Castleberry Independent School District
5228 Ohio Garden Rd. • River Oaks, Texas 76114 • (817) 252-2000
DeAnne M Page, Executive Director of Financial Services

Competitive Sealed Proposal
Kitchen Renovation Contractors
CSP# 23-001

Castleberry Independent School District (Castleberry ISD) is soliciting Competitive Sealed Proposals for Kitchen Renovation Contractors per the specifications stated elsewhere in this solicitation document. Request for Bid Proposals marked CSP# 23-001 are to be submitted to:

Jessica Martinez, PROPOSAL Coordinator
Castleberry ISD
Administration Building
5228 Ohio Garden Road
Fort Worth, Texas 76114

Proposals will be received at the above address until 1:00 PM CST, on or before May 9, 2023. CSP will be publicly opened at 1:00 PM on May 9, 2023.

CSP must be submitted in sufficient time to be received and time-stamped at the above location on or before the published date and time shown on the CSP. Castleberry ISD will not be responsible for mail delivery. CSP received after the published time and date cannot be considered. FAXED Proposals will not be accepted.

Bidders must submit Proposals in the form of the executed Proposal Form together with any material required by any addendum to the CSP by the time and date specified. All Proposals must remain open for thirty (30) days from the Proposal date, pending acceptance by Castleberry ISD.

Castleberry ISD's buyer for this Proposal is Jessica Martinez, PH (817)252-2029. Questions concerning the proposal can be sent to the following email address: purchasing@castleberryisd.net

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TERMS AND CONDITIONS

Kitchen Renovations Contractors

CSP# 23-001

1. The term of the agreement is that the work will commence on May 17, 2023 with utilities and finishes completed by August 1, 2023 and substantial completion by September 30, 2023.
2. There will be a Contractor On-site Meeting on Friday May 5th, 2023 at 9:30 AM at the Castleberry High School cafeteria, located at 215 Churchill Rd Fort Worth, TX 76114 and at 10:15 AM at the CISD Gary S. Jones Administration Building, located at 5228 Ohio Garden Rd.
3. Transfer of assignment of contract by vendor is prohibited. CSP must give the full firm name and address of the responder. Failure to manually sign CSP will disqualify it. Person signing an CSP should show TITLE or AUTHORITY TO BIND THEIR FIRM IN A CONTRACT.
4. Castleberry ISD is exempt from Federal Excise Tax. DO NOT INCLUDE TAX IN CSP. Excise Tax Certificate furnished upon request. Castleberry ISD State Tax Exemption Certificate number 1-75-6004526-6.
5. Cash Discounts with terms less than 30 days will not be considered in the awarding of CSP. CSP will be tabulated as net.
6. The Castleberry ISD Board of Education reserves the right to accept or reject all or any part of any CSP, waive minor technicalities and award the CSP to best serve the interests of the Castleberry ISD.
7. In the event no funds or insufficient funds are appropriated and budgeted or are otherwise available in the next fiscal year for obligation herein provided, Castleberry ISD can terminate this agreement with a thirty (30) day written notice.
8. If at any time, the vendor fails to fulfill or abide by the terms, conditions, or specifications of the agreement, the Castleberry ISD reserves the right to cancel the agreement with a thirty (30) day written notice to the vendor at the address indicated on the CSP.
9. Castleberry ISD requires compliance with Executive Order 11246, titled Equal Employment Opportunity, as amended by Executive Order 11375, and as supplemented in the Department of Labor regulations (41 CRF Part 60).
10. All terms and conditions contained in the agreement shall be incorporated into any future agreements relating to the CSP between the vendor and Castleberry ISD.
11. Any material and equipment should be proposed new with the freight and shipping costs included in the Proposal price.
12. **Failure to submit a response may result in your company being deleted from the bid list.**
13. Each bidder shall furnish the information required by the Proposal documents and submit them with their proposal. The Bidder shall sign the Bid Proposal Form, the Felony Conviction Notice, Non-Boycott and return them with their offer. The person signing the documents must initial erasures or other changes. Proposals signed by an agent are to be accompanied by evidence of his authority unless such evidence has been previously furnished to Castleberry ISD.

14. Submission of Proposals: CSP must be submitted on the Proposal Form only. Each CSP shall be placed in a separate envelope. Be sure the envelope is completely and properly identified. CSP must be received in the Business Office **BEFORE** the date specified.
    A. Proposals that are received late will be **UNOPENED** and disqualified from consideration.
    B. CSP unit prices on quantity specified – extend and show total. In case of errors in extension, **UNIT** prices shall govern.
    C. CSP Proposals must be firm for 30 days.
    D. **Please submit three (3) copies along with the original CSP.**
15. The responsibility for compliance with this solicitation and the subsequent contract shall be with the bidder.
16. Bidders are expected to provide prompt service that is due under this contract including warranties. Past performance of bidders may be a factor in awarding future contracts.
17. Bidders are expected to deliver product(s) per specifications.
18. If the person, owner or operator of the business entity has been convicted of a felony, the person or entity submitting the offer must give written notice to the district at the time of offer submission.
19. Castleberry ISD shall have the right to terminate for default all or any part of this contract if the bidder breaches any of the terms hereof or if the bidder becomes insolvent or files any petition in bankruptcy. Such right of termination is in addition to and not in lieu of any other remedies which Castleberry ISD may have in law or equity, specifically including, but not limited to, the right to collect for damages or demand specific performance. Castleberry ISD additionally has the right to terminate this CSP without cause by delivery to the vendor of a "Notice of Termination" specifying the extent to which performance hereunder is terminated and the date upon which such termination becomes effective.

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Proposal Sheet
Kitchen Renovation Contractors
CSP# 23-001

We, at _____ propose to provide the general contractor for the Kitchen Renovations.

I have read and understand the proposal specifications as listed herein and agree to these requirements. I/We agree to furnish goods and/or services in strict compliance and conditions contained in this document for purchase of **Kitchen Renovation Contractors.**

_____ _____
Signature of Authorized Representative Name (Print)

_____ _____
Date

_____
Name of Firm

_____
Address, City, State & Zip

_____ _____
Telephone Fax

_____
Email Address

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Inter-Local Co-Operative/Co-Operatives
Kitchen Renovation Contractors
CSP# 23-001

We (your firm) are current members of the following Inter-Local Co-Operative/Co-Operatives List pricing available with any/all entities.

- TASB
- BUYBOARD
- TRASS (Formerly TBPC)
- TCPN
- TIPS
- ESC REG XI

Please list any other purchasing cooperatives you are associated with

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Proposal Sheet
Kitchen Renovation Contractors
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_____ _____
Signature of Authorized Representative Name (Print)

_____ _____
Date

_____
Name of Firm

_____
Address, City, State & Zip

_____ _____
Telephone Fax

_____
Email Address

Castleberry Independent School District
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Inter-Local Co-Operative/Co-Operatives
Kitchen Renovation Contractors
CSP# 23-001

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- TASB
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- ESC REG XI

Please list any other purchasing cooperatives you are associated with

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FELONY CONVICTION NOTIFICATION
Kitchen Renovation Contractors
CSP# 23-001

State of Texas Legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (a), states "a person or business entity that enters into a contract with a school district must give advance notice to the District if the person or owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony."

Subsection (b) states "a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract".

This notice is not required of a publicly-held corporation.
Please complete the information below.

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony convictions has been reviewed by me and the following information furnished is true to the best of my knowledge.

Vendor's Name: _____

Authorized Company Official's Name (Please print or type):

_____

A. My firm is a publicly-held corporation; therefore, this reporting requirement is not applicable.
Signature of Company Official: _____
Date

B. My firm **is not** owned nor operated by anyone who has been convicted of a felony.

Signature of Company Official: _____
Date

C. My firm **is** owned or operated by the following individual(s) who has/have been convicted of a felony:
Name of Felon(s):_____
_____
Details of Conviction(s):_____
_____
_____

Signature of Company Official: _____ Date_____

COMPLETED & SIGNED FORM MUST BE RETURNED WITH BID

Castleberry Independent School District
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Affirmation of Non-Boycott Israel Statement
Kitchen Renovation Contractors
CSP# 23-001

Company Name:_____

affirms that it does not and will not boycott Israel during the term of this contract.

Signature of Company Official: _____

Date_____

COMPLETED & SIGNED FORM MUST BE RETURNED WITH BID

Castleberry Independent School District
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STATEMENT OF NON-COLLUSION AND NON-DISCRIMINATION

Kitchen Renovations Contractors

CSP# 23-001

My signature certifies that the accompanying Bid/Proposal

1. Is not the result of, or affected by an unlawful act of collusion with another person or company engaged in the same line of business or commerce, or any act of fraud punishable under current local, state, and/or federal ordinances, statutes, regulations and/or policies. Furthermore, I understand that fraud and unlawful collusion are crimes under Federal Law, and can result in fines, prison sentences, and civil damage awards

1 This bid/proposal has not been knowingly disclosed, and will not be knowingly disclosed to any other bidder, competitor, or potential prior to the opening of bids or proposals for this project

2 No attempt has been or will be made to induce any other person, partnership, or corporation to submit or not submit a bid proposal

Furthermore

1. During the performance of any contract awarded, the Seller will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, or handicaps, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operations of the Seller. The Seller agrees to post in conspicuous places, available to employee and applicants for employment, notices setting forth the provisions of this non-discrimination clause

1 The Seller, in all solicitations or advertisements for employees placed by or on behalf of the Seller, will state that such Seller is an equal opportunity employer

2 Notices, advertisements and solicitations placed in accordance with Federal Law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section

3 The Seller shall include the provisions of the foregoing paragraphs 1, 2, and 3 in every subcontract or purchase order over $10,000.00 so that the provisions will be binding upon each subcontractor or vendor

I hereby certify that I am authorized to sign as a Representative for the Seller and I am fully informed regarding the accuracy of the statements contained in this certification, and that the penalties herein are applicable to the bidder as well as to any person signing on his/her behalf

NAME OF SELLER_____

ADDRESS_____

CITY, STATE, ZIP_____

NAME (PRINT)_____

AUTHORIZED SIGNATURE_____

TITLE_____ DATE_____

TELEPHONE_____ FAX_____

EMAIL ADDRESS_____

COMPLETED & SIGNED FORM MUST BE RETURNED WITH BID

Castleberry Independent School District
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VENDOR DEBARMENT STATEMENT

Kitchen Renovations Contractors

CSP# 23-001

I have read the conditions and specifications provided in the bid/proposal document attached. I affirm, to the best of my knowledge, the company I represent has not been debarred or suspended from conducting business with school districts in the state of Texas or from receiving a federally funded contract under the Federal OMB, A-12, common rules. This certification is required by the regulations implementing Executive Order 1259, debarment and suspension 7 CFR part 3017, section 3017 510, Participants responsibilities. The regulations were published as Part IV of the January 30th, 1989 Federal Register (pages 4722 - 4733). Copies of the regulation may be obtained by contacting the Department of Agriculture Agency from which this transaction originated.

Name of Company/Firm_____

Mailing Address_____

City/State/Zip_____

Email address_____

Prepared By_____

Company Official's Printed Name_____

Company Official's Signature_____

Title_____

Telephone_____ Fax_____

Date_____

COMPLETED & SIGNED FORM MUST BE RETURNED WITH BID

EPCNT

EDUCATIONAL PURCHASING COOPERATIVE OF NORTH TEXAS

INTERLOCAL AGREEMENT CLAUSE

Several governmental entities around the Castleberry Independent School District have indicated an interest in being included in this contract. Should these governmental entities decide to participate in this contract, would you (the vendor) agree that all terms, conditions, specifications, and pricing would apply?

Yes_____ No_____

If so, (the vendor) check yes, the following will apply

Governmental entities utilizing Internal Governmental contracts with Castleberry Independent School District will be eligible, but not obligated, to purchase materials/services under the contract(s) awarded as a result of this solicitation. All purchases by governmental entity other than Castleberry Independent School District will be bill directly to that governmental entity and paid by that governmental entity. Castleberry Independent School District will not be responsible for another governmental entity's debts. Each governmental entity will order its own material/service as needed.

For information regarding the Educational Purchasing Cooperative of North Texas, please visit their website at the following address http://www wpcnt com/INDEX htm

Company Name _____
(type or print)

Title if Authorized Representative_____
(type or print)

Signature of Authorized Company Official _____

Date Signed _____

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

_____ _____

Signature of vendor doing business with the governmental entity Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

Castleberry Independent School District
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(817) 252-2000

CISD New Vendor Request Form

Vendor Name: _____

Mailing Address: _____

_____

Accounts Receivable
Contact Name: _____

Direct Line/Extension: _____

Email Address: _____

Where to send Purchase Orders: _____

Phone: _____

Fax: _____

Castleberry ISD is now offering payment by ACH direct deposit to all Accounts Payable vendors. Payments by ACH are deposited directly into your bank account. A notification of the upcoming deposit is sent by email, with the same memo information that would appear on a check stub. If you would like your payment to be made by Electronic Funds Transfer through ACH, please complete Sections 1-3 of the form below, sign in Section 3, and return to the Purchasing department by email at purchasing@castleberryisd.net, by fax at 817-252-2098, or by mail at 5228 Ohio Garden Rd., River Oaks Texas 76114.

Accounts Payable Electronic Fund Transfer Agreement (EFT)

(PAYMENT BY ACH)

Section 1- Vendor Information

Name:
Address:
City/State/Zip: Phone:
Last 3 digits of Fed ID or SSN (to verify vendor identification):
Email Address for Notification of Deposit (required):

Section 2 – Bank Account Information (contact bank ACH department for correct routing number)

Financial Institution Name:
Financial Institution Address:
Routing Number for ACH:
Depositor Account Number:
Type of Account: _____ Checking _____ Savings
Type of Account: _____ Business _____ Personal

Section 3 – Authorization

I authorize Castleberry ISD to credit my account with the depository named above. If the district should erroneously deposit funds into my account, upon notification by the district I will authorize the necessary debit entries to correct the error, not to exceed the amount deposited in error.
This authorization will remain in effect until the district has received written notification from me that it is to be terminated.
Signature **Date**:

Section 4 – DECLINATION

I do **NOT** wish to setup ACH payments at this time. Should I decide to have Castleberry ISD deposit payments into my bank account at a future date, I will contact the Purchasing Dept to complete the necessary paperwork.
Signature **Date:**

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

► **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

Give Form to the requester. Do not send to the IRS.

Print or type. See **Specific Instructions** on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ►

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	**Signature of U.S. person** ►	**Date** ►

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting,* later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

2. You do not certify your TIN when required (see the instructions for Part II for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code,* later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships,* earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code,* later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester,* later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.SSA.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/Businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. Go to *www.irs.gov/Forms* to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to *www.irs.gov/OrderForms* to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code,* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor[2]
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee[1]
b. So-called trust account that is not a legal or valid trust under state law	The actual owner[1]
6. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity[4]
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships,* earlier.

***Note:** The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov.* You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at *spam@uce.gov* or report them at *www.ftc.gov/complaint.* You can contact the FTC at *www.ftc.gov/idtheft* or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see *www.IdentityTheft.gov* and Pub. 5027.

Visit *www.irs.gov/IdentityTheft* to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

OWNER
Castleberry Independent School District
817-252-2000
www.castleberryisd.net

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

GENERAL NOTES

1. CONSTRUCTION DOCUMENT COORDINATION:
A.) REVIEW ALL DRAWINGS AND SPECIFICATIONS FOR COMPLETE REQUIREMENTS AS COORDINATION IS REQUIRED BETWEEN VARIOUS PORTIONS OF THE WORK. (EXAMPLE: REFER ARCHITECTURAL DRAWINGS FOR LOCATING PLUMBING, & ELECTRICAL.)

2. DIMENSIONS:
A.) DO NOT SCALE DRAWINGS UNLESS AUTHORIZED BY ARCHITECT FOR SPECIFIC ITEMS.
B.) DIMENSIONS ARE TYPICALLY SHOWN TO CENTERLINE OF COLUMN, FACE OF METAL STUD (NOT FACE OF DRYWALL), OR FACE OF CONCRETE UNLESS SPECIFICALLY NOTED OTHERWISE.
C.) DIMENSIONS ARE TO BE CAREFULLY REVIEWED BY CONTRACTORS AND DISCREPANCIES REPORTED TO ARCHITECT FOR CORRECTION BEFORE PROCEEDING WITH THE AFFECTED AREA OF THE WORK.
D.) COORDINATE OPENINGS REQUIRED FOR ITEMS SUCH AS DOORS, WINDOWS,ETC. WITH SCHEDULED SIZE. VERIFY ANY AND ALL EXISTING OPENING SIZES PRIOR TO FABRICATION.

3. DRYWALL:
A.) ALL GYPSUM BOARD SHALL BE TYPE 'X' EXCEPT AS OTHERWISE REQ'D FOR TESTED ASSEMBLY RATING.

4. PENETRATIONS / EXPANSION JOINTS:
A.) MECHANICAL PENETRATIONS THRU FIRE RATED PARTITIONS OR FLOORS ARE TO BE PROVIDED WITH FIRE DAMPERS. (REFER TO MECHANICAL DRAWINGS.)
B.) ROOF PENETRATIONS - LOCATE INDIVIDUAL PENETRATIONS WITH 12 INCH MINIMUM CLEARANCE FROM EACH OTHER AND ALL WALLS AND CURBS. PITCH PANS WILL ONLY BE ALLOWED WHERE UNAVOIDABLE AND SPECIFICALLY APPROVED BY THE ARCHITECT.
C.) PENETRATIONS THRU WALLS FLOOR CEILING/ROOF WHICH ARE FIRE RATED (AS NOTED OR SCHEDULED) ARE TO BE SEALED AIR TIGHT WITH FIRE RATED SEALANT PER SPECIFICATION.

INDEX OF DRAWINGS

ARCHITECT
WRA Architects, Inc.
214-750-0077
www.wraarchitects.com

FOOD SERVICE
Bosma Design Solution, Inc.
972-822-6350
www.bosmadesign.com

MPE ENGINEER
Estes, McClure & Associates, Inc.
903-581-2677
www.estesmcclure.com

REGISTERED ARCHITECT — STATE OF TEXAS — 4-19-23

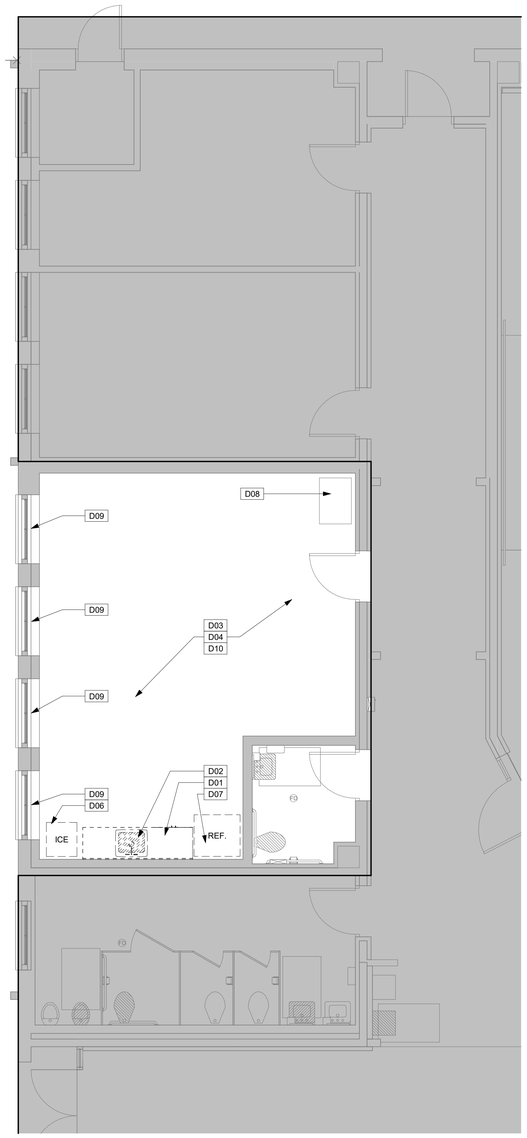
PROJECT NAME:
CASTLEBERRY ISD ADMIN. KITCHEN

PROJECT ADDRESS:
5228 Ohio Garden Road, Fort Worth, TX 76114

JOB NO. 2320
DATE: April 18, 2023

Cover Sheet

G001



1 Demolition Floor Plan
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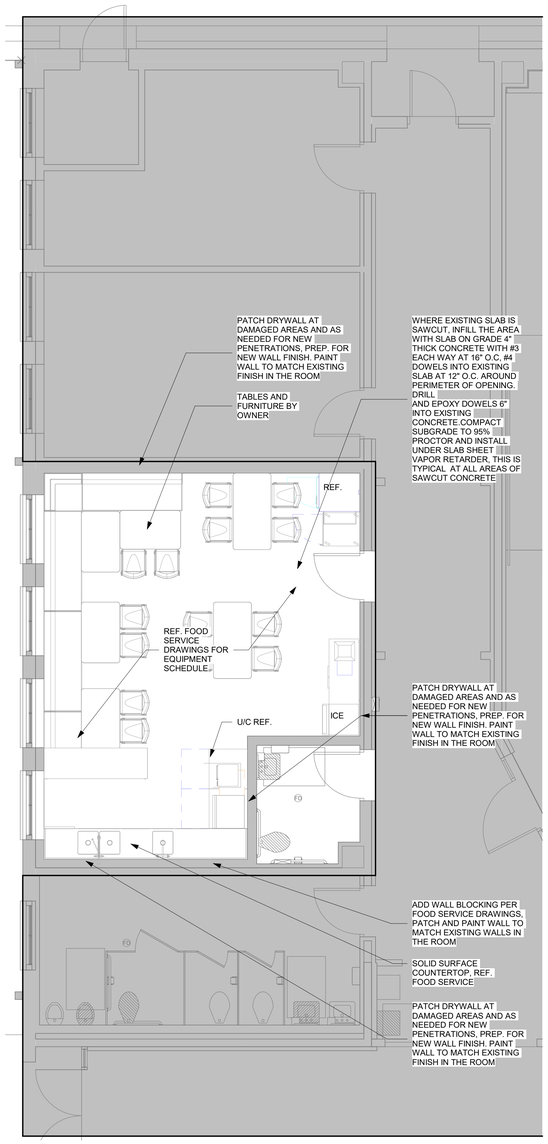
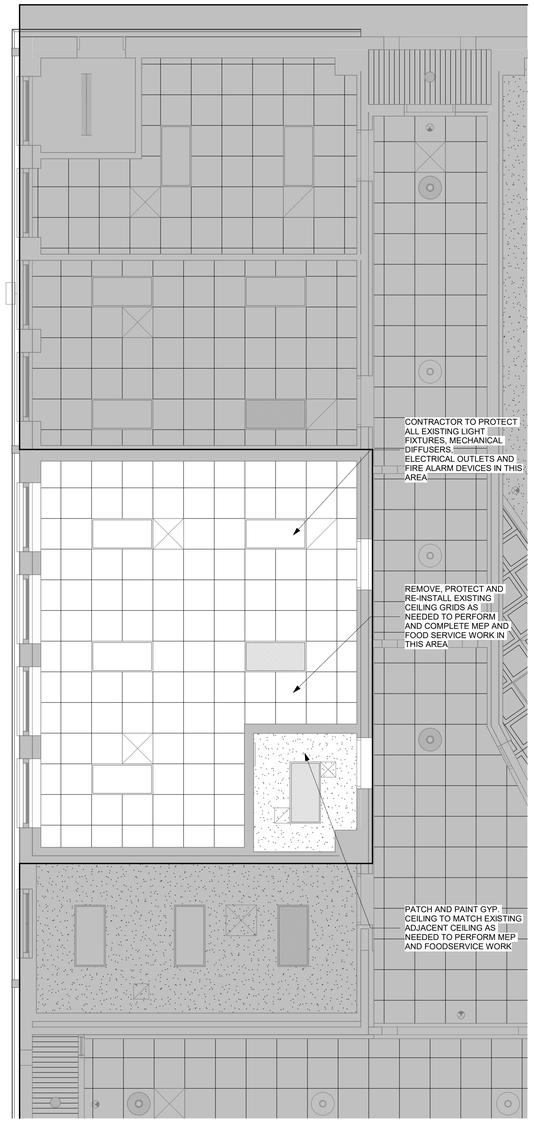
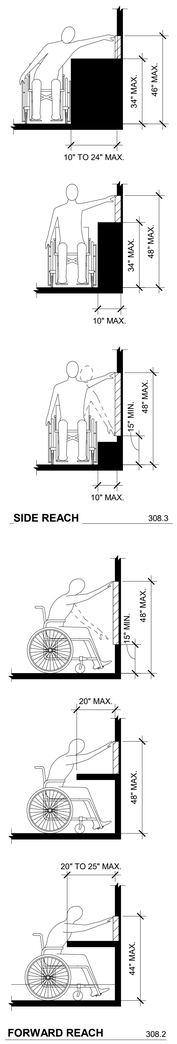


2 Floor Plan
1/4" = 1'-0"



3 Reflected Ceiling Plan
1/4" = 1'-0"



ACCESSIBLE REACH RANGES
3/8" = 1'-0"

GENERAL DEMOLITION NOTES

1. ITEMS TO BE REMOVED ARE SHOWN THUS:

2. ALL MATERIALS INDICATED TO BE DEMOLISHED ARE TO BECOME PROPERTY OF THE CONTRACTOR AND ARE TO BE REMOVED FROM THE PROPERTY PROPERLY AND DISPOSED OFF-SITE IN A LEGAL MANNER UNLESS NOTED OTHERWISE.

3. COORDINATE WITH OWNER AND ARCHITECT FOR SCHEDULING OF DEMOLITION OF VARIOUS ELEMENTS OF PAVING AND OTHER STRUCTURES TO FACILITATE CONTINUED FUNCTIONS OF SCHOOL FACILITIES.

4. ANY DAMAGE TO SURROUNDING AREAS THAT OCCURS DURING DEMOLITION ARE TO BE REPAIRED AND RESTORED TO ORIGINAL CONDITION.

5. PROTECT AND RE-INSTALL EXISTING WINDOW WALL COVERINGS ONCE WORK IN THE AREA IS COMPLETED

6. EXISTING EXPANSION JOINT COVERS TO BE REMOVED AND PROTECTED FOR REINSTALLATION, THOSE DAMAGED DURING REMOVAL TO BE REPLACED.

7.ALL LIGHTS, HVAC DIFFUSERS, ELECTRICAL OUTLETS, AND FIRE ALARMS IN THE AREA OF WORK SHALL BE PROTECTED AND MAKE-SAFE DURING CONSTRUCTION ACTIVITIES.

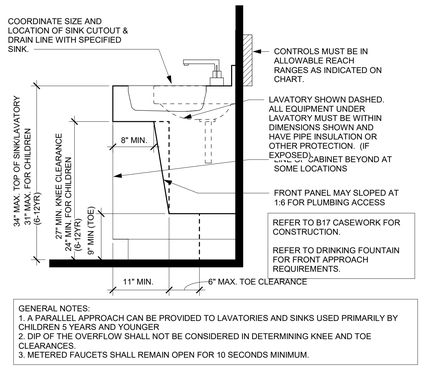
- D01 REMOVE EXISTING CASEWORK, COUNTERTOP AND BACKSPLASH
- D02 REMOVE EXISTING LAVATORY
- D03 REMOVE EXISTING FLOOR FINISH & BASE. PREPARE FLOOR FOR NEW FINISH. NEW FINISH TO BE OWNER FURNISHED AND OWNER INSTALLED
- D04 SAWCUT CONCRETE FOR NEW PLUMBING PIPES AND FLOOR DRAIN. REF. TO MPE DRAWINGS FOR LOCATION OF ALL PLUMBING WORK THAT WILL REQUIRE SAWCUTTING
- D06 REMOVE EXISTING ICE MAHCINE AND RETURN TO OWNER
- D07 REMOVE EXISTING REFRIGERATOR AND RETURN TO OWNER
- D08 REMOVE AND RETURN EXISTING VENDING MACHINE TO OWNER
- D09 REMOVE THE EXISTING WINDOW COVERINGS DURING CONSTRUCTION, RE-INSTALL THE WINDOW COVERINGS ONCE WORK IN THE AREA IS COMPLETE. CONTRACTOR TO TAKE ALL MEASURES TO PROTECT THE WINDOW COVERINGS
- D10 REMOVE EXISTING CEILING TILES AS NEEDED TO COMPLETE WORK IN THIS AREA. RE-INSTALL CEILING TILES ONCE WORK IS COMPLETED. CONTRACTOR TO TAKE ALL MEASURES TO PROTECT THE EXISTING CEILING TILES IN THE AREA

SPECIFICATIONS

1.1 INTERIOR GYPSUM BOARD
- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.
  1. Products: Subject to compliance with requirements, provide one of the following:
     a. American Gypsum; 5/8 inch FireBloc Type X Gypsum Wallboard.
     b. CertainTeed Corporation; Type X Gypsum Board.
     c. Continental Building Products, LLC; Firecheck Type X.
     d. Georgia-Pacific Building Products; ToughRock Fireguard X Gypsum Board.
     e. National Gypsum Company; Gold Bond Brand Fire-Shield Gypsum Board.
     f. United States Gypsum Company; USG Sheetrock Brand Firecode X Gypsum Panels.
  2. Thickness: 5/8 inch (15.9 mm) or 1/4 inch where indicated on Drawings.
  3. Long Edges: Tapered.

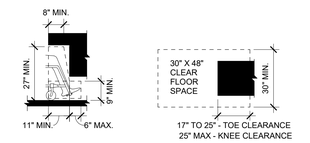
1.2 JOINT TREATMENT MATERIALS
- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  1. Interior Gypsum Board: Paper.
  2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
     a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use drying-type, all-purpose compound.
  4. Finish Coat: For third coat, use drying-type, all-purpose compound.

1.3 PAINT
- A. Material Compatibility:
  1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.



GENERAL NOTES:
1. A PARALLEL APPROACH CAN BE PROVIDED TO LAVATORIES AND SINKS USED PRIMARILY BY CHILDREN 5 YEARS AND YOUNGER
2. DIP OF THE OVERFLOW SHALL NOT BE CONSIDERED IN DETERMINING KNEE AND TOE CLEARANCES.
3. METERED FAUCETS SHALL REMAIN OPEN FOR 10 SECONDS MINIMUM.

ACCESSIBLE SINK AND LAVATORY 306.1, 606.2
1" = 1'-0"



ACCESSIBLE TOE & KNEE CLEARANCE
3/8" = 1'-0"

THESE DIAGRAMS REPRESENTS WRA'S INTERPRETATION OF THE 2010 ADA & 2012 TEXAS ACCESSIBILITY STANDARDS AND SHOULD BE USED FOR GUIDANCE ON THE PROJECT. THE CONTRACTOR IS STILL RESPONSIBLE FOR ADHERING TO ALL ADA, TAS AND TDLR REQUIREMENTS

WRA Architects, Inc.
12377 Merit Dr. #1800
Dallas, Texas 75251
214-750-0077
www.wraarchitects.com

REGISTERED ARCHITECT STATE OF TEXAS 32703 4-19-23

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

No.	Date

JOB NO. 2320
DATE: April 18, 2023

Demolition Plan, Floor Plan, RCP

A201

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GENERAL CONDTION NOTES TO ALL CONSTRUCTION TRADES AND DESIGN TEAM

HEALTH DEPARTMENT NOTES:

1. New exhaust hoods will be constructed to meet the following standards, "NSF, UL, and NFPA-96". New Hoods to bear UL Classified Label without dampers in exhaust vent collars. Hoods are designed to meet or exceed 50 FPM capture velocity at the cooking surface edge and have 1'-0" minimum overhang at all exposed cooking area.

2. Cooking equipment under exhaust hood are either on casters with flexible utility quick disconnects with Safety-Set or fixed on stainless steel legs and sealed to walls with clear silicone sealant. Safety-Set is a positioning system for mobile cooking equipment under a hood. NFPA codes 17A (5.6.4) and 96 (12.1.2.3) require that a means be present to ensure cooking equipment in always positioned in its design specified location in relation to fire suppression and ventilation systems during cooking operations.

3. Dishwasher will be designed as high temperature wash system with a wash temperature of 140-degree Fahrenheit minimum and a final rinse temperature of 180-degree Fahrenheit minimum.

4. The exhaust duct system (design by mechanical engineer provided by mechanical contractor) by G.C. shall be provided with an automatic fire extinguishing system per code. Refer to mechanical engineer's drawings on all duct work, exhaust fans, MAU, scrubber, and control systems when required.

5. Shut-off valves, required as part of the fire suppression system for gas and/or electric cooking equipment, under or adjacent to the hoods, should be provided by G.C. As required per governing jurisdiction and local and/or state codes.

6. Refrigeration equipment shall have thermometers which are easily readable, in proper working condition and accurate, within arrange of plus or minus two (2) degrees.

7. Countertop equipment not readily movable, weighing over 75 pounds, will be provided with legs or feet at least 4" high.

8. Chemical injection systems must be installed downstream from a vacuum breaker or air gap, to prevent possible back siphonage of the chemicals into water line system.

9. Cutting boards and work surfaces shall be of non-wood construction.

10. An aisle space of thirty (36") inches or more shall be provided within all work and storage areas or what local codes require.

