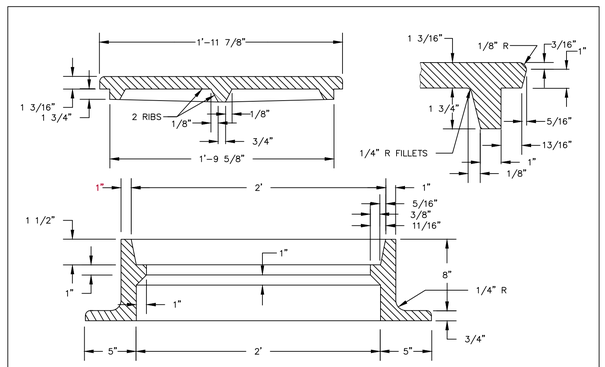
CONCRETE THRUST BLOCKING
N.T.S.



BEDDING & HAUNCHING DETAIL
NTS



BYPASS DISCHARGE PIPE
NTS



NOTES:

1. FRAME AND COVER SHALL BE TRAFFIC-RATED FOR H-20/HS-20 TRAFFIC LOADING WHERE CALLED FOR IN PLANS.
2. PICKHOLES SHALL BE NON-PENETRATING AND WATER TIGHT. CORRUGATION AND TWO PICKHOLES IN COVER, NO PERFORATION. SEATING SURFACE OF FRAMES AND COVERS TO BE MACHINED TO FIT. FRAME AND COVER SHALL WEIGH 300 POUNDS MINIMUM.

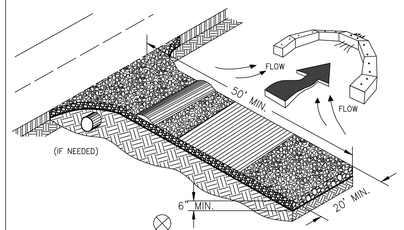
STANDARD MANHOLE FRAME AND COVER
N.T.S.

PIPE DIA.	NO. RODS REQ'D.	ROD ø
30"	20	1"
24"	16	3/4"
20"	14	3/4"
18"	12	3/4"
16"	12	3/4"
12"	8	3/4"
10"	8	3/4"
8"	6	3/4"
6"	6	3/4"

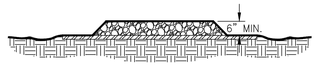
RODDING SCHEDULE DETAIL
NTS

CRUSHED STONE CONSTRUCTION EXIT

EXIT DIAGRAM



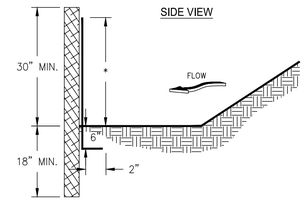
ENTRANCE ELEVATION



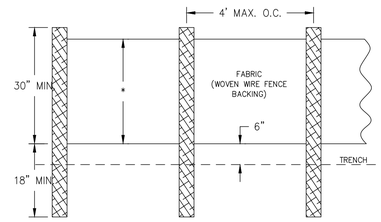
NOTES:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE, AND CROWN FOR POSITIVE DRAINAGE.
3. AGGREGATE SIZE SHALL BE IN ACCORDANCE WITH NATIONAL STONE ASSOCIATION R-2 (1.5"-3.5" STONE).
4. GRAVEL PAD SHALL HAVE A MINIMUM THICKNESS OF 6".
5. PAD WIDTH SHALL BE EQUAL FULL WIDTH AT ALL POINTS OF VEHICULAR EGRESS, BUT NO LESS THAN 20'.
6. A DIVERSION RIDGE SHOULD BE CONSTRUCTED WHEN GRADE TOWARD PAVED AREA IS GREATER THAN 2%.
7. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES.
8. WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN (DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE).
9. WASHRACKS AND/OR TIRE WASHERS MAY BE REQUIRED DEPENDING ON SCALE AND CIRCUMSTANCE. IF NECESSARY, WASHRACK DESIGN MAY CONSIST OF ANY MATERIAL SUITABLE FOR TRUCK TRAFFIC THAT REMOVE MUD AND DIRT.
10. MAINTAIN AREA IN A WAY THAT PREVENTS TRACKING AND/OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

SILT FENCE - TYPE SENSITIVE

SIDE VIEW



FRONT VIEW



NOTES:
1. USE STEEL OR WOOD POSTS OR AS SPECIFIED BY THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.
2. HEIGHT (*) IS TO BE SHOWN ON THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.

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Fax: (478) 474-5045

BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS

FOR THE

CITY OF COMMERCE

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	3/1/2022

BID SET

GEORGIA REGISTERED No. PE046341 PROFESSIONAL ENGINEER ANDREW D SWICEGOOD

DRAWN BY: ADS
CHECKED BY: ABG
DATE: FEB 2022
SCALE: N.T.S.

CONTENT:

CONSTRUCTION DETAILS

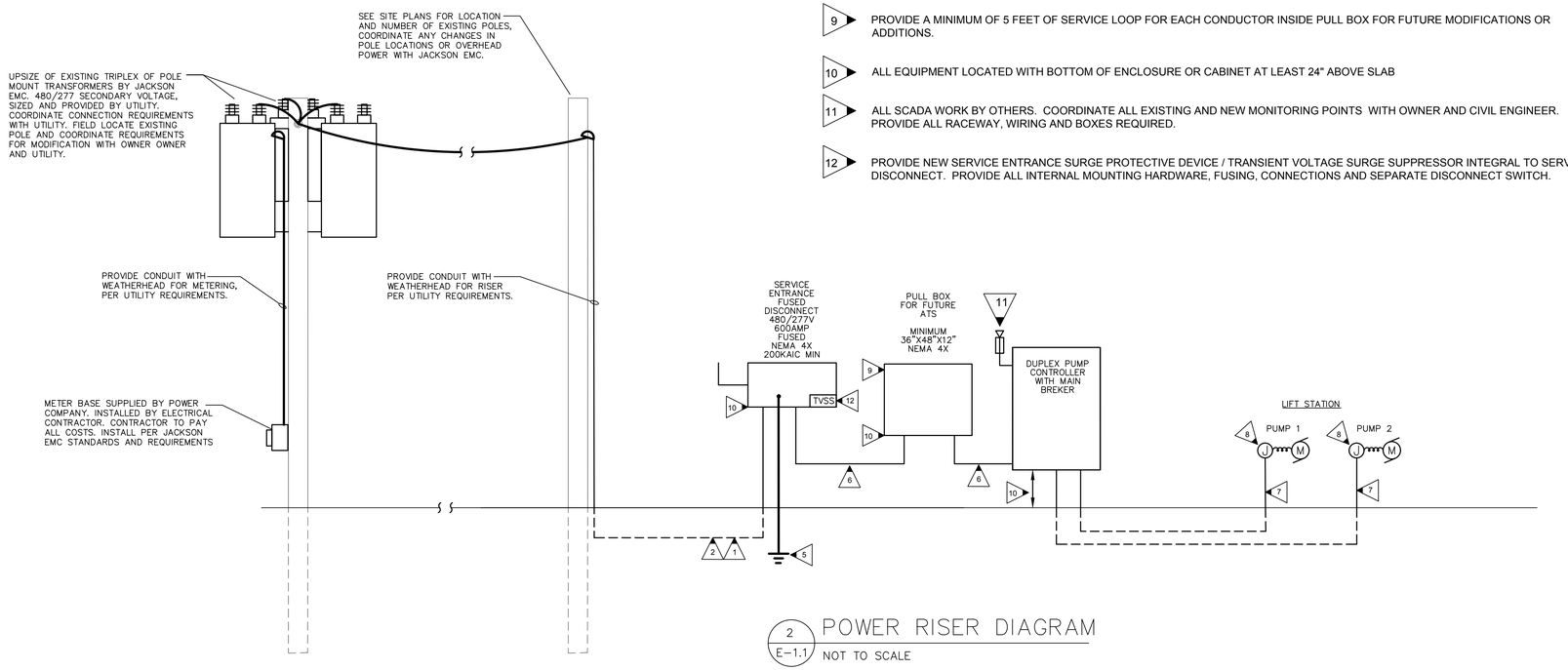
SHEET NO:

C3.0

Last Saved By: ENGESG222401 Plotted: 3/10/2022 4:54 PM
Drawing Path: Z:\Engineer Projects\C3000 - COMMERCE, CITY OF\C3000.110 Northside WWTF Capacity Evaluation and Beck LS Transfer Study\Beck LS\CAD\Base\C-PROP-BASE (Beck LS).dwg

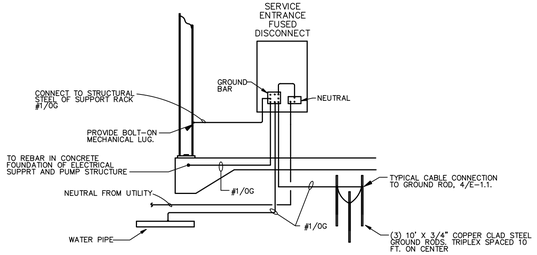
KEYED NOTES:

1. INCOMING PRIMARY SERVICE BY JACKSON EMC, COORDINATE LOCATION AND TYPE OF TRANSFORMER TO BE PROVIDED WITH UTILITY. PROVIDE METERING, CONDUIT STUB OUTS, AND TRANSFORMER PAD, PER UTILITY STANDARDS.
2. STUB TWO (2) 4" CONDUITS FROM DISCONNECT IN DIRECTION OF UTILITY TRANSFORMER FOR SECONDARY CONDUCTORS BY UTILITY PROVIDER, EXTEND A MINIMUM OF 5', OR PER UTILITY REQUIREMENTS. CAP CONDUITS UNDER GROUND WHEN NOT IN USE.
3. PROVIDE NEW ELECTRICAL SERVICE RACK, WITH SLAB FOR MOUNTING. SLAB TO BE MINIMUM 12" THICK 3000 PSI CONCRETE WITH TWO LAYERS OF #4 REBAR AT 6" OC IN EACH DIRECTION, EXTEND SLAB 6" ABOVE GRADE ON HIGH SIDE AND 6" BELOW GRADE MINIMUM ON LOW SIDE. SUPPORT POSTS ARE TO BE MINIMUM 4 INCH GALVANIZED I-BEAM, CROSS RUNGS 4 INCH GALVANIZED C-CHANNEL. ALL BOLTS AND MOUNTING HARDWARE STAINLESS STEEL .
4. DIMENSIONS OF SLAB TO BE MINIMUM 8 WIDE X 12' LONG, COORDINATE WITH MOUNTING REQUIREMENTS OF EQUIPMENT.
5. SEE DETAIL 2 / E-1.1 FOR SERVICE ENTRANCE GROUNDING REQUIREMENTS
6. TWO (2) SETS OF 4#350KCMIL, 1#1/0, 3" CONDUIT, FROM DISCONNECT TO PULL BOX AND PULL BOX TO DUPLEX CONTROLLER.
7. 4#350KCMIL, 1#1/0, 3" CONDUIT TO EACH PUMP FROM DUPLEX CONTROLLER.
8. PROVIDE JUNCTION BOX AND LIQUID TIGHT FLEX FOR FINAL CONNECTIONS AS REQUIRED. COORDINATE LOCATION AND REQUIREMENTS WITH PUMP MANUFACTURER INSTALLATION REQUIREMENTS. REFER TO SITE PLAN FOR GENERAL LOCATION.
9. PROVIDE A MINIMUM OF 5 FEET OF SERVICE LOOP FOR EACH CONDUCTOR INSIDE PULL BOX FOR FUTURE MODIFICATIONS OR ADDITIONS.
10. ALL EQUIPMENT LOCATED WITH BOTTOM OF ENCLOSURE OR CABINET AT LEAST 24" ABOVE SLAB
11. ALL SCADA WORK BY OTHERS. COORDINATE ALL EXISTING AND NEW MONITORING POINTS WITH OWNER AND CIVIL ENGINEER. PROVIDE ALL RACEWAY, WIRING AND BOXES REQUIRED.
12. PROVIDE NEW SERVICE ENTRANCE SURGE PROTECTIVE DEVICE / TRANSIENT VOLTAGE SURGE SUPPRESSOR INTEGRAL TO SERVICE DISCONNECT. PROVIDE ALL INTERNAL MOUNTING HARDWARE, FUSING, CONNECTIONS AND SEPARATE DISCONNECT SWITCH.



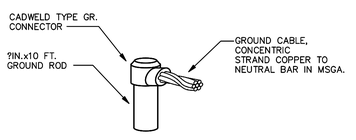
2 E-1.1 POWER RISER DIAGRAM

NOT TO SCALE



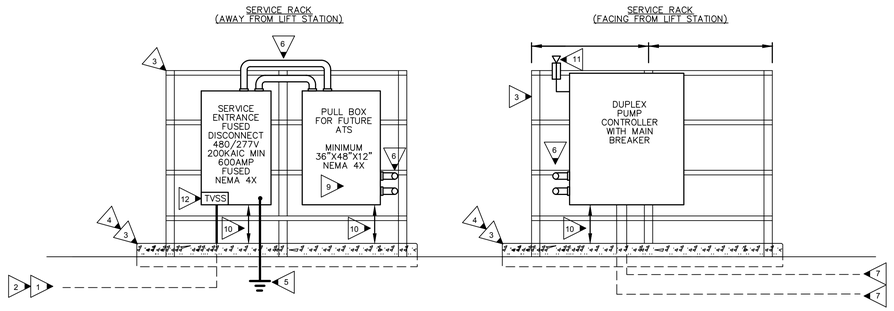
3 E-1.1 SERVICE GROUNDING DETAIL

NOT TO SCALE



4 E-1.1 CABLE CONNECTION TO GROUND ROD

NOT TO SCALE



1 E-1.1 NEW ELECTRICAL SERVICE RACK ELEVATION

NOT TO SCALE

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6400 Peake Rd
Macon, GA 31210
Ph: (478) 474-4996
Fax: (478) 474-5045

BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS

FOR THE

CITY OF COMMERCE

REVISIONS

NO.	DESCRIPTION	DATE

BID SET

GEORGIA REGISTERED PROFESSIONAL ENGINEER JEFFREY H. McGEE

DRAWN BY: LSS
CHECKED BY: JHM
DATE: 3 / 8 / 2022
SCALE: N.T.S.

CONTENT:

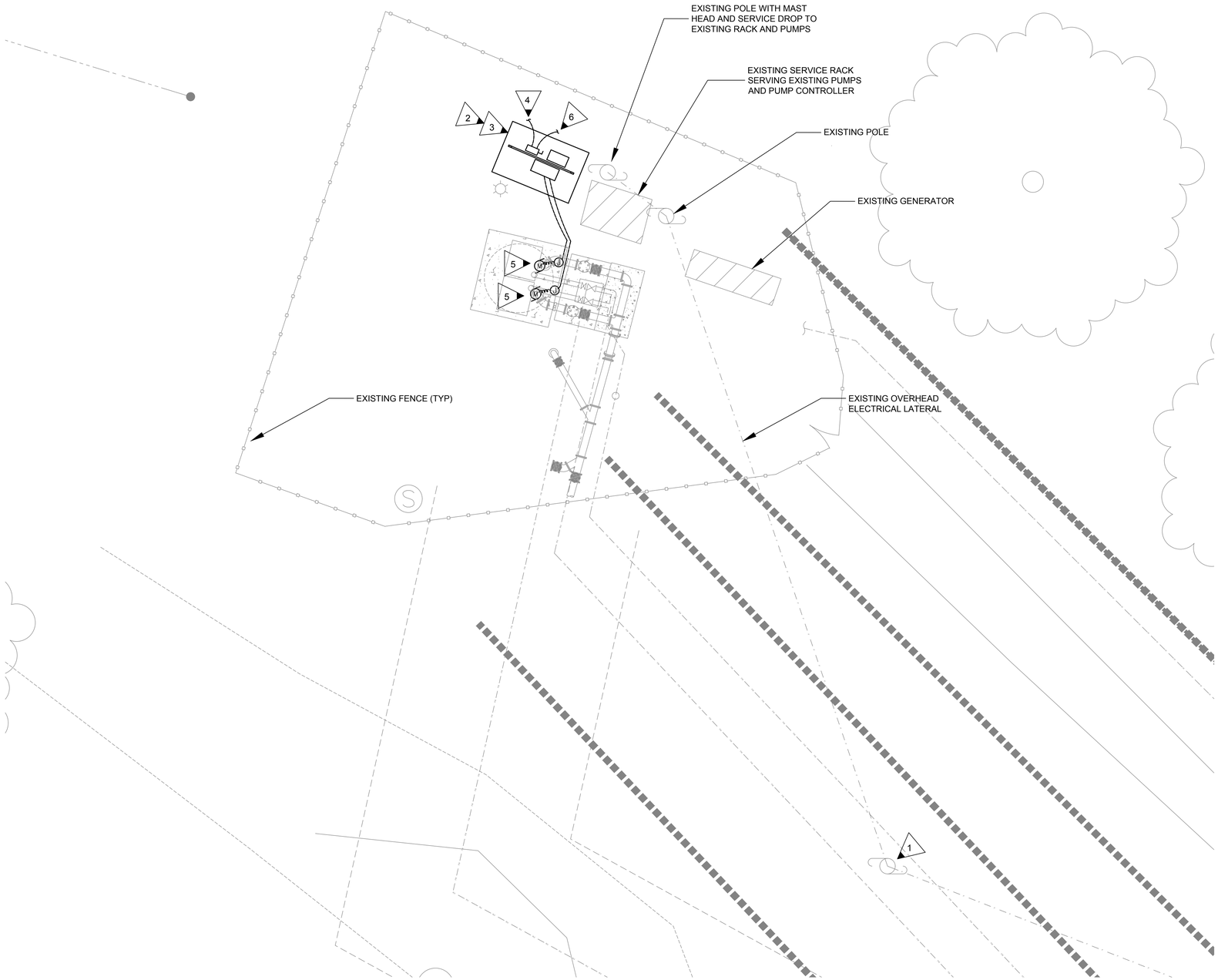
ELECTRICAL LEGEND, NOTES AND DETAILS

SHEET NO:

E1.1

ELECTRICAL DESIGN CONSULTANTS, INC.
175 NEW ST.,STE.1
MACON, GA 31201
EDC• M22017

Last Saved By: DS2103
Plotted: 3/9/2022 9:34 AM
Drawing Path: Z:\2022 CAD\M22017 Commerce-Beck Road Lift Station\WORKING DRAWINGS\ELEC\M222017E11.dwg



1 / E-2.1 SITE PLAN – ELECTRICAL

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

0 4' 8'

KEYED NOTES:

1. APPROXIMATE LOCATION OF EXISTING UTILITY POLE WITH TRIPLEX OF POLE MOUNTED TRANSFORMERS / OVERHEAD ELECTRICAL SERVICE.
2. SEE DETAIL 2 / E-1.1 FOR POWER RISER DIAGRAM AND ADDITIONAL SERVICE REQUIREMENTS, INCLUDING CONDUIT AND CABLE REQUIREMENTS.
3. SEE DETAIL 1 / E-1.1 FOR SERVICE RACK AND UTILITY PAD REQUIREMENTS.
4. SEE DETAIL 3 / E-1.1 FOR SERVICE GROUNDING REQUIREMENTS.
5. COORDINATE FINAL CONNECTION AND MOUNTING REQUIREMENTS FOR LIFT STATION ELECTRICAL CONNECTIONS WITH MANUFACTURER SHOP DRAWINGS AND INSTALLATION DETAILS. SEE 2 / E-1.1 FOR FEEDER REQUIREMENTS TO PUMPS.
6. COORDINATE UTILITY CONNECTION REQUIREMENTS AND LOCATIONS WITH UTILITY PROVIDER. SEE 2 / E-1.1 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

GENERAL NOTES:

1. EXISTING SERVICE, GENERATOR, AND LIFT STATION IS TO REMAIN IN SERVICE UNTIL SWITCH OVER AND REPLACEMENT OF EQUIPMENT.
2. ENSURE NEW SERVICE EQUIPMENT IS IN PLACE AND READY FOR SWITCH OVER TO MINIMIZE DOWN TIME.
3. COORDINATE WITH OWNER AND UTILITY WITH REGARD TO PHASING, AND PROVISIONS REQUIRED FOR SWITCHOVER.
4. COORDINATE LOCATIONS AND MOUNTING OF ALL EQUIPMENT WITH CIVIL PLANS AND DETAILS. FIELD VERIFY SIZE AND CONFIGURATIONS OF ALL EXISTING EQUIPMENT, PRIOR TO ANY DEMOLITION OR NEW CONSTRUCTION.
5. COORDINATE FINAL CONNECTIONS TO EQUIPMENT WITH SHOP DRAWINGS AND INSTALLATION DETAILS AND DIRECTIONS.