11. Backsplashes of equipment shall be sealed to the walls with clear silicone.

12. Vacuum breakers, when used, to be minimum of six (6") inches above the flood level rim with no shut off devices beyond the discharge of the vacuum breaker.

13. Provide a minimum of 50-foot candles of lighting in all food preparation, cooking and dish washing areas. Lighting is to be shielded over exposed food and utensil areas. Provide a minimum of 50-foot candles of lighting over food serving and pickup area.

14. Handwashing facilities are required for food preparation, serving and/or utensil washing area and will be shown on the kitchen equipment floor plan.

15. Openings in construction will be sealed to within 1/32 of an inch.

16. The use of sealants must be listed as approved by the National Sanitation Foundation (NSF) under standard C-2.

17. Sealants may be used only in structurally sound joints and seams. Sealants may not be utilized in food and splash contact surfaces, to fill open spaces or voids which result due to improper fabrication. Any opening more than 1/8 inch shall be considered excessive and must be closed using proper field joint.

18. Opening around service and utility lines should be closed as far as possible with collars, grommets and flexible from gaskets. Sealants may not be used to seal service and utility lines to walls or adjacent pieces of equipment.

19. Plumbing Contractor to furnish and install RPZ's per code. Refer to Engineer's drawings for specifications and all requirements.

20. Plumbing Contractor to furnish and install eye wash station per code. Refer to Engineer's drawings for specifications and all requirements unless otherwise noted.

21. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.

22. A food service establishment or any other business discharging grease, oil or other similar materials shall have an operable grease trap, grease interceptor or other comparable device(s) as determined by local code and the city's chief building inspector to be an adequate substitute for a grease trap or grease interceptor. All drains from food preparation and cleanup areas including, but not limited to, prewash sinks, floor drains, food waste disposal units, pots and pans sinks, scullery sinks, and garbage can wash areas shall be connected to such trap or interceptor. The size of a grease trap or grease interceptor shall be as determined by local code and designed by Engineer of record on project.

TYPICAL HEALTH/HYGIENE- REQUIREMENTS

1. What follows are typical requirements from review authorities within food/beverage storage, preparation, and service zones. These are for reference-only and final finishes should be available on the Architect's and/or Interior Design documents.
   a. Flooring surfaces/systems should be smooth, non-slip with commercial-grade durability, made of non-absorbent material, and easily cleanable in all the following zones:
   b. Where food is prepared, packaged, and stored
   c. Where utensils are washed and staged
   d. Where refuse is stored and staged
   e. Within janitor rooms and lien storage areas
   f. Within washroom and hand washing areas

2. Flooring surfaces should be coved at the intersection of the floor and wall with 1/2" minimum radius and should extend up the wall minimum of six inches (6") in all foodservice space. Mastic-applied vinyl is not acceptable.

3. Floor drains should be installed in zones for general cleaning and washdown areas. Additional drains should be installed in floors that are more frequently sprayed-down in the cleaning process. Whole room flooring should be sloped to the drain 1/16" per foot or within a six-foot (6'-0") radius. Refer to Consultant floor drain detail if design calls for spot location floor drains.

4. Wall and ceiling finishes within all foodservice zones where food is stored, prepared, picked-up and stated should be durable, smooth, non-absorbent, impervious, and washable. Wall and ceiling finishes within food preparation and utensil washing areas should be light-colored with durability equal to demand. Wall finishes on interior surfaces of walk-in refrigeration cavities should also be light-colored with durability equal to demand. Cement board with Fiberglass Reinforced Panel finish is typical minimum wall finish in all preparation/wash-up zones. Wall areas adjacent to bar sinks should be smooth and easily cleanable. Conduits of all types should be installed within walls; when installed on surface of walls, they should be shrouded to facilitate ease of cleaning.

5. Lighting in every zone where food is prepared, processed, or packaged or where utensils are cleaned should be provided in an intensity of no less than 50-foot candles as measured 30" above the finished floor, except the working surfaces of bars and bar work-boards where at least 10 foot-candles of light are required. Required light source must be shrouded with shatter-proof covers.

6. Exhaust ventilation should be provided at or above all electric or gas cooking equipment and dishwashers that utilize hot water or chemicals for sanitization per local, regional, and national code. Exhaust ventilation may be required above hot beverage equipment – confirm with local code. Washrooms, dressing rooms should be vented to the atmosphere by means of an openable, screened window, and air shaft or switch-activated exhaust fan per local building codes.

7. Foodservice facility should be constructed, and maintained and operated to prevent entrance of animals, birds and vermin including rodents and insects.

8. Delivery doors leading to the exterior should be self-closing and open outward. Vestibules are typically required where large double-doors may enter-into a food preparation area. All exterior doors should be provided with an overhead air curtain, air curtain should produce a downward and outward airflow not less than three inches (3") thick at the nozzle with an air velocity no less than 1600FPM across entire opening.

9. Circulation- minimum of thirty-six inches (36") is required for all aisles and working areas within foodservice and beverage preparation zones.

10. Hand washing sinks with single-use towels and hand cleanser should be provided within, or adjacent to, washrooms and should be equipped with an adequate supply of hot/cold running water. A dedicated hand washing station should be provided within each food preparation zone.

11. Restrooms for use by foodservice employees should be provided and should have a self-closing door and not open directly into food prep area.

12. Ware Washing machines using hot water or chemical sanitizing rinse must conform to applicable National Sanitation Foundation (NSF) standards and shall be installed and operated in accordance with those standards.

13. All cold storage space must be equipped with a thermometer that is easily readable and in proper working condition.

14. Equipment installation- all equipment must meet National Sanitation Foundation (NSF) design and installation requirements. All foodservice equipment should be easily moveable, light enough to be easily moved by one (1) person or installed on a raised minimum six inches (6") rounded stainless steel legs or sealed to a minimum four inches (4") stainless steel or galvanized steel channel base filled with lightweight concrete with minimum 1/2" coved radius. If on an island, equipment should overhang the base at least three inches (3"), but not more than the height of the base. Sealing to the finished floor is acceptable for equipment designed to be on level with floor such as roll-in refrigerator/freezers, large blast chiller/freezers, roll-in ovens, and proofers.

15. Gaps between equipment base and top of channel base should be sealed with non-hardening silicone sealant. All equipment on counters, tables and shelves that are not easily moved are to be installed on approved 4" legs or sealed to table, shelf, etc. (Verify with local code). All fabricated equipment, flashing, and back splashes must be sealed to walls and abutting equipment or moved away from adjacent fabricated equipment minimum of 3" or adjacent wall minimum of 6". Dipper wells with running water should be provided for ice cream/frozen dessert with scooping required.

ARCHITECT'S AND OWNER'S NOTES

1. Pertinent preliminary and updated cad or reproducible Architectural background base sheets at intermediate intervals and phases of the project when necessary to communicate a spatial description of the foodservice areas and/or any changes to the space which will affect the work of the Consultant.

2. Project information provided by the Architect of Record including:
   a. Project directory including all primary code and jurisdictional authorities, Consultants, Designers, Engineers, Architects, Contractors, and Owner's representatives.
   b. Initial foodservice equipment estimated budget.
   c. Project CAD/Revit, graphic and quality control standards, and policies.

3. Pertinent building construction details, mechanical, electrical, plumbing, and structural characteristic of the building or site, which affect the work of the Consultant.

4. Architect/Owners' design standards for foodservice materials and equipment.

5. Foodservice operations program and planning documents outlining the following:
   a. Menu and operational concepts.
   b. Staffing requirements and hours of operations.
   c. Anticipated types, numbers, and frequencies of persons to utilize operation.
   d. Objectives of the foodservice operation.
   e. Special materials, production, and delivery requirements.
   f. Historical data for current operations.
   g. Spatial program for all foodservice areas.

6. Owner operational and maintenance standards.

7. Architects/Owners schedule and budget for the project. Architects/Owners is required to provide written approval on design development phase and equipment selection.

8. The Architect/Owner will render decisions in a timely manner pertaining to design and document submittals prepared by the Consultant to avoid unreasonable delays in the orderly and sequential progress of the Consultant's work. Owner's agent or representative shall issue any instructions, approvals, changes, modifications, or directives to the Consultant in writing.

9. The Architect shall provide the Consultant with a complete set of contract documents and/or a set of all Contract Documents pertaining to this portion of the work for his records at no cost to the Consultant. In addition, the Consultant shall be provided with copies of all bids for this part of the work, contracts, correspondence, change orders, and other documentation, which may affect the work performed by the Consultant.

10. The Architect/Owner shall be responsible for submission of food service drawings to the proper governing authorities for code review and compliance. If Consultant contract is direct with the Owner, it is the Owner's responsibility to notify the Architect of their responsibility to submit for permit and review.

11. The Architect/Owner shall be responsible for reviewing each phase of the project and communicate to consultant to proceed forward to next phase according to project schedule. Consultant will move on to the next phase as an approval from Architect/Owner with no delays.

12. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.

GENERAL CONTRACTOR NOTES:

1. The following scope of work are excluded from Kitchen Equipment Contractor's scope of work. General Contractor or equivalent contractor other than the Kitchen Equipment Contractor (KEC) to provide the following below.

2. General Contractor and their trades are responsible for reviewing all the Food Service Consultant's construction documents (this includes 114000 specifications). Food facility requirement notes, and all other notes are to be considered as part of these notes. General Contractor to provide as they apply.

3. General Contractor to cut and provide holes through ceiling, roofs, walls, and floors for ducts, refrigeration lines, etc. in accordance with local fire and building codes and in accordance with duct sizes specified. General Contractor to provide the resealing of all holes (including the "mopping-in" of fan curbs and roof jacks.) General Contractor to provide all duct fire separation enclosures, wrappings, etc. as may be required by local building and fire codes. (See Notes Below)

4. General Contractor to provide all duct chases/shafts from hood to Fan, sized and constructed, conforming to jurisdictional codes. Install a leveled platform on the roof for remote compressors, exhaust fans, MAU, and scrubbers. Verify all locations with architect's and/or engineer's drawings. Provide weatherproof covers for all outdoor equipment, comply with equipment requirements and code requirements.

5. Where noise or vibration producing equipment (dish machine, disposer, etc.) is located adjacent to dining areas and/or any public areas, provisions should be made by the General Contractor to soundproof common walls.

6. All roof curb and roof jacks to be provided, located, and installed by GC including resealing of roof and roof penetrations.

7. Sleeves and conduits to be provided by GC in walls, floors, and ceiling for lines (drains, refrigeration, beverage, fire suppression, etc.) to pass through and G.C. to reseal after lines are run. All conduit to meet local codes - see detail on K sheets.

8. General Contractor to provide access to hoods at area above hoods for mounting of hood supports. If access is not provided, General Contractor to provide hood supports. All roof curb and jacks to be provided, located, and installed by GC, including resealing of roof and roof penetrations. General Contractor to provide structurally engineered support for all equipment hanging from ceiling.

9. General Contractor to provide sprinkler heads in walk-in boxes if required and to adequately protect against freezing.

10. Provide door wall openings and or passages to assure access for all kitchen equipment and front-end items. Coordinate sizes with KEC Removal of window glass, window frames, doors and door frames and center post for entry of equipment shall be the responsibility of the General Contractor and at no expense to KEC if necessary.

11. General Contractor to provide and install all wall backing per drawings and locations coordinated by KEC.

12. All dimensions shown are measured from guidelines, finished walls, floors, ceilings, and/or column to center lines of studs or outlets. Allowance shall be made for miscellaneous obstructions, structures, venting, electrical, plumbing, and thickness of finishes when framing and/or roughing-in as required.

13. When equipment is noted as existing it is the responsibility of respective trade to confirm existing utility requirements.

14. When equipment is noted by vendor, utility requirements should be verified by respective trades to confirm utility requirements. Most of this information may be sourced by the owner.

15. General Contractor shall keep the working area free from debris of all kinds and shall remove all rubbish resulting from the work being done by them. When the work is completed, contractor shall leave the premises in a clean and finished condition. General Contractor to provide waste container at job site for KEC.

16. Provide walk-in cooler/freezer depressions, if required. Refer to shop drawings and "K Sheets". Then finished flooring to continue within both cooler and freezer. Recessed floors for walk-in coolers and freezer as indicated on plans. Including floor insulation (if walk-in manufacturer does not provide panel flooring) and perimeter thermal breaks where indicated. Perimeter thermal breaks where indicated. Recessed floors to be level, trowel smooth and backfill depressions after walk-in box has been erected. Refer to shop drawings for dimensions and details.

17. General Contractor to provide enclosures from top of walk-in to ceiling, if required.

18. Refrigeration rack pad or curb as detailed and sized on manufacturer's shop drawing, including metal cap/flashing and pitch pockets.

19. Provide coved base-molding or coved integral floor material at all vertical surfaces for kitchen and food prep floors, per jurisdiction code.

20. All metal curbs included with equipment shall be sealed and waterproofed to floor, tiled and /or sealed to equipment by GC. Cove base and interior cove in walk-in boxes to be provided by GC unless otherwise specified by KEC.

21. Concrete curbs/housekeeping pad for equipment as indicated on plans. Curbs/Pad to be level and trowel smooth. All measurements are from finished floor or walls.

22. Provide minimum 50-foot candles of light in all food preparation and storage areas.

23. Walls and ceilings of food preparation and storage shall be smooth, washable, light in color. Refer to Architect/interior designer's drawings.

24. 3" x 3" x 1/4" angle steel support system (CSS) at, or maximum 18" above ceiling at area indicated on plans for F.S.E.C. to attach hanger rods for hoods or attach ceiling mounted shelves or pot racks.

25. General Contractor to block out slab floor troughs and back fill with cement after troughs have been installed by Plumbing Contractor.

26. General Contractor to allow for finished floor when forming curbs.

27. "K SHEETS" drawings are provided for the sole purpose of locating equipment requirements only and do not relieve the General Contractor or Subcontractor of the responsibility of complying with all applicable codes. Please see Architect's drawings for all other requirements and codes.

28. It is the responsibility of the Owner, Architect and/or General Contractor to inform the KEC in writing of all changes and all addendums to plans which are made prior to and during construction. KEC assumes no responsibility for equipment deviations of size and/or utilities from lack of this information. The Owner will be responsible for all cost incurred by failure to give KEC notice of changes.

29. Last dated revisions void all previous plans. It is the responsibility of the Owner, Architect and/or General Contractor to inform and provide all updates to the KEC. Any discrepancies between plans and code requirements that may affect the installation, fabrication or overall work in any way shall be brought to the attention of the Kitchen Equipment Contractor (KEC) immediately by the general contractor before start of construction.

30. General Contractor to coordinate with Owner's vendor on all lease equipment regarding utility requirements and installation. This will also include owner furnished equipment but not limited to this.

31. General Contractor to review all of Consultant's construction documents including 114000 written specs and follow the process and procedures set in place by these documents. General Contractor to provide a complete submittal set and wait for the completion of the review process before KEC orders any equipment.

PLUMBING CONTRACTOR NOTES:

1. All rough ins related to foodservice equipment only. Please see architectural/engineering plans for additional plumbing requirements and codes.

2. Final connections to all equipment to be by Plumbing Contractor. all required tubing, misc. fittings, traps, etc., shall be supplied by the plumbing contractor unless otherwise specified. All exposed plumbing lines(including indirect waste) to be hard copper(connections using lead free solder) and shall be painted with chrome or aluminum paint.

3. Water quality requirement. The recommended minimum water quality standards whether untreated or pretreated, based upon 10 hours of use per day, and a daily blow-down, are as follows:
   a. Total dissolved solids – less than 30 parts per million
   b. Total alkalinity – less than 85 parts per million
   c. Silica – less than 13 parts per million
   d. pH Factor – Greater than 7.0

4. Plumbing Contractor to verify all plumbing rough-ins and location with owner, vendor, or GC on existing equipment or other equipment not provided by KEC.

5. Plumbing Contractor to furnish and install the following as per jurisdictional code:
   a. All water, waste, gas, and steam service to point of rough-in as shown on plan. Rough-in outlets to stub 4" out of walls at height indicated from finished floor to center line of outlet.
   b. Pressure reducing and/or regulating valves for dishwashers, booster heaters, and as otherwise noted, in kitchen areas.
   c. Cold water drains tempering kit as required by jurisdictional code.
   d. All floor sinks, complete with top grates, and removable sediment bucket set flush with finished floor, unless noted or as per local code.
   e. All waste lines, direct and indirect, except as noted, shall be pitched downward. All waste lines shall have adequate clean-out provisions.
   f. Indirect waste lines for walk-in refrigerated/freezers, pitched 1/4" per 12" (minimum) and with a "P" trap at end over floor sink as required by jurisdictional code.
   g. Heater tape, with 35 watts per lineal foot of drain line, and insulation of all drain lines inside freezer compartments.
   h. Install in an accessible location the fire control gas shut-off valve as supplied by Fire Protection System Supplier if gas cooking equipment is used.
   i. Vacuum breakers as required.
   j. Insulation of all steam, hot water, and condensate lines in kitchen.
   k. Clean-out valves for steam condensate and air lines.
   l. All piping condensate and drain lines, to and from equipment, must be kept a minimum of (6") above finished floor to allow for cleaning or prevailing jurisdictional code.
   m. In-line water filters are required for the following equipment (water filter by PC unless otherwise noted): Soda Systems, Ice Machines and Steam Equipment.

6. Plumbing Contractor to interconnect dish machine with booster heater and water-type ventilators with control panels as per manufacturer's instruction, when applicable and noted.

7. All lines routed through equipment shall not interfere with intended use.

8. All line routes shall not Interfere with servicing of equipment.

9. All vent pipes are to be concealed in walls and column chases.

10. Plumbing Contractor is responsible for interconnection between steam equipment and steam generator.

11. Grease trap to be specified and located by Mechanical Engineer and provided and installed by Mechanical or Plumbing Contractor, if required.

12. All plumbing locations are shown at optimum spots. Utilize all existing services where applicable.

13. All plumbing to be concealed within walls where possible.

14. Hot water heater to provide a minimum of 140-degree Fahrenheit water to all kitchen equipment.

15. All dimensions shown are measured from grid lines, finished calls, floors ceilings and/or column to center lines of stubs or outlets. The plumbing contractor shall make allowanced for miscellaneous obstructions such as piping mains, electrical components, structures, venting and thickness of finishes when roughing-in as required.

16. All faucets and/or disposers located on foodservice plan shall be provided loose by KEC and installed by Plumbing Contractor, unless otherwise agreed upon.

17. Hand sinks are to be mounted by KEC/GC (unless otherwise noted) and connected by Plumbing Contractor.

18. These drawings are not to be considered architectural drawings. The data shown on these drawings are reasonably accurate. Exact locations, distances, heights, and levels will be governed by the building and/or field conditions.

19. All work shall comply with the latest jurisdictional codes and all applicable amendments.

20. Where stubbing up out of a floor, piping shall extend a minimum 6" above the finished floor or curb.

21. Hose reel control box to connect in or through valve compartment, Contractor shall stub-up into valve compartment at height indicated on rough-in plan, cap their work, and make final connections after equipment is in place.

ELECTRICAL CONTRACTOR NOTES:

1. The electrical specifications and connections shown on these plans are for foodservice equipment requirements only. It is the responsibility of the Electrical Contractor to consult the Architect's, Mechanical Engineer's, and/or General Contractor's plans and Owner for further building electrical requirements.

2. Access areas and cut-ins on custom and buy-out equipment and fixtures shall be provided by the KEC as required for proper installation of electrical outlets, junction boxes, home runs, etc. The Electrical Contractor shall provide and install shields and extension boxes as required.

3. The Electrical Contractor shall connect all compressors and provide fused disconnects, magnetic starters, and thermos overload protection as required.

4. Vapor proof light fixtures for exhaust hoods shall be furnished by the hood supplier. The Electrical Contractor shall supply and install pull boxes, conduit, wire, bulbs, etc. Provide and connect to a wall mounted switch located per plans, if required.

5. It shall be the responsibility of the Electrical Contractor to interconnect and install light fixtures (provided loose by KEC) as required. Electrical Contractor to supply, install, and connect all drain lines heater tape.

6. Electrical Contractor to interconnect the remote refrigeration compressor, evaporator, T-stat, solenoid, and defrost timer (all controls) where required.

7. All electrical materials including wiring, fuses, conduit, switches, disconnects, magnetic starters, thermos-overload protectors, transformers, electrical panels, cords, plugs, GFCI receptacles(or GFCI breaker), bulbs, etc. shall be supplied by the Electrical Contractor unless specified in these plans or in writing by the KEC.

8. It shall be the responsibility of the Electrical Contractor to provide waterproof power outlet(s) on the roof for exhaust system fan(s) make-up air fan(s) and refrigeration system(s) as required. Low voltage (or common voltage) wiring shall also be supplied and installed by the Electrical Contractor when necessary to control and interconnect the above systems.

9. The Electrical Contractor shall furnish and install all electrical connections as required by applicable codes and ordinances.

10. All dimensions shown on these plans are measured from finished walls, floors, ceilings, and/or column center lines or grid lines to enter lines of outlets and pull boxes. The Electrical Contractor shall make allowances for finishes when roughing-in as required.

11. The Electrical Contractor shall provide and install element contact or relay shut-offs (shunt trip) and/or solenoid shut-off valve and interconnect with the fire suppression system for the cooking equipment, to shut off all equipment automatically in case of fire. Verify with local codes for shutdown of exhaust fan(s) and/or make-up air fan(s) requirements.

12. All 120-volt convenience outlets not designated with specific loads are to be rated 20.0 amps. Electrical Contractor is to confirm any additional outlets as requested by Architect, Owner and/or General Contractor. GFCI as required by code. GFCI receptacles to be readily accessible per the written code in NEC and if not readily accessible per the written words of the code, then GFCI breaker shall be provided.

13. Electrical Contractor to provide caps and cords for all equipment where caps and cords are not standard from manufacturer.

14. Internal wiring and plumbing of fabricated fixtures shall be by the Electrical and/or Plumbing Contractors.

15. Electrical Contractor to provide temporary power to food service equipment contractors' installers, as required.

16. All receptacles and junction boxes to be flushed mounted in walls with stainless steel cover plates, unless noted otherwise. No exposed conduit. Contractors are to provide minimum wall furring if required. Outlets are dimensioned on-center.

17. Where applicable, Electrical Contractor to provide conduit, wiring, install electrical components, and interwire, between the following:
   a. Control panels to ventilators and exhaust/supply fans per manufacturer's instructions
   b. Kitchen exhaust hood/ventilators to fire control system and hood controls
   c. Kitchen printers, POS, monitors, and wireless access points as required.
   d. Sneeze guard lighting
   e. Module counters and components or equipment mounted on counters.
   f. Heat lamps are to be connected through remote controls, pilot lights, etc.
   g. Air curtain and micro switch(s)

18. Electrical Contractor to provide and install all light bulbs (LED) for fixtures, where applicable.

19. All symbols for outlet on walls are indicated at the specific height. Height of outlet is given from finished floor to centerline of outlet.

20. These drawings are not to be considered architectural drawings; the data shown on these drawings are reasonably accurate. Exact locations, distances, heights, and levels will be governed by the building and/or field conditions.

21. All work shall comply with the latest jurisdictional codes and all applicable amendments.

22. Where stubbing up out of the floor, conduit shall extend a minimum of 8" above the finished floor or curb.

23. Electrical Contractor shall pack and seal all exposed J-Box and conduit on walk-in coolers and freezers to prevent internal condensation.

24. Electrical Contractor shall furnish hexagon boxes for fire suppression system pull stations at 48" AFF as specified by Fire Safety Inspector.

25. Electrical Contractor shall provide and install electrical conduit runs for beverage and/or refrigeration lines as indicated on plans. Conduit to have a minimum 30" radius (NO FACTORY "L" S). Provide pull boxes inside walls, floors and/or ceiling as required.

MECHANICAL CONTRACTOR NOTES:

1. Mechanical Contractor to provide fans, duct work, (all welding of hood and duct required) controls, duct collar, final connection(s), hanging of hoods, permits and make-up air equipment, unless otherwise noted. Any seismic engineering required will be supplied by Mechanical Contractor. In Conditions of high deck (exceeding 4ft) GC to provide structural scaffolding to hang hood below at correct height. Refer to manufacturer's shop drawings for exact locations and sizes of duct collars. Provide tempered make-up in all kitchens.

2. Mechanical Contractor to balance exhaust system.

3. All duct collars, cut-outs, and penetrations in hoods to be located and provided by Mechanical Contractor in field.

4. Food Service Consultant only design the exhaust hood and fire protection system, unless otherwise specified. Everything above finished ceiling is by Mechanical Engineer (Exhaust fans, MAU, duct work, scrubber, and control system) and provided by Mechanical Contractor.

5. Food Service Consultant strongly suggests that tempered make-up air (heating and cooling) is provided for all kitchen workspace environment +/- 10 degrees Fahrenheit of the building's average ambient temperature(74-degree Fahrenheit or per local codes).

REFRIGERATION CONTRACTOR NOTES:

1. Refrigeration lines to be installed and protected from damage.

2. Refrigeration Contractor to be responsible for locating and setting in place remote compressors, verify location with applicable parties.

3. Refrigeration Contractor to be responsible for all applicable permitting required by local jurisdiction.

FIRE PROTECTION CONTRACTOR NOTES:

1. Where indicated on drawings, dry or liquid chemical system shall be provided to protect all cooking exhaust hoods, ducts, and cooking appliance against fire and re-flash by a fire control system. The size and number of systems shall be in conformance with N.F.P.A. pamphlet 96, and local and state codes. The system shall be installed by authorized installers.

2. The system shall be automatic actuated or be manually operable at the nozzle release and a remote manual pull operator shall be located as shown on the electrical rough-in drawing. Actuation of the system shall provide automatic gas and/or electric fuel line cut-off.

3. Electrically controlled or manually controlled gas solenoid valve shall be installed by the Plumbing Contractor. The Electrical Contractor shall furnish and install line voltage wiring and conduit from cut-off relay to solenoid valve and connect cut-off relay and solenoid valve as required.

4. Electrical cooking equipment shall be shut-off at the electrical panel by means of shunt trips. Electrical Contractor shall furnish and install shunt trips, line voltage wiring and conduit from fire protecting micro-switch, or equivalent, to panels, to meet all local codes.

5. All handheld fire extinguishers to be provided by General Contractor.

6. All tie-ins to fire safety systems to be the responsibility of Electrical Contractor.

7. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.

MASONRY CONTRACTOR NOTES:

1. All curb dimensions are finished dimensions. Verify face and top finish (where curb is exposed) with Architect, General Contractor and Owner. Concrete curbs/housekeeping pad for equipment as indicated on plans. Curbs/Pad to be level and trowel smooth. All measurements are from finished floor or walls.

2. All curb heights to be taken from finished floor to top of finished curb.

3. All curb dimensions are taken from finished wall to face of finished curb, or from finished face of curb to finished face of curb.

4. Provide a 3/4" radius cove where finished face of curb intersects the finished floor.

5. See plumbing plan(s) for exact location of floor sinks and floor drains. Verify with Plumbing Contractor.

6. Do not scale drawings - use written dimensions shown on "K SHEETS" plans.

KITCHEN EQUIPMENT CONTRACTOR(KEC) NOTES:

1. All foodservice equipment and fixtures furnished and installed shall be as approved by the National Sanitation Foundation (NSF) or as approved by local environmental health authorities.

2. Conduits for refrigeration, beverage, and soda lines are not the responsibility of the foodservice equipment contractor(KEC) but are to be supplied and installed by other.

3. KEC is responsible for sealing any fixtures to wall and closure panels.

4. All equipment is to be properly leveled and pinned to floor as required. All island worktable with any direct connected utilities shall be required to have flanged feet and secured to floor.

5. KEC to review all of Consultant's construction documents including 114000 written specs and follow the process and procedures set in place by these documents. KEC to provide a complete submittal set and wait for the completion of the review process before ordering any equipment.

6. Food Service Consultant only specifies the equipment called out within the equipment schedule on the plan sheets, unless otherwise noted.

ABBREVIATIONS:		ABBREVIATIONS:	
ABV	Above	LDR	Leader
AFF	Above Finished Floor	LT	Light
AMP	Amperage (A)	M	Meter
ARCH	Architect(ural)	MECH	Mechanical
AVG	Average	MEZZ	Mezzanine
BDSI	Bosma Design Solutions, Inc.	MFG	Manufacturer
BEL	Below	MIN	Minimum
BFF	Below Finished Floor	MISC	Miscellaneous
BHP	Boiler Horsepower	MM	Millimeter
BNB	Bag-N-Box (soda system)	MOD	Modify
BTC	Branch to Connection	MDR	Modular
BTF	Branch to Fixture	MSD	Mop Sink Drain
BTU	British Thermal Units per Hour	MTR	Motor
CL	Center Line	MT	Mount
CLR	Clear(ance)	N	North
CNTR	Counter	NIC	Not in Contract
COL	Column	NTS	Not to Scale
CONN	Connect(or) (ion)	NUM	Number
CSWK	Casework	OC	On Center
CNR	Center	OPP	Opposite
CW	Cold Water	OVHD	Overhead
DAB	Dwane A. Bosma	OZ	Ounce
DATA	Data connection	PC	Plumbing Contractor
DCO	Duplex Convenience Outlet	PERF	Perforate(d)
DBL	Double	PERIM	Perimeter
DD1	Direct Drain 1 (options)	PERP	Perpendicular
DEMO	Demolition	PH	Phase
DFA	Drop from Above	PL	Plastic Laminate
DIM	Dimension	POS	Point of Sale
DN	Down	PPH	Pounds Per Hour
DR	Drain	PREP	Preparation
DWG	Drawing	PSI	Pounds Per Square Inch
DWR	Drawer	PTR	Printer
E	East	QTR	Quarter
EC	Electrical Contractor	QTY	Quantity
EL	Elevation Above Finished Floor	QUAD	Quad Outlet
ELEC	Electrical	RECT	Receptacle
ELEV	Elevation	REF	Refrigerator
ENTR	Entrance	REINE	Reinforcing(ment)
EP	Electrical Panel	REQ	Required
EQ	Equipment	RM	Room
EXG	Existing	SCO	Single Convenience Outlet
EXH	Exhaust	S	South
EXT	Exterior	SAN	Sanitation
FAB	Fabrication / Fabricator	SCHD	Schedule
FCSI	Foodservice Consultants Society International	SECT	Section
		SF	Square Foot
FD	Floor Drain	SHT	Sheet
FE	Fire Extinguisher	SL	Soda Line
FFD	Funnel Floor Drain	SLV	Sleeve
FIN	Finish	SP	Switch with pilot light
FL	Full Load	SPEC	Specification(s)
FLR	Floor	SQ	Square
FO	Face Of	SR	Steam Return
FP	Fire Pull	SS	Steam Supply
FR	Floor Receptacle	STD	Standard
FS	Floor Sink	STL	Steel
FSC	Fire Safety Contractor	STOR	Storage
FT	Foot, Feet	SU	Stub Up (Utilities)
FTD	Floor Trough Drain	SUSP	Suspended
HD	Hub Drain	SW	Switch
IW	Indirect Waste	T	Telephone
G	Gas	TEMP	Temperature
GA	Gauge	THRU	Through
GALV	Galvanized	TO	Top Of
GC	General Contractor	TV	Television
GFCI	Ground Fault Circuit Interrupter	TYP	Typical
GPH	Gallons Per Hour	UON	Unless Otherwise Noted
GPM	Gallons Per Minute	UTIL	Utility
GYP	Gypsum Board	V	Voltage (VOLT)
HD	Hub Drain	VBFM	Verify by Field Measurement
HGT	Height	VEN	Vendor
HORZ	Horizontal	VENT	Ventilating
HP	Horsepower	VERT	Vertical
HTR	Heater	VOL	Volume
HW	Hot Water	W	Watts
IN	Inch	W/	With
INT	Interior	W/O	Without
JAN	Janitorial	WD	Washer Drain
JB	Junction Box	YD	Yard
KEC	Kitchen Equipment Contractor	YR	Year
KES	Kitchen Equipment Supplier	&	And
KW	Kilowatts	@	At
LAV	Lavatory	#	Number / Pound

FOOD SERVICE SHEET LIST	
Sheet Number	Sheet Name
K000	GENERAL CONDITION NOTES FOR ALL TRADES AND DESIGN TEAM
K200	WARMING KITCHEN EQUIPMENT PLAN AND SCHEDULE
K201	WARMING KITCHEN EQUIPMENT DRAIN PLAN
K202	WARMING KITCHEN PLUMBING PLAN
K203	WARMING KITCHEN ELECTRICAL PLAN
K204	WARMING KITCHEN WALL BLOCKING PLAN
K205	CUSTOM EQUIPMENT SHOP DRAWINGS

WRA Architects, Inc.
12377 Merit Dr. #1800
Dallas, Texas 75251
214-750-0077
www.wraarchitects.com

REGISTERED ARCHITECT DERRICK YORK 20752 STATE OF TEXAS 4-19-23

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:
No. Date

JOB NO. 1329
DATE: February 22, 2023

GENERAL CONDITION NOTES FOR ALL TRADES AND DESIGN TEAM

K000

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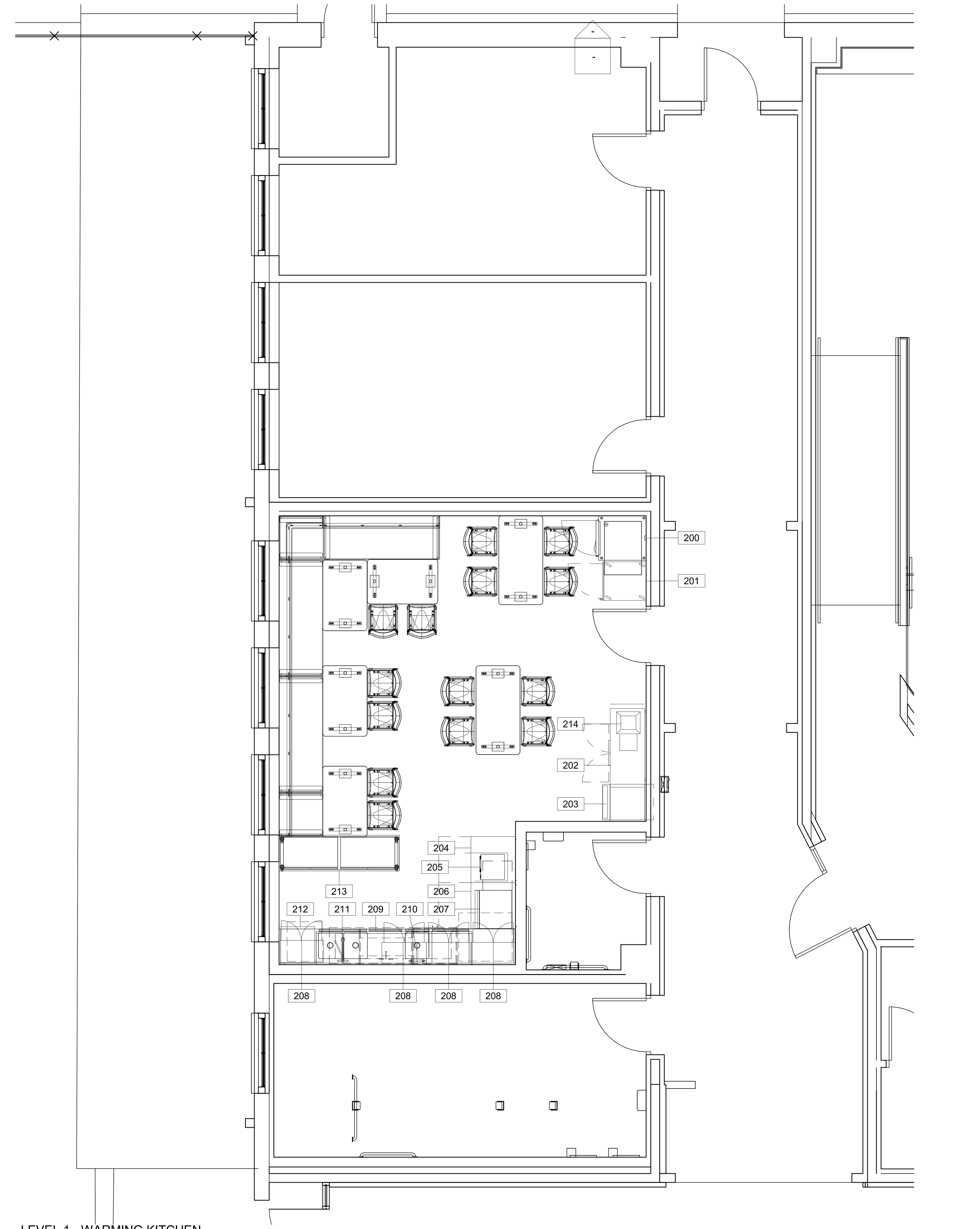
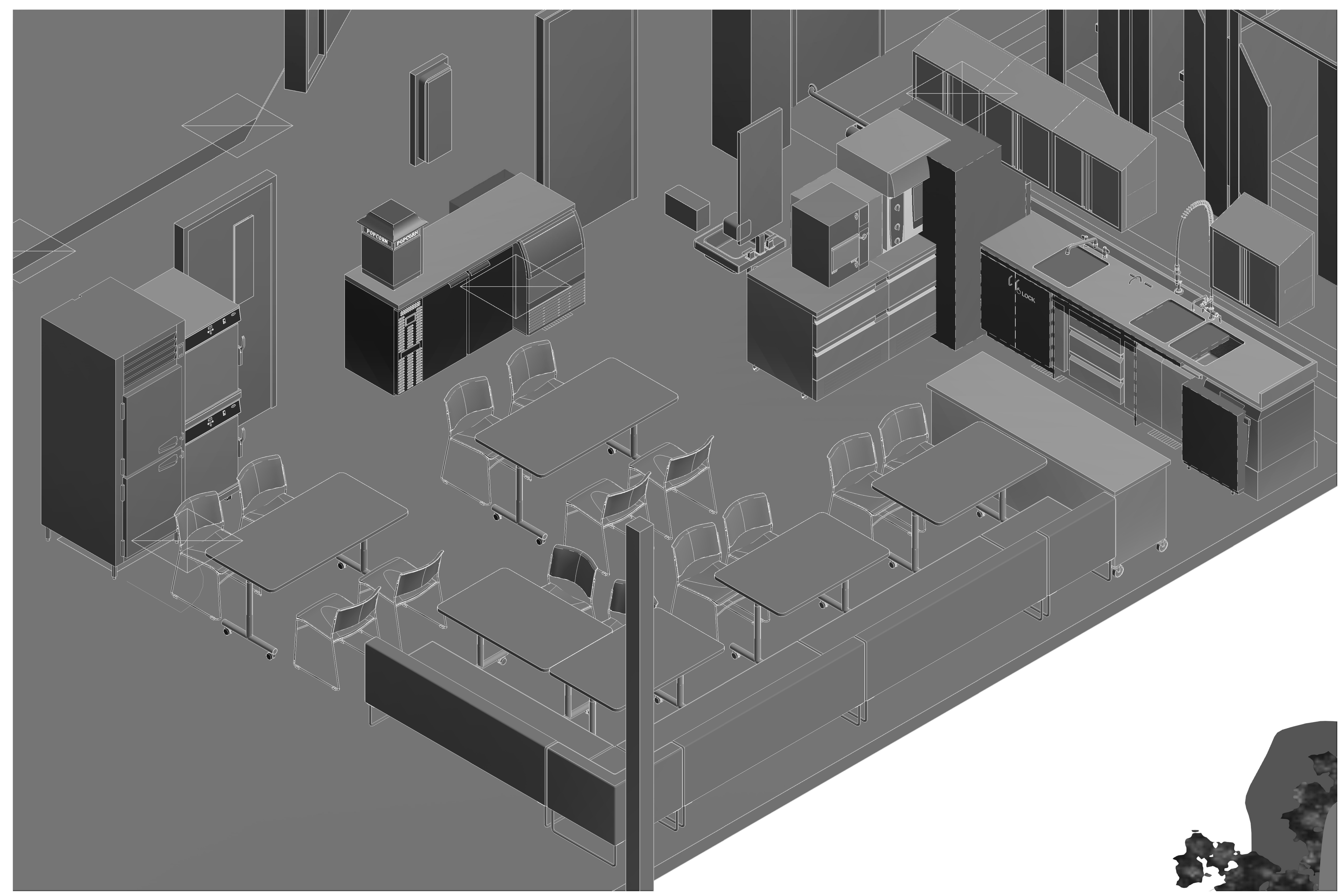


1 LEVEL 1 - WARMING KITCHEN EQUIPMENT PLAN
1/4" = 1'-0"

FOOD SERVICE EQUIPMENT SCHEDULE					
Mark	Count	Description	Manufacturer	Model	Comments
200	1	Refrigerator/Freezer, Dual-Temp	Traulsen	ADT132WUT-HHS	
201	1	FLAV-R-SAVOR, PORTABLE HOLDING CABINET	HATCO	FSHC-7W1-EE_STACKED	
202	1	Back Bar Cooler	Continental Refrigerator	BB50SN	
203	1	Self-Contained Ice Machine	Scotsman	UN324A-1	
204	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
205	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
206	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
207	1	Electrical Combi with Ventless Hood System	RATIONAL AG	CMP XS 6-2/3	
208	4	Wall Cabinets	Eagle Group	WCH-30	
209	1	BACK SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
210	1	Faucet, 8" Centers, Deck Mount, 12" Spout	T&S Brass and Bronze Works, Inc.	5F-8DLX12	
211	1	Pre-Rinse Unit	T&S Brass and Bronze Works, Inc.	B-0113-ADF12-B	
212	1	Warewasher	Hobart	LXeH-1	
213	1	MOBILE SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
214	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	



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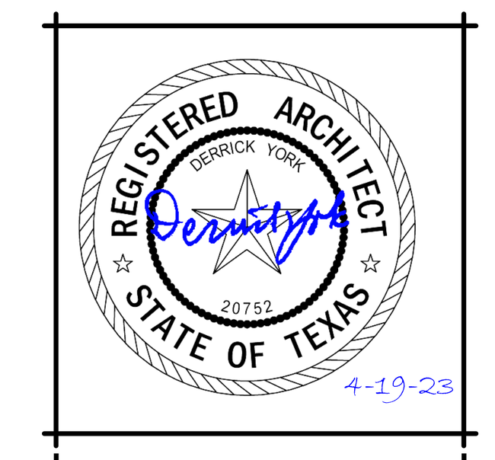
12377 Merit Dr. #1800
Dallas, Texas 75251
214-750-0077
www.wraarchitects.com



CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:
No. Date

JOB NO. 1329
DATE: February 22, 2023

WARMING KITCHEN EQUIPMENT PLAN AND SCHEDULE

K200

1 LEVEL 1 - WARMING KITCHEN DRAIN PLAN
1/4" = 1'-0"

DRAIN SCHEDULE

TAG	UTILITY	SIZE		HEIGHT A.F.F.			CONNECTED TO:/REMARKS
		ROUGH-IN	CONNECTION	FLOOR	WALL	DFA	
DD1	DIRECT DRAIN	2"	1-1/2"		24"		FOR HAND SINK WHEN LOCAL CODE REQUIRE DIRECT CONNECTION
DD2	DIRECT DRAIN	2"	2"		18"		FOR POT SINK WHEN LOCAL CODE REQUIRE DIRECT CONNECTION
FD	FLOOR DRAIN			-1/2"			FOR GENERAL CLEAN-UP
FFD	FUNNEL FLOOR DRAIN			FLUSH			4" HIGH FUNNEL (PLUMBER TO RUN INDIRECT DRAIN LINES FROM FIXTURES)
FTD	FLOOR TROUGH DRAIN		4"	-7 1/4"			SEE FLOOR TROUGH DETAIL
FS	FLOOR SINK			FLUSH			12" SQUARE (PLUMBER TO RUN INDIRECT DRAIN LINES FROM FIXTURES)
HD	HUB DRAIN	2"	VERIFY	6"			PLUMBER TO RUN INDIRECT WASTE FROM FIXTURE
IW	INDIRECT WASTE			EQUIP			PLUMBING CONTRACTOR SHALL RUN ALL INDIRECT WASTE (HARD COPPER) FROM EQUIPMENT TO DRAIN LOCATIONS AND SECURE I.W. LINES TO FLOOR AND WALL PER CODES.
MSD	MOP SINK DRAIN	2"	2"	2 1/4"			B.T.C. ON MOP SINK WASTE (VERIFY WITH PLUMBER IF MOP SINK IS FURNISHED BY OTHERS)
WD	WASHER DRAIN	2"	2"		36"		B.T.C. ON STAND PIPE RECESSED WALL MOUNTED UTILITY BOX FOR WASHER, FURNISHED AND INSTALLED BY PLUMBER

2 DRAIN SCHEDULE
1/4" = 1'-0"

DRAIN SYMBOLS

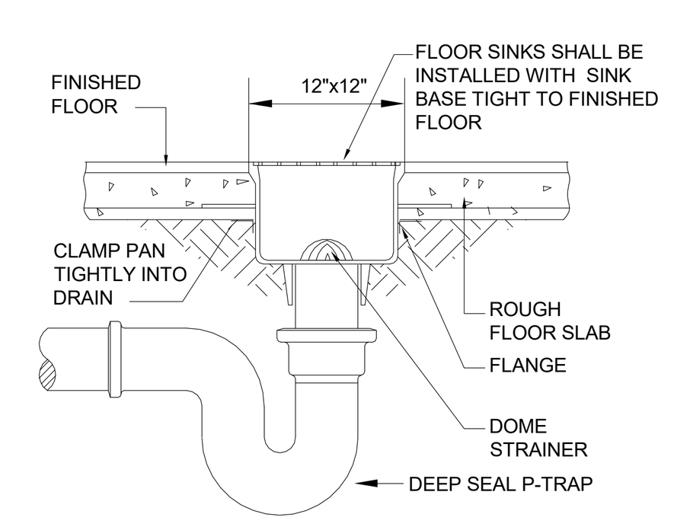
SYMBOLS		ABBREVIATIONS	
Ⓗ Ⓒ	HOT/COLD WATER	HW	HOT WATER
Ⓓ	DRAIN IN WALL	CW	COLD WATER
○	CONNECTION	DR	DRAIN
	FLOOR DRAIN	AFF	ABOVE FINISHED FLOOR
	FUNNEL FLOOR DRAIN	BFF	BELOW FINISHED FLOOR
	FLOOR SINK (FULL GRATE)	FD	FLOOR DRAIN
	FLOOR SINK (HALF GRATE)	FFD	FUNNEL FLOOR DRAIN
	HUB DRAIN	FS	FLOOR SINK
SL	SODA LINE	HD	HUB DRAIN
	GAS LINE (NATURAL GAS - LOOP)	SS	STEAM SUPPLY
	T&S-GAS QUICK DISCONNECT	SR	STEAM RETURN
WATER SUPPLY REQUIREMENTS		EL	ELEVATION ABOVE FINISHED FLOOR
ALL WATER SUPPLIED KITCHEN EQUIPMENT SYSTEMS ARE SUBJECT TO CONTAMINATION AND FAILURE DUE TO MINERAL CONTENT FOUND IN MOST WATER SUPPLIES. TO MINIMIZE SERVICE PROBLEMS AND TO MEET WARRANTY REQUIREMENTS A WATER TREATMENT (SOFTENING) SYSTEM IS RECOMMENDED WHEN WATER QUALITY IS FOUND TO EXCEED LIMITS STATED BELOW AND IN OPERATORS MANUALS. RECOMMENDED MINIMUM WATER QUALITY STANDARDS ARE TOTAL DISSOLVED SOLIDS (TDS) CONTENT SHOULD NOT EXCEED 30 PARTS PER MILLION: AND WATER PH SHOULD BE 7.0 OR HIGHER		SU	STUB UP ABOVE FINISHED FLOOR
		GPH	GALLONS PER HOUR
		GPM	GALLONS PER MINUTE
		BHP	BOILER HORSE POWER
		PPH	POUNDS PER HOUR
		PSI	POUNDS PER SQUARE INCH
		BTC	BRANCH TO CONNECTION POINT AND CONNECT EQUIPMENT
		DFA	DOWN FROM ABOVE

FINAL CONNECTION TO ALL EQUIPMENT TO BE BY THE PLUMBING CONTRACTOR. ALL REQUIRED TUBING, MISCELLANEOUS FITTINGS, TRAPS, ETC., SHALL BE SUPPLIED BY PLUMBING CONTRACTOR UNLESS OTHERWISE SPECIFIED. ALL EXPOSED PLUMBING LINES TO BE HARD COPPER (CONNECTIONS USING LEAD FREE SOLDER) AND SHALL BE PAINTED WITH CHROME OR ALUMINUM PAINT.

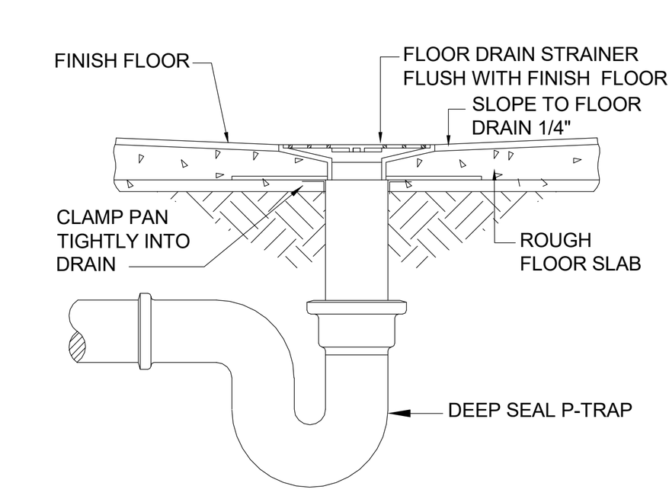
PLUMBING NOTES

NOTES	
A	PLUMBER TO PROVIDE BACKFLOW PREVENTERS IN WATER SUPPLY LINES AS REQUIRED BY LOCAL CODES
B	PLUMBER TO SPECIFY AND LOCATE EQUIPMENT AND UTILITIES FOR THESE LOCATIONS.
C	PLUMBER TO CONNECT ALL WATER LINES, GAS LINES, WASTE LINES, ETC. TO FULLY CONNECT ALL EQUIPMENT AND RUN CONDENSATE LINES FROM UNITS TO DRAINS AND THESE LINES TO BE NO SMALLER THAN THE STUB-OUT OF THE FIXTURE. PLUMBER TO PROVIDE GATE VALVES, CUT-OFFS, TRAPS, HYDROSTATIC SHOCK ELIMINATORS, PRESSURE REGULATORS AND MATERIALS NECESSARY TO CONNECT ALL LINES, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. FAUCETS, DRAIN OUTLET FITTINGS IN FIXTURES AND SPECIALTY ITEMS ARE TO BE FURNISHED BY THE KITCHEN EQUIPMENT SUPPLIER AS OUTLINED IN THE ITEM SPECIFICATIONS. ALL WORK TO BE PERFORMED IN FULL ACCORDANCE WITH THE APPLICABLE CODES RELATING TO INSTALLATION AND HOOK-UP OF EQUIPMENT. OMISSIONS OR ERRORS ON THE SCHEDULE DO NOT RELIEVE THE PLUMBING CONTRACTOR FROM COMPLETE FINAL PLUMBING RESPONSIBILITY.
D	ALL OUTLETS AND CONNECTIONS SHOWN RELATE TO KITCHEN EQUIPMENT ONLY. REFER TO ARCHITECTURAL/ENGINEERING PLANS FOR ADDITIONAL REQUIREMENTS.
E	ALL DIMENSIONS GIVEN ARE FROM COLUMN CENTERLINES AND/OR FINISHED WALLS AND ARE IN INCHES TO 4'-0". ELEVATIONS GIVEN ARE FROM FINISHED FLOORS. ALL ROUGH-INS SHOWN ARE TO BE RUN INSIDE WALLS (EXCEPT STUB-UPS) LOCATIONS INDICATE POINT OF EXIT FROM WALLS, CEILINGS OR FLOORS.
F	ALL FLOOR DRAINS STRAINERS TO SET FLUSH WITH FINISHED FLOOR AND TO SLOPE TO FLOOR DRAIN 1/4", SEE FLOOR DRAIN DETAIL. UNLESS OTHERWISE NOTED. DO NOT SLOPE FLOORS SO CLOSE TO DRAINS AS TO CREATE "PITS" OR "DIPS" IN FLOOR. MINIMUM RADIUS OF SLOPE TO BE 24" FROM CENTERLINE OF DRAIN.
G	PLUMBER TO RUN HARD COPPER DRAINLINE HIGH AS POSSIBLE IN WALK-IN VAULT FROM BLOWER COIL TO WALL THEN SLOPING DOWN TO A POINT 18" ABOVE FLOOR THEN THRU. WALL FORMING A "P" TRAP FLAT AGAINST WALL ABOVE DRAIN THEN SECURE LINES IN A NEAT MANNER AND EXTENDING TO DRAIN. FINISH WITH CHROMATONE PAINT - SEAL ALL PENETRATIONS.

3 DRAIN SYMBOLS & NOTES
1/4" = 1'-0"



4 FLOOR SINK DETAIL
1/4" = 1'-0"



5 FLOOR DRAIN DETAIL
1/4" = 1'-0"

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Dallas, Texas 75251
214-750-0077
www.wraarchitects.com

REGISTERED ARCHITECT STATE OF TEXAS
4-19-23

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:
No. Date

JOB NO. 1329
DATE: February 22, 2023

WARMING KITCHEN EQUIPMENT DRAIN PLAN

K201

1 LEVEL 1 - WARMING KITCHEN PLUMBING PLAN
1/4" = 1'-0"

PLUMBING CONNECTION SCHEDULE

TAG	PLUMBING TYPE	SIZE	HEIGHT A.F.F.	REMARKS
P1	COLD WATER	1/2"	18"	B.T.C. ON ICE MACHINE THRU FILTER
P2	COLD WATER	3/4"	18"	B.T.C. ON COMBI OVEN THRU WATER FILTER - WATER TO MEET MFG QUALITY REQUIREMENTS
P3	HOT & COLD WATER, 8" O.C.	1/2"	18"	B.T.C. ON FAUCET FIXTURE
P4	HOT WATER	3/4"	18"	B.T.C. ON DISH MACHINE, MINIMUM 140 °F HOT WATER

PLUMBING SYMBOLS

SYMBOLS		ABBREVIATIONS	
(H) (C)	HOT/COLD WATER	HW	HOT WATER
(D)	DRAIN IN WALL	CW	COLD WATER
○	CONNECTION	DR	DRAIN
	FLOOR DRAIN	AFF	ABOVE FINISHED FLOOR
	FUNNEL FLOOR DRAIN	BFF	BELOW FINISHED FLOOR
	FLOOR SINK (FULL GRATE)	FD	FLOOR DRAIN
	FLOOR SINK (HALF GRATE)	FFD	FUNNEL FLOOR DRAIN
	HUB DRAIN	FS	FLOOR SINK
(SL)	SODA LINE	HD	HUB DRAIN
⊕	GAS LINE (NATURAL GAS - LOOP)	SS	STEAM SUPPLY
	T&S-GAS QUICK DISCONNECT	SR	STEAM RETURN
		EL	ELEVATION ABOVE FINISHED FLOOR
		SU	STUB UP ABOVE FINISHED FLOOR
		GPH	GALLONS PER HOUR
		GPM	GALLONS PER MINUTE
		BHP	BOILER HORSE POWER
		PPH	POUNDS PER HOUR
		PSI	POUNDS PER SQUARE INCH
		BTC	BRANCH TO CONNECTION POINT AND CONNECT EQUIPMENT
		DFA	DOWN FROM ABOVE

WATER SUPPLY REQUIREMENTS

ALL WATER SUPPLIED KITCHEN EQUIPMENT SYSTEMS ARE SUBJECT TO CONTAMINATION AND FAILURE DUE TO MINERAL CONTENT FOUND IN MOST WATER SUPPLIES. TO MINIMIZE SERVICE PROBLEMS AND TO MEET WARRANTY REQUIREMENTS A WATER TREATMENT (SOFTENING) SYSTEM IS RECOMMENDED WHEN WATER QUALITY IS FOUND TO EXCEED LIMITS STATED BELOW AND IN OPERATORS MANUALS. RECOMMENDED MINIMUM WATER QUALITY STANDARDS ARE TOTAL DISSOLVED SOLIDS (TDS) CONTENT SHOULD NOT EXCEED 30 PARTS PER MILLION: AND WATER PH SHOULD BE 7.0 OR HIGHER

ENGINEER AND PLUMBING CONTRACTOR TO SUPPLY THE MINIMUM PSI REQUIREMENTS PER THE FOOD SERVICE EQUIPMENT DESIGNED TO OPERATE THE FOOD SERICE FACILITY PROPERLY. ALL THE REQUIRED INFORMATION CAN BE FOUND WITHIN THE NATIVE FILES, EQUIPMENT CUT BOOK, PLAN SCHEDULE WITH MODEL NUMBERS AND THE FIANL SUBMITTAL DOCUMENTS FROM THE KITCHEN EQUIPMENT CONTRACTOR(KEC).

PLUMBING NOTES

	NOTES
A	PLUMBER TO PROVIDE BACKFLOW PREVENTERS IN WATER SUPPLY LINES AS REQUIRED BY LOCAL CODES
B	PLUMBER TO SPECIFY AND LOCATE EQUIPMENT AND UTILITIES FOR THESE LOCATIONS.
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D	ALL OUTLETS AND CONNECTIONS SHOWN RELATE TO KITCHEN EQUIPMENT ONLY. REFER TO ARCHITECTURAL/ENGINEERING PLANS FOR ADDITIONAL REQUIREMENTS.
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2 PLUBMING SYMBOLS & NOTES
1/4" = 1'-0"

WRA
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12377 Merit Dr. #1800
Dallas, Texas 75251
214-750-0077
www.wraarchitects.com

REGISTERED ARCHITECT STATE OF TEXAS 20743
4-19-23

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

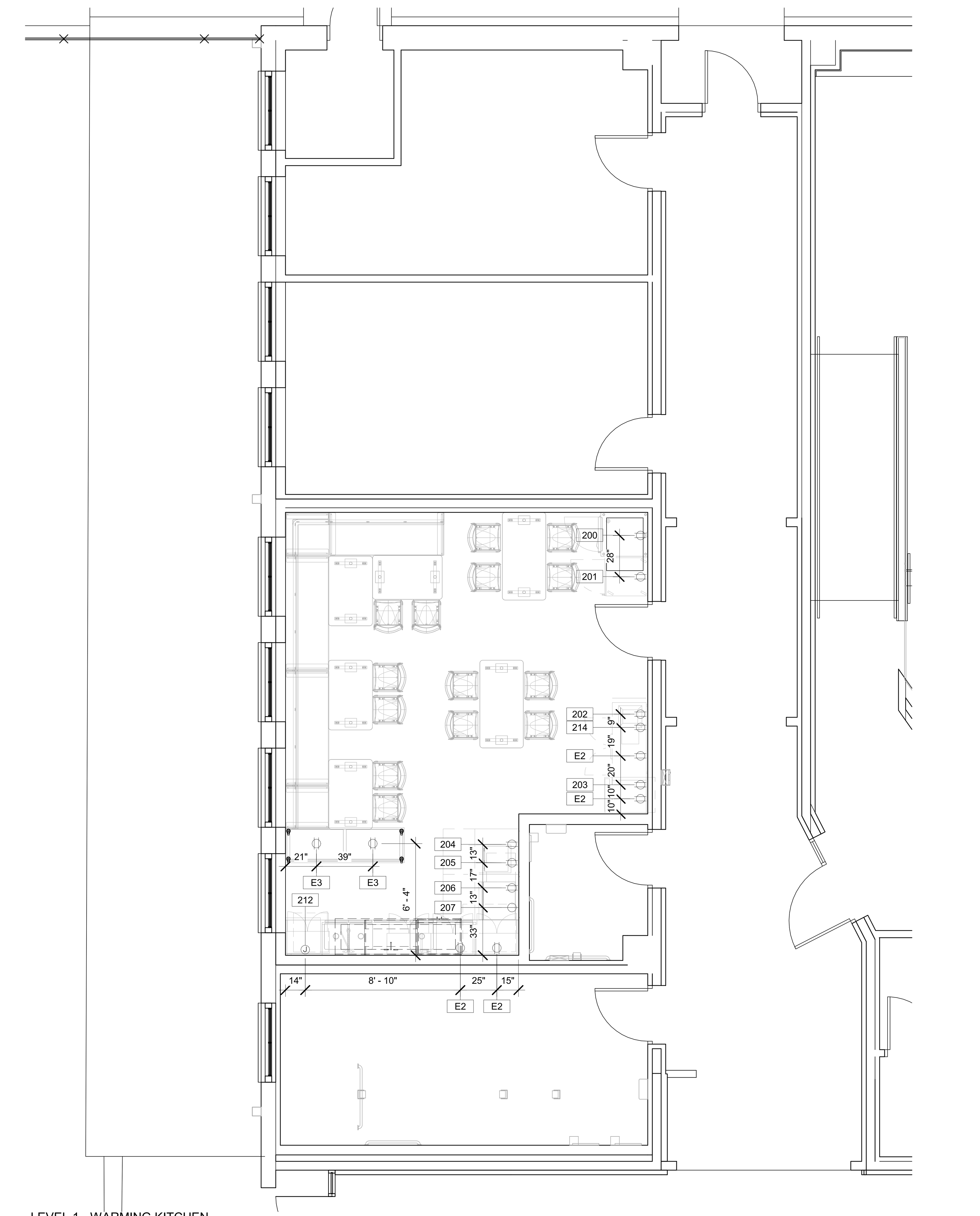
No.	Date
.	

JOB NO.	1329
DATE:	February 22, 2023

WARMING KITCHEN PLUMBING PLAN

K202

4/19/2023 11:00:45 AM



LEVEL 1 - WARMING KITCHEN ELECTRICAL PLAN
1/4" = 1'-0"

ELECTRICAL ROUGH-IN SCHEDULE

ITEM	VOLT	PHASE	TYPE	HEIGHT	LOAD AMPS	LOAD KW	LOAD H.P.	NOTES	CORD AND PLUG	NEMA
200	120	1	DCO	4'-0"	11.0			FOR REACH-IN REFRIGERATOR/FREEZER	YES	5-15
201	120	1	DCO	4'-0"	9.3			FOR HEATED HOLDING CABINET	YES	5-15
202	120	1	DCO	24"	3.7			FOR BACK BAR COOLER	YES	5-15
203	120	1	DCO	24"	15.0			FOR ICE MAKER	YES	5-15
204	120	1	DCO	24"	5.2			FOR UNDERCOUNTER REFRIGERATOR/FREEZER	YES	5-15
205	120	1	DCO	4'-2"	16.0			FOR COUNTERTOP DEEP FRYER	YES	5-20
206	120	1	DCO	24"	5.2			FOR UNDERCOUNTER REFRIGERATOR/FREEZER	YES	5-15
207	208	3	SCO	4'-0"	16.5			FOR COMBI OVEN	YES	15-30
212	208	1	J-BOX	24"	30.5			B.T.C. ON DISH MACHINE	NO	
214	120	1	DCO	4'-2"	9.4			FOR POPCORN POPPER	YES	5-15
E1	120	1	DCO	18"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E2	120	1	DCO	4'-2"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E3	120	1	DCO	DFA	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER. - ELECTRICIAN TO PROVIDE LOCKING DROP CORD RECEPTACLE	YES	5-20

ELECTRICAL SYMBOLS

SYMBOLS		ABBREVIATIONS	
⏀	SCO	A	AMPERAGE (AMP)
	DCO	AFF	ABOVE FINISHED FLOOR
	QUAD OUTLET	BFF	BELOW FINISHED FLOOR
Ⓙ	JUNCTION BOX	BTC	BRANCH TO CONNECTION
	HEATING ELEMENT	BTF	BRANCH TO FIXTURE
⊙	FLOOR RECEPTACLE	DCO	DUPLEX CONVENIENCE OUTLET
	DATA	DFA	DOWN FROM ABOVE
▲	TELEPHONE	EL	ELEVATION ABOVE FINISHED FLOOR
	MOTOR OUTLET	FP	FIRE PULL
Ⓢ	SOLENOID	GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
	LIGHT FIXTURE (LED LIGHT TO BE TRUE WHITE LIGHT)	HP	HORSE POWER
Ⓒ	CONDUIT	JB	JUNCTION BOX
	ELECTRICAL PANEL	KW	KILOWATTS
	J-BOX W/ DISCONNECT	PH	PHASE (Ø)
		SCO	SINGLE CONVENIENCE OUTLET
		Sp	SWITCH & PILOT LIGHT
		SU	STUB UP ABOVE FINISH FLOOR
		Sw	SWITCH AS NOTED
		V	VOLTAGE (VOLT)
		W	WATTS

ELECTRICAL NOTES

NOTES

ALL ELECTRICAL OUTLETS SHOWN ON THIS PLAN ARE FOR FIXTURES AND EQUIPMENT SPECIFIED AS FURNISHED BY THE KITCHEN EQUIPMENT SUPPLIER, FOR FURTHER BUILDING ELECTRICAL REQUIREMENTS (TELEPHONE, CLOCK, SIGNS, EXHAUST FAN SWITCHING, ETC.) SEE OTHER PLANS.

ALL DIMENSIONS GIVEN ARE IN INCHES TO 4'-0" AND ARE FROM COLUMN CENTERLINES AND/OR FINISHED WALLS. ELEVATIONS GIVEN ARE FROM FINISHED FLOOR TO CENTERLINE OF OUTLET. ALL CONVENIENCE OUTLETS ARE TO SET HORIZONTALLY. ALL 120V OUTLETS NOT DESIGNATED WITH SPECIFIC LOADS TO BE RATED AT 20.0 AMPS.

ELECTRICIAN TO CONNECT ALL ELECTRICAL EQUIPMENT AND FIXTURES AND DO ANY INTERNAL WIRING REQUIRED IN THE FIXTURES AS REQUIRED BY THE SPECIFICATIONS. ALL ELECTRICAL OUTLET COVER PLATES ARE TO BE STAINLESS STEEL AND ARE TO BE FURNISHED BY THE ELECTRICIAN, AS WELL AS THE RECEPTACLE, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. KITCHEN EQUIPMENT SUPPLIER TO FURNISH A GALVANIZED JUNCTION BOX IN THE FIXTURE CUTOUT TO RECEIVE THE RECEPTACLE, UNLESS OTHERWISE NOTED. ALL DISCONNECT SWITCHES REQUIRED ARE TO BE FURNISHED AND INSTALLED BY THE ELECTRICIAN AT TIME OF INSTALLATION.