ELECTRICAL DESIGN
EDC CONSULTANTS, INC.
175 NEW ST.,STE.1
MACON, GA 31201
EDC• M22017

ESG ENGINEERING
6400 Peake Rd
Macon, GA 31210
Ph: (478) 474-4996
Fax: (478) 474-5045

BECK ROAD LIFT STATION & FORCE MAIN IMPROVEMENTS

FOR THE

CITY OF COMMERCE

REVISIONS

NO.	DESCRIPTION	DATE

BID SET

GEORGIA REGISTERED PROFESSIONAL ENGINEER JEFFREY H. McGEE

DRAWN BY: LSS
CHECKED BY: JHM
DATE: 3 / 8 / 2022
SCALE: 1/8" = 1'-0"

CONTENT:

ELECTRICAL SITE PLAN

SHEET NO:

E2.1

Last Saved By: DS2103
Plotted: 3/9/2022 9:35 AM
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ELECTRICAL SPECIFICATIONS INDEX

EDC# M22017

SECTION 26 0000
GENERAL

1.01 CONTRACT DOCUMENTS**:**

A. All work of Section 26 0000 shall comply with the requirements of:

1. General Conditions
2. Supplementary General Conditions
3. General Requirements
4. Specifications
5. Drawings
6. Modifications incorporated in the documents before their execution.

1.02 WORK INCLUDED

A. This Division of the specifications (26 0000) covers the complete exterior electrical system for all work shown on the drawings as specified herein providing all material, labor and equipment required for the installation of the electrical systems complete and in operating condition.

B. Include in the electrical work all the necessary supervision and the issuing of all coordinating information to any other trades who are supplying work to accommodate the electrical installations.

C. Where "Architect" or "Architectural" is used in these specifications it shall mean "Engineer".

1.03 DRAWINGS

A. The drawings for electrical work utilize symbols and schematic diagrams which have no dimensional significance. The work shall therefore, be installed to fulfill the diagrammatic intent expressed on the electrical drawings.

B. Coordinate electrical work with the architectural details, floor plans, elevations, structural and mechanical drawings. Provide fittings, junction boxes and accessories to meet conditions.

C. Do not scale drawings. Dimensions for layout of equipment, or spaces shall be obtained from architectural, structural or mechanical drawings unless specifically indicated on the electrical drawings.

D. Discrepancies shown on different drawings, between drawings and specifications or between drawings and field conditions shall be promptly brought to the attention of the Architect.

E. Provide as used on the drawings and in the specifications shall mean, furnish, install, connect, adjust and test.

F. The drawings and specifications are complimentary and any work or material shown in one and omitted in the other, or described in the one and not shown in the other, or which may be implied by both or either, shall be furnished as though shown on both, in order to give a complete and first class installation.

1.04 SHOP DRAWINGS/ SUBMITTALS

A. General: The contractor shall provide a digital submittal data for review.

1. Equipment Power Supply and Wiring Requirements: The contractor shall submit for review a tabulated sheet of equipment power supply and wiring requirements for all mechanical equipment requiring power as specified in other divisions of these specifications. Requirements shall be identified by horsepower or KW, operating amperage, required voltage and phase requirements, and manufacturer's suggested overcurrent circuit protection device size and minimum circuit ampacity size. Where the electrical requirements submitted for mechanical equipment differs from the branch circuitry shown on the electrical drawings, (when using the basis of design unit listed in the mechanical schedules/specifications or a similar unit of the same size from listed alternate manufacturers), the contractor shall make the necessary adjustments to the branch circuitry per the 2020 NEC at no additional cost to the owner. When changes are made to power requirements for equipment due to Owner/Architect/Engineer approved value engineering changes to equipment, this cost must be included in the value engineering overall change order cost. Costs due to adjustments in branch circuitry to equipment due to value engineering changes will not be allowed after the overall value engineering change order has been approved. In all cases, power and wiring requirements for mechanical equipment must be provided to the engineer before or at the same time as the shop drawings for the electrical distribution gear. In no case shall electrical distribution gear be ordered or branch circuitry roughed in prior to engineer review and comment on this document. Any equipment ordered or branch circuitry roughed in on the jobsite without this review and comment will be totally at the contractors risk. The Tabulation sheet submitted shall be in the following format:

B. Review: The contractor shall review all submittal prior to submitting to ensure compliance with the contract documents. Comments made by the Architect do not relieve the contractor from complying with the contact documents (Drawings, Specifications, and Addenda). The purpose of the submittals is to demonstrate to the Architect that the contractor understands the design concept and that he demonstrates his understanding by indicating which equipment and materials he intends to furnish and install. When Shop Drawings are reviewed, some errors may be detected but others may be overlooked. This does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Drawings and Specifications shall be followed and are not waived or superseded in any way by the Shop Drawing review. Any deviations from the contract documents shall be clearly stated on the submittal data. If not clearly stated the submittal shall be marked "Revised and Resubmit". Failure of the contractor to provide submittals during the submittal process shall make the contractor totally responsible for any and all changes to achieve compliance with the contract documents. Items on the submittal stamp are described as follows:

1. No Exceptions: Submittal reviewed and appears to be in compliance with the contract documents. Furnish as submitted.
2. No Exceptions As Corrected: Submittal reviewed and appears to be in compliance with the contract documents except for items noted. Contractor shall insure noted corrections are incorporated into the equipment furnish to the project. No resubmittal required unless requested.
3. Revise and Resubmit: Submittal reviewed does not comply with the contract documents. Contractor shall resubmit equipment to the Architect with additional information indicating compliance with the contract documents.
4. Not Acceptable: Submittal for incorrect job or submittal damaged during shipment or delivery

C. Submit information as required under SUBMITTALS, for each of the individual electrical sections of the specifications.

D. Items to be submitted:

1. Equipment Power Supply and Wiring Requirements
2. Panelboards/Switchboards and Transformers
3. Layout of equipment in electrical rack indicating NEC required clearances
4. Fuses
5. Conduit and Raceway
6. Conductors and Cable
7. Outlets and Boxes
8. Wiring Devices
9. Disconnect Switches
10. Grounding Equipment and Materials
11. Labeling Materials and Equipment

E. Data submitted shall contain all information required to indicate compliance with equipment specified. Submit field information drawings to explain fully all procedures involved in erecting, mounting and connecting all items of equipment which differ from that specified.

1.05 RECORD DRAWINGS:

A. One complete set of electrical drawings shall be reserved for as-built drawings. Any approved deviation from the contract drawings shall be recorded on these drawings. Drawings shall be checked monthly for completeness.

B. Completed as-built drawings shall be presented to the Architect prior to final inspection.

1.06 MAINTENANCE AND OPERATING INSTRUCTIONS:

A. Provide at the time of final inspection three sets of maintenance and operating instruction for:

1. Panelboards/Switchboards
2. Fuses
3. Wiring Devices
4. Disconnect Switches

B. Furnish a qualified and accredited factory trained technician to train personnel designated by the Owner in the proper operation and maintenance of specialized equipment.

C. The issuing of operating instructions shall include the submission of the name, address, and telephone number of the manufacturer's representative and service company for each item of equipment so that service and spare parts can be readily obtained.

1.07 CODES AND PERMITS:

A. All electrical work shall meet or exceed the latest requirements of the following codes and/or other authorities exercising jurisdiction over the electrical construction work and the project.

1. The National Electrical Code (NFPA 70) - 2020 Edition
2. The National Electrical Safety Code (ANSI C-2)
3. The Life Safety Code (NFPA 101)
4. The International Building Code

5. Regulations of the local utility company with respect to metering and service entrance.
6. Municipal and State ordinances governing electrical work.

B. All required permits and inspection certificates shall be obtained, and made available at the completion of the work. Permits, inspections, and certification fees shall be paid for as a part of the electrical work.

1.08 DEVIATIONS:

A. No deviations from the plans and specifications shall be made without the full knowledge and consent of the Architect or his authorized representative.

B. Should the Contractor find at any time during progress of the work that, in his judgement, existing conditions make desirable a modification in requirements covering any particular item or items, he shall report such items promptly to the Architect for his decision and instruction.

1.09 COOPERATION:

A. This Contractor shall schedule his work and in every way possible cooperate with all other Contractors on the job to avoid delays, interferences, and unnecessary work. He shall notify them of all openings, hangers, excavations, etc., so that proper provisions shall be made for his work. This shall not relieve him of the cost of cutting, when such is required.