ALL WORK TO BE PERFORMED IN FULL ACCORDANCE WITH ALL APPLICABLE CODES RELATING TO HOOKUP, INSTALLATION AND WIRING OF EQUIPMENT.

2 ELECTRICAL SYMBOLS & NOTES
1/4" = 1'-0"

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REGISTERED ARCHITECT
STATE OF TEXAS
4-19-23

CASTLEBERRY ISD ADMIN. KITCHEN
5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:
No. Date

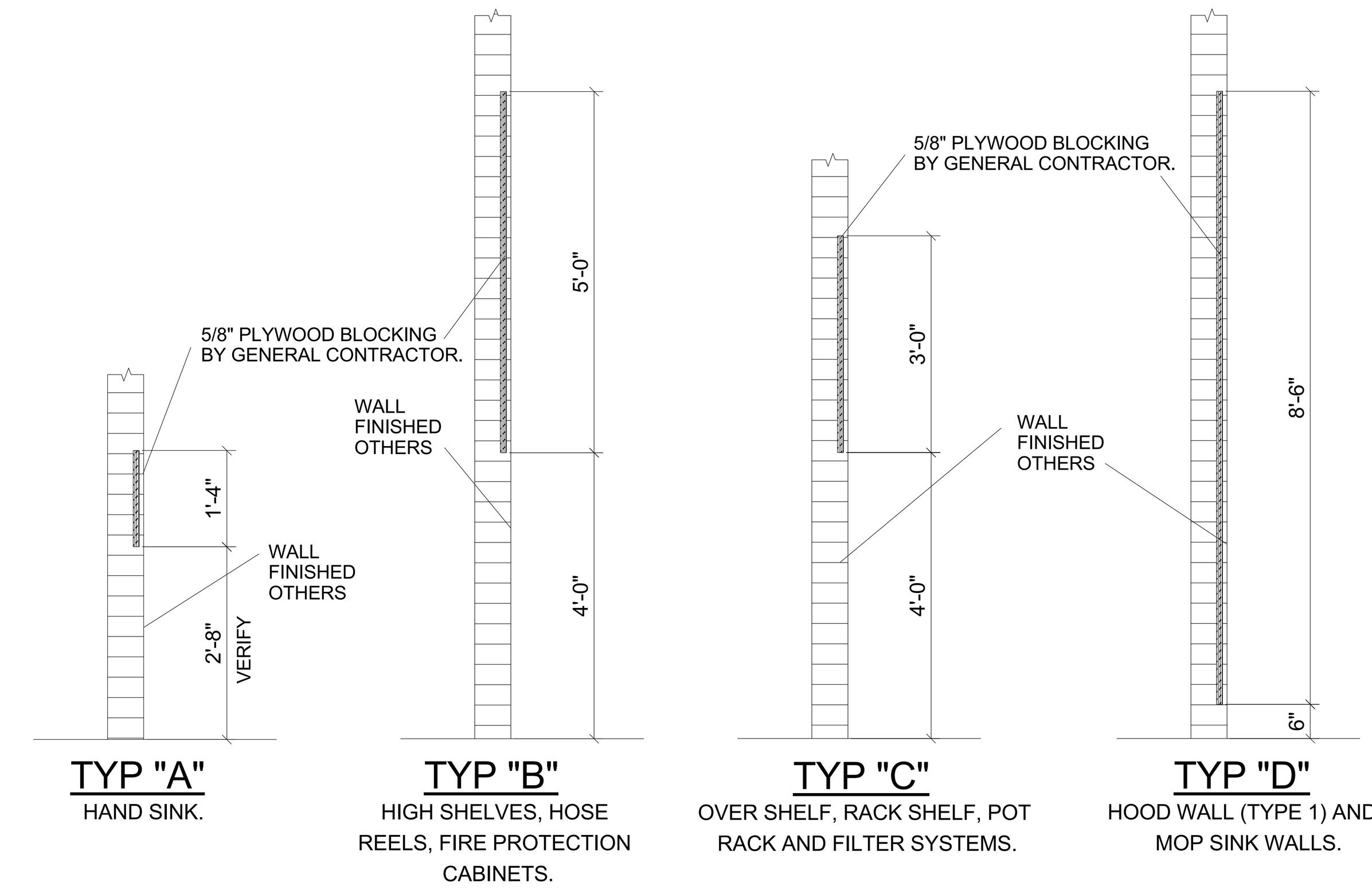
JOB NO. 1329
DATE: February 22, 2023

WARMING KITCHEN ELECTRICAL PLAN

K203

4/19/2023 11:01:01 AM

LEVEL 1 - WARMING KITCHEN WALL BLOCKING PLAN
1/4" = 1'-0"



WALL BLOCKING DETAILS
1/4" = 1'-0"

4/19/2023 11:10:34 AM

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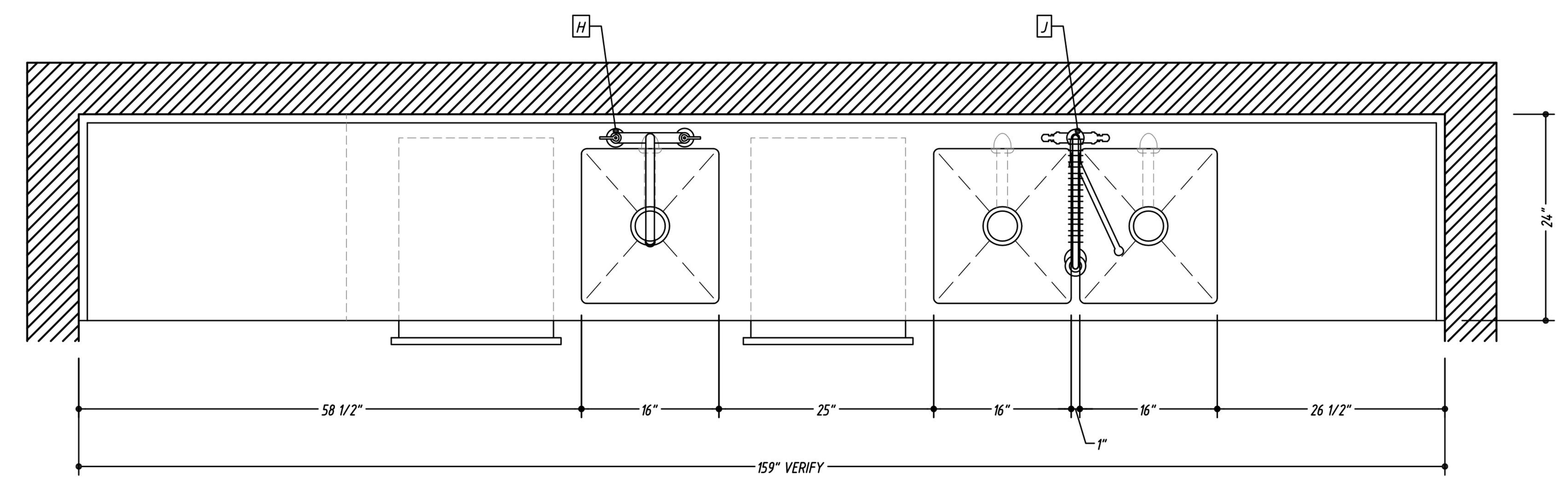
5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:
No. . Date

JOB NO.	1329
DATE:	February 22, 2023

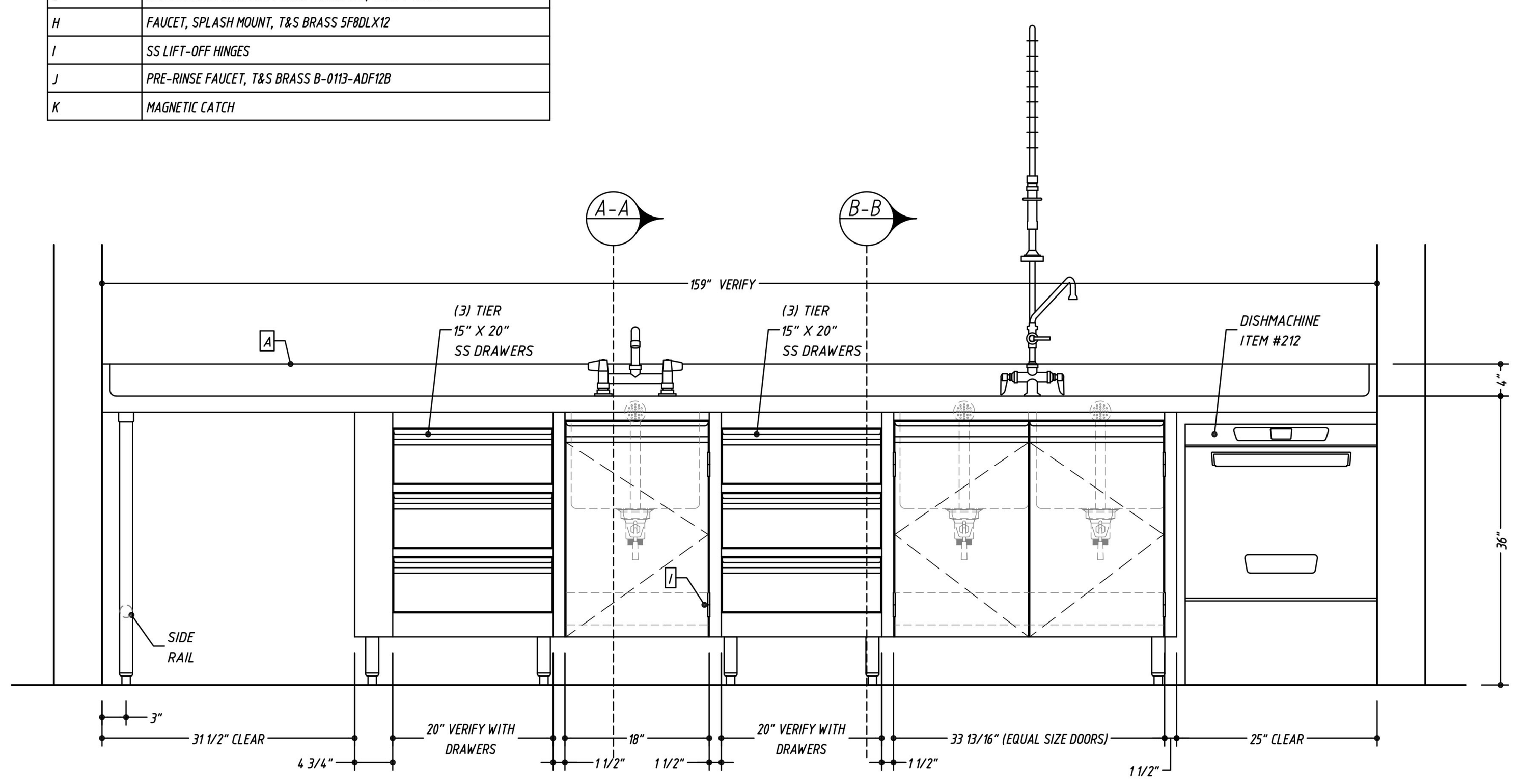
WARMING KITCHEN WALL BLOCKING PLAN

K204

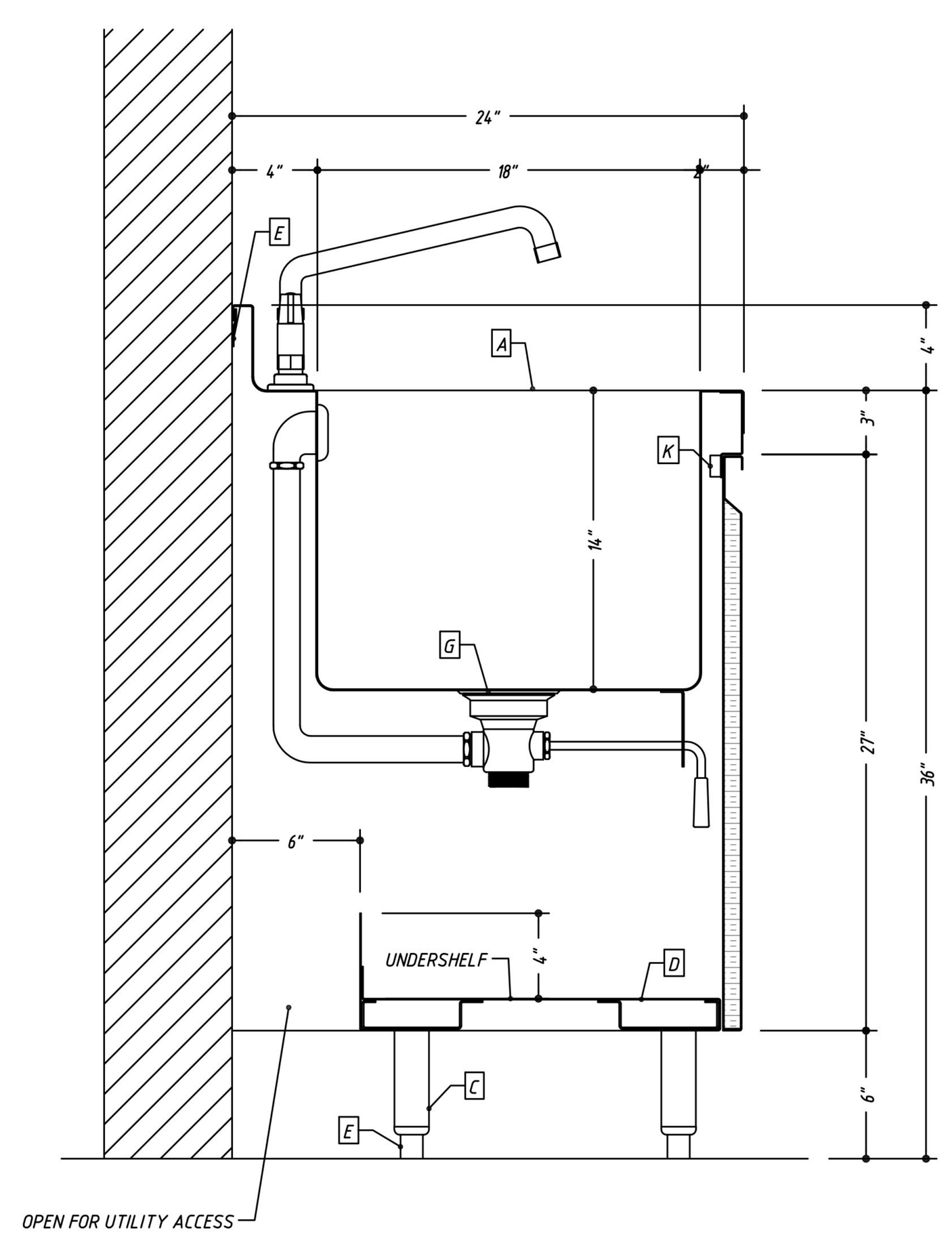


PLAN VIEW ITEM #209
SCALE: 3/4" = 1'-0"

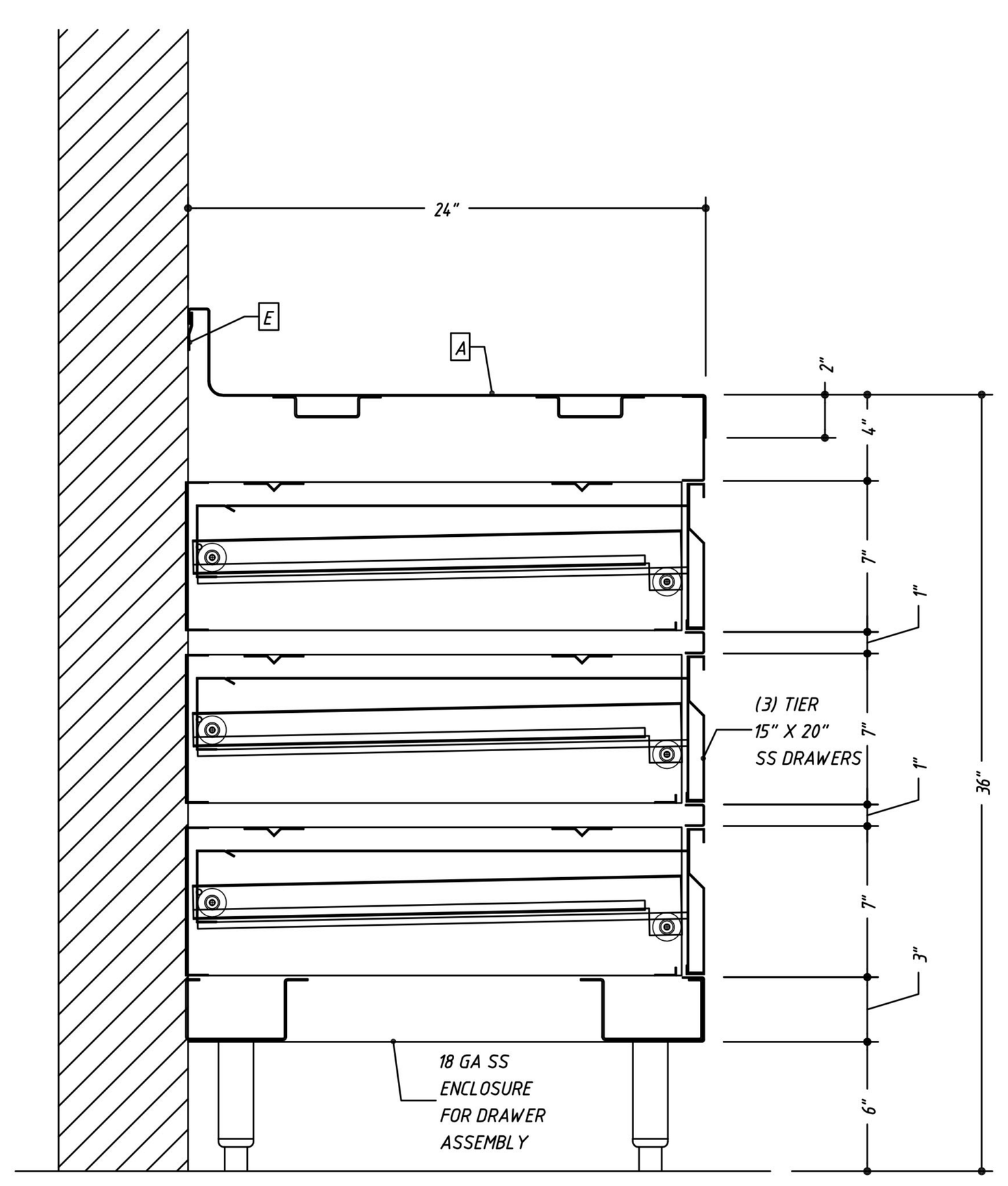
ITEM # BOM, QTY: 1 EA	
CALLOUT	DESCRIPTION
A	16 GA. TYPE 304 SS TOP
B	SS LEG GUSSETS
C	1 5/8" Ø 16 GA. TYPE 304 SS LEG/CROSSRAIL TUBING
D	SS ADJUSTABLE FEET
E	14 GA. TYPE 304 SS UNDERBRACING/"Z" CLIP/SINK COVER BRACKET/GUSSET SINK PAD/WASTE BRACKET
F	18 GA. TYPE 304 SS UNDERSHELF
G	LEVER WASTE ASSEMBLY WITH OVERFLOW, VERIFY MODEL #
H	FAUCET, SPLASH MOUNT, T&S BRASS 5F8DLX12
I	SS LIFT-OFF HINGES
J	PRE-RINSE FAUCET, T&S BRASS B-0113-ADF12B
K	MAGNETIC CATCH



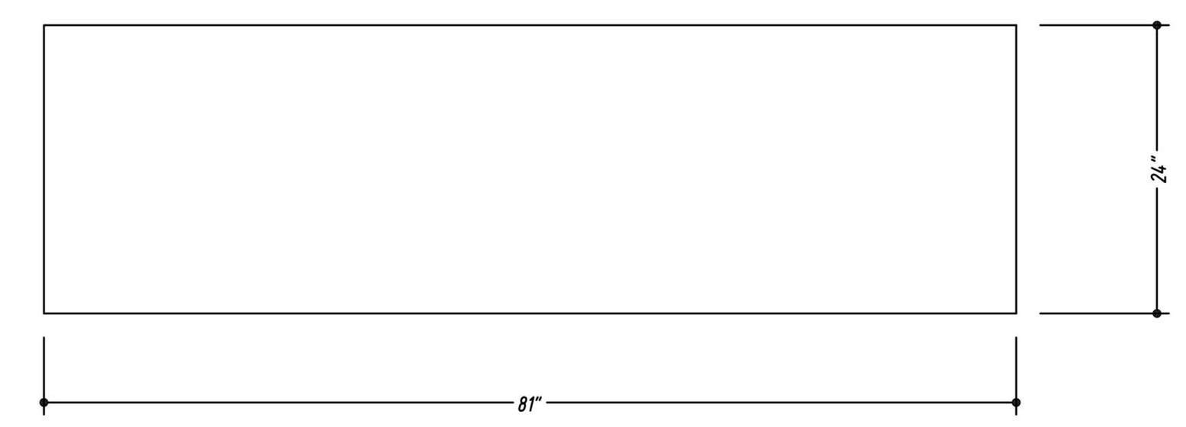
ELEVATION VIEW
SCALE: 3/4" = 1'-0"



SECTION VIEW A-A
SCALE: 1 1/2" = 1'-0"

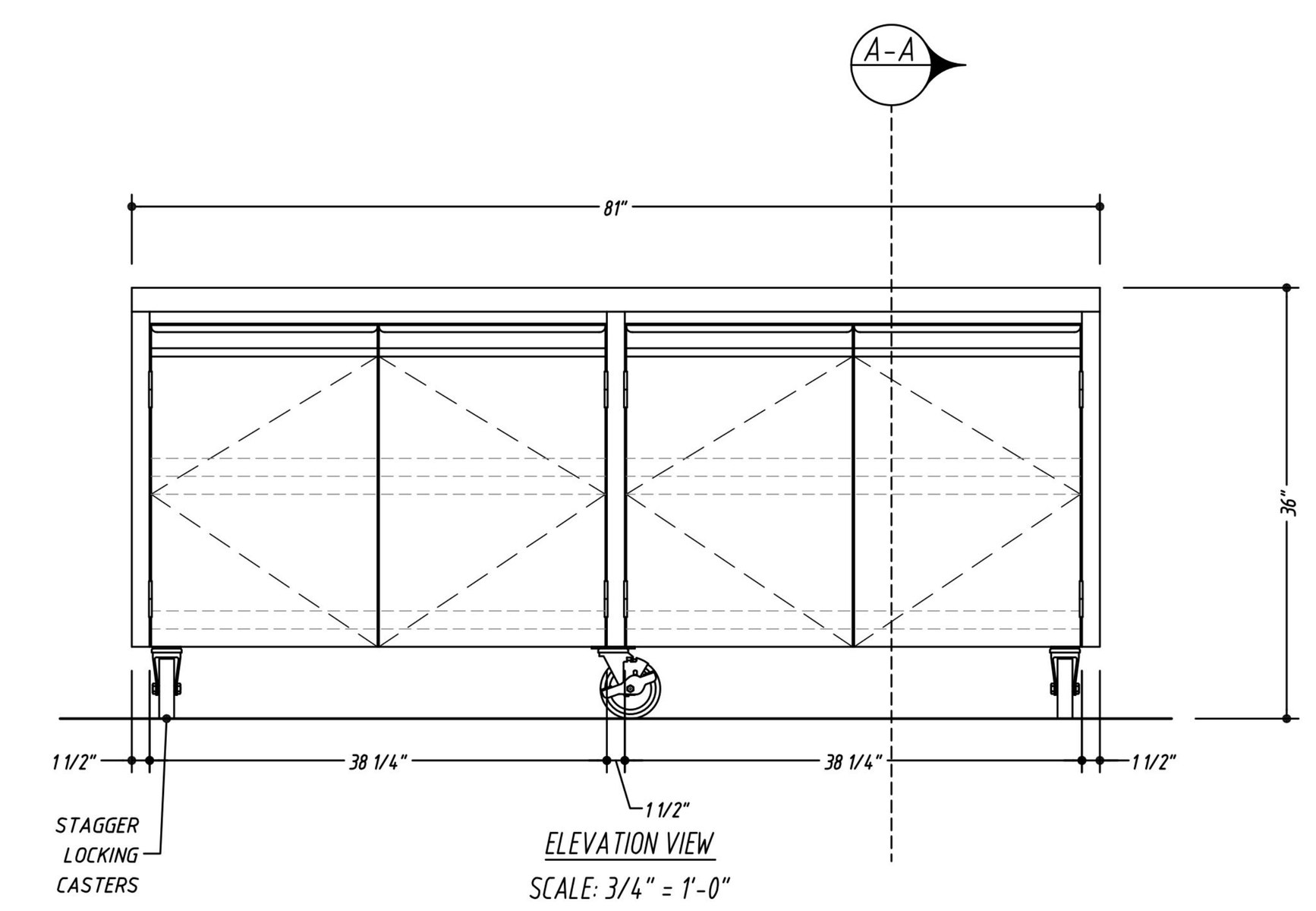


SECTION VIEW B-B
SCALE: 1 1/2" = 1'-0"

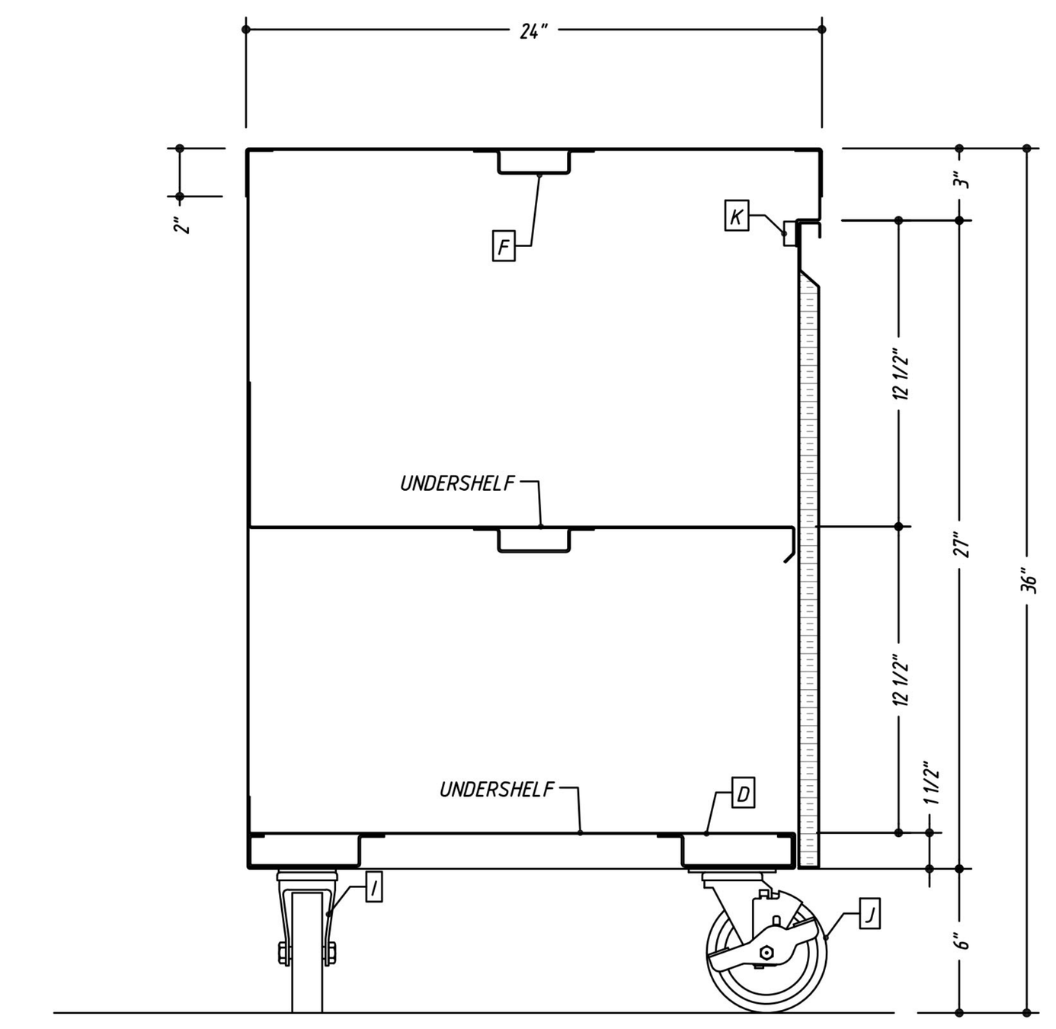


PLAN VIEW ITEM #213
SCALE: 3/4" = 1'-0"

ITEM #213 BOM, QTY: 1 EA	
CALLOUT	DESCRIPTION
A	16 GA. TYPE 304 SS TOP
B	SPARE
C	1 5/8" Ø 16 GA. TYPE 304 SS LEG TUBING
D	18 GA. TYPE 304 SS UNDERSHELF
E	SPARE
F	14 GA. TYPE 304 SS UNDERBRACING
G	SPARE
H	SPARE
I	5" SWIVEL PLATE CASTER WITH LOCK
J	5" SWIVEL PLATE CASTER WITHOUT LOCK



ELEVATION VIEW
SCALE: 3/4" = 1'-0"



SECTION VIEW A-A
SCALE: 1 1/2" = 1'-0"

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CASTLEBERRY ISD ADMIN. KITCHEN

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REVISIONS:
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JOB NO. 1329
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CUSTOM EQUIPMENT SHOP DRAWINGS

K205

4/19/2023 11:10:45 AM

FOOD SERVICE EQUIPMENT SCHEDULE					
Mark	Count	Description	Manufacturer	Model	Comments
200	1	Refrigerator/Freezer, Dual-Temp	Traulsen	ADT132WUT-HHS	
201	1	FLAV-R-SAVOR, PORTABLE HOLDING CABINET	HATCO	FSHC-7W1-EE_STACKED	
202	1	Back Bar Cooler	Continental Refrigerator	BB50SN	
203	1	Self-Contained Ice Machine	Scotsman	UN324A-1	
204	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
205	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
206	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
207	1	Electrical Combi with Ventless Hood System	RATIONAL AG	CMP XS 6-2/3	
208	4	Wall Cabinets	Eagle Group	WCH-30	
209	1	BACK SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
210	1	Faucet, 8" Centers, Deck Mount, 12" Spout	T&S Brass and Bronze Works, Inc.	5F-8DLX12	
211	1	Pre-Rinse Unit	T&S Brass and Bronze Works, Inc.	B-0113-ADF12-B	
212	1	Warewasher	Hobart	LXeH-1	
213	1	MOBILE SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
214	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	

*PLUMBING CONTRACTOR SHALL PROVIDE AN OFFSET VACUUM BREAKER TUBE WHERE THE HEIGHT OF THE GRAB BAR CREATES A CONFLICT WITH THE FLUSH VALVE.

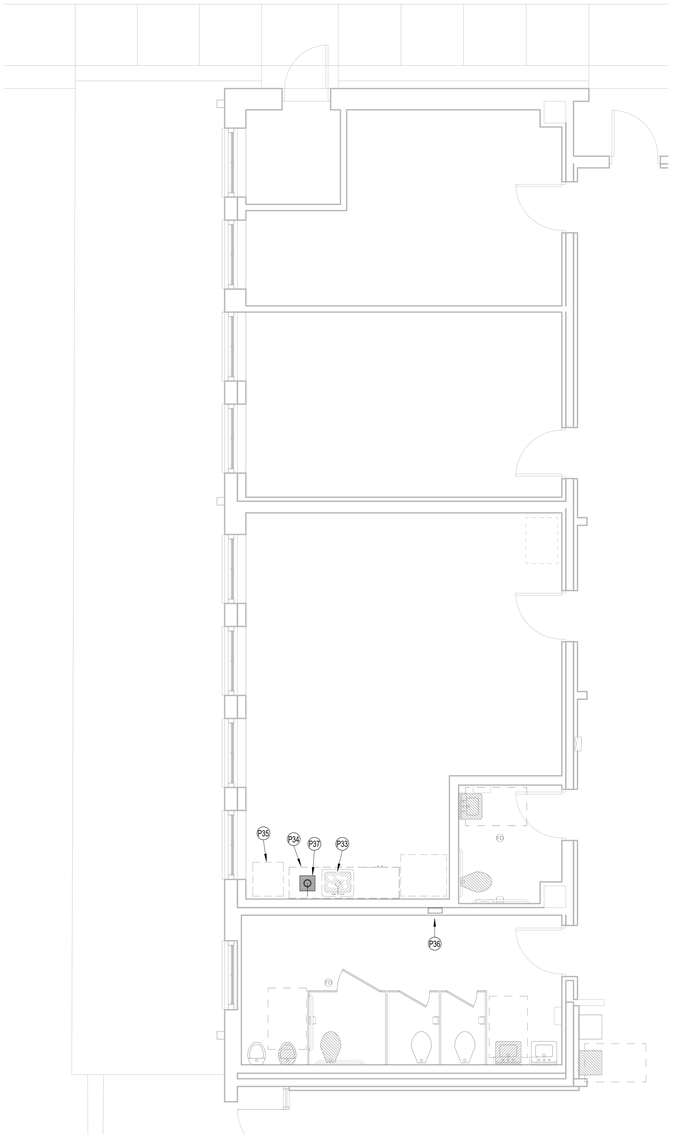
MINIMUM FIXTURE CONNECTION SCHEDULE

NAME OF FIXTURE	C.W.	H.W.	TRAP SIZE	WASTE	VENT	REMARKS
WATER CLOSET	1"	-	-	4"	2"	FLUSH VALVE WITH MAX. 1.28 GALLON FLUSH
URINAL	3/4"	-	3"	3"	2"	SIPHON JET TYPE W/MAX. 0.5 GAL. FLUSH
LAVATORY	1/2"	1/2"	1-1/4"	1-1/2"	1-1/4"	
COUNTER SINK	1/2"	1/2"	1-1/2"	2"	1-1/2"	
JANITOR SINK	1/2"	1/2"	3"	3"	2"	WALL HUNG OR FLOOR TYPE
ELEC. WATER COOLER	1/2"	-	1-1/4"	1-1/2"	1-1/4"	
FLOOR DRAIN	1/2"	-	3"	3"	2"	ALL FLOOR DRAINS TO HAVE TRAP PRIMERS

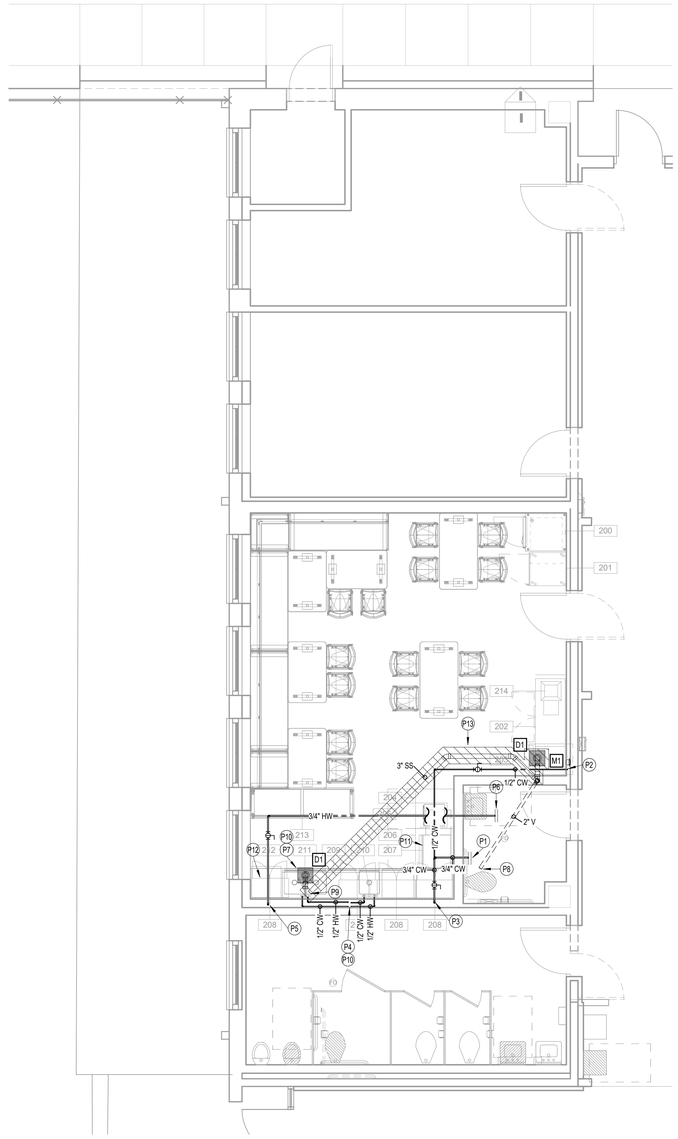
NOTE: ALL THE ABOVE FIXTURES ARE NOT NECESSARILY USED.

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER & NO.	SUPPLY	ELEC. DATA	ACCESSORIES
D1	FLOOR SINK	WADE 9143,6,15			12" x 12" x 8", 1/2 GRATE, TRAP PRIMER TAP, 3" DISCHARGE
M1	ICE MACHINE UTILITY BOX AND RPZ	GUY GRAY MIB1HAAB	COLD		MOUNT CONTROLS AT A.D.A. HEIGHT, PROVIDE WATTS LF-009 RPZ ON SUPPLY LINE



1 PLUMBING DEMOLITION FLOOR PLAN
1/4" = 1'-0"



2 PLUMBING FLOOR PLAN
1/4" = 1'-0"

PLUMBING DEMOLITION GENERAL NOTES

1. CONTRACTOR TO VISIT SITE AND BE FAMILIAR WITH BUILDING MECHANICAL AND ELECTRICAL LAYOUTS.
2. ALL MATERIAL, EQUIPMENT, DUCTS, PIPE, ETC. TO BE REMOVED SHALL BE DISPOSED OF OFF SITE IN A LEGAL AND LAWFUL MANNER.
3. CAP ANY UNUSED PIPE AT FLOOR, WALL, OR CEILING. REMOVE MATERIAL NOT BEING REUSED.
4. IF ASBESTOS IS FOUND, CONTACT OWNER IMMEDIATELY. DO NOT WORK IN ANY AREA SUSPECTED TO CONTAIN ASBESTOS.
5. ALL EXISTING EQUIPMENT SHOWN IN APPROXIMATE LOCATION. ALL EXISTING CONCEALED PIPING SHOWN IS BASED ON THE MOST RECENT EXISTING M.E.P. AND CIVIL DRAWINGS AVAILABLE. FIELD VERIFY.
6. TAKE CARE NOT TO DESTROY INSULATION VALUE TO ANY WATER PIPING BEING REUSED. REPAIR AS NECESSARY.
7. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES AND RELOCATE AS REQUIRED BY NEW CONSTRUCTION.

PLUMBING GENERAL NOTES

1. PLUMBING CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS FOR A.D.A. PLUMBING FIXTURE AND STANDARD MOUNTING HEIGHTS.
2. PLUMBING CONTRACTOR TO COORDINATE ALL PIPING ROUTING ABOVE WITH MECHANICAL AND ELECTRICAL CONTRACTORS BEFORE INSTALLING.
3. ALL VALVES SHALL BE INSTALLED NO HIGHER THAN 2'-0" ABOVE THE CEILING. ACCESS DOORS TO BE INSTALLED AT ALL HARD CEILING LOCATIONS.
4. ALL PIPING PENETRATIONS SHALL BE SLEEVED. COMPLETELY GROUT AROUND OUTSIDE OF SLEEVE AND FILL SLEEVE VOID AROUND PIPE WITH FIBERFRAX FYRE-PUTTY.
5. AT ALL DISSIMILAR METAL CONNECTIONS, PROVIDE AND INSTALL DIELECTRIC UNIONS IMMEDIATELY TO MINIMIZE USE OF GALVANIZED PIPE MATERIAL.
6. DO NOT INSTALL PLUMBING VENTS WITHIN 10'-0" OF ANY ROOFTOP UNITS OR FRESH AIR UNITS / INTAKES. COORDINATE WITH MECHANICAL CONTRACTOR.
7. PLUMBING CONTRACTOR TO PROVIDE AND INSTALL ALL BACK-FLOW PREVENTERS TO KITCHEN EQUIPMENT AS REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
8. ALL CONCEALED EXISTING PIPING SHOWN IS BASED ON EXISTING M.E.P. DRAWINGS. FIELD VERIFY AS NECESSARY.

PLUMBING PLAN NOTES

P1	TIE NEW 3/4" COLD WATER INTO EXISTING COLD WATER SERVING WATER CLOSET IN RR A104. FIELD VERIFY EXACT LOCATION OF EXISTING PIPE.
P2	1/2" COLD WATER DOWN TO ICE MACHINE SUPPLY BOX.
P3	3/4" COLD WATER DOWN TO COMBI OVEN.
P4	EXTEND EXISTING COLD AND HOT WATER TO NEW SINKS. PROVIDE NEW VALVE STOPS FOR BOTH SINKS.
P5	3/4" HOT WATER DOWN TO WAREWASHER.
P6	TIE NEW 3/4" HOT WATER INTO EXISTING 3/4" OR LARGER HOT WATER PIPE. FIELD VERIFY EXACT LOCATION.
P7	INSTALL NEW FLOOR SINK IN EXISTING FLOOR SINK LOCATION AND TIE INTO EXISTING SANITARY SEWER. COORDINATE EXACT LOCATION OF FLOOR SINK WITH KITCHEN CONSULTANT.
P8	TIE NEW 2" VENT INTO EXISTING VENT STACK SERVING RR A104. FIELD VERIFY EXACT LOCATION.
P9	TIE NEW 3" SANITARY SEWER FROM NEW FLOOR SINK INTO EXISTING SANITARY SEWER. FIELD VERIFY EXACT LOCATION AND INVERT DEPTH.
P10	PROVIDE INDIRECT DRAIN FROM SINK TO FLOOR SINK. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
P11	PROVIDE INDIRECT DRAIN FROM COMBI OVER TO FLOOR SINK. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
P12	PROVIDE INDIRECT DRAIN FROM WARE WASH TO FLOOR SINK. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
P13	CONTRACTOR TO SAWCUT AND PATCH EXISTING SLAB AS NECESSARY FOR NEW SANITARY SEWER PIPING.
P33	REMOVE AND DISCARD EXISTING SINK. PERMANENTLY CAP EXISTING SANITARY SEWER IN WALL. EXISTING COLD AND HOT WATER PIPING TO BE REUSED.
P34	REMOVE AND RETURN EXISTING DISHWASHER TO OWNER. DEMOLISH EXISTING HOT WATER AND SANITARY SEWER AS REQUIRED TO ACCOMMODATE NEW KITCHEN LAYOUT.
P35	REMOVE AND RETURN EXISTING ICE MACHINE TO OWNER. DEMOLISH EXISTING COLD WATER PIPING AS REQUIRED TO ACCOMMODATE NEW KITCHEN LAYOUT.
P36	EXISTING COLD WATER VALVE BOX TO REMAIN.
P37	REMOVE AND DISCARD EXISTING FLOOR SINK. NEW FLOOR SINK TO BE INSTALLED IN EXISTING FLOOR SINK LOCATION.

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

JAVIER GARCIA
118760
LICENSED
PROFESSIONAL ENGINEER
04-18-2023

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

No	Date
-	

JOB NO.	2320
DATE:	April 18, 2023

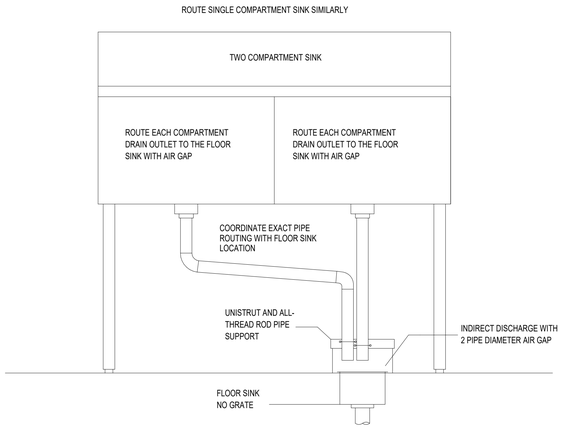
PLUMBING FLOOR PLANS

PL201

EMA Engineering & Consulting, Inc.
Tyler | Austin | Houston | El Paso
DFW | San Antonio | Shreveport
Texas Firm Registration No. F-893
Louisiana Firm Registration No. EF-5818
DESIGN SOLVE ENHANCE www.EMAengineer.com

SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

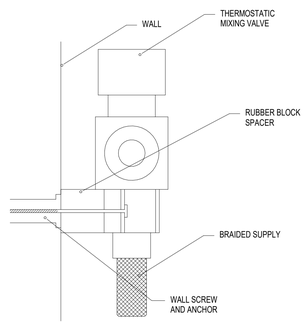
4/19/2023 8:28:23 AM



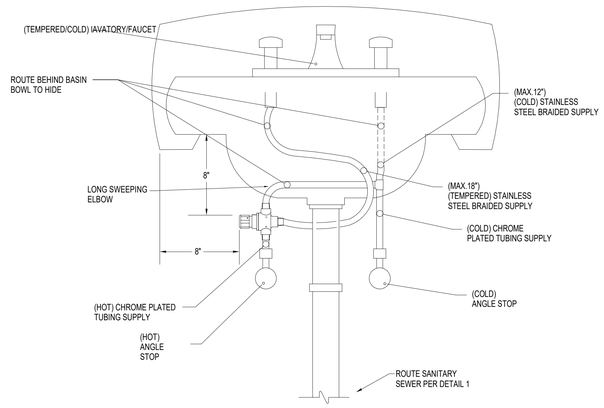
1 DRAIN OUTLET AT TWO-COMPARTMENT SINK
N.T.S.

NOTES:

1. THERMOSTATIC MIXING VALVE MUST HAVE BRACKET FOR MOUNTING TO WALL.
2. PROVIDE RUBBER SPACER BETWEEN WALL AND TMV.
3. WALL ANCHOR SYSTEM MUST BE USED.
4. STAINLESS STEEL SUPPLY LINES MUST BE KEPT TO MINIMUM LENGTH.

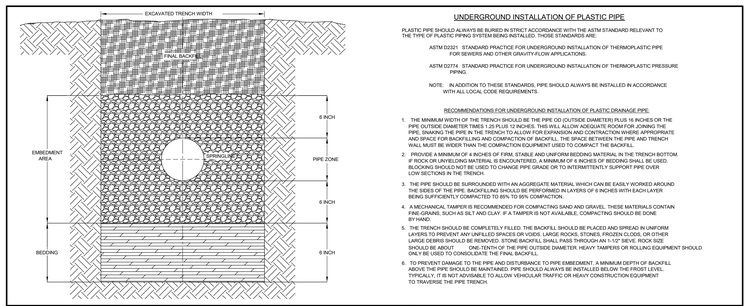


THERMOSTATIC MIXING VALVE WITH BRACKET



FINISHED FLOOR

2 TEMPERED & COLD SUPPLY DETAIL
N.T.S.



UNDERGROUND INSTALLATION OF PLASTIC PIPE

PLASTIC PIPE SHOULD ALWAYS BE BURIED IN STRICT ACCORDANCE WITH THE ASTM STANDARD RELEVANT TO THE TYPE OF PLASTIC PIPING SYSTEM BEING INSTALLED. THOSE STANDARDS ARE:

ASTM D2321 STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS.

ASTM D3774 STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING.

NOTE: IN ADDITION TO THESE STANDARDS, PIPE SHOULD ALWAYS BE INSTALLED IN ACCORDANCE WITH ALL LOCAL CODE REQUIREMENTS.

RECOMMENDATIONS FOR UNDERGROUND INSTALLATION OF PLASTIC DRAINAGE PIPE:

1. THE MINIMUM WIDTH OF THE TRENCH SHOULD BE THE PIPE OD (OUTSIDE DIAMETER) PLUS 16 INCHES OR THE PIPE OUTSIDE DIAMETER TIMES 1.25 PLUS 12 INCHES. THIS WILL ALLOW ADEQUATE ROOM FOR JOINING THE PIPE, SNAKING THE PIPE IN THE TRENCH TO ALLOW FOR EXPANSION AND CONTRACTION WHERE APPROPRIATE AND SPACE FOR BACKFILLING AND COMPACTION OF BACKFILL. THE SPACE BETWEEN THE PIPE AND TRENCH WALL MUST BE WIDER THAN THE COMPACTION EQUIPMENT USED TO COMPACT THE BACKFILL.
2. PROVIDE A MINIMUM OF 4 INCHES OF FIRM, STABLE AND UNIFORM BEDDING MATERIAL IN THE TRENCH BOTTOM. IF ROCK OR UNYIELDING MATERIAL IS ENCOUNTERED, A MINIMUM OF 6 INCHES OF BEDDING SHALL BE USED. BLOCKING SHOULD NOT BE USED TO CHANGE PIPE GRADE OR TO INTERMITTENTLY SUPPORT PIPE OVER LOW SECTIONS IN THE TRENCH.
3. THE PIPE SHOULD BE SURROUNDED WITH AN AGGREGATE MATERIAL WHICH CAN BE EASILY WORKED AROUND THE SIDES OF THE PIPE. BACKFILLING SHOULD BE PERFORMED IN LAYERS OF 6 INCHES WITH EACH LAYER BEING SUFFICIENTLY COMPACTED TO 85% TO 95% COMPACTION.
4. A MECHANICAL TAMPER IS RECOMMENDED FOR COMPACTING SAND AND GRAVEL. THESE MATERIALS CONTAIN FINE-GRAINS, SUCH AS SILT AND CLAY. IF A TAMPER IS NOT AVAILABLE, COMPACTING SHOULD BE DONE BY HAND.
5. THE TRENCH SHOULD BE COMPLETELY FILLED. THE BACKFILL SHOULD BE PLACED AND SPREAD IN UNIFORM LAYERS TO PREVENT ANY UNFILLED SPACES OR VOIDS. LARGE ROCKS, STONES, FROZEN CLODS, OR OTHER LARGE DEBRIS SHOULD BE REMOVED. STONE BACKFILL SHALL PASS THROUGH AN 1-1/2" SIEVE. ROCK SIZE SHOULD BE ABOUT ONE-TENTH OF THE PIPE OUTSIDE DIAMETER. HEAVY TAMPERS OR ROLLING EQUIPMENT SHOULD ONLY BE USED TO CONSOLIDATE THE FINAL BACKFILL.
6. TO PREVENT DAMAGE TO THE PIPE AND DISTURBANCE TO PIPE EMBEDMENT, A MINIMUM DEPTH OF BACKFILL ABOVE THE PIPE SHOULD BE MAINTAINED. PIPE SHOULD ALWAYS BE INSTALLED BELOW THE FROST LEVEL, TYPICALLY. IT IS NOT ADVISABLE TO ALLOW VEHICULAR TRAFFIC OR HEAVY CONSTRUCTION EQUIPMENT TO TRAVERSE THE PIPE TRENCH.

UNDERGROUND INSTALLATION DETAIL OF PLASTIC PIPING SYSTEMS | Pea Gravel Installation

3 PEA GRAVEL INSTALLATION FOR PLASTIC PIPE
N.T.S.

PLUMBING SYMBOLS

	SANITARY SEWER LINE
ES ES	EXISTING SANITARY SEWER LINE
	VENT LINE
EV EV	EXISTING VENT LINE
	COLD WATER LINE
CW CW	EXISTING COLD WATER LINE
	HOT WATER LINE
HW HW	EXISTING HOT WATER LINE
COND	CONDENSATE LINE
EC EC	EXISTING CONDENSATE LINE
	GAS LINE
GAS	EXISTING GAS LINE
	ACID WASTE LINE
A A	EXISTING ACID WASTE LINE
	CUT-OFF VALVE
	CUT-OFF VALVE
	HOSE BIBB
	CAP
	DRAIN
	GAS METER
	FLOOR SINK/O.S.D.
	PLUMBING RISER
	WATER METER
	GAS COCK (VALVE)
	PRIMARY/OVERFLOW ROOF DRAIN
V.T.R.	VENT THROUGH ROOF
F F	SPRINKLER LINE
EF EF	EXISTING SPRINKLER LINE
RD RD	PRIMARY ROOF DRAIN LINE
RD RD	EXISTING PRIMARY ROOF DN. LN.
ORD	OVERFLOW ROOF DRAIN LINE
ORD	EXISTING OVERFLOW RF. DN. LN.
SD SD	STORM DRAIN
SD SD	EXISTING STORM DRAIN LINE
	INDICATES SAWCUT SLAB AND PATCH TO MATCH AFTERWARDS
AIR	COMPRESSED AIR LINE
EA EA	EXISTING COMPRESSED AIR LINE
	TEMPERED WATER LINE
TP TP	EXISTING TEMPERED WATER LINE
GL GL	GREASE LINE
GR GR	EXISTING GREASE LINE
SEC	SECONDARY CONDENSATE LINE
SEC	EXISTING SECONDARY COND. LINE
SP SP	ELEVATOR SUMP LINE
SP SP	EXISTING ELEVATOR SUMP LINE

NOTE: NOT ALL SYMBOLS ARE USED

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

JAVIER GARCIA 118760 LICENSED PROFESSIONAL ENGINEER
04-18-2023

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

No	Date
.	

JOB NO.	2320
DATE:	April 18, 2023

PLUMBING DETAILS

PL701

EMA Engineering & Consulting, Inc.
Tyler | Austin | Houston | El Paso
DFW | San Antonio | Shreveport
Texas Firm Registration No. F-893
Louisiana Firm Registration No. EF-5818
DESIGN SOLVE ENHANCE www.EMAengineer.com

SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

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FOOD SERVICE EQUIPMENT SCHEDULE					
Mark	Count	Description	Manufacturer	Model	Comments
200	1	Refrigerator/Freezer, Dual-Temp	Traulsen	ADT132WUT-HHS	
201	1	FLAV-R-SAVOR, PORTABLE HOLDING CABINET	HATCO	FSHC-7W1-EE_STACKED	
202	1	Back Bar Cooler	Continental Refrigerator	BB50SN	
203	1	Self-Contained Ice Machine	Scotsman	UN324A-1	
204	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
205	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
206	1	Refrigerator/Freezer, Undercounter	Traulsen	TF031D3	
207	1	Electrical Combi with Ventless Hood System	RATIONAL AG	CMP XS 6-2/3	
208	4	Wall Cabinets	Eagle Group	WCH-30	
209	1	BACK SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
210	1	Faucet, 8" Centers, Deck Mount, 12" Spout	T&S Brass and Bronze Works, Inc.	5F-8DLX12	
211	1	Pre-Rinse Unit	T&S Brass and Bronze Works, Inc.	B-0113-ADF12-B	
212	1	Warewasher	Hobart	LXeH-1	
213	1	MOBILE SERVICE COUNTER W/ SOILD WORKTOP	CUSTOM	CUSTOM	
214	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	

ELECTRICAL ROUGH-IN SCHEDULE										
ITEM	VOLT	PHASE	TYPE	HEIGHT	LOAD			NOTES	CORD AND PLUG	NEMA
					AMPS	KW	H.P.			
200	120	1	DCO	4'-0"	11.0			FOR REACH-IN REFRIGERATOR/FREEZER	YES	5-15
201	120	1	DCO	4'-0"	9.3			FOR HEATED HOLDING CABINET	YES	5-15
202	120	1	DCO	24"	3.7			FOR BACK BAR COOLER	YES	5-15
203	120	1	DCO	24"	15.0			FOR ICE MAKER	YES	5-15
204	120	1	DCO	24"	5.2			FOR UNDERCOUNTER REFRIGERATOR/FREEZER	YES	5-15
205	120	1	DCO	4'-2"	16.0			FOR COUNTERTOP DEEP FRYER	YES	5-20
206	120	1	DCO	24"	5.2			FOR UNDERCOUNTER REFRIGERATOR/FREEZER	YES	5-15
207	208	3	SCO	4'-0"	16.5			FOR COMBI OVEN	YES	15-30
212	208	1	J-BOX	24"	30.5			B.T.C. ON DISH MACHINE	NO	
214	120	1	DCO	4'-2"	9.4			FOR POPCORN POPPER	YES	5-15
E1	120	1	DCO	18"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E2	120	1	DCO	4'-2"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E3	120	1	DCO	DFA	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER. - ELECTRICIAN TO PROVIDE LOCKING DROP CORD RECEPTACLE	YES	5-20

ELECTRICAL DEMOLITION GENERAL NOTES

(SOME NOTES MAY NOT BE USED)

1. UNLESS NOTED ON DRAWINGS, ALL LIGHTING, SWITCHES, OUTLETS AND OTHER ELECTRICAL DEVICES ARE TO REMAIN.
2. REFER TO SPECIFICATION SECTION 26 05 05, ELECTRICAL DEMOLITION REMODELING, FOR GENERAL DEMOLITION REQUIREMENTS.
3. ALL MATERIAL REMOVED AND NOT RETAINED BY THE OWNER SHALL BE DISPOSED OF OFF SITE IN A LAWFUL MANNER.
4. BEFORE DEMOLISHING PANELS, TRACE ALL BRANCH CIRCUITS TO CONFIRM THAT EXISTING LOADS HAVE BEEN RELOCATED TO NEW PANELS. IF A LOAD EXISTS THAT HAS NOT BEEN RELOCATED TO NEW PANELS, CONTACT THE ENGINEER FOR INSTRUCTIONS.

ELECTRICAL DEMOLITION PLAN NOTES

ED2	EXISTING RECEPTACLES AND DEVICES TO REMAIN IN PLACE AND OPERATIONAL.
ED3	EXISTING RECEPTACLES AND DEVICES TO BE REMOVED. REMOVE EXISTING CONDUIT AND WIRING BACK TO SOURCE.

ELECTRICAL GENERAL NOTES

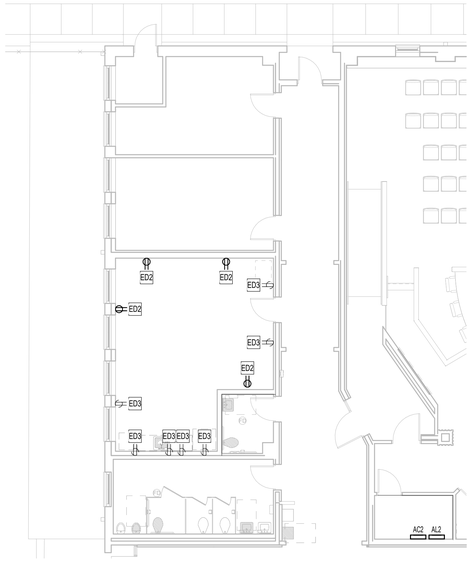
(SOME NOTES MAY NOT BE USED)

1. SEE SHEET EP701 FOR GENERAL NOTES APPLICABLE TO THE ENTIRE DRAWING SET.

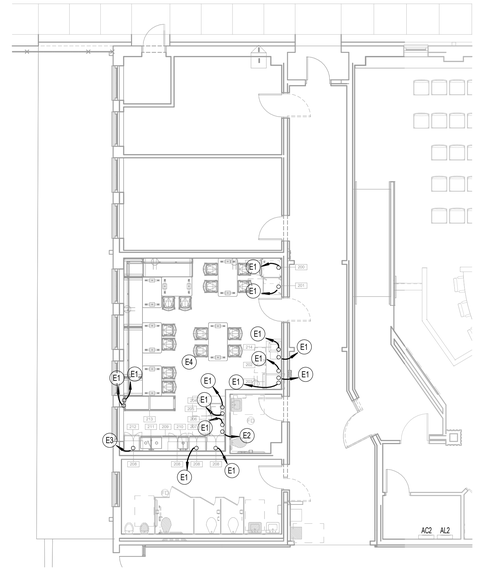
ELECTRICAL PLAN NOTES

E1	PROVIDE POWER TO NEW KITCHEN EQUIPMENT FROM EXISTING AVAILABLE SPACE IN EXISTING PANEL AL OR NEAREST AVAILABLE 120/208V PANEL. PROVIDE A NEW 20A 1P BREAKER WITH #12 WIRE.
E2	PROVIDE POWER TO NEW KITCHEN EQUIPMENT FROM EXISTING AVAILABLE SPACE IN EXISTING PANEL AL OR NEAREST AVAILABLE 120/208V PANEL. PROVIDE A NEW 20A 3P BREAKER WITH #12 WIRE.
E3	PROVIDE POWER TO NEW KITCHEN EQUIPMENT FROM EXISTING AVAILABLE SPACE IN EXISTING PANEL AL OR NEAREST AVAILABLE 120/208V PANEL. PROVIDE A NEW 40A 2P BREAKER WITH #8 WIRE.
E4	CONTRACTOR TO COORDINATE SURFACE MOUNTED CONDUIT LOCATIONS AND ROUTING WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.

ELEC UTIL BILLS HAVE BEEN REQUESTED



1 ELECTRICAL DEMOLITION FLOOR PLAN - LEVEL 1
1/8" = 1'-0"



2 ELECTRICAL FLOOR PLAN - LEVEL 1
1/8" = 1'-0"

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

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CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

No	Date
-	

JAVIER GARCIA
TEXAS P.E. 118760
4/19/2023 8:30:03 AM

JAMES TATE III
TEXAS P.E. 102427
4/19/2023 8:30:03 AM

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JOB NO.	2320
DATE:	April 18, 2023

ELECTRICAL FLOOR PLAN

EP201

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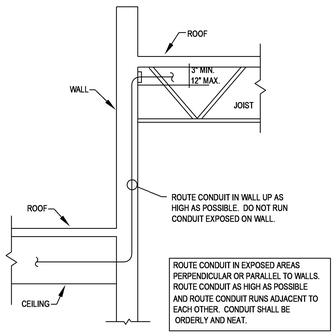
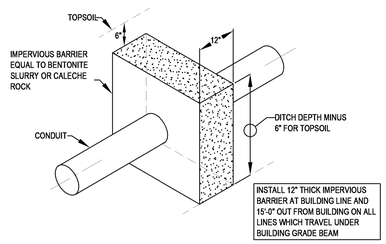
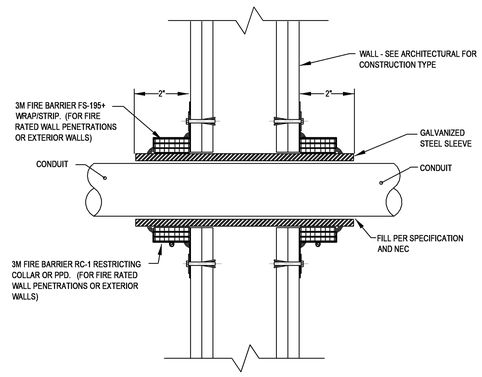


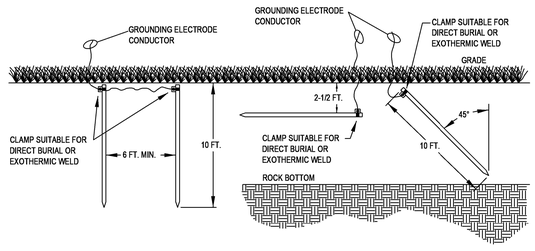
1 EXPOSED CONDUIT ROUTING
1/8" = 1'-0"



2 IMPERVIOUS BARRIER
1/8" = 1'-0"

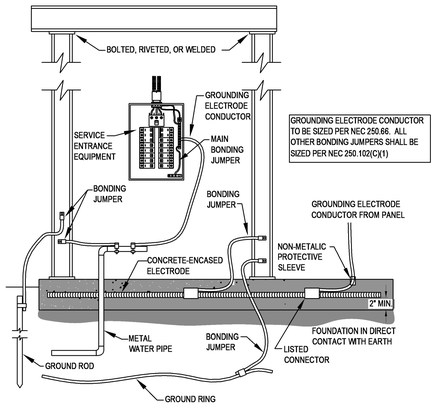


3 WALL PENETRATION
1/8" = 1'-0"

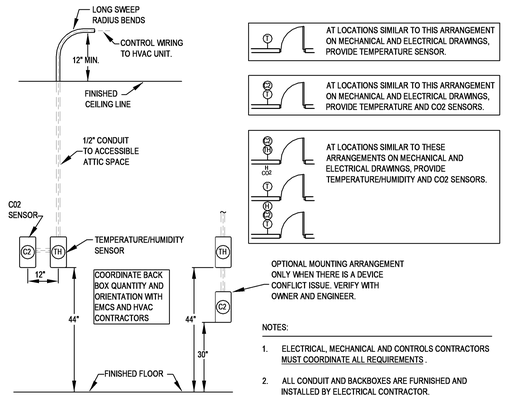


NOTE: ALL PIPE AND ROD ELECTRODES MUST HAVE 8 FEET OF LENGTH IN CONTACT WITH SOIL REGARDLESS OF ROCK BOTTOM IN ORDER TO ENSURE THAT THE UPPER END OF THE ELECTRODE IS FLUSH WITH OR BELOW GROUND LEVEL UNLESS THE ABOVEGROUND PORTION IS PROTECTED FROM PHYSICAL DAMAGE.

4 NEC GROUND ROD
1/8" = 1'-0"

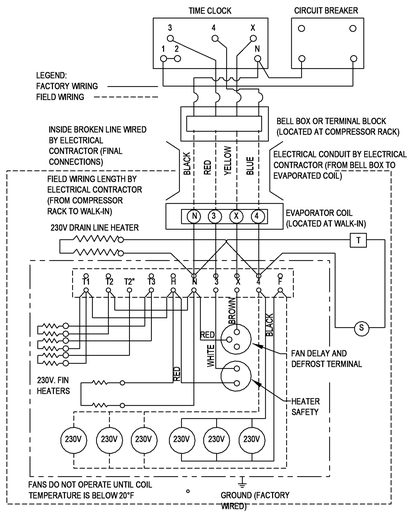


5 GROUNDING ELECTRODE SYSTEM
1/8" = 1'-0"



NOTES:
1. ELECTRICAL, MECHANICAL AND CONTROLS CONTRACTORS MUST COORDINATE ALL REQUIREMENTS .
2. ALL CONDUIT AND BACKBOXES ARE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR.
3. ALL SENSORS, CONTROL WIRING AND ASSOCIATED DEVICES ARE FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.