B. This Contractor shall do all cutting and excavating necessary for the complete installation of his work, but he shall not cut the work of any other Contractor without first consulting the Architect. He shall repair any work damaged by him or his workmen, employing the services of the Contractor whose work is damaged.

C. This Contractor shall by all means coordinate the location of ceiling lighting fixtures, both recessed and surface mounted, with the Ceiling Contractor so that proper hangers and supports shall be provided.

D. Any conflict between electrical and other trades shall be reported before construction starts. No extra charges will be approved for work resulting from failure to coordinate with other trades.

1.10 INSTALLATION:

A. Raceways, fixtures, devices, and other electrical equipment shall be installed in a neat and workmanlike manner and in accordance with recognized good practice for a first class installation.

B. The Architect or his representative shall have the authority to reject any workmanship not complying with the contract documents.

C. The Electrical Contractor shall personally or through an authorized licensed and competent electrician, constantly supervise the work from beginning to complete and final inspection.

D. Electrical equipment shall be installed in accordance with manufacturer's recommendations.

E. Locations of proposed raceway, riser, location of structural elements, location and size of chases method and type of construction of floors, walls, partitions, etc., shall be verified before construction starts.

F. Consult owner and utility companies for underground lines before any underground work is started. Contractors shall be responsible for any damage.

1.11 EXCAVATION, TRENCHING AND BACKFILLING:

A. General. The Contractor shall perform all excavation to install conduit structures and equipment specified in this Division of the Specifications. During excavation, materials for backfilling shall be piled back from the banks of the trench to avoid over-loading and to prevent slides and cave-ins. All excavated materials not to be used for backfill shall be removed and disposed of by the Contractor. Grading shall be done to prevent surface water from flowing into trenches and other excavations and water accumulating therein shall be removed by pumping. All excavations shall be made by open cut. No tunneling shall be done. All requirements of OSHA shall be complied with.

B. Trench Excavation. The bottom of the trenches shall be graded to provide uniform bearing and support for each section of the conduit on undisturbed soil at every point along its entire length. Over depths shall be backfilled with loose, granular, moist earth, tamped. Removed unstable soil that is not capable of supporting the conduit and replace with specified material.

C. Backfilling. The trenches shall not be backfilled until it is reviewed by the Architect or his representative. The trenches shall be backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, and gravel or soft shale, free from large clods of earth or stones, deposited in 6" layers and tamped until the conduit has a cover of not less than the adjacent existing ground but not greater than 2" above existing ground. The backfilling shall be carried on simultaneously on both sides of the trench so that conduit is not displaced. The compaction of the filled trench shall be at least equal to that of the surrounding undisturbed material, except that trenches occurring under paved areas or in areas to be filled shall be backfilled in 6" maximum layers and each layer compacted to 95% maximum density. Settling the backfill with water will not be permitted. Any trenches not meeting compaction requirements or where settlement occurs shall have backfill removed down to the top of the conduit then backfill with approved materials as specified hereinbefore.

D. Positively no tree roots are to be damaged, hand dig where required. Hand digging means no shovels or picks. Damaged trees or shrubbery shall be replaced in kind and must be approved by Engineer.

1.12 MATERIALS**:**

A. Materials specified by manufacturer's name shall be used unless approval of other manufacturers are listed in addenda to these specifications.

B. Drawings indicating proposed layout of space, all equipment to be installed therein and clearance between equipment shall be submitted, where substitution of materials alter space requirements on the drawings.

C. Material Standards: All materials shall be new and shall conform to the standards where such have been established for the particular material in question. Publications and Standards of the organization listed below are applicable to materials specified herein.

1. American Society for Testing and Materials (ASTM)
2. Underwriter's Laboratories, Inc. (UL)
3. National Electrical Manufacturer Association (NEMA)
4. Insulated Cable Engineers Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. National Fire Protection Association (NFPA)
7. American National Standards Institute (ANSI)

D. Material of the same type shall be the product of one manufacturer.

E. Materials not readily available from local sources shall be ordered immediately upon approval.

F. The Architect shall have authority to reject any materials, or equipment, not complying with these specifications and have the Contractor replace materials so rejected immediately upon notification of rejection.

G. Any material or equipment so rejected shall be removed from the job within 24 hours of such rejection; otherwise the Architect may have same removed at the Contractor's expense.

1.13 EQUIPMENT CONNECTIONS:

A. All equipment requiring electrical power connections shall be connected under this Division of these specifications.

B. Where electrical connections to equipment require specific locations, such locations shall be obtained from shop drawings.

C. Drawings for location of conduit stub-up boxes mounted in wall or floor to serve specific equipment shall not be scaled.

D. Electrical circuits to equipment furnished under other sections of these specifications are based on design loads. If actual equipment furnished has loads other than design loads electrical circuits and protective devices shall be revised to be compatible with equipment furnished at no additional cost to the Owner. Any revisions must have prior approval by the Architect. Before submitting shop drawings, Electrical Sub-Contractor shall along with the Mechanical Sub-Contractor review voltage and load requirements for mechanical and plumbing equipment to determine the compatibility between what is being furnished and what is shown in the contract drawings. The Electrical Sub-Contractor shall along with his submittals submit a statement that he has reviewed all shop drawings including review with the Mechanical and Plumbing Sub-Contractors.

E. Where equipment is indicated to be served thru conduit stub-up, conduit shall be stubbed up not less than four inches above floor where transition shall be made to sealtite flexible conduit for connection to equipment.

F. The Contractor's attention is invited to other Divisions of these specifications, where equipment requiring electrical service or electrically related work is specified to become fully aware of the scope of work required for electrical service or related work.

G. Where electricity utilizing equipment is supplied separate from the electrical work, and is energized, controlled or otherwise made operative by electrical work, the testing to provide the proper functional performance of such wiring systems shall be conducted by the trade responsible for the equipment. The electrical work shall, however, include cooperation in such testing and the making available of any necessary testing or adjustments to the electrical equipment.

H. Heating, air conditioning, and ventilating equipment is specified to be furnished and installed under other sections of these specifications. The controls likewise are specified to be furnished thereunder. All necessary wiring, wiring troughs and circuit breakers for power for this equipment shall be furnished and installed under this section of the specifications, in accordance with the plans and/or diagrams furnished with the equipment, or shown on these plans. Starters furnished by the Mechanical Contractor shall be installed under this Division of the specifications. Power wiring to auxiliary equipment on a piece of equipment remote from its main terminal box and interlocking of apparatus shall be accomplished under Heating Ventilating Equipment section of the specifications. Conduit and outlets for control

wiring shall be furnished and installed under Division 23 of these specifications. Control conductors for mechanical equipment shall not be installed in same conduit with power conductors.

1.14 PRODUCT DELIVERY, STORAGE, HANDLING, & PROTECTION

A. Inspect materials upon arrival at Project and verify conformance to Contract Documents. Prevent unloading of unsatisfactory material. Handle materials in accordance with manufacturer's applicable standards and suppliers recommendations, and in a manner to prevent damage to materials. Store packaged materials in original undamaged condition with manufacturer's labels and seals intact. Containers which are broken, opened, damaged, or watermarked are unacceptable and shall be removed from the premises.

B. All material, except items specifically designed to be installed outdoors such as pad mounted transformers or stand-by generators, shall be stored in an enclosed, dry building or trailer. Areas for general storage shall be provided by the Contractor. Provide temperature and/or humidity control where applicable. No material for interior installation, including conductors, shall be stored other than in an enclosed weather tight structure. Equipment stored other than as specified above shall be removed from the premises.

C. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable to protect the equipment or materials. Conditions shall be those for which the equipment or materials are designed to be installed. Equipment and materials shall be protected from water, direct sunlight, cold or heat. Equipment or materials damaged or which are subjected to these elements are unacceptable and shall be removed from the premises and replaced.

1.15 CLEANING AND PAINTING

A. Remove oil, dirt, grease and foreign materials from all raceways, fittings, boxes, panelboard trims and cabinets to provide a clean surface for painting. Touch-up scratched or marred surfaces of lighting fixtures, panelboard and cabinet trims, motor control center, switchboard or equipment enclosures with paint furnished by the equipment manufacturers specifically for that purpose.

B. Do not paint trim covers for flush mounted panelboards, telephone cabinets, pull boxes, junction boxes and control cabinet unless required by the Architect. Remove trim covers before painting. Under no conditions shall locks, latches or exposed trim clamps be painted.

C. Unless indicated on the drawings or specified herein to the contrary, all painting shall be done under the PAINTING Section of these Specifications.

D. Where plywood backboards are used to mount equipment provided under Division 26 0000, paint backboards with two coats of light grey semi-gloss paint.

1.16 GUARANTEE:

A. All systems and component parts shall be guaranteed for one year from the date of final acceptance of the complete project. Defects found during this guaranteed period shall be promptly corrected at no additional cost to the Owner.

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END OF SECTION 26 0000

SECTION 26 0100
LIGHTING AND POWER PANELBOARDS

1.01 SUBMITTALS

A. Complete panelboard shop drawings shall be submitted, listing as a minimum the following items:

1. Voltage rating.
2. Bus assembly rating.
3. Main breaker rating by capacity, number of poles and interrupting rating in RMS symmetrical amperes.
4. Surface or flush mounting.
5. Listing of branch breakers by capacity number of poles and interrupting rating in RMS symmetrical amperes.
6. Top or bottom feed.
7. A schedule similar to that shown on the drawings, depicting branch breaker arrangement and breaker sizes and giving full explanation for any difference between the two.

B. Contractor utilizing switch gear other than Square "D" Company, shall submit layout of electrical rooms delineating placement of equipment.

1.02 MANUFACTURERS

A. For the purpose of selecting quality and types of panels, equipment as manufactured by Square "D" Company has been specified. Following manufacturers meeting these specifications are acceptable.