6 SENSOR MOUNTING DETAIL
1/8" = 1'-0"

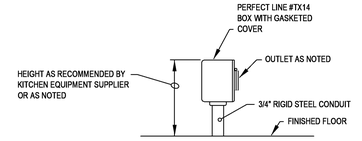


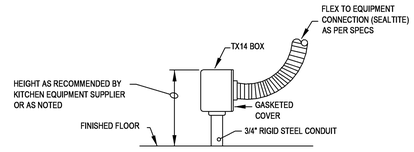
7 FOUR WIRE COLOR DECODED DEFROST SYSTEM
1/8" = 1'-0"

ELECTRICAL LEGEND - POWER SYMBOLS

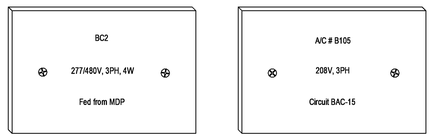
	BRANCH CIRCUIT - CONDUIT IN WALL or ABOVE CEILING. INDICATES DEVICES AND EQUIPMENT ON A CIRCUIT. NOT INTEDED TO SHOW ROUTING.
	BRANCH CIRCUIT OR FEEDER CONDUIT UNDER FLOOR or UNDERGROUND.
	SWITCH WIRE - SWITCH CIRCUIT
CL-1, 3, 5	HOME RUN WITH CIRCUIT DESIGNATION(S) - LETTER DENOTES PANEL
	PANELBOARD or SWITCHGEAR (SEE PANEL SCHEDULES AND RISER DIAGRAM)
	SPECIAL PANEL, EQUIPMENT RACK, CABINET, ETC. - SURFACE MOUNT; FLUSH MOUNT
TX	POWER TRANSFORMER - SEE PANEL SCHEDULE, RISER, AND SPECIFICATIONS.
	DISCONNECT / SAFETY SWITCH - SEE SCHEDULES FOR MORE INFORMATION.
	GROUND ; WEATHERHEAD
	CONCRETE IN-GRADE PULL BOX / HAND HOLE - PROVIDE AS SHOWN OR AS REQUIRED.
	JUNCTION BOX - @ 18" AFF OR AS NOTED ; FLUSH WALLS / FLUSH CEILING or FLOOR or ELSE.
	RECEPTACLE @ 18" AFF OR AS NOTED - DUPLEX ; QUAD, SIMPLEX.
	MULTI-POLE RECEPTACLE @ 18" AFF or AS NOTED ; NON-LINEAR TWISTLOCK MULTIPOLE @ 18" AFF or AS NOTED.
	GFCI DUPLEX RECEPTACLE @ 6" ABOVE BACKSPLASH IF SHOWN ON MILLWORK or 18" AFF ; WEATHERPROOF GFCI.
	DUPLEX RECEPTACLE W/ DUAL USB @ 6" ABOVE BACKSPLASH IF SHOWN AT MILLWORK or 18" AFF. SEE SPECIFICATIONS FOR MORE INFORMATION.
	NON-LINEAR RECEPTACLE @ 18" AFF or AS NOTED - DUPLEX ; QUAD.
IG	DUPLEX FLOOR W/ BRASS COVER PLATE & 3/4" C TO ACCESSIBLE ATTIC SPACE or AS NOTED.
	FLOOR BOX - 2 GANG (RFB2/CFB2) W/1X DUPLEX; 4 GANG (RFB4/CFB4) W/2X DUPLEX. SEE SPECS FOR MORE INFO.
	FLOOR BOX - 6 GANG ; 8 GANG. SEE SPECS FOR MORE INFO.
	FLOOR BOX - 10 GANG; CUSTOM FLOORBOX AS NOTED, SEE SPECS FOR MORE INFO.
	POKE-THRU FLOOR BOX - 3X RECEPTACLES & COMM. SEE SPECS FOR MORE INFO. WALKERBOX EVOLUTION 8AT or APPROVED EQUAL, OR AS NOTED.
	POWER POLE - POWER & DATA
	PLUGMOLD WITH RECEPTACLES AT 12" OC
SR	SURFACE - MOUNT RACEWAY - SEE SPECIFICATIONS FOR MORE INFORMATION.
BC, BF, BT, BP	MOTOR - W / MOTOR SWITCH, OVERLOADS SQ.D. CLASS 2510, NEMA ENCL. (TYPE K) or AS NOTED. FINAL CONNECTION BY ELECTRICAL CONTRACTOR - MOTOR (GENERAL) ; EXHAUST FAN ; SUPPLY FAN ; PUMP.
S	MOTOR TOGGLE SWITCH.
	DOOR HOLD BACK - PROVIDE POWER SHOWN TO LOW VOLTAGE TX TO SERVE DEVICE(S).
	EMERGENCY POWER OFF (EPO) - SEE SPECIFICATIONS FOR MORE INFORMATION.
	BUZZER - EDWARDS #156G-6G1 OR APPROVED EQUAL AT 80" AFF.
	PUSH BUTTON - EDWARDS #695 OR APPROVED EQUAL AT 44" AFF ; SIGNAL TX ABOVE CEILING.
WH	WATER HEATER - SEE PLUMBING SCHEDULE FOR MORE INFORMATION.
PS	PLUMBING SENSORS - PROVIDE POWER SHOWN TO LOW VOLTAGE TX TO SERVE DEVICE(S).
	DUPLEX RAISED FLOOR RECEPTACLE.

NOTES:
1. SOME SYMBOLS MAY NOT BE USED.
2. ACCESSIBLE DEVICES HIGHEST OPERABLE PART TO BE 46" MAXIMUM/18" MINIMUM A.F.F. - REFER TO ARCHITECTURAL DRAWINGS.
3. DIMENSIONS GIVEN A.F.F. ARE TO BOTTOM OF BOX.





8 KITCHEN RECEPTACLE DETAIL
1/8" = 1'-0"



PANELBOARD LABEL (TYPICAL)

HVAC DISCONNECT SWITCH LABEL (TYPICAL)

NOTES:
1. ATTACH SECURELY WITH NON-CORRODING STAINLESS STEEL SCREWS, NON-CORRODING POP RIVETS ARE ACCEPTABLE, ADHESIVE ATTACHMENT IS NOT ACCEPTABLE.
2. LABEL ALL PANELBOARDS, SWITCHBOARDS, TRANSFORMERS, HVAC DISCONNECT SWITCHES, AND MOTOR CONTROL CENTERS AS REQUIRED, REFERENCE SPECIFICATION SECTION 260553.

9 ELECTRICAL EQUIPMENT IDENTIFICATION
1/8" = 1'-0"

ELECTRICAL GENERAL NOTES

(SOME NOTES MAY NOT BE USED)

1. BRANCH CIRCUIT - PROVIDE A SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT. MULTIPLE CIRCUITS SHALL NOT SHARE A COMMON NEUTRAL. NEUTRAL CONDUCTORS SHALL BE SIZED AS LARGE AS THE PHASE CONDUCTORS. NEUTRAL CONDUCTORS SHALL NOT BE OF A REDUCED SIZE.
2. CONDUIT - WHERE POSSIBLE, ALL CONDUIT AND/OR CABLING SHALL BE INSTALLED BETWEEN THE BOTTOM AND TOP CHORD OF JOIST. WHERE NO CEILINGS ARE SCHEDULED, ALL CONDUIT SHALL BE UP AGAINST BOTTOM OF THE TOP CHORD. DO NOT SUPPORT OR REST CONDUITS ON BOTTOM CHORD OF THE JOISTS.
3. CONDUIT - ROUTE CONDUIT IN EXPOSED AREAS PERPENDICULAR OR PARALLEL TO WALLS. ROUTE CONDUIT AS HIGH AS POSSIBLE AND ROUTE CONDUIT RUNS ADJACENT TO EACH OTHER. CONDUITS SHALL BE ORDERLY AND NEAT.
4. DEVICES - VERIFY ALL INSTALLATION HEIGHTS OF RECEPTACLES WITH ARCHITECTURAL CASEWORK DETAILS BEFORE ROUGH-IN.
5. EQUIPMENT - DURING THE SUBMITTAL PHASE, THIS CONTRACTOR SHALL SUBMIT LAYOUT OF ALL PANELS, SWITCHGEAR, TRANSFORMERS, CONTACTORS, ETC. IN EACH EQUIPMENT ROOM WHERE THIS EQUIPMENT IS LOCATED. ALL LAYOUTS MUST BE DRAWN TO SCALE AND DIMENSIONED.
6. UTILITY - THE CONTRACTOR AND SUBCONTRACTORS SHALL COORDINATE WITH ALL UTILITY COMPANIES AND THE OWNER'S REPRESENTATIVE TO DETERMINE THE LOCATION OF ALL EXISTING LINES AND UTILITIES BEFORE DITCHING IS PERFORMED. THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR REPAIR OF ANY CUT OR DAMAGED LINES OR UTILITIES THAT ARE NOT SHOWN ON ANY PLANS.
7. MECHANICAL - EXACT MECHANICAL EQUIPMENT LOCATIONS AND TYPE SHALL BE COORDINATED WITH MECHANICAL PLANS AND MECHANICAL CONTRACTOR. DO NOT INSTALL CONDUIT/CABLING WITHIN 3'-0" OF ANY HVAC UNIT UNLESS THE CONDUIT AND/OR CABLING SERVES THAT UNIT.
8. MECHANICAL - UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS, PROVIDE A LISTED MANUAL MOTOR-CIRCUIT SWITCH AS A DISCONNECTING MEANS AT EACH MOTOR. FOR MOTORS SHOWN WITH "MS" PROVIDE A LISTED MANUAL MOTOR -CIRCUIT SWITCH WITH OVERLOAD PROTECTION AS A DISCONNECTING MEANS AT EACH MOTOR.
9. MECHANICAL - SEE EXHAUST FAN SCHEDULE ON MECHANICAL SHEET FOR EXHAUST FAN SWITCHING, UNLESS CONTROLS ARE SPECIFICALLY NOTED ON THE DRAWINGS. WHERE "EMCS" IS MENTIONED, PROVIDE MECHANICALLY-HELD CONTACTORS AS NECESSARY FOR FAN CONTROL. COORDINATE CONTACTOR COIL ELECTRICAL REQUIREMENTS WITH MECHANICAL CONTROLS CONTRACTOR. WHERE "24/7" IS MENTIONED, PROVIDE A MOTOR-RATED SWITCH AT THE MOTOR ONLY. WHERE "SWITCH" IS MENTIONED, DO ONE OF THE FOLLOWING:
   A. IN KITCHEN, TIE ALL HOOD SUPPLY AND EXHAUST FANS TO HOOD CONTROLS. PROVIDE SWITCHES AS NECESSARY AT HOOD. FOR MORE INFORMATION, SEE KITCHEN HOOD DETAIL.
   B. IN SCIENCE LABS, TIE EXHAUST FANS TO UTILITY CONTROLLER PER LABORATORY UTILITY SHUT OFF SYSTEM DETAIL.
   C. IN ART, PROVIDE CONTROLS FOR KILN EXHAUST PER KILN EXHAUST FAN CONTROL DETAIL.
   D. IN BATHROOMS AND JANITORAL, EXHAUST FAN TO BE SWITCHED WITH THE LUMINAIRES IN THE SPACE PER THE EXHAUST FAN SWITCHING DETAIL.
   E. ELSEWHERE, SWITCH THE FAN WITH A MOTOR-RATED SWITCH ON THE WALL IN THE SPACE THE EXHAUST FAN SERVES.
10. CONDUIT - COORDINATE CONDUIT ROOF PENETRATIONS WITH MECHANICAL ROOF TOP UNITS AND/OR THRU HOODED PLUMBING PENETRATIONS TO CONDENSING UNITS.
11. MECHANICAL - REFER TO THE MECHANICAL SHEETS FOR ALL SENSOR LOCATIONS (THERMOSTAT, HUMIDISTAT, CO2, etc.), DUCT DETECTORS, CONTROL RELAYS, MOTORIZED DAMPERS, SFDs, etc. THIS CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONDUIT, BACK BOXES AND LINE VOLTAGE WIRING TO SENSORS, DEVICES, etc. AS REQUIRED TO ENSURE A COMPLETE AND OPERATIONAL SYSTEM. FOR MORE INFORMATION, REFER TO SPECIFICATIONS AND SENSOR INSTALLATION DETAIL.
12. DEVICES - VERIFY WHITEBOARD AND TACKBOARD LOCATIONS WITH ARCHITECTURAL PLANS. DO NOT INSTALL DEVICES IN THESE AREAS.
13. DEVICES - EXACT LOCATION OF ALL OUTLETS, DEVICES, & ETC. INSTALLED IN MOVEABLE FURNITURE SHALL BE COORDINATED WITH ARCHITECT AND OWNER.
14. DEVICES - REFER TO ELECTRICAL COMMUNICATION DRAWINGS FOR GENERAL LOCATION OF CONDUIT AND BOXES SUPPLIED BY THIS CONTRACTOR IN BASE BID.
15. BRANCH CIRCUIT - ALL COMPUTER POWER OUTLETS TO BE ISOLATED GROUND WITH #10 AWG NEUTRAL. DIFFERENT CIRCUITS SHALL NOT SHARE A COMMON NEUTRAL.
16. DEVICES - TAMPER RESISTANT RECEPTACLES SHALL BE PROVIDED IN ACCORDANCE WITH NEC ARTICLE 406.12.
17. MECHANICAL - ALL VARIABLE FREQUENCY DRIVES (VFD's) ARE TO BE PROVIDED BY THE MECHANICAL CONTRACTOR, INSTALLED AND POWERED BY THE ELECTRICAL CONTRACTOR, AND CONTROLLED BY THE CONTROLS CONTRACTOR. THIS CONTRACTOR TO PROVIDE ALL NECESSARY POWER WIRING FROM PANEL TO VFDs AND FROM VFDs TO EACH MOTOR.
18. MECHANICAL - FOR ALL UNITS WITH PLASMA AIR IONIZATION DEVICE. PROVIDE CONTROL WIRING AS REQUIRED BY MANUFACTURER FROM LOW VOLTAGE FAN CONTROL TERMINALS TO POWER INPUT TERMINALS ON IONIZATION DEVICE. PROVIDE STEP-DOWN TRANSFORMERS AS REQUIRED TO PROVIDE LOW VOTAGE POWER FROM UTILIZING THE CIRCUIT POWERING THE UNIT. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH MECHANICAL INSTALLER. LOCATE EACH TRANSFORMER IN A NEMA 3R ENCLOSURE MOUNTED AT THE UNIT.

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REVIEW ONLY
NOT FOR CONSTRUCTION
4/19/2023 8:30:04 AM

CASTLEBERRY ISD ADMIN. KITCHEN

5228 Ohio Garden Road, Fort Worth, TX 76114

REVISIONS:

No	Date
.	

JOB NO. 2320
DATE: April 18, 2023

ELECTRICAL DETAILS, SYMBOLS, & GENERAL NOTES

EP701

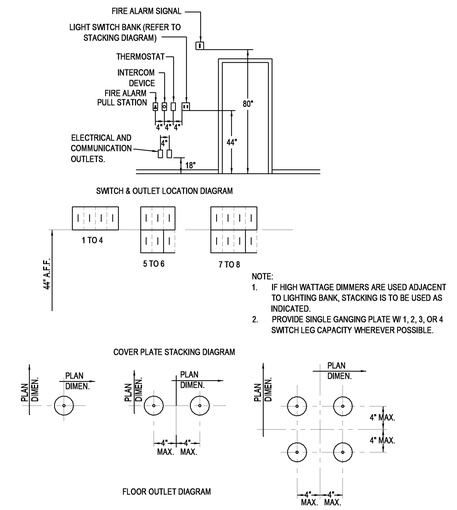
JAVIER GARCIA
TEXAS P.E. 118760
4/19/2023 8:30:04 AM

JAMES TATE III
TEXAS P.E. 102427
4/19/2023 8:30:04 AM

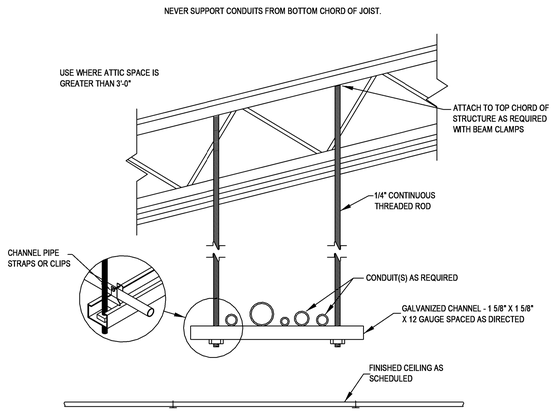
EMA Engineering & Consulting, Inc.
Tyler | Austin | Houston | El Paso
DFW | San Antonio | Shreveport
Texas Firm Registration No. F-893
Louisiana Firm Registration No. EF-5818
DESIGN SOLVE ENHANCE www.EMAengineer.com

SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

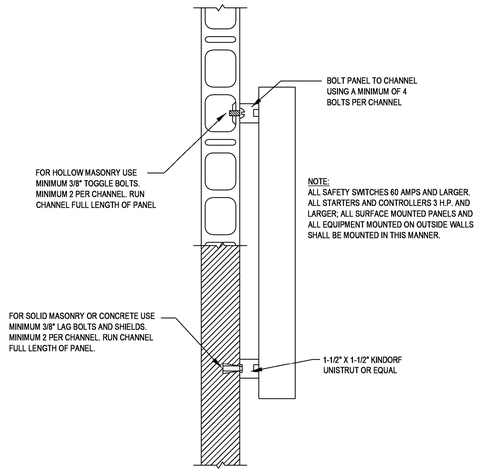
4/19/2023 8:30:04 AM



1 OUTLET DIAGRAM
1/8" = 1'-0"



2 CONDUIT SUPPORT
1/8" = 1'-0"



3 SURFACE EQUIPMENT MOUNTING DETAIL (VERTICAL)
1/8" = 1'-0"

4/19/2023 8:30:05 AM

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JOB NO.	2320
DATE:	April 18, 2023

ELECTRICAL DETAILS

EP702

OWNER
Castleberry Independent School District
817-252-2000
www.castleberryisd.net

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

GENERAL NOTES

1. CONSTRUCTION DOCUMENT COORDINATION:
A.) REVIEW ALL DRAWINGS AND SPECIFICATIONS FOR COMPLETE REQUIREMENTS AS COORDINATION IS REQUIRED BETWEEN VARIOUS PORTIONS OF THE WORK. (EXAMPLE: REFER ARCHITECTURAL DRAWINGS FOR LOCATING PLUMBING, & ELECTRICAL.)

2. DIMENSIONS:
A.) DO NOT SCALE DRAWINGS UNLESS AUTHORIZED BY ARCHITECT FOR SPECIFIC ITEMS.
B.) DIMENSIONS ARE TYPICALLY SHOWN TO CENTERLINE OF COLUMN, FACE OF METAL STUD (NOT FACE OF DRYWALL), OR FACE OF CONCRETE UNLESS SPECIFICALLY NOTED OTHERWISE.
C.) DIMENSIONS ARE TO BE CAREFULLY REVIEWED BY CONTRACTORS AND DISCREPANCIES REPORTED TO ARCHITECT FOR CORRECTION BEFORE PROCEEDING WITH THE AFFECTED AREA OF THE WORK.
D.) COORDINATE OPENINGS REQUIRED FOR ITEMS SUCH AS DOORS, WINDOWS,ETC. WITH SCHEDULED SIZE. VERIFY ANY AND ALL EXISTING OPENING SIZES PRIOR TO FABRICATION.

3. NOT USED

4. DRYWALL:
A.) ALL GYPSUM BOARD SHALL BE TYPE 'X' EXCEPT AS OTHERWISE REQ'D FOR TESTED ASSEMBLY RATING.

5. PENETRATIONS / EXPANSION JOINTS:
A.) MECHANICAL PENETRATIONS THRU FIRE RATED PARTITIONS OR FLOORS ARE TO BE PROVIDED WITH FIRE DAMPERS. (REFER TO MECHANICAL DRAWINGS.)
B.) ROOF PENETRATIONS - LOCATE INDIVIDUAL PENETRATIONS WITH 12 INCH MINIMUM CLEARANCE FROM EACH OTHER AND ALL WALLS AND CURBS. PITCH PANS WILL ONLY BE ALLOWED WHERE UNAVOIDABLE AND SPECIFICALLY APPROVED BY THE ARCHITECT.
C.) PENETRATIONS THRU WALLS FLOOR CEILING/ROOF WHICH ARE FIRE RATED (AS NOTED OR SCHEDULED) ARE TO BE SEALED AIR TIGHT WITH FIRE RATED SEALANT PER SPECIFICATION.

6. NOT USED

7. FINISHES:
A.) POLYMER COATING FINISH:
I.) EXTERIOR POLYMER COATING TO BE APPLIED AFTER PROPERLY PREPARING NEW CONCRETE SUBSTRATE.

INDEX OF DRAWINGS

ARCHITECT
WRA Architects, Inc.
214-750-0077
www.wraarchitects.com

FOOD SERVICE
Bosma Design Solution, Inc.
972-822-6350
www.bosmadesign.com

MPE ENGINEER
Estes, McClure & Associates, Inc.
903-581-2677
www.estesmcclure.com

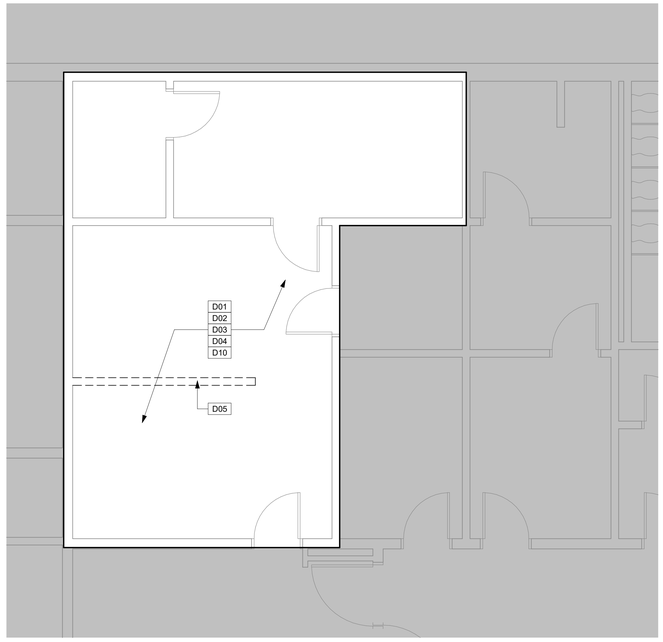
PROJECT NAME:
CASTLEBERRY HS CONCESSIONS

PROJECT ADDRESS:
215 Churchill Road, Fort Worth, Texas - 76114

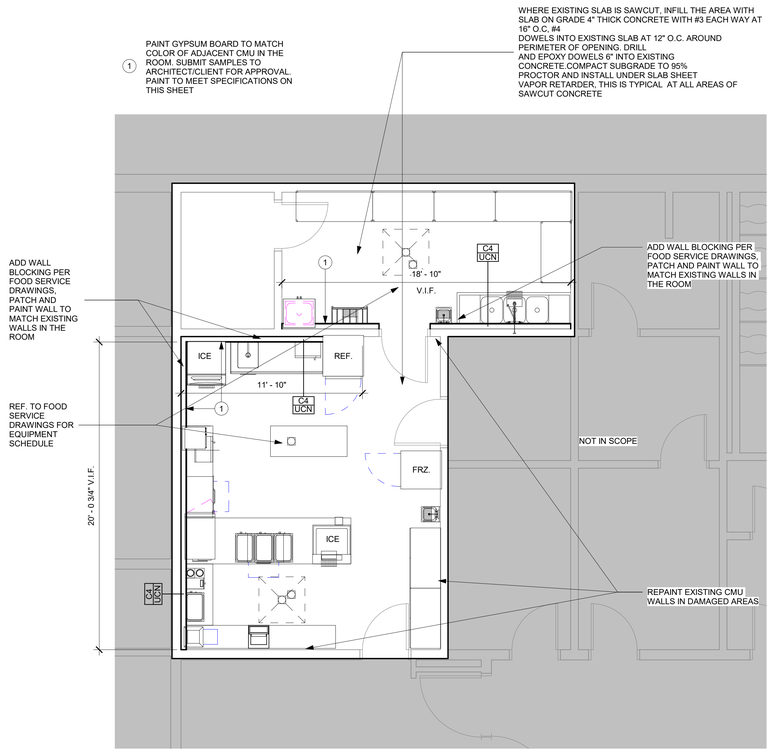
JOB NO. 2320
DATE: April 18, 2023

Cover Sheet

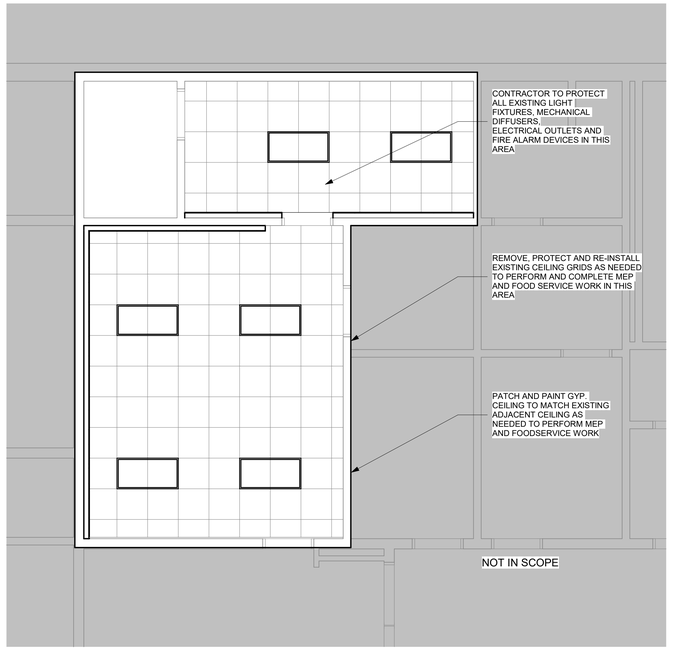
G001



1 Demolition Floor Plan
1/4" = 1'-0"



2 Floor Plan
1/4" = 1'-0"



3 Reflected Ceiling Plan
1/4" = 1'-0"

GENERAL DEMOLITION NOTES

1. ITEMS TO BE REMOVED ARE SHOWN THUS:

2. ALL MATERIALS INDICATED TO BE DEMOLISHED ARE TO BECOME PROPERTY OF THE CONTRACTOR AND ARE TO BE REMOVED FROM THE PROPERTY PROPERLY AND DISPOSED OFF-SITE IN A LEGAL MANNER UNLESS NOTED OTHERWISE.

3. COORDINATE WITH OWNER AND ARCHITECT FOR SCHEDULING OF DEMOLITION OF VARIOUS ELEMENTS OF PAVING AND OTHER STRUCTURES TO FACILITATE CONTINUED FUNCTIONS OF SCHOOL FACILITIES.

4. ANY DAMAGE TO SURROUNDING AREAS THAT OCCURS DURING DEMOLITION ARE TO BE REPAIRED AND RESTORED TO ORIGINAL CONDITION.

5. EXISTING EXPANSION JOINT COVERS TO BE REMOVED AND PROTECTED FOR REINSTALLATION, THOSE DAMAGED DURING REMOVAL TO BE REPLACED.

6.ALL LIGHTS, HVAC DIFFUSERS, ELECTRICAL OUTLETS, AND FIRE ALARMS IN THE AREA OF WORK SHALL BE PROTECTED AND MAKE-SAFE DURING CONSTRUCTION ACTIVITIES.

- D01 REMOVE EXISTING CASEWORK, COUNTERTOP AND BACKSPLASH
- D02 PROTECT ALL EXISTING WALL FINISHES AND DOORS DURING CONSTRUCTION
- D03 REMOVE EXISTING FLOOR FINISH & BASE. PREPARE FLOOR FOR NEW FINISH. NEW FINISH TO BE OWNER FURNISHED AND OWNER INSTALLED
- D04 SAWCUT CONCRETE FOR NEW PLUMBING PIPES AND FLOOR DRAIN. REF. MPE DRAWINGS FOR LOCATION OF ALL PLUMBING WORK THAT WILL REQUIRE SAWCUTTING
- D05 REMOVE EXISTING WALL, SHOWN DASHED.
- D10 REMOVE EXISTING CEILING TILES AS NEEDED TO COMPLETE WORK IN THIS AREA. RE-INSTALL CEILING TILES ONCE WORK IS COMPLETED. CONTRACTOR TO TAKE ALL MEASURES TO PROTECT THE EXISTING CEILING TILES IN THE AREA

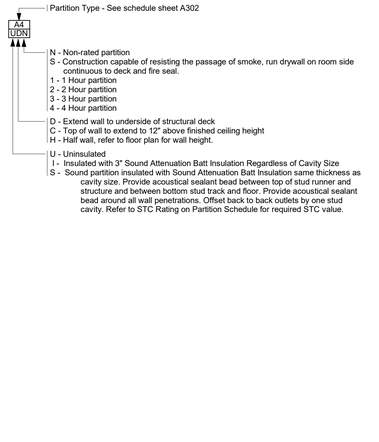
PARTITION SCHEDULE

TYPE	WALL THICKNESS	DESCRIPTION	U.L. DESIGN NUMBER WHERE SCHEDULED	COMMENTS
C2 — 2 1/2" STUDS	3 1/8"			
C4 — 3 5/8" STUDS	4 1/4"	METAL STUDS AT 16" O.C.		
C6 — 6" STUDS	6 5/8"	1 LAYER OF 5/8" GYPSUM BOARD		

GENERAL PARTITION NOTES:

1. PLAN DIMENSIONS ARE TO FACE OF STUD, FACE OF FURRING CHANNEL, OR FACE OF MASONRY; IN THAT ORDER.
2. ADHERE TO MANUFACTURER'S INFORMATION FOR MINIMUM METAL STUD GAUGE TO BE USED FOR THE UNBRACED LENGTH OF THE WALL (MINIMUM GAUGE TO BE 25 GA; IF WELDED).
3. ALL GYPSUM BOARD AT RATED WALLS SHALL BE TYPE 'X'.
4. STUD SPACING SHALL BE 16" O.C. EXCEPT AT CORRIDORS AND TOILET WALLS WHICH SHALL BE SPACED AT 12" O.C.
5. STUD WALLS RECEIVING CERAMIC WALL TILE SHALL BE CONSTRUCTED WITH 20 GAUGE STUDS.
6. FIRE RATED PARTITION IS TO BE CONTINUOUS IN CONDITIONS WHERE ADDITIONAL WALL FURROUT OCCURS.
7. SMOKE SEAL FIRE CAULKING REQUIRED AT ALL FIRE RATED PARTITIONS (1HR - 4HR) AND AT "S" PARTITION THAT ARE OTHERWISE NON - RATED PARTITIONS.

PARTITION SYMBOL LEGEND

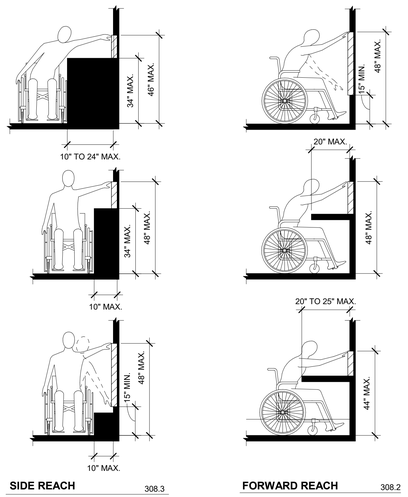


SPECIFICATIONS

1.1 INTERIOR GYPSUM BOARD
- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. American Gypsum; 5/8 inch FireBloc Type X Gypsum Wallboard.
    - b. CertainTeed Corporation; Type X Gypsum Board.
    - c. Continental Building Products, LLC; Firecheck Type X.
    - d. Georgia-Pacific Building Products; ToughRock Fireguard X Gypsum Board.
    - e. National Gypsum Company; Gold Bond Brand Fire-Shield Gypsum Board.
    - f. United States Gypsum Company; USG Sheetrock Brand Firecode X Gypsum Panels.
  - 2. Thickness: 5/8 inch (15.9 mm) or 1/4 inch where indicated on Drawings.
  - 3. Long Edges: Tapered.

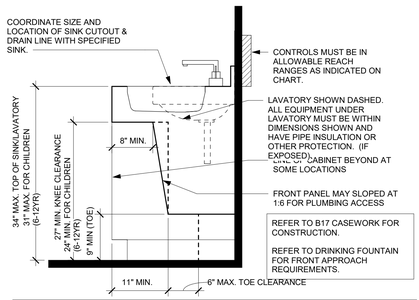
1.2 JOINT TREATMENT MATERIALS
- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.

1.3 PAINT
- A. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.



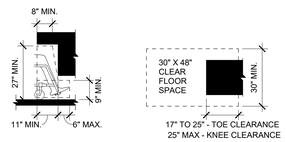
SIDE REACH 308.3 FORWARD REACH 308.2

ACCESSIBLE REACH RANGES
3/8" = 1'-0"



GENERAL NOTES:
1. A PARALLEL APPROACH CAN BE PROVIDED TO LAVATORIES AND SINKS USED PRIMARILY BY CHILDREN 5 YEARS AND YOUNGER
2. DIP OF THE OVERFLOW SHALL NOT BE CONSIDERED IN DETERMINING KNEE AND TOE CLEARANCES.
3. METERED FAUCETS SHALL REMAIN OPEN FOR 10 SECONDS MINIMUM.