1. G. E.
2. Siemens
3. Cutler Hammer

1.03 EQUIPMENT

A. Furnish and install circuit breaker lighting and power panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be of the dead-front safety type, equipped with thermal magnetic molded case circuit breakers with frame and trip rating as shown in the schedule.

B. Circuit breakers shall be HACR rated, quick-make, quick-break, thermal-magnetic, trip-indicating, and have common trip on all multi-pole breakers. Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF, when the breaker is tripped. Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip setting of not more than 10 times the trip rating of the breakers. Connection to bus in all panels shall be bolted. All breakers shall be 20 ampere trip, unless otherwise shown. All breakers shall be minimum for 120/208 volts (10,000) and for 277/480 volts (14,000) A.I.C. sym. unless otherwise noted.

C. Bus bar connections to the branch circuit breakers shall be the distributed phase type. Three-phase, four-wire bussing shall be such that any three adjacent single-pole breakers are individually connected to each of the three different phases in such a manner that two or three-pole breakers can be installed at any location. All current-carrying parts of the bus assembly shall be copper. Main ratings shall be as shown in the panelboard schedule on the drawings.

D. Panel front shall be door-in-door with one door over interior and additional door which exposes wiring gutters.

E. A steel circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. The directory card shall provide a space at least 1/4" high x 3" long for each circuit.

F. All panels shall be equipped with a copper equipment grounding bar. The bar shall have lugs of sufficient size to handle all grounding conductors.

G. Sub-feed circuit breakers are not permitted in panels unless specifically called for.

H. Provide mounting hardware for all spaces shown on panelboard schedule.

I. Panelboard circuit numbering shall be such that starting at the top, odd numbering shall be used in sequence down the left hand side and even numbers down the right hand side.

J. Except where otherwise indicated on the drawings or required to avoid conflicts, mount the panelboards so the tops of the cabinets will be 6 feet above the finished floors. For panelboards which are too high, mount them so the bottoms of the cabinets will be not less than 6 inches above the finished floors.

K. Locate the cabinets so that present and future conduits can be connected to them conveniently. Coordinate the dimensions of the cabinets with the dimensions of the spaces designated for installation prior to fabrication of the cabinets. Cabinet shall be minimum 20" wide.

L. Wiring in panelboards shall be neatly grouped and secured with ty-wraps.

M. Electrical panels shall not be used as wireways or junction boxes for control conductors.

N. Where spaces are called for in a panel, all mounting hardware shall be provided for the frame size indicated.

O. Splices in panelboards are not permitted.

END OF SECTION 26 0100

SECTION 26 0150
FUSES

1.01 SUBMITTALS

A. Shop drawings shall be submitted and shall consist of manufacturer's published literature and technical data sufficient for the engineer to determine whether system function will be adversely affected, whether proposed fuses meet this specification, and whether they are equal in quality.

1.02 MANUFACTURERS

A. Acceptable manufacturers are:

1. Littelfuse
2. Cefco
3. Gould - Shawmut

1.03 EQUIPMENT/MATERIAL

A. All fuses rated 600 volts or less and used for main, feeder, or branch circuit protection with 200,000 ampere interrupting rating and shall be so labeled. Fuse classes and sizes indicated on the drawings have been selected to provide a fully coordinated selective protection system. To maintain this design, all fuses provided shall be furnished by the same manufacturer. Should equipment provided require a different U.L. Class or fuse size, the engineer shall be furnished with sufficient data to ascertain that system function will not be adversely affected.

B. Current-Limiting Fuses 601-6000 Amperes

Fuses rated over 600 amperes shall be U.L. Class "L" fuses, and shall have a minimum time delay of 10 seconds at 500% rating.

C. Current-Limiting Fuses 600 Amperes or Less

All fuses 600 amperes and below shall be true dual-element time delay fuses with separate spring-loaded thermal overload elements in all ampere ratings. All ampere ratings shall be designed to open at 400 degrees Fahrenheit or less when subjected to a non-load oven test. To eliminate induction heating, all fuse ferrules and end caps shall be non-ferrous and shall be bronze or another alloy not subject to stress cracking.

D. Spare Fuses

At the time of final acceptance, the contractor shall furnish the owner's representative, not less than three (3) spare fuses of each size and type installed.

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END OF SECTION 26 0150

SECTION 26 0200
RACEWAYS

1.01 SUBMITTALS

A. Submit manufacturer's literature for each type of conduit or tubing and fittings used in the project.

1.02 MANUFACTURERS

A. Acceptable manufacturers of rigid steel and electrical metallic tubing conduit are:

1. Allied Tube and Conduit Co.
2. Wheatland Tube Co.
3. Triangle
4. L.T.V.

B. Acceptable manufacturers of polyvinyl chloride (PVC) conduit are:

1. Certainteed
2. Georgia Pipe
3. Carlon
4. Can-Tex

C. Acceptable manufacturers of conduit fittings, bushings, and locknuts are:

1. O-Z/Gedney
2. Thomas and Belts
3. Raco

1.03 MATERIALS

A. All metallic conduit and electric metallic tubing shall be steel, of standard pipe dimensions, smooth inside and out, and shall be galvanized. Where the word "conduit" is used hereinafter it shall mean rigid steel conduit, electric metallic tubing, flexible steel conduit, liquid tight flexible steel conduit or schedule 40 plastic conduit. Intermediate grade conduit is not acceptable.

B. Galvanized rigid steel conduit shall be used in all areas where it will be exposed to physical damage. Schedule 40 plastic conduit shall be used underground. In no case shall plastic conduit be exposed or in slab; switch to rigid steel conduit before turning up exposed (including elbow). All other conduit, unless otherwise specified or called for on the plans, may be galvanized electric metallic tubing.

C. Plastic conduit shall be made from virgin polyvinyl chloride C-300 compound. Conduit and fittings shall carry a UL label. Fitting and cement shall be produced by the same manufacturer as the conduit to assure system integrity.

D. Connectors and couplings shall be rain tight and shall have a nylon insulated throat. All fittings shall be "UL" approved. Die cast, and indenter type fittings are not acceptable. Fittings for liquid tight flexible conduit shall be steel and have nylon insulated throat. All rigid steel conduit 1" or over shall terminate using insulated grounding bushing similar and equal to O-Z/Gedney type BLG, bushings shall be steel, zink coated with copper saddle.

E. Rigid steel conduit shall be not less than 1/2 inch trade size; schedule 40 plastic conduit shall not be less than 3/4" trade size and not less than required by the NEC or indicated. However, where permitted by the NEC, smaller size flexible metal conduit may be used only for individual lighting fixtures. Conduit runs with more than 5 #12 conductors shall not be less than 3/4".

F. Galvanized rigid steel conduit couplings and connections:

1. Install standard, conduit-threaded fittings.
2. Ream the ends of conduits after cutting and threading them.
3. For connection to sheet metal boxes, cabinets and other sheet metal enclosures, install locknuts on the inside and outside of the enclosure for each connection. See Section 26 0400 of these specifications.

G. Installation of plastic conduit:

1. Shall be installed in complete accordance with manufacturer's recommendations.
2. Shall be a minimum of 2'-0" below finished grade when not covered by concrete.
3. Shall have properly sized bond wire installed with all circuits.
4. Bends and turns shall be kept to a bare minimum.
5. Extreme care shall be taken to avoid crushing or cracking conduit. "DO NOT" run vehicles over exposed conduit under any conditions.
6. All conduit and fittings shall be solvent welded.
7. Plastic conduit maybe turned up in masonry walls only, and shall extend no further up the wall than counter height.
8. Do not install conduit in slab. All conduit shall be installed a minimum of 6" below slab. Conduits shall not be bunched together. Maintain 1" clearance between conduits.

H. Insulated bushings:

1. Install nylon insulated bushings on the end of all rigid conduit.
2. The insulating material shall be designed for rugged, long service.
3. Bushings which consist of only insulating material will not be accepted.
4. Fittings which incorporate insulated bushings will be considered for approval in lieu of fittings with separate bushings.

I. All couplings and connections in location where water or other liquid or vapor might contact the conduit shall also be watertight.

J. Close empty conduit as complete runs before pulling in the cables and wires.

K. Install exposed conduit parallel to or at right angles with the lines of the building. Locate them so they will not obstruct headroom or walkways or cause tripping.

L. Avoid bends or offsets where practicable:

1. Do not install more bends, offsets or equivalent in any conduit run than permitted by the NEC.
2. Make bends with standard conduit bending machines.
3. Conduit hickeys may be used for making slight offsets and for straightening conduits tubbed out of concrete.
4. Conduit bent with a pipe tee or vise will not be accepted.
5. Do not install crushed or deformed conduits.

M. Install conduit clamps:

1. Fasten the clamps and other supports as follows:

a. For new masonry or concrete structures, install threaded metal inserts prior to pouring the concrete.

b. For existing solid masonry or reinforced concrete structures:

1. Install expansion anchors and bolts or approved power-set fasteners.

2. Expansion anchors and bolts shall be not less that 1/4 inch diameter and shall extend not less than 3 inches into the concrete or masonry.

3. Power-set fasteners shall be not less than 1/4-inch diameter and shall extend not less than 1-1/4-inch into the concrete.

c. For hollow masonry install toggle bolts. Bolts supported only by plaster will not be accepted.

d. For metal structures install machine screws. (Stainless Steel)

e. Attachments to wood plug, rawl plug, soft metal insert or wood blocking will not be permitted.

N. Conduits shall be kept 6" away from parallel runs of steam or hot water pipes.

O. Clogged raceways shall be entirely free of obstructions or shall be replaced.

P. Rigid steel conduit installed underground and in concrete shall be coated with scotchrap pipe primer and then wrapped with two layers of scotchrap 50 and 51 corrosion protection tape (Bituminous paint, two layers, is acceptable).

Q. All empty conduit shall have nylon pull cord installed to provide for installation of cables, conductors or wiring. Provide cap and label for each end identifying termination location of other end.

R. Do not combine conduit homeruns. Each homerun shall be separately routed directly to panel unless specifically noted otherwise.

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END OF SECTION 26 0200

SECTION 26 0300
CONDUCTORS

1.01 SUBMITTALS

A. Shop drawings shall be submitted and shall consist of manufacturer's published literature.

1.02 MANUFACTURERS

A. Acceptable manufacturers are:
1. General
2. Okonite
3. Senator
4. Triangle
5. Pirelli
6. Cyprus Rome
7. Essex
8. Carol
9. Southwire
10. American

B. All wiring shall be manufactured in the United States.

1.03 MATERIALS

A. Ratings and sizes:

1. Shall be not less than indicated on the drawings and not less than required by the NEC.
2. Minimum size shall be No. 12 AWG copper provided the maximum voltage drops in the control circuits will not adversely affect the operation of the controls.
3. Conductor sizes indicated on the drawings are for copper conductors.

B. Conductors and ground wires:

1. Shall be copper.
2. Size No. 8 AWG and larger shall be stranded.
3. Size No. 10 AWG and smaller may be solid or stranded at the Contractor's option, however; do not mix the two. All conductors in flexible conduit shall be stranded.

C. Conductor insulation:

1. Conductor insulation shall be the NEC type THHN for sizes No 10 and smaller and XHHW for sizes No. 8 and larger. Under no circumstances shall asbestos insulation be used.

D. Wire shall be factory color coded in size No. 10 and smaller. Color shall be by integral pigmentation with a separate color for each phase, neutral and grounding conductor. Color code per phase shall be continuous throughout the project.

E. Manufacturer's name and other pertinent information shall be marked or molded clearly on the overall jackets outside surface or incorporated on marker tapes within the cables and wires at reasonable intervals along the cables and wires.

F. Cables and wires indicated on the drawings for communication and signaling systems are for typical systems. Install cables and wires for the system being installed.

G. All wiring shall be in conduit unless specifically noted otherwise.

H. Every coil of wire shall be in the original wrapping and shall bear the Underwriters' Label of approval.

I. Where wires are left for connection to any fixture or an apparatus, spare wire or cables shall be provided at the ends for connections. Fixture connections at the outlet box shall be made with insulated wire connectors.

J. Outer jackets shall be color coded as follows:

1. Three phase or single phase circuits, 120/208 volts:

a. Phase A - Black
b. Phase B - Red
c. Phase C - Blue
d. Neutral - White
e. Insulated ground wire - Green

Note: Where dedicated neutrals are used for receptacle circuits. Outer jacket shall be white with appropriate colored tracer (i.e. white with red tracer, white with blue tracer, white with black tracer).

2. Three phase or single phase circuits, 480/277 volts:

a. Phase A - Brown.
b. Phase B - Orange.
c. Phase C - Yellow.
d. Neutral - Gray.
e. Insulated ground wire - Green.

3. Only for large power cables and wires which do not have color coded jackets: No. 8 and larger.

a. Install bands of adhesive non-fading colored tape or slip-on bands of colored plastic tubing over the cables and wires at their originating and terminations points and at all outlets of junction boxes.
b. Color shall be permanent and shall withstand cleanings.

K. Wiring for signal circuits shall conform to the recommendations of manufacturers of the signal system being installed so the system shall have optimum performance and maximum service continuity. Communication and signaling circuit wiring where run in conduit below grade or in a damp location shall be listed for use in a damp or wet location. Communication and signaling circuits run exposed above ceiling in an environmental air plenum area shall be rated for plenum use.

L. No circuit wiring shall be smaller than number 12. Where the homerun exceeds 80'-0" in length, number 10 (minimum) wire shall be used even though all such circuits are not indicated on the plans. All wiring for emergency branch circuits shall be number 10 (minimum) unless noted otherwise.

M. When installing THWN-2 extra care must be exercised so as not to damage nylon jacket. When nylon jacket is damaged wiring shall be removed from service.

END OF SECTION 260030

SECTION 26 0400
OUTLETS

1.01 SUBMITTALS

A. Shop drawings shall be submitted and shall consist of manufacturer's published literature.

1.02 MANUFACTURERS

A. Acceptable manufacturers are:
1. Raco
2. Steel City
3. Appleton
4. Hubbell

1.03 MATERIALS

A. Boxes shall be galvanized pressed sheet steel for all concealed work.

B. Where conduit runs are exposed, outlet shall be of the cast metal type.

C. For concealed work each box shall be provided with a square cornered plaster ring.

D. Each surface receptacle and switch shall be provided with flush mounted outlet box. All outlets installed in panels and other architectural features shall be centered. The location of any outlet may be moved as much as 10'-0" by the Architect before the outlet is placed without incurring any extra cost. All dimensions refer to the finished floor line. Outlet boxes shall be pressed sheet steel and shall be galvanized for all concealed work. Where conduit runs are exposed outlets shall be of the cast metal type.

E. Boxes shall be for the service and the type of outlet and shall not be less than 4" square and 1-1/2" deep except where otherwise specified. Boxes installed in walls shall be provided with a square cornered 1-1/2" plaster ring installed flush with surface of wall. Each outlet box above ceiling shall be supported from a structural member of the building either directly or by using a substantial and approved metal support. Conduit is not an approved means of support. Boxes installed in wall shall be supported either directly to a stud or between studs utilizing an approved bar hanger. In no case shall switch box support and clips used for mounting boxes in old work be used unless specifically called for. Top of outlet box shall be level.

F. All ceiling or wall recessed outlet boxes or their associated plaster rings shall be flush with the finished surface. Using coverplate to secure wiring devices or shimming the device is not acceptable. Contractor shall exercise due care when cutting opening in walls or ceilings for outlet boxes so that opening size will permit the proper installation of boxes and devices. Fixture studs in ceilings and bracket outlets shall be bolted with stove bolts or shall be locking type of stud mounting.

G. In addition to boxes indicated, install enough boxes to prevent damage to cables and wires during pulling-in operations.

H. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

I. "There shall be no outlets installed back to back. A minimum of 4" shall separate each outlet."

J. Where the volume allowed per conductor exceeds that allowed in Table 370-6(b) of the NEC for the minimum size outlet specified, a larger size outlet box shall be used and shall be sized in accordance with the table noted above.

K. Outlet boxes shall be clean and free from dust, paint, dirt, plaster ready mix joint compound and /or any other debris.

END OF SECTION 26 0040

SECTION 26 0500
WIRING DEVICES AND DEVICE PLATES

1.01 SUBMITTALS

A. Submit product data under provisions of Section 26 0000, GENERAL.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

1.02 REFERENCES

A. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

B. FS W-S-896 - Switch, Toggle.

C. NEMA WD 1 - General-Purpose Wiring Devices.

D. NEMA WD 5 - Specific-Purpose Wiring Devices.

1.03 MANUFACTURERS

A. For the purpose of selecting quality and type of device, equipment manufactured by Arrow Hart has been specified. The following manufacturers meeting this specification are acceptable:

1. Bryant
2. Pass and Seymour
3. Hubbell
4. G.E.
5. Leviton

1.04 PRODUCTS

A. Lighting Switches: color shall be gray, see plans for types.

B. Switches: All switches shall be 20 ampere, 120/277 volts, have self grounding provisions, side wiring only and shall be of the silent type. Color shall be gray.

1. Single Pole: Arrow Heart 1221.
2. Keyed Switch: Cylinder style with stainless steel faceplate.

B. Receptacle: All receptacles shall be of the grounding type, of the configuration shown on the drawings and shall be flush wall mounting type. Color shall be gray. Generator receptacles shall be red.

1. Standard duplex receptacle: 20 ampere, 125 volt, NEMA type 5-20 R, 2 pole, 3 wire, straight blade, U-grounding slot, specification grade. Arrow Hart 5342.

2.. Power, receptacle with matching plug: 20 ampere, 125/250 volt, NEMA type 14-20, 3 pole 4 wire grounded, straight blade type. Arrow Hart 5759

3. Power receptacle with matching plug: 20 ampere, 250 volt, NEMA type 6-20R 2-pole, 3 wire grounded, straight blade type. Arrow Hart 5461.

4. Power receptacle with matching plug: 30 ampere, 250 volt, NEMA type 6-30R 2-pole, 3 wire, u-grounded slot, straight blade type. Arrow Hart 5700 N.

5. Power receptacle with matching plug: 50 ampere, 125/250 volt, NEMA type 14-50R, 3-pole, 4 wire grounded, straight blade type. Arrow Hart 5754 N.

6. Ground fault interrupter receptacle: 20 ampere, 125 volts, NEMA type 5-20R, 2-pole, 3-wire with grounded U slot. Arrow Hart AHGF 5342.

C. Device plates: Plates shall be furnished for all devices and outlets indicated on the drawings (telephone, computer, TV, etc.). All plates shall be oversized jumbo type.

1. Flush mounted plates: Beveled type with smooth rolled outer edge, stainless steel type 302 with brushed finish. Pass and Seymour Sierra SO Series.

2. Surface box plates, beveled, galvanized steel, pressure formed for smooth edge to fit box.

3. Weatherproof plates: Pass and Seymour Sierra WP Series.

4. Telephone and Data outlet coverplates shall be of a type that will provide a means of permanent labeling. No “stick on” labels are acceptable.

1.05 INSTALLATION

A. Switches:

1. Where more than one switch is indicated in the same location switches shall be gang mounted under a common plate.

2. Center line of switches in general, shall be set 3'-6" above the floor (off position down) and shall clear the door trim or corner by 4" or center the space occupied.

3. Architectural plans shall be consulted before placing switches so they will in every case be located on the strike side of the door and clear door, chair, window, and baseboard moldings.