ACCESSIBLE SINK AND LAVATORY 306.1, 606.2
1" = 1'-0"



ELEVATION PLAN 306

ACCESSIBLE TOE & KNEE CLEARANCE
3/8" = 1'-0"

THESE DIAGRAMS REPRESENTS WRA'S INTERPRETATION OF THE 2010 ADA & 2012 TEXAS ACCESSIBILITY STANDARDS AND SHOULD BE USED FOR GUIDANCE ON THE PROJECT. THE CONTRACTOR IS STILL RESPONSIBLE FOR ADHERING TO ALL ADA, TAS AND TDLR REQUIREMENTS

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT — DERRICK YORK — 26797 — STATE OF TEXAS — 4-19-23

CASTLEBERRY HS CONCESSIONS
215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:
No Date
- -

JOB NO. 2320
DATE: April 18, 2023

Floor Plans

A201

4/19/2023 10:08:32 AM

GENERAL CONDTION NOTES TO ALL CONSTRUCTION TRADES AND DESIGN TEAM

HEALTH DEPARTMENT NOTES:

1. New exhaust hoods will be constructed to meet the following standards, "NSF, UL, and NFPA-96". New Hoods to bear UL Classified Label without dampers in exhaust vent collars. Hoods are designed to meet or exceed 50 FPM capture velocity at the cooking surface edge and have 1'-0" minimum overhang at all exposed cooking area.
2. Cooking equipment under exhaust hood are either on casters with flexible utility quick disconnects with Safety-Set or fixed on stainless steel legs and sealed to walls with clear silicone sealant. Safety-Set is a positioning system for mobile cooking equipment under a hood. NFPA codes 17A (5.6.4) and 96 (12.1.2.3) require that a means be present to ensure cooking equipment in always positioned in its design specified location in relation to fire suppression and ventilation systems during cooking operations.
3. Dishwasher will be designed as high temperature wash system with a wash temperature of 140-degree Fahrenheit minimum and a final rinse temperature of 180-degree Fahrenheit minimum.
4. The exhaust duct system (design by mechanical engineer provided by mechanical contractor) by G.C. shall be provided with an automatic fire extinguishing system per code. Refer to mechanical engineer's drawings on all duct work, exhaust fans, MAU, scrubber, and control systems when required.
5. Shut-off valves, required as part of the fire suppression system for gas and/or electric cooking equipment, under or adjacent to the hoods, should be provided by G.C. As required per governing jurisdiction and local and/or state codes.
6. Refrigeration equipment shall have thermometers which are easily readable, in proper working condition and accurate, within arrange of plus or minus two (2) degrees.
7. Countertop equipment not readily movable, weighing over 75 pounds, will be provided with legs or feet at least 4" high.
8. Chemical injection systems must be installed downstream from a vacuum breaker or air gap, to prevent possible back siphonage of the chemicals into water line system.
9. Cutting boards and work surfaces shall be of non-wood construction.
10. An aisle space of thirty (36") inches or more shall be provided within all work and storage areas or what local codes require.
11. Backsplashes of equipment shall be sealed to the walls with clear silicone.
12. Vacuum breakers, when used, to be minimum of six (6") inches above the flood level rim with no shut off devices beyond the discharge of the vacuum breaker.
13. Provide a minimum of 50-foot candles of lighting in all food preparation, cooking and dish washing areas. Lighting is to be shielded over exposed food and utensil areas. Provide a minimum of 50-foot candles of lighting over food serving and pickup area.
14. Handwashing facilities are required for food preparation, serving and/or utensil washing area and will be shown on the kitchen equipment floor plan.
15. Openings in construction will be sealed to within 1/32 of an inch.
16. The use of sealants must be listed as approved by the National Sanitation Foundation (NSF) under standard C-2.
17. Sealants may be used only in structurally sound joints and seams. Sealants may not be utilized in food and splash contact surfaces, to fill open spaces or voids which result due to improper fabrication. Any opening more than 1/8 inch shall be considered excessive and must be closed using proper field joint.
18. Opening around service and utility lines should be closed as far as possible with collars, grommets and flexible from gaskets. Sealants may not be used to seal service and utility lines to walls or adjacent pieces of equipment.
19. Plumbing Contractor to furnish and install RPZ's per code. Refer to Engineer's drawings for specifications and all requirements.
20. Plumbing Contractor to furnish and install eye wash station per code. Refer to Engineer's drawings for specifications and all requirements unless otherwise noted.
21. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.
22. A food service establishment or any other business discharging grease, oil or other similar materials shall have an operable grease trap, grease interceptor or other comparable device(s) as determined by local code and the city's chief building inspector to be an adequate substitute for a grease trap or grease interceptor. All drains from food preparation and cleanup areas including, but not limited to, prewash sinks, floor drains, food waste disposal units, pots and pans sinks, scullery sinks, and garbage can wash areas shall be connected to such trap or interceptor. The size of a grease trap or grease interceptor shall be as determined by local code and designed by Engineer of record on project.

TYPICAL HEALTH/HYGIENE- REQUIREMENTS

1. What follows are typical requirements from review authorities within food/beverage storage, preparation, and service zones. These are for reference-only and final finishes should be available on the Architect's and/or Interior Design documents.
   a. Flooring surfaces/systems should be smooth, non-slip with commercial-grade durability, made of non-absorbent material, and easily cleanable in all the following zones:
   b. Where food is prepared, packaged, and stored
   c. Where utensils are washed and staged
   d. Where refuse is stored and staged
   e. Within janitor rooms and lien storage areas
   f. Within washroom and hand washing areas
2. Flooring surfaces should be coved at the intersection of the floor and wall with 1/2" minimum radius and should extend up the wall minimum of six inches (6") in all foodservice space. Mastic-applied vinyl is not acceptable.
3. Floor drains should be installed in zones for general cleaning and washdown areas. Additional drains should be installed in floors that are more frequently sprayed-down in the cleaning process. Whole room flooring should be sloped to the drain 1/16" per foot or within a six-foot (6'-0") radius. Refer to Consultant floor drain detail if design calls for spot location floor drains.
4. Wall and ceiling finishes within all foodservice zones where food is stored, prepared, picked-up and stated should be durable, smooth, non-absorbent, impervious, and washable. Wall and ceiling finishes within food preparation and utensil washing areas should be light-colored with durability equal to demand. Wall finishes on interior surfaces of walk-in refrigeration cavities should also be light-colored with durability equal to demand. Cement board with Fiberglass Reinforced Panel finish is typical minimum wall finish in all preparation/wash-up zones. Wall areas adjacent to bar sinks should be smooth and easily cleanable. Conduits of all types should be installed within walls; when installed on surface of walls, they should be shrouded to facilitate ease of cleaning.
5. Lighting in every zone where food is prepared, processed, or packaged or where utensils are cleaned should be provided in an intensity of no less than 50-foot candles as measured 30" above the finished floor, except the working surfaces of bars and bar work-boards where at least 10 foot-candles of light are required. Required light source must be shrouded with shatter-proof covers.
6. Exhaust ventilation should be provided at or above all electric or gas cooking equipment and dishwashers that utilize hot water or chemicals for sanitization per local, regional, and national code. Exhaust ventilation may be required above hot beverage equipment – confirm with local code. Washrooms, dressing rooms should be vented to the atmosphere by means of an openable, screened window, and air shaft or switch-activated exhaust fan per local building codes.
7. Foodservice facility should be constructed, and maintained and operated to prevent entrance of animals, birds and vermin including rodents and insects.
8. Delivery doors leading to the exterior should be self-closing and open outward. Vestibules are typically required where large double-doors may enter-into a food preparation area. All exterior doors should be provided with an overhead air curtain, air curtain should produce a downward and outward airflow not less than three inches (3") thick at the nozzle with an air velocity no less than 1600FPM across entire opening.
9. Circulation- minimum of thirty-six inches (36") is required for all aisles and working areas within foodservice and beverage preparation zones.
10. Hand washing sinks with single-use towels and hand cleanser should be provided within, or adjacent to, washrooms and should be equipped with an adequate supply of hot/cold running water. A dedicated hand washing station should be provided within each food preparation zone.
11. Restrooms for use by foodservice employees should be provided and should have a self-closing door and not open directly into food prep area.
12. Ware Washing machines using hot water or chemical sanitizing rinse must conform to applicable National Sanitation Foundation (NSF) standards and shall be installed and operated in accordance with those standards.
13. All cold storage space must be equipped with a thermometer that is easily readable and in proper working condition.
14. Equipment installation- all equipment must meet National Sanitation Foundation (NSF) design and installation requirements. All foodservice equipment should be easily moveable, light enough to be easily moved by one (1) person or installed on a raised minimum six inches (6") rounded stainless steel legs or sealed to a minimum four inches (4") stainless steel or galvanized steel channel base filled with lightweight concrete with minimum 1/2" coved radius. If on an island, equipment should overhang the base at least three inches (3"), but not more than the height of the base. Sealing to the finished floor is acceptable for equipment designed to be on level with floor such as roll-in refrigerator/freezers, large blast chiller/freezers, roll-in ovens, and proofers.
15. Gaps between equipment base and top of channel base should be sealed with non-hardening silicone sealant. All equipment on counters, tables and shelves that are not easily moved are to be installed on approved 4" legs or sealed to table, shelf, etc. (Verify with local code). All fabricated equipment, flashing, and back splashes must be sealed to walls and abutting equipment or moved away from adjacent fabricated equipment minimum of 3" or adjacent wall minimum of 6". Dipper wells with running water should be provided for ice cream/frozen dessert with scooping required.

ARCHITECT'S AND OWNER'S NOTES

1. Pertinent preliminary and updated cad or reproducible Architectural background base sheets at intermediate intervals and phases of the project when necessary to communicate a spatial description of the foodservice areas and/or any changes to the space which will affect the work of the Consultant.
2. Project information provided by the Architect of Record including:
   a. Project directory including all primary code and jurisdictional authorities, Consultants, Designers, Engineers, Architects, Contractors, and Owner's representatives.
   b. Initial foodservice equipment estimated budget.
   c. Project CAD/Revit, graphic and quality control standards, and policies.
3. Pertinent building construction details, mechanical, electrical, plumbing, and structural characteristic of the building or site, which affect the work of the Consultant.
4. Architect/Owners' design standards for foodservice materials and equipment.
5. Foodservice operations program and planning documents outlining the following:
   a. Menu and operational concepts.
   b. Staffing requirements and hours of operations.
   c. Anticipated types, numbers, and frequencies of persons to utilize operation.
   d. Objectives of the foodservice operation.
   e. Special materials, production, and delivery requirements.
   f. Historical data for current operations.
   g. Spatial program for all foodservice areas.
6. Owner operational and maintenance standards.
7. Architects/Owners schedule and budget for the project. Architects/Owners is required to provide written approval on design development phase and equipment selection.
8. The Architect/Owner will render decisions in a timely manner pertaining to design and document submittals prepared by the Consultant to avoid unreasonable delays in the orderly and sequential progress of the Consultant's work. Owner's agent or representative shall issue any instructions, approvals, changes, modifications, or directives to the Consultant in writing.
9. The Architect shall provide the Consultant with a complete set of contract documents and/or a set of all Contract Documents pertaining to this portion of the work for his records at no cost to the Consultant. In addition, the Consultant shall be provided with copies of all bids for this part of the work, contracts, correspondence, change orders, and other documentation, which may affect the work performed by the Consultant.
10. The Architect/Owner shall be responsible for submission of food service drawings to the proper governing authorities for code review and compliance. If Consultant contract is direct with the Owner, it is the Owner's responsibility to notify the Architect of their responsibility to submit for permit and review.
11. The Architect/Owner shall be responsible for reviewing each phase of the project and communicate to consultant to proceed forward to next phase according to project schedule. Consultant will move on to the next phase as an approval from Architect/Owner with no delays.
12. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.

GENERAL CONTRACTOR NOTES:

1. The following scope of work are excluded from Kitchen Equipment Contractor's scope of work. General Contractor or equivalent contractor other than the Kitchen Equipment Contractor (KEC) to provide the following below.
2. General Contractor and their trades are responsible for reviewing all the Food Service Consultant's construction documents (this includes 114000 specifications). Food facility requirement notes, and all other notes are to be considered as part of these notes. General Contractor to provide as they apply.
3. General Contractor to cut and provide holes through ceiling, roofs, walls, and floors for ducts, refrigeration lines, etc. in accordance with local fire and building codes and in accordance with duct sizes specified. General Contractor to provide the resealing of all holes (including the "mopping-in" of fan curbs and roof jacks.) General Contractor to provide all duct fire separation enclosures, wrappings, etc. as may be required by local building and fire codes. (See Notes Below)
4. General Contractor to provide all duct chases/shafts from hood to Fan, sized and constructed, conforming to jurisdictional codes. Install a leveled platform on the roof for remote compressors, exhaust fans, MAU, and scrubbers. Verify all locations with architect's and/or engineer's drawings. Provide weatherproof covers for all outdoor equipment, comply with equipment requirements and code requirements.
5. Where noise or vibration producing equipment (dish machine, disposer, etc.) is located adjacent to dining areas and/or any public areas, provisions should be made by the General Contractor to soundproof common walls.
6. All roof curb and roof jacks to be provided, located, and installed by GC including resealing of roof and roof penetrations.
7. Sleeves and conduits to be provided by GC in walls, floors, and ceiling for lines (drains, refrigeration, beverage, fire suppression, etc.) to pass through and G.C. to reseal after lines are run. All conduit to meet local codes - see detail on K sheets.
8. General Contractor to provide access to hoods at area above hoods for mounting of hood supports. If access is not provided, General Contractor to provide hood supports. All roof curb and jacks to be provided, located, and installed by GC, including resealing of roof and roof penetrations. General Contractor to provide structurally engineered support for all equipment hanging from ceiling.
9. General Contractor to provide sprinkler heads in walk-in boxes if required and to adequately protect against freezing.
10. Provide door wall openings and or passages to assure access for all kitchen equipment and front-end items. Coordinate sizes with KEC Removal of window glass, window frames, doors and door frames and center post for entry of equipment shall be the responsibility of the General Contractor and at no expense to KEC if necessary.
11. General Contractor to provide and install all wall backing per drawings and locations coordinated by KEC.
12. All dimensions shown are measured from guidelines, finished walls, floors, ceilings, and/or column to center lines of studs or outlets. Allowance shall be made for miscellaneous obstructions, structures, venting, electrical, plumbing, and thickness of finishes when framing and/or roughing-in as required.
13. When equipment is noted as existing it is the responsibility of respective trade to confirm existing utility requirements.
14. When equipment is noted by vendor, utility requirements should be verified by respective trades to confirm utility requirements. Most of this information may be sourced by the owner.
15. General Contractor shall keep the working area free from debris of all kinds and shall remove all rubbish resulting from the work being done by them. When the work is completed, contractor shall leave the premises in a clean and finished condition. General Contractor to provide waste container at job site for KEC.
16. Provide walk-in cooler/freezer depressions, if required. Refer to shop drawings and "K Sheets". Then finished flooring to continue within both cooler and freezer. Recessed floors for walk-in coolers and freezer as indicated on plans. Including floor insulation (if walk-in manufacturer does not provide panel flooring) and perimeter thermal breaks where indicated. Perimeter thermal breaks where indicated. Recessed floors to be level, trowel smooth and backfill depressions after walk-in box has been erected. Refer to shop drawings for dimensions and details.
17. General Contractor to provide enclosures from top of walk-in to ceiling, if required.
18. Refrigeration rack pad or curb as detailed and sized on manufacturer's shop drawing, including metal cap/flashing and pitch pockets.
19. Provide coved base-molding or coved integral floor material at all vertical surfaces for kitchen and food prep floors, per jurisdiction code.
20. All metal curbs included with equipment shall be sealed and waterproofed to floor, tiled and /or sealed to equipment by GC. Cove base and interior cove in walk-in boxes to be provided by GC unless otherwise specified by KEC.
21. Concrete curbs/housekeeping pad for equipment as indicated on plans. Curbs/Pad to be level and trowel smooth. All measurements are from finished floor or walls.
22. Provide minimum 50-foot candles of light in all food preparation and storage areas.
23. Walls and ceilings of food preparation and storage shall be smooth, washable, light in color. Refer to Architect/interior designer's drawings.
24. 3" x 3" x 1/4" angle steel support system (CSS) at, or maximum 18" above ceiling at area indicated on plans for F.S.E.C. to attach hanger rods for hoods or attach ceiling mounted shelves or pot racks.
25. General Contractor to block out slab floor troughs and back fill with cement after troughs have been installed by Plumbing Contractor.
26. General Contractor to allow for finished floor when forming curbs.
27. "K SHEETS" drawings are provided for the sole purpose of locating equipment requirements only and do not relieve the General Contractor or Subcontractor of the responsibility of complying with all applicable codes. Please see Architect's drawings for all other requirements and codes.
28. It is the responsibility of the Owner, Architect and/or General Contractor to inform the KEC in writing of all changes and all addendums to plans which are made prior to and during construction. KEC assumes no responsibility for equipment deviations of size and/or utilities from lack of this information. The Owner will be responsible for all cost incurred by failure to give KEC notice of changes.
29. Last dated revisions void all previous plans. It is the responsibility of the Owner, Architect and/or General Contractor to inform and provide all updates to the KEC. Any discrepancies between plans and code requirements that may affect the installation, fabrication or overall work in any way shall be brought to the attention of the Kitchen Equipment Contractor (KEC) immediately by the general contractor before start of construction.
30. General Contractor to coordinate with Owner's vendor on all lease equipment regarding utility requirements and installation. This will also include owner furnished equipment but not limited to this.
31. General Contractor to review all of Consultant's construction documents including 114000 written specs and follow the process and procedures set in place by these documents. General Contractor to provide a complete submittal set and wait for the completion of the review process before KEC orders any equipment.

PLUMBING CONTRACTOR NOTES:

1. All rough ins related to foodservice equipment only. Please see architectural/engineering plans for additional plumbing requirements and codes.
2. Final connections to all equipment to be by Plumbing Contractor. all required tubing, misc. fittings, traps, etc., shall be supplied by the plumbing contractor unless otherwise specified. All exposed plumbing lines(including indirect waste) to be hard copper(connections using lead free solder) and shall be painted with chrome or aluminum paint.
3. Water quality requirement. The recommended minimum water quality standards whether untreated or pretreated, based upon 10 hours of use per day, and a daily blow-down, are as follows:
   a. Total dissolved solids – less than 30 parts per million
   b. Total alkalinity – less than 85 parts per million
   c. Silica – less than 13 parts per million
   d. pH Factor – Greater than 7.0
4. Plumbing Contractor to verify all plumbing rough-ins and location with owner, vendor, or GC on existing equipment or other equipment not provided by KEC.
5. Plumbing Contractor to furnish and install the following as per jurisdictional code:
   a. All water, waste, gas, and steam service to point of rough-in as shown on plan. Rough-in outlets to stub 4" out of walls at height indicated from finished floor to center line of outlet.
   b. Pressure reducing and/or regulating valves for dishwashers, booster heaters, and as otherwise noted, in kitchen areas.
   c. Cold water drains tempering kit as required by jurisdictional code.
   d. All floor sinks, complete with top grates, and removable sediment bucket set flush with finished floor, unless noted or as per local code.
   e. All waste lines, direct and indirect, except as noted, shall be pitched downward. All waste lines shall have adequate clean-out provisions.
   f. Indirect waste lines for walk-in refrigerated/freezers, pitched 1/4" per 12" (minimum) and with a "P" trap at end over floor sink as required by jurisdictional code.
   g. Heater tape, with 35 watts per lineal foot of drain line, and insulation of all drain lines inside freezer compartments.
   h. Install in an accessible location the fire control gas shut-off valve as supplied by Fire Protection System Supplier if gas cooking equipment is used.
   i. Vacuum breakers as required.
   j. Insulation of all steam, hot water, and condensate lines in kitchen.
   k. Clean-out valves for steam condensate and air lines.
   l. All piping condensate and drain lines, to and from equipment, must be kept a minimum of (6") above finished floor to allow for cleaning or prevailing jurisdictional code.
   m. In-line water filters are required for the following equipment (water filter by PC unless otherwise noted): Soda Systems, Ice Machines and Steam Equipment.
6. Plumbing Contractor to interconnect dish machine with booster heater and water-type ventilators with control panels as per manufacturer's instruction, when applicable and noted.
7. All lines routed through equipment shall not interfere with intended use.
8. All line routes shall not Interfere with servicing of equipment.
9. All vent pipes are to be concealed in walls and column chases.
10. Plumbing Contractor is responsible for interconnection between steam equipment and steam generator.
11. Grease trap to be specified and located by Mechanical Engineer and provided and installed by Mechanical or Plumbing Contractor, if required.
12. All plumbing locations are shown at optimum spots. Utilize all existing services where applicable.
13. All plumbing to be concealed within walls where possible.
14. Hot water heater to provide a minimum of 140-degree Fahrenheit water to all kitchen equipment.
15. All dimensions shown are measured from grid lines, finished calls, floors ceilings and/or column to center lines of stubs or outlets. The plumbing contractor shall make allowanced for miscellaneous obstructions such as piping mains, electrical components, structures, venting and thickness of finishes when roughing-in as required.
16. All faucets and/or disposers located on foodservice plan shall be provided loose by KEC and installed by Plumbing Contractor, unless otherwise agreed upon.
17. Hand sinks are to be mounted by KEC/GC (unless otherwise noted) and connected by Plumbing Contractor.
18. These drawings are not to be considered architectural drawings. The data shown on these drawings are reasonably accurate. Exact locations, distances, heights, and levels will be governed by the building and/or field conditions.
19. All work shall comply with the latest jurisdictional codes and all applicable amendments.
20. Where stubbing up out of a floor, piping shall extend a minimum 6" above the finished floor or curb.
21. Hose reel control box to connect in or through valve compartment, Contractor shall stub-up into valve compartment at height indicated on rough-in plan, cap their work, and make final connections after equipment is in place.

ELECTRICAL CONTRACTOR NOTES:

1. The electrical specifications and connections shown on these plans are for foodservice equipment requirements only. It is the responsibility of the Electrical Contractor to consult the Architect's, Mechanical Engineer's, and/or General Contractor's plans and Owner for further building electrical requirements.
2. Access areas and cut-ins on custom and buy-out equipment and fixtures shall be provided by the KEC as required for proper installation of electrical outlets, junction boxes, home runs, etc. The Electrical Contractor shall provide and install shields and extension boxes as required.
3. The Electrical Contractor shall connect all compressors and provide fused disconnects, magnetic starters, and thermos overload protection as required.
4. Vapor proof light fixtures for exhaust hoods shall be furnished by the hood supplier. The Electrical Contractor shall supply and install pull boxes, conduit, wire, bulbs, etc. Provide and connect to a wall mounted switch located per plans, if required.
5. It shall be the responsibility of the Electrical Contractor to interconnect and install light fixtures (provided loose by KEC) as required. Electrical Contractor to supply, install, and connect all drain lines heater tape.
6. Electrical Contractor to interconnect the remote refrigeration compressor, evaporator, T-stat, solenoid, and defrost timer (all controls) where required.
7. All electrical materials including wiring, fuses, conduit, switches, disconnects, magnetic starters, thermos-overload protectors, transformers, electrical panels, cords, plugs, GFCI receptacles(or GFCI breaker), bulbs, etc. shall be supplied by the Electrical Contractor unless specified in these plans or in writing by the KEC.
8. It shall be the responsibility of the Electrical Contractor to provide waterproof power outlet(s) on the roof for exhaust system fan(s) make-up air fan(s) and refrigeration system(s) as required. Low voltage (or common voltage) wiring shall also be supplied and installed by the Electrical Contractor when necessary to control and interconnect the above systems.
9. The Electrical Contractor shall furnish and install all electrical connections as required by applicable codes and ordinances.
10. All dimensions shown on these plans are measured from finished walls, floors, ceilings, and/or column center lines or grid lines to enter lines of outlets and pull boxes. The Electrical Contractor shall make allowances for finishes when roughing-in as required.
11. The Electrical Contractor shall provide and install element contact or relay shut-offs (shunt trip) and/or solenoid shut-off valve and interconnect with the fire suppression system for the cooking equipment, to shut off all equipment automatically in case of fire. Verify with local codes for shutdown of exhaust fan(s) and/or make-up air fan(s) requirements.
12. All 120-volt convenience outlets not designated with specific loads are to be rated 20.0 amps. Electrical Contractor is to confirm any additional outlets as requested by Architect, Owner and/or General Contractor. GFCI as required by code. GFCI receptacles to be readily accessible per the written code in NEC and if not readily accessible per the written words of the code, then GFCI breaker shall be provided.
13. Electrical Contractor to provide caps and cords for all equipment where caps and cords are not standard from manufacturer.
14. Internal wiring and plumbing of fabricated fixtures shall be by the Electrical and/or Plumbing Contractors.
15. Electrical Contractor to provide temporary power to food service equipment contractors' installers, as required.
16. All receptacles and junction boxes to be flushed mounted in walls with stainless steel cover plates, unless noted otherwise. No exposed conduit. Contractors are to provide minimum wall furring if required. Outlets are dimensioned on-center.
17. Where applicable, Electrical Contractor to provide conduit, wiring, install electrical components, and interwire, between the following:
   a. Control panels to ventilators and exhaust/supply fans per manufacturer's instructions
   b. Kitchen exhaust hood/ventilators to fire control system and hood controls
   c. Kitchen printers, POS, monitors, and wireless access points as required.
   d. Sneeze guard lighting
   e. Module counters and components or equipment mounted on counters.
   f. Heat lamps are to be connected through remote controls, pilot lights, etc.
   g. Air curtain and micro switch(s)
18. Electrical Contractor to provide and install all light bulbs (LED) for fixtures, where applicable.
19. All symbols for outlet on walls are indicated at the specific height. Height of outlet is given from finished floor to centerline of outlet.
20. These drawings are not to be considered architectural drawings; the data shown on these drawings are reasonably accurate. Exact locations, distances, heights, and levels will be governed by the building and/or field conditions.
21. All work shall comply with the latest jurisdictional codes and all applicable amendments.
22. Where stubbing up out of the floor, conduit shall extend a minimum of 8" above the finished floor or curb.
23. Electrical Contractor shall pack and seal all exposed J-Box and conduit on walk-in coolers and freezers to prevent internal condensation.
24. Electrical Contractor shall furnish hexagon boxes for fire suppression system pull stations at 48" AFF as specified by Fire Safety Inspector.
25. Electrical Contractor shall provide and install electrical conduit runs for beverage and/or refrigeration lines as indicated on plans. Conduit to have a minimum 30" radius (NO FACTORY "L" S). Provide pull boxes inside walls, floors and/or ceiling as required.

MECHANICAL CONTRACTOR NOTES:

1. Mechanical Contractor to provide fans, duct work, (all welding of hood and duct required) controls, duct collar, final connection(s), hanging of hoods, permits and make-up air equipment, unless otherwise noted. Any seismic engineering required will be supplied by Mechanical Contractor. In Conditions of high deck (exceeding 4ft) GC to provide structural scaffolding to hang hood below at correct height. Refer to manufacturer's shop drawings for exact locations and sizes of duct collars. Provide tempered make-up in all kitchens.
2. Mechanical Contractor to balance exhaust system.
3. All duct collars, cut-outs, and penetrations in hoods to be located and provided by Mechanical Contractor in field.
4. Food Service Consultant only design the exhaust hood and fire protection system, unless otherwise specified. Everything above finished ceiling is by Mechanical Engineer (Exhaust fans, MAU, duct work, scrubber, and control system) and provided by Mechanical Contractor.
5. Food Service Consultant strongly suggests that tempered make-up air (heating and cooling) is provided for all kitchen workspace environment +/- 10 degrees Fahrenheit of the building's average ambient temperature(74-degree Fahrenheit or per local codes).

REFRIGERATION CONTRACTOR NOTES:

1. Refrigeration lines to be installed and protected from damage.
2. Refrigeration Contractor to be responsible for locating and setting in place remote compressors, verify location with applicable parties.
3. Refrigeration Contractor to be responsible for all applicable permitting required by local jurisdiction.

FIRE PROTECTION CONTRACTOR NOTES:

1. Where indicated on drawings, dry or liquid chemical system shall be provided to protect all cooking exhaust hoods, ducts, and cooking appliance against fire and re-flash by a fire control system. The size and number of systems shall be in conformance with N.F.P.A. pamphlet 96, and local and state codes. The system shall be installed by authorized installers.
2. The system shall be automatic actuated or be manually operable at the nozzle release and a remote manual pull operator shall be located as shown on the electrical rough-in drawing. Actuation of the system shall provide automatic gas and/or electric fuel line cut-off.
3. Electrically controlled or manually controlled gas solenoid valve shall be installed by the Plumbing Contractor. The Electrical Contractor shall furnish and install line voltage wiring and conduit from cut-off relay to solenoid valve and connect cut-off relay and solenoid valve as required.
4. Electrical cooking equipment shall be shut-off at the electrical panel by means of shunt trips. Electrical Contractor shall furnish and install shunt trips, line voltage wiring and conduit from fire protecting micro-switch, or equivalent, to panels, to meet all local codes.
5. All handheld fire extinguishers to be provided by General Contractor.
6. All tie-ins to fire safety systems to be the responsibility of Electrical Contractor.
7. All ceilings, walls, and floor finishes shall be specified by either Architect or Interior Designer. Information on finishes will be located within Architect's or Interior Designer's documents. All fire rating requirements and materials designed and specified by Architect of record.

MASONRY CONTRACTOR NOTES:

1. All curb dimensions are finished dimensions. Verify face and top finish (where curb is exposed) with Architect, General Contractor and Owner. Concrete curbs/housekeeping pad for equipment as indicated on plans. Curbs/Pad to be level and trowel smooth. All measurements are from finished floor or walls.
2. All curb heights to be taken from finished floor to top of finished curb.
3. All curb dimensions are taken from finished wall to face of finished curb, or from finished face of curb to finished face of curb.
4. Provide a 3/4" radius cove where finished face of curb intersects the finished floor.
5. See plumbing plan(s) for exact location of floor sinks and floor drains. Verify with Plumbing Contractor.
6. Do not scale drawings - use written dimensions shown on "K SHEETS" plans.

KITCHEN EQUIPMENT CONTRACTOR(KEC) NOTES:

1. All foodservice equipment and fixtures furnished and installed shall be as approved by the National Sanitation Foundation (NSF) or as approved by local environmental health authorities.
2. Conduits for refrigeration, beverage, and soda lines are not the responsibility of the foodservice equipment contractor(KEC) but are to be supplied and installed by other.
3. KEC is responsible for sealing any fixtures to wall and closure panels.
4. All equipment is to be properly leveled and pinned to floor as required. All island worktable with any direct connected utilities shall be required to have flanged feet and secured to floor.
5. KEC to review all of Consultant's construction documents including 114000 written specs and follow the process and procedures set in place by these documents. KEC to provide a complete submittal set and wait for the completion of the review process before ordering any equipment.
6. Food Service Consultant only specifies the equipment called out within the equipment schedule on the plan sheets, unless otherwise noted.