4. Switches shall be screwed tight to the boxes and shall not depend on the cover plate to pull them tight.

B. Receptacles:

1. Conductors shall be looped around the terminal screws, "DO NOT BACK WIRE DEVICES."

2. Receptacles shall be grounded by the green wire bond and shall be pigtailed as shown on the drawings.

3. Receptacles shall be screwed tight to the plaster ring or outlet box and shall not depend on the device plate to pull them tight.

4. Center line of general use receptacles shall be in general, set 18" above the floor with receptacle mounted in the vertical position and with grounding pole at the top.

5. Coordinate receptacle height with Architectural drawings and locate so that bottom of receptacle plate shall be 1" above counter or back splash and clear all moldings.

6. Center line of receptacles located adjacent to lavatories in toilets shall be set 3'-6" above floor.

7. Receptacles serving water coolers shall be located within cooler housing or as close to bottom of housing as possible. Cord serving unit shall be as short as possible. In no case shall cord or receptacle be seen from normal viewing angle.

8. All receptacles installed in bathrooms, toilets, within 4 feet of lavatories or sinks or on building exterior shall be ground fault circuit interrupter type.

C. Plates:

1. Plates shall be level and all edges shall be in full contact with wall.

2. Plates shall be furnished for all devices and other outlets indicated on the drawings.

3. Install plates on outlet boxes and junction boxes in unfinished areas above ceilings and on surface mounted outlets.

4. Plates shall not be used to keep devices secure.

5. Plates shall be clean and free from dust, plaster or paint and spots.

6. Plate shall cover openings around outlets.

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END OF SECTION 26 0500

SECTION 26 0700
DISCONNECT SWITCHES

1.01 SUBMITTALS

A. Shop drawings shall be submitted and shall consist of manufacturer's published literature.

1.02 MANUFACTURERS

A. Acceptable manufacturers are:

1. Square "D" Company
2. G. E.
3. I.T.E.
4. Cutler Hammer

1.03 EQUIPMENT

A. Disconnect switches shall be provided for all motors and strip heaters located out of sight of motor controller, and where specifically indicated on the drawings. Disconnect switches shall disconnect all ungrounded conductors. When exposed to weather, enclosure shall be NEMA – 4X as shown. Switches shall be installed to be fully accessible in accordance with Article 110-16 of the National Electrical Code.

B. All disconnects shall be heavy duty type and shall be equipped with neutral bar bonded to the can for grounding purposes.

C. For single phase motors, a single - or double-pole toggle switch with pilot light and overload protection, rated only for alternating current, will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating. Enclosed safety switches shall be horsepower rated in conformance with Table III of Fed. Spec. W-D-865. Switches shall disconnect all ungrounded conductors.

D. Each disconnect serving exterior A/C units shall be equipped with a padlock (Master 3206) all keyed alike.

E. All disconnects shall be equipped with provisions to lock the handle in the OFF position.

F. All disconnects shall be fused in accordance with the name plate data on the unit.

G. Install fuses so that ampere rating can be read without having to remove fuses.

H. All fuses shall be as noted in Section 26 0150.

I. Disconnects shall be identified as required under Section 26 0700.

J. Maintain 3'-0" clearance in front of disconnect having voltage rating of 250 volts and 4'-0" clearance in front of disconnect having voltage rating of 480 volts. Do not locate disconnect over other electrical equipment (re: transformers).

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END OF SECTION 26 0700

SECTION 26 1000

PULL BOXES, JUNCTION BOXES AND FITTINGS

1.01 PULL BOXES AND JUNCTION BOXES AND FITTINGS

A. Boxes shall be provided in the raceway systems wherever required for the pulling of wires and the making of connections.

B. Pull boxes of not less than the minimum size required by the National Electrical Code Article 370 shall be constructed of code-gauge galvanized sheet steel. Boxes shall be furnished with screw-fastened covers. Covers on flush wall mounted boxes in well appointed areas (offices, reception, classrooms, media center, etc) shall be minimum 1/16 302 stainless steel. Boxes located on the exterior of the building shall be watertight. Covers shall be secured with tamper proof screws.

C. Boxes shall be securely and rigidly fastened to the surface of which they are mounted or shall be supported from structural member of the building either directly or by using a substantial and approved metal rod or brace.

D. All boxes shall be so installed that the wiring contained in them can be rendered accessible without removing part of the building.

E. Where several circuits pass through a common pull box, the circuits shall be tagged to indicate clearly their electrical characteristics, circuit number and designation.

F. Allow eight inches minimum of spare conductors in all junction and pull boxes for future use. Do not pull conductors straight through.

G. All boxes with unused knockouts removed shall be plugged.

H. Maximum pull distance between pull boxes shall be maximum 180 feet, or as required by the 2020 National Electrical Code.

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END OF SECTION 26 1000

SECTION 26 1100
GROUNDING

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract documents including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Section.

1.02 SUMMARY

A. The work required under this section of the specifications consists of furnishing, installation and connections of the building secondary grounding systems. Exterior branch circuit wiring and feeder conductors extended beyond the building are included. The building electrical system shall be a 3 phase, 4 wire grounded wye delta system supplemented with equipment grounding system. Equipment grounding system shall be established with equipment grounding conductors; the use of metallic raceways for equipment grounding is not acceptable.

1.03 QUALITY ASSURANCE

A. Industry Referenced Standards: The following specifications and standards are incorporated into and become a part of this Specification by Reference.

1. Underwriters' Laboratories, Inc. (UL) Publications:

No.44 Rubber-Insulated Wire & Cables
No.83 Thermoplastic-Insulated Wires
No.467 Electrical Grounding & Bonding Equipment
No.493 Thermoplastic-Insulated Underground Feeder & Branch Circuit Cables
No.486 Wire Connectors and Soldering Lugs

2. National Electrical Manufacturers' Standards (NEMA):

WC-5 Thermoplastic Insulated Wire & Cable
WC-7 Cross-Linked-Thermosetting Polyethylene Insulated Wire

3. National Fire Protection Association Publication (NFPA):

No.70 National Electrical Code (NEC)
No.76B Safe Use of Electricity in Patient Care Areas of Hospitals
No.99 Health Care Facilities

B. Acceptable Manufacturers: Products produced by the following manufacturer which conform to this specification are acceptable.

1. Hydraulically applied conductor terminations:

a. Square D
b. Burndy
c. Ilsco
d. Scotch (3M)
e. Thomas and Betts (T&B)
f. Anderson

2. Mechanically applied (crimp) conductor terminations:

a. Scotch (3M)
b. Ideal
c. Thomas and Betts (T&B)
d. Burndy

PART 2 - PRODUCTS

2.01 GENERAL MATERIALS REQUIREMENTS

A. Provide all materials under this section of the specifications. All materials shall be new.

B. All materials shall be UL listed and bear a UL label.

C. Refer to the specific specification section for the description and requirements of materials mentioned herein for installation.

2.02 GROUNDING CONDUCTORS

A. Grounding electrode conductor shall be bare or green insulated copper conductor sized as indicated on the drawings.

B. Equipment grounding conductors shall be green insulated type THHW, XHHW conductors sized as indicated on the drawings. Where size is not indicated on the drawings, conductor size shall be determined from the National Electrical Code table of sizes of equipment grounding conductors.

C. Bonding jumpers shall be flexible copper bonding jumpers sized in accordance with the National Electrical Code table on sizes of equipment grounding electrode conductors.

2.03 TRANSFORMERS & MOTOR CONTROLLERS

A. Provide a conductor termination grounding lug bonded to the enclosure of each transformer and motor controller.

B. Provide a neutral bar with bonding screw in each disconnect for grounding purposes.

2.04 DEVICES

A. Each receptacle and switch device shall be furnished with a grounding screw connected to the metallic device frame. Bond equipment grounding conductor to each outlet box. For isolated ground receptacles, bond equipment grounding conductor to box, and isolated ground conductor to device grounding screw.

2.05 GROUND RODS

A. Ground rods shall be 3/4" x 10'-0" copper clad steel. Provide (3) ground rods in a triangular pattern 10 ft. apart for the service grounding electrode.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ground all non-current carrying parts of the electrical system, i.e., wireways, equipment enclosures and frames, junction and outlet boxes, machine frames and other conductive items in close proximity with electrical circuits, to provide a low impedance path for potential grounded faults.

B. Service entrance and separately derived electrical systems, grounding electrode system.

1. The neutral conductor of the electrical service serving the premises wiring system shall be grounded to the ground bus bar in the service equipment which shall be grounded to the cold water system, the ground rod system, and other grounding electrodes specified herein or indicated on the drawings. Grounding electrode conductors shall be installed in rigid, non-metallic conduit to point of ground connection, unless subject to physical damage in which case they shall be installed in galvanized rigid steel. Where metallic conduit is permitted, bond conduit at both ends to grounding electrode conductor with a UL bonding bushing.

2. Make connection to main water line entering the building. Make connections ahead of any valve or fittings whose removal may interrupt ground continuity. Install a bonding jumper of the same size as the grounding conductor around the water meter.

3. Bond together the following systems to form the grounding electrode system. All system connections shall be made as close as possible to the service entrance equipment and each connected at the service entrance equipment ground bus. Do not connect electrode systems together except at ground bus.

a. Cold water piping system
b. Ground rod system
c. Structural steel metal building frame, see detail on drawings.
d. Main re-bar in a foundation footing, for a concrete structure

4. Ground the neutral of all dry type transformers as indicated on the drawings.

5. Grounding electrode connections to structural steel, reinforcing bars, ground rods, or where indicated on the drawings shall be with chemical exothermic weld connection devices recommended for the particular connection type. Connections to piping shall be with UL listed mechanical ground clamps.

6. Where more than one service serves a building or interconnected buildings, connect each service equipment ground bus together with a #4/0 copper conductor in PVC conduit.

7. Bonding shall be in accordance with the National Electrical Code.

8. Install ground rods where indicated on the drawings with the top of the ground rods 24" below finished grade.

C. Equipment Grounding Conductor

1. Grounding conductors shall be provided in all branch circuit raceways and cables. Grounding conductors shall be the same AWG size as branch circuit conductors.

2. Grounding conductors for feeders are typically indicated on the drawings and the raceway is sized to accommodate grounding conductor shown. Where grounding

conductor size is not indicated on the drawings, conductor shall be in accordance with the equipment grounding conductor table of the National Electrical Code.

3. A grounding conductor shall be installed in all flexible conduit installations. For branch circuits, grounding conductor shall be sized to match branch circuit conductors.

4. A feeder serving several panelboards shall have a continuous grounding conductor which shall be connected to each related cabinet grounding bar.

5. The equipment grounding conductor shall be attached to equipment with bolt or sheet metal screw used for no other purpose. Where grounding conductor is stranded, attachment shall be made with lug attached to grounding conductor with crimping tools.

6. Ground all motors by drilling and tapping the bottom of the motor junction box with a round head bolt used for no other purpose. Conductor attachment shall be through the use of a lug attached to conductor with a crimping tool.

7. Equipment grounding conductors shall terminate on panelboard, switchboard, or motor control center grounding bus only. Do not terminate on neutral bus. Provide a single terminals lug for each conductor. Conductor shall terminate the same section as the phase conductors originate. Do not terminate neutral conductors on the ground bus.

C. Other Grounding Requirements

1. Each telephone SCADA backboard or enclosure shall be provided with a No.6 grounding conductor. When backboard is located in vicinity of electrical service equipment, the "point of grounding" of this conductor shall be the main cold water service with connections made ahead of any valves or joints. Remote backboards shall use building steel as "point of grounding". Terminate conductor by stapling to backboard.
2. At each building expansion joint flexible copper bonding jumpers shall be attached to building structure by exothermic weld process. Install bonding jumpers in concealed locations that will not subject connections or jumpers to physical abuse. Install 100' on centers across expansion joints.
3. Lighting fixtures shall be grounded with a green insulated ground wire secured to the fixture with a UL listed bond lug, screw, or clip specifically made for such use.

3.02 TESTING

A. Upon completion of the ground rod installation, grounding resistance reading shall be taken before connection is made to the building cold water piping system. Ground resistance readings shall not be taken within forty-eight hours of rainfall. Results of ground resistance readings shall be forwarded, in writing, immediately to the Architect and Owner.

END OF SECTION 26 1100

SECTION 26 1200

EQUIPMENT IDENTIFICATION

1.01 SUBMITTALS

A. Submit sample of laminated plastic identification plate with lettering.

1.02 MATERIALS

A. Laminated plastic plates with 3/8" high white letter etched on black background for 120/208 volt equipment (white letter with red background for 277/480 volt equipment).
B. Plates shall be permanently mounted utilizing pop rivets.
C. Painted, stenciled or indented tape identification is not acceptable.

1.03 ITEM IDENTIFICATION

A. All electrical apparatus such as wiring troughs, panelboards, individual circuit breakers, transformers and disconnect switches shall have laminated plastic identification plates. Identification shall match labeling shown on plans.
B. A "steel" circuit directory frame, and a directory card with a plastic covering shall be provided on the inside of each panel door. The directory shall be typed to identify the load fed by each circuit and the areas served. Spaces or room numbers shown on the drawings are not necessarily the final numbers to be assigned to these areas. The Contractors shall before completion of the project obtain from the Architect final space or room numbers so that it can be typed onto directory.
C. Circuit breakers and disconnects shall identify the equipment served and circuit and panel from which it is served.
D. On all panelboards the exterior identification plate shall match that on the drawings and the panel and circuit number serving the panel shall be designated within the panel.

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END OF SECTION 26 1200

SECTION 26 1600
TRANSIENT VOLTAGE SURGE SUPPRESSORS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Electrical and mechanical drawings for the TVSS shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.

B. The manufacturer shall furnish an equipment manual with installation, operation, and maintenance instructions for the specified unit.

C. Documentation of unit's UL 1449 suppression rating shall be included as required product data submittal information.

D. The contractor shall provide detailed compliance exception statements to all provisions of this specification ten (10) days prior to the bid date.

1.02 MANUFACTURERS

A. For the purpose of selecting quality and type of TVSS units, equipment as manufactured by Current Technology Inc. has been specified. The following manufacturers meeting these specifications are acceptable.

1. Liebert
2. Lea International
3. Surge Suppression, Inc.
4. APT
5. Intermatic

B. The manufacturer shall provide a Limited Five-Year Warranty, from the date of installation, against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's recommended installation, operation and maintenance instructions.

1.03 GENERAL

A. These specifications describe the electrical and mechanical requirements for a high-energy suppression filter system utilizing transient voltage surge suppression (TVSS) for application in Category C (Main Service Entrance) and Category B (Distribution Panels) areas as defined by the IEEE C62.41 standard.

B. The specified unit shall provide effective high energy **transient voltage clamping and surge current diversion** for all electrical modes of equipment connected downstream from the facility's main distribution panel or main over current device. The unit shall be designed for parallel connection to the facility's wiring system.

C. All Category B (distribution panels) shall include a high frequency attenuation filter for all modes of protection the TVSS is providing.

D. The unit shall include, but not be limited to, an engineered solid-state high-performance suppression system, utilizing Selenium Cells and/or arrays of fused non-linear voltage dependent Metal Oxide Varistors (MOV).

E. The suppression system shall not utilize gas tubes, spark gaps, or any other components which might short or crowbar the line, thus leading to interruption of normal power to connected loads. The suppression system shall not incorporate non-field replaceable fusing,

circuit boards, plug-in or quick-connect connections as part of any surge current carrying path.

F. All internal wiring associated with the suppression filter system and subject to surge currents shall utilize low-impedance copper bus bar and/or copper conductor or equal. All internal connections associated with the suppression/filter system and which are subject to surge currents shall be made with compression type solder less lugs and shall be bolted in place.

G. The unit shall be connected to the panel or switch gear by means of a circuit breaker as specified on the drawings or as recommended by the manufacturer. An integral fused disconnect shall not be furnished with the unit unless otherwise specified.

H. Units shall be provided in a NEMA 1 type enclosure constructed of minimum 14 gauge steel, painted inside and out with rust inhibiting paint. Surface or flush mount enclosures are specified on the drawings.

I. The unit shall be installed as close as practical to the wiring system in accordance with applicable national/local electrical codes and the manufacturers recommended installation instructions. Maximum 6' connections shall be made with copper conductor and shall not be any longer than is reasonably necessary, avoiding unnecessary bends. When possible, current carrying conductors between the panelboard and the suppression unit shall be twisted together.

J. The unit shall include mechanical lugs for each phase, neutral and ground, where applicable. The lugs shall accommodate up to a 1/0 AWG copper conductor.

K. The unit shall include externally mounted visual indicators that monitor the on-line status of each phase of the unit (L.E.D.s, neon lamps, etc.).

L. The unit shall include Form C dry contacts (N.O. or N.C.) to facilitate connection to a building management system in order to monitor the on-line status of the unit. The contacts shall be combination normally open, normally closed and shall operate upon failure of the suppression system. Also include a display event counter.

M. The unit shall include the manufacturer's nameplate and UL inspection labels on interior of cabinet.

1.04 STANDARDS

A. The specified unit shall be designed, manufactured and tested in compliance with the following standards:

1. American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.41-1991 and C62.45-1987).
2. National Electrical Manufacturers Association (NEMA).
3. National Fire Protection Association (NFPA 70 [NEC], 75, and 78).
4. Underwriters Laboratories (UL 1449 and 1283).

B The maximum continuous operating voltage (MCOV) or threshold voltage of all suppression components utilized in the unit shall not be less than 125% of the facility's nominal operating voltage for 120 volt systems and not less than 115% of the facility's nominal operating voltage for 208, 277, and 480 volts.

C. Based on ANSI/IEEE C62.41-1991's standard 8/20 microsecond current waveform, and in accordance with NEMA Publication No. LS 1-1992, the tested single-pulse surge current capacity, in amps, of the unit shall be no less than the following:

MODE OF PROTECTION	L-N	L-G	N-G
Main Service Panel:	150,000	150,000	150,000
Total Capacity per Phase =	300,000		
Distribution Panels:	60,000	40,000	40,000
Total Capacity per Phase =	120,000		

D. The unit shall be UL 1449 Listed as a Transient Voltage Surge Suppressor.

E. The unit shall be factory tested following IEEE C62.41 and C62.45 guidelines without failing or degrading the UL 1449 Surge Suppression Rating by more than 10%.

F. Manufacturer shall provide proof of independent third party testing in accordance with NEMA Standard LS 1-1992; the suppression unit shall provide protection modes as follows:

1. Five (5) modes of protection for a single phase configuration:

   - Line-to-Neutral (2)
   - Line-to-ground (2)
   - Neutral-to-ground (1)

2. Seven (7) modes of protection for a three phase wye configuration:

   - Line-to-Neutral (3)
   - Line-to-Ground (3)
   - Neutral-to-Ground (1)

The environmental operating parameters for the unit shall meet or exceed the following conditions:

1. Operating temperature range shall be -40 to +60 C (-40 to +140 F).

2. Operation shall be reliable in an environment with 5% to 95% non-condensing relative humidity.

3. The unit shall not generate noise levels in excess of 10dB, "A" weighted.

4. No appreciable magnetic fields shall be generated. Unit shall be capable of use directly in computer rooms in any location without danger to data storage systems or devices.

For purposes of quality assurance, the unit shall be "burned-in" at the factory, applying nominal voltages for which a particular unit is designed.

G. A list of customer-replaceable spare parts where applicable shall be included in the unit's documentation set.

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END OF SECTION 26 1600