ABBREVIATIONS:		ABBREVIATIONS:	
ABV	Above	LDR	Leader
AFF	Above Finished Floor	LT	Light
AMP	Amperage (A)	M	Meter
ARCH	Architect(ural)	MECH	Mechanical
AVG	Average	MEZZ	Mezzanine
BDSI	Bosma Design Solutions, Inc.	MFG	Manufacturer
BEL	Below	MIN	Minimum
BFF	Below Finished Floor	MISC	Miscellaneous
BHP	Boiler Horsepower	MM	Millimeter
BNB	Bag-N-Box (soda system)	MOD	Modify
BTC	Branch to Connection	MDR	Modular
BTF	Branch to Fixture	MSD	Mop Sink Drain
BTU	British Thermal Units per Hour	MTR	Motor
CL	Center Line	MT	Mount
CLR	Clear(ance)	N	North
CNTR	Counter	NIC	Not in Contract
COL	Column	NTS	Not to Scale
CONN	Connect(or) (ion)	NUM	Number
CSWK	Casework	OC	On Center
CNR	Center	OPP	Opposite
CW	Cold Water	OVHD	Overhead
DAB	Dwane A. Bosma	OZ	Ounce
DATA	Data connection	PC	Plumbing Contractor
DCO	Duplex Convenience Outlet	PERF	Perforate(d)
DBL	Double	PERIM	Perimeter
DD1	Direct Drain 1 (options)	PERP	Perpendicular
DEMO	Demolition	PH	Phase
DFA	Drop from Above	PL	Plastic Laminate
DIM	Dimension	POS	Point of Sale
DN	Down	PPH	Pounds Per Hour
DR	Drain	PREP	Preparation
DWG	Drawing	PSI	Pounds Per Square Inch
DWR	Drawer	PTR	Printer
E	East	QTR	Quarter
EC	Electrical Contractor	QTY	Quantity
EL	Elevation Above Finished Floor	QUAD	Quad Outlet
ELEC	Electrical	RECT	Receptacle
ELEV	Elevation	REF	Refrigerator
ENTR	Entrance	REINE	Reinforcing(ment)
EP	Electrical Panel	REQ	Required
EQ	Equipment	RM	Room
EXG	Existing	SCO	Single Convenience Outlet
EXH	Exhaust	S	South
EXT	Exterior	SAN	Sanitation
FAB	Fabrication / Fabricator	SCHD	Schedule
FCSI	Foodservice Consultants Society International	SECT	Section
		SF	Square Foot
FD	Floor Drain	SHT	Sheet
FE	Fire Extinguisher	SL	Soda Line
FFD	Funnel Floor Drain	SLV	Sleeve
FIN	Finish	SP	Switch with pilot light
FL	Full Load	SPEC	Specification(s)
FLR	Floor	SQ	Square
FO	Face Of	SR	Steam Return
FP	Fire Pull	SS	Steam Supply
FR	Floor Receptacle	STD	Standard
FS	Floor Sink	STL	Steel
FSC	Fire Safety Contractor	STOR	Storage
FT	Foot, Feet	SU	Stub Up (Utilities)
FTD	Floor Trough Drain	SUSP	Suspended
HD	Hub Drain	SW	Switch
IW	Indirect Waste	T	Telephone
G	Gas	TEMP	Temperature
GA	Gauge	THRU	Through
GALV	Galvanized	TO	Top Of
GC	General Contractor	TV	Television
GFCI	Ground Fault Circuit Interrupter	TYP	Typical
GPH	Gallons Per Hour	UON	Unless Otherwise Noted
GPM	Gallons Per Minute	UTIL	Utility
GYP	Gypsum Board	V	Voltage (VOLT)
HD	Hub Drain	VBFM	Verify by Field Measurement
HGT	Height	VEN	Vendor
HORZ	Horizontal	VENT	Ventilating
HP	Horsepower	VERT	Vertical
HTR	Heater	VOL	Volume
HW	Hot Water	W	Watts
IN	Inch	W/	With
INT	Interior	W/O	Without
JAN	Janitorial	WD	Washer Drain
JB	Junction Box	YD	Yard
KEC	Kitchen Equipment Contractor	YR	Year
KES	Kitchen Equipment Supplier	&	And
KW	Kilowatts	@	At
LAV	Lavatory	#	Number / Pound

FOOD SERVICE SHEET LIST	
Sheet Number	Sheet Name
K000	GENERAL CONDITION NOTES FOR ALL TRADES AND DESIGN TEAM
K100	KITCHEN EQUIPMENT PLAN AND SCHEDULE
K101	KITCHEN EQUIPMENT DRAIN PLAN
K102	KITCHEN EQUIPMENT PLUMBING PLAN
K103	KITCHEN EQUIPMENT ELECTRICAL PLAN
K104	KITCHEN EQUIPMENT WALL BLOCKING PLAN
K105	CUSTOM EQUIPMENT SHOP DRAWINGS

WRA

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT
DERRICK YORK
20752
STATE OF TEXAS
4-19-23

CASTLEBERRY H[illegible]IONS
215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

No. Date

JOB NO. 1531

DATE: February 22, 2023

GENERAL CONDITION NOTES FOR ALL TRADES AND DESIGN TEAM

K000

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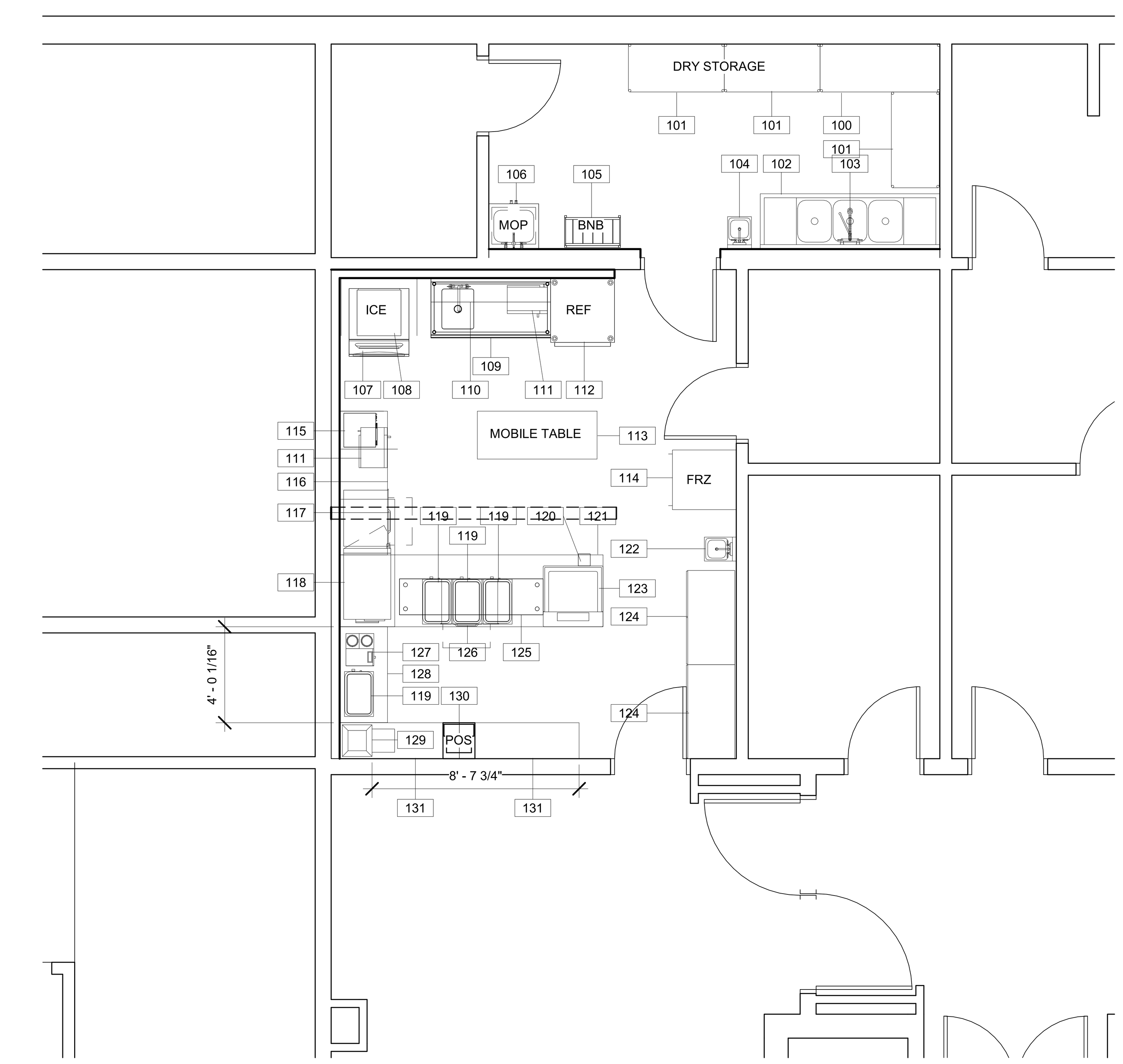
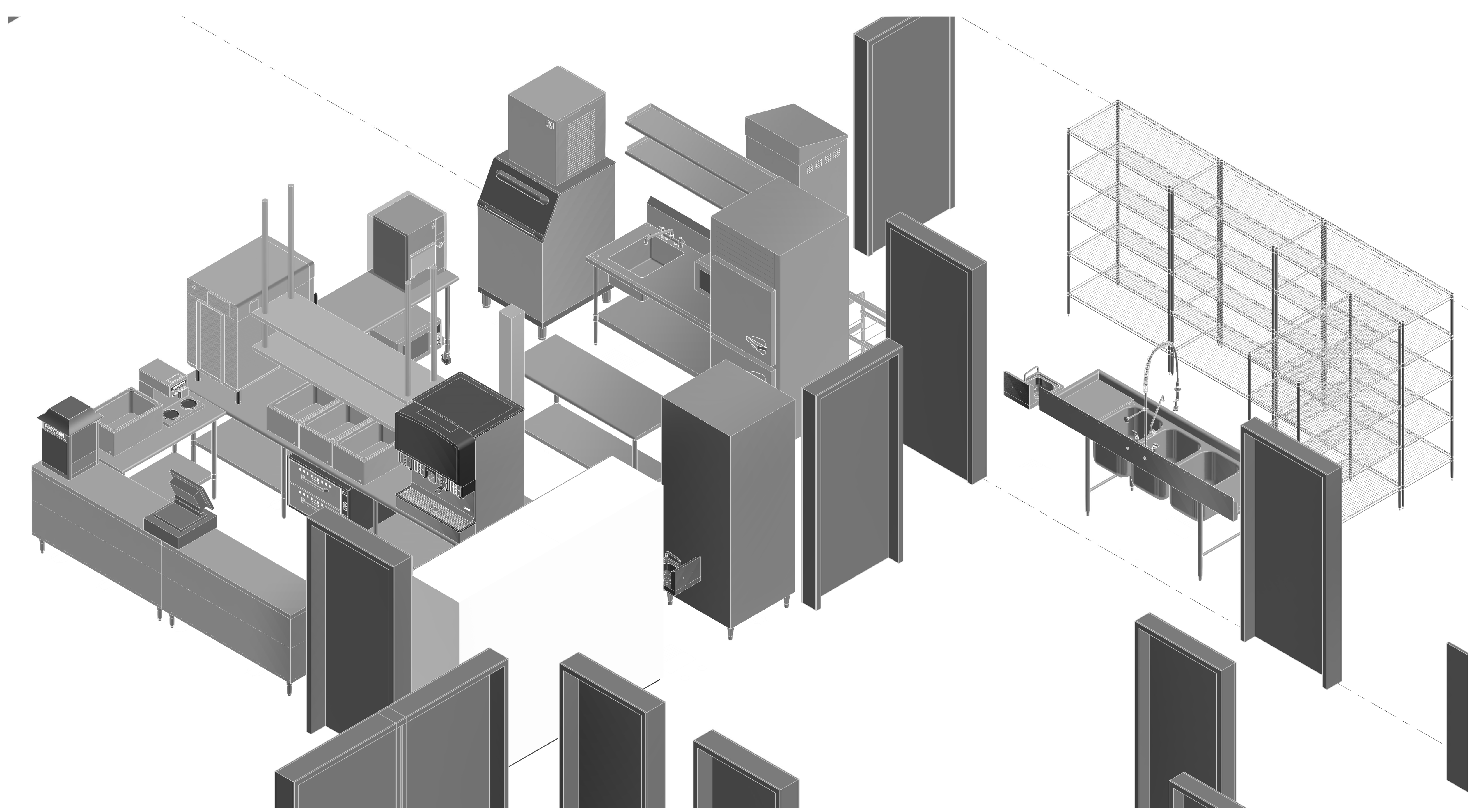
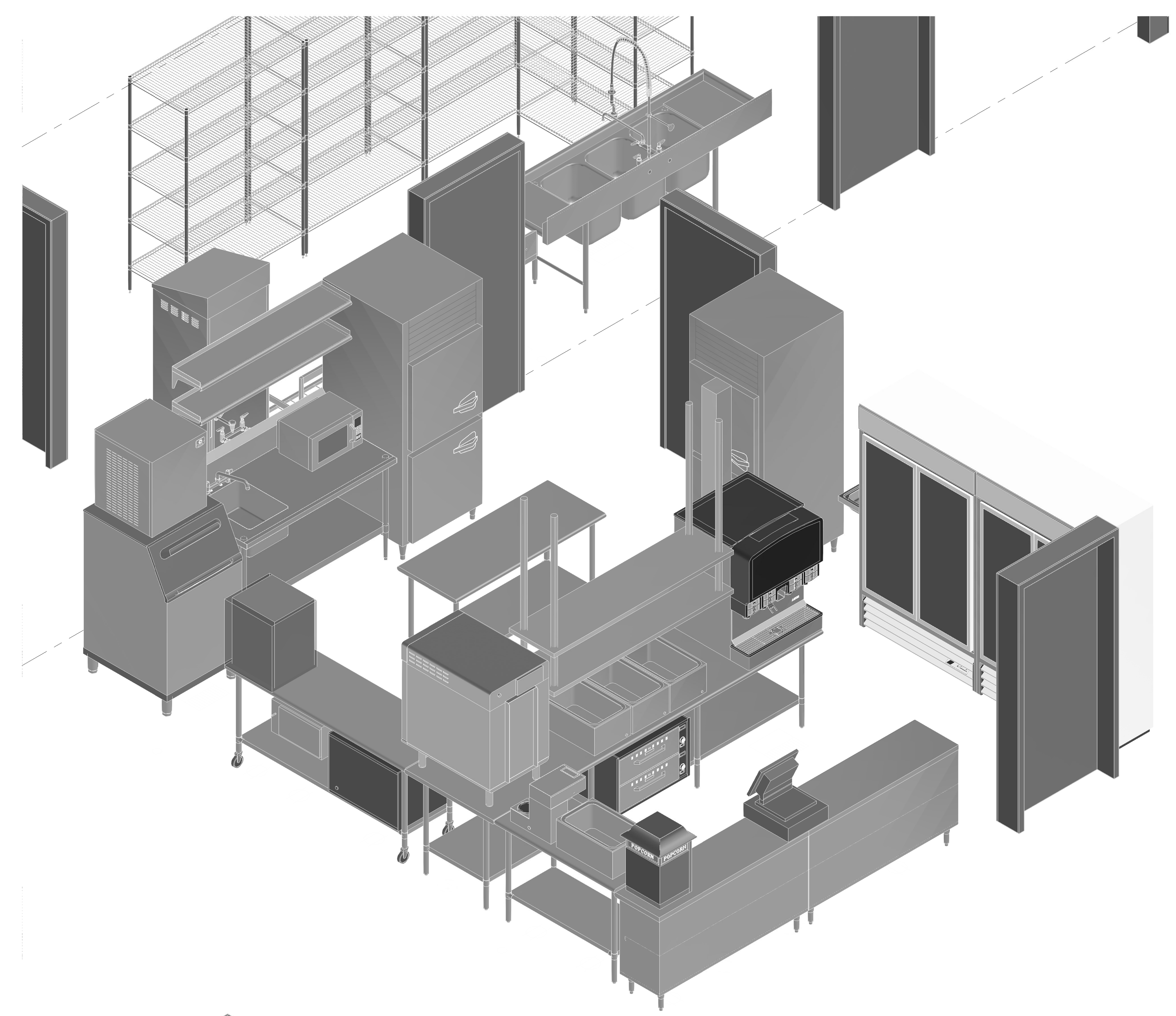


1 LEVEL1 - CONCESSION EQUIPMENT PLAN
1/4" = 1'-0"

FOOD SERVICE EQUIPMENT SCHEDULE					
Mark	Count	Description	Manufacturer	Model	Comments
100	1	Redi-Pak Five-Shelf Unit	Eagle Group	2460VG74-5	
101	3	Redi-Pak Five-Shelf Unit	Eagle Group	2448VG74-5	
102	1	Three-Compartment Sink	Eagle Group	314-16-3-18	
103	1	Pre-Rinse Wall Mount Mixing Faucet	T&S Brass and Bronze Works, Inc.	B-0133-12-CR-B	
104	1	Hand Sink	Advance Tabco	7-PS-23	
105	1	SODA RACK SYSTEM	BY VENDOR - EXISTING	EXISTING	
106	1	Mop Sink Storage Cabinet	Eagle Group	F1916-VSCS	
107	1	570 lb Ice Bin - EXISTING	Manitowoc Ice	D-570	
108	1	Ice Maker, Nugget Style	Manitowoc Ice	RNF0620A-161	
109	1	WORK TABLE W/ PREP SINK	JOHN BOOS	EPT8R5-3060SSK-L	
110	2	Wall Mounted Shelves	Eagle Group	WS1260	
111	2	COMMERCIAL MICROWAVE OVEN	PANASONIC	NE-1054F	
112	1	Refrigerator, Reach-In	Traulsen	RHT132E-HHS	
113	1	Worktable-Rolled Edge	Eagle Group	T2460SE-CA	
114	1	Reach-In Freezer	Traulsen	RLT132WUT-HHS	
115	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
116	1	Worktable-Rolled Edge	Eagle Group	T2472SE-CA	
117	1	DRAWER WARMERS	HATCO	HDM-2B	
118	1	WIDE SERIES MULTI-COOK OVEN		VMC-H3HW-SX	
119	4	COUNTERTOP HEATED WELLS	HATCO	CHW-FUL	
120	1	STAINLESS STEEL CHASE	CUSTOM	CUSTOM	
121	1	Worktable-Rolled Edge	Eagle Group	T36132SE	
122	1	Hand Sink	Advance Tabco	7-PS-23	
123	1	ICE BEVERAGE DISPENSER	BY VENDOR - EXISTING	BY VENDOR - EXISTING	
124	2	GLASS DOOR MERCHANDISER - EXISTING	TRUE	BY VENDOR	
125	1	DOUBLE OVERSHELF CEILING MOUNTED	CUSTOM	CUSTOM	
126	1	DRAWER WARMERS	HATCO	HDM-2B	
127	1	KOFFEE KING THREE WARMER STEPPED RIGHT, POUR OVER LO-PROFILE COFFEE BREWER	BLOOMFIELD	8571	
128	1	Worktable-Rolled Edge	Eagle Group	T2448B	
129	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	
130	1	POS (BY OWNER)	Generic	Touch Screen Register	
131	2	SPEC-MASTER Plate Cabinet	Eagle Group	PC1860SE-CS	



2 3D - VIEW A



3 3D - VIEW B

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WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT STATE OF TEXAS
4-19-23

CASTLEBERRY HS CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:
No. Date

JOB NO. 1531
DATE: February 22, 2023

KITCHEN EQUIPMENT PLAN AND SCHEDULE

K100

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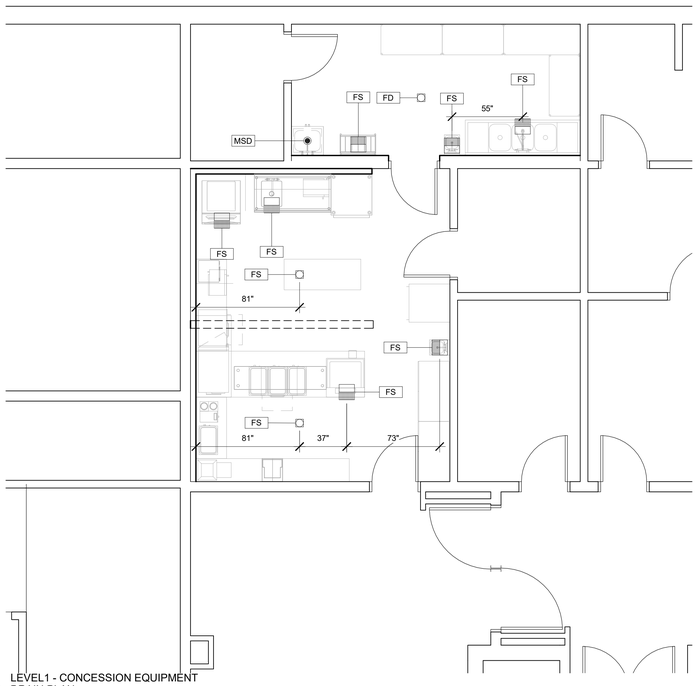


1 LEVEL1 - CONCESSION EQUIPMENT DRAIN PLAN
1/4" = 1'-0"

DRAIN SCHEDULE

TAG	UTILITY	SIZE		HEIGHT A.F.F.			CONNECTED TO:/REMARKS
		ROUGH-IN	CONNECTION	FLOOR	WALL	DFA	
DD1	DIRECT DRAIN	2"	1-1/2"		24"		FOR HAND SINK WHEN LOCAL CODE REQUIRE DIRECT CONNECTION
DD2	DIRECT DRAIN	2"	2"		18"		FOR POT SINK WHEN LOCAL CODE REQUIRE DIRECT CONNECTION
FD	FLOOR DRAIN			-1/2"			FOR GENERAL CLEAN-UP
FFD	FUNNEL FLOOR DRAIN			FLUSH			4" HIGH FUNNEL (PLUMBER TO RUN INDIRECT DRAIN LINES FROM FIXTURES)
FTD	FLOOR TROUGH DRAIN		4"	-7 1/4"			SEE FLOOR TROUGH DETAIL
FS	FLOOR SINK			FLUSH			12" SQUARE (PLUMBER TO RUN INDIRECT DRAIN LINES FROM FIXTURES)
HD	HUB DRAIN	2"	VERIFY	6"			PLUMBER TO RUN INDIRECT WASTE FROM FIXTURE
IW	INDIRECT WASTE			EQUIP			PLUMBING CONTRACTOR SHALL RUN ALL INDIRECT WASTE (HARD COPPER) FROM EQUIPMENT TO DRAIN LOCATIONS AND SECURE I.W. LINES TO FLOOR AND WALL PER CODES.
MSD	MOP SINK DRAIN	2"	2"	2 1/4"			B.T.C. ON MOP SINK WASTE (VERIFY WITH PLUMBER IF MOP SINK IS FURNISHED BY OTHERS)
WD	WASHER DRAIN	2"	2"		36"		B.T.C. ON STAND PIPE RECESSED WALL MOUNTED UTILITY BOX FOR WASHER, FURNISHED AND INSTALLED BY PLUMBER

2 DRAIN SCHEDULE
1/4" = 1'-0"

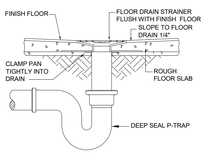
DRAIN SYMBOLS

SYMBOLS		ABBREVIATIONS	
Ⓗ Ⓒ	HOT/COLD WATER	HW	HOT WATER
Ⓓ	DRAIN IN WALL	CW	COLD WATER
○	CONNECTION	DR	DRAIN
	FLOOR DRAIN	AFF	ABOVE FINISHED FLOOR
	FUNNEL FLOOR DRAIN	BFF	BELOW FINISHED FLOOR
	FLOOR SINK (FULL GRATE)	FD	FLOOR DRAIN
	FLOOR SINK (HALF GRATE)	FFD	FUNNEL FLOOR DRAIN
⊙	HUB DRAIN	FS	FLOOR SINK
(SL)	SODA LINE	HD	HUB DRAIN
	GAS LINE (NATURAL GAS - LOOP)	SS	STEAM SUPPLY
	T&S-GAS QUICK DISCONNECT	SR	STEAM RETURN
WATER SUPPLY REQUIREMENTS		EL	ELEVATION ABOVE FINISHED FLOOR
ALL WATER SUPPLIED KITCHEN EQUIPMENT SYSTEMS ARE SUBJECT TO CONTAMINATION AND FAILURE DUE TO MINERAL CONTENT FOUND IN MOST WATER SUPPLIES. TO MINIMIZE SERVICE PROBLEMS AND TO MEET WARRANTY REQUIREMENTS A WATER TREATMENT (SOFTENING) SYSTEM IS RECOMMENDED WHEN WATER QUALITY IS FOUND TO EXCEED LIMITS STATED BELOW AND IN OPERATORS MANUALS. RECOMMENDED MINIMUM WATER QUALITY STANDARDS ARE TOTAL DISSOLVED SOLIDS (TDS) CONTENT SHOULD NOT EXCEED 30 PARTS PER MILLION: AND WATER PH SHOULD BE 7.0 OR HIGHER		SU	STUB UP ABOVE FINISHED FLOOR
		GPH	GALLONS PER HOUR
		GPM	GALLONS PER MINUTE
		BHP	BOILER HORSE POWER
		PPH	POUNDS PER HOUR
		PSI	POUNDS PER SQUARE INCH
		BTC	BRANCH TO CONNECTION POINT AND CONNECT EQUIPMENT
		DFA	DOWN FROM ABOVE
FINAL CONNECTION TO ALL EQUIPMENT TO BE BY THE PLUMBING CONTRACTOR. ALL REQUIRED TUBING, MISCELLANEOUS FITTINGS, TRAPS, ETC., SHALL BE SUPPLIED BY PLUMBING CONTRACTOR UNLESS OTHERWISE SPECIFIED. ALL EXPOSED PLUMBING LINES TO BE HARD COPPER (CONNECTIONS USING LEAD FREE SOLDER) AND SHALL BE PAINTED WITH CHROME OR ALUMINUM PAINT.			

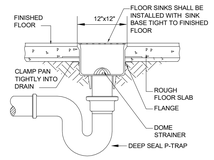
PLUMBING NOTES

	NOTES
A	PLUMBER TO PROVIDE BACKFLOW PREVENTERS IN WATER SUPPLY LINES AS REQUIRED BY LOCAL CODES
B	PLUMBER TO SPECIFY AND LOCATE EQUIPMENT AND UTILITIES FOR THESE LOCATIONS.
C	PLUMBER TO CONNECT ALL WATER LINES, GAS LINES, WASTE LINES, ETC. TO FULLY CONNECT ALL EQUIPMENT AND RUN CONDENSATE LINES FROM UNITS TO DRAINS AND THESE LINES TO BE NO SMALLER THAN THE STUB-OUT OF THE FIXTURE. PLUMBER TO PROVIDE GATE VALVES, CUT-OFFS, TRAPS, HYDROSTATIC SHOCK ELIMINATORS, PRESSURE REGULATORS AND MATERIALS NECESSARY TO CONNECT ALL LINES, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. FAUCETS, DRAIN OUTLET FITTINGS IN FIXTURES AND SPECIALTY ITEMS ARE TO BE FURNISHED BY THE KITCHEN EQUIPMENT SUPPLIER AS OUTLINED IN THE ITEM SPECIFICATIONS. ALL WORK TO BE PERFORMED IN FULL ACCORDANCE WITH THE APPLICABLE CODES RELATING TO INSTALLATION AND HOOK-UP OF EQUIPMENT. OMISSIONS OR ERRORS ON THE SCHEDULE DO NOT RELIEVE THE PLUMBING CONTRACTOR FROM COMPLETE FINAL PLUMBING RESPONSIBILITY.
D	ALL OUTLETS AND CONNECTIONS SHOWN RELATE TO KITCHEN EQUIPMENT ONLY. REFER TO ARCHITECTURAL/ENGINEERING PLANS FOR ADDITIONAL REQUIREMENTS.
E	ALL DIMENSIONS GIVEN ARE FROM COLUMN CENTERLINES AND/OR FINISHED WALLS AND ARE IN INCHES TO 4'-0". ELEVATIONS GIVEN ARE FROM FINISHED FLOORS. ALL ROUGH-INS SHOWN ARE TO BE RUN INSIDE WALLS (EXCEPT STUB-UPS) LOCATIONS INDICATE POINT OF EXIT FROM WALLS, CEILINGS OR FLOORS.
F	ALL FLOOR DRAINS STRAINERS TO SET FLUSH WITH FINISHED FLOOR AND TO SLOPE TO FLOOR DRAIN 1/4". SEE FLOOR DRAIN DETAIL. UNLESS OTHERWISE NOTED. DO NOT SLOPE FLOORS SO CLOSE TO DRAINS AS TO CREATE "PITS" OR "DIPS" IN FLOOR. MINIMUM RADIUS OF SLOPE TO BE 24" FROM CENTERLINE OF DRAIN.
G	PLUMBER TO RUN HARD COPPER DRAINLINE HIGH AS POSSIBLE IN WALK-IN VAULT FROM BLOWER COIL TO WALL THEN SLOPING DOWN TO A POINT 18" ABOVE FLOOR THEN THRU. WALL FORMING A "P" TRAP FLAT AGAINST WALL ABOVE DRAIN THEN SECURE LINES IN A NEAT MANNIER AND EXTENDING TO DRAIN. FINISH WITH CHROMATONE PAINT - SEAL ALL PENETRATIONS.

3 DRAIN SYMBOLS & NOTES
1/4" = 1'-0"



4 FLOOR DRAIN DETAIL
1/4" = 1'-0"



5 FLOOR SINK DETAIL
1/4" = 1'-0"

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT DENNIS YORK 20797 STATE OF TEXAS
4-19-23

CASTLEBERRY HS CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

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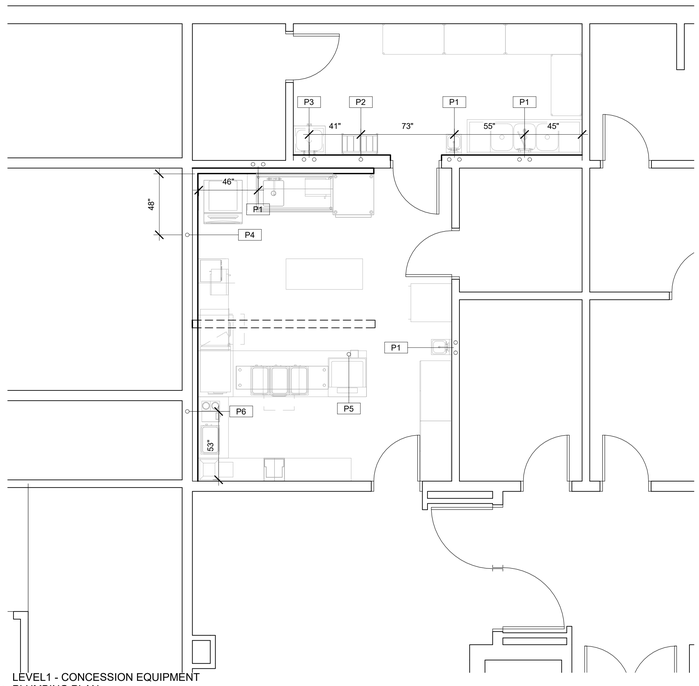
-	

JOB NO. 1531
DATE: February 22, 2023

KITCHEN EQUIPMENT DRAIN PLAN

K101

4/19/2023 10:57:52 AM



1 LEVEL1 - CONCESSION EQUIPMENT PLUMBING PLAN
1/4" = 1'-0"

PLUMBING CONNECTION SCHEDULE

TAG	PLUMBING TYPE	SIZE	HEIGHT A.F.F.	REMARKS
P1	HOT & COLD WATER, 8" O.C.	1/2"	18"	B.T.C. ON FAUCET FIXTURE
P2	COLD WATER	1/2"	6'-0"	B.T.C. ON SODA SYSTEM - VERIFY REQUIREMENTS WITH PURVEYOR
P3	HOT & COLD WATER, 8" O.C.	1/2"	36"	B.T.C. ON SERVICE FAUCET (MOP SINK , FILLER FAUCET AND HOSE BIB)
P4	COLD WATER	1/2"	5'-0"	B.T.C. ON ICE MAKER - THRU FILTER
P5	COLD WATER	1/2"	DFA	B.T.C. ON SODA DISPENSER THRU FILTER - ROUTE WATER THRU SS CHASE
P6	COLD WATER	1/2"	18"	PROVIDE SHUT-OFF VALVE AT WALL. FOR BEVERAGE EQUIPMENT, OWNER'S VENDOR TO MAKE ALL CONNECTIONS FOR EQUIPMENT.

PLUMBING SYMBOLS

SYMBOLS		ABBREVIATIONS	
Ⓗ Ⓒ	HOT/COLD WATER	HW	HOT WATER
Ⓓ	DRAIN IN WALL	CW	COLD WATER
○	CONNECTION	DR	DRAIN
	FLOOR DRAIN	AFF	ABOVE FINISHED FLOOR
FFD	FUNNEL FLOOR DRAIN	BFF	BELOW FINISHED FLOOR
	FLOOR SINK (FULL GRATE)	FD	FLOOR DRAIN
FSK	FLOOR SINK (HALF GRATE)	FFD	FUNNEL FLOOR DRAIN
Ⓗ	HUB DRAIN	FS	FLOOR SINK
SL	SODA LINE	HD	HUB DRAIN
	GAS LINE (NATURAL GAS - LOOP)	SS	STEAM SUPPLY
	T&S-GAS QUICK DISCONNECT	SR	STEAM RETURN
WATER SUPPLY REQUIREMENTS		EL	ELEVATION ABOVE FINISHED FLOOR
ALL WATER SUPPLIED KITCHEN EQUIPMENT SYSTEMS ARE SUBJECT TO CONTAMINATION AND FAILURE DUE TO MINERAL CONTENT FOUND IN MOST WATER SUPPLIES. TO MINIMIZE SERVICE PROBLEMS AND TO MEET WARRANTY REQUIREMENTS A WATER TREATMENT (SOFTENING) SYSTEM IS RECOMMENDED WHEN WATER QUALITY IS FOUND TO EXCEED LIMITS STATED BELOW AND IN OPERATORS MANUALS. RECOMMENDED MINIMUM WATER QUALITY STANDARDS ARE TOTAL DISSOLVED SOLIDS (TDS) CONTENT SHOULD NOT EXCEED 30 PARTS PER MILLION: AND WATER PH SHOULD BE 7.0 OR HIGHER		SU	STUB UP ABOVE FINISHED FLOOR
		GPH	GALLONS PER HOUR
		GPM	GALLONS PER MINUTE
		BHP	BOILER HORSE POWER
		PPH	POUNDS PER HOUR
		PSI	POUNDS PER SQUARE INCH
		BTC	BRANCH TO CONNECTION POINT AND CONNECT EQUIPMENT
		DFA	DOWN FROM ABOVE
ENGINEER AND PLUMBING CONTRACTOR TO SUPPLY THE MINIMUM PSI REQUIREMENTS PER THE FOOD SERVICE EQUIPMENT DESIGNED TO OPERATE THE FOOD SERICE FACILITY PROPERLY. ALL THE REQUIRED INFORMATION CAN BE FOUND WITHIN THE NATIVE FILES, EQUIPMENT CUT BOOK, PLAN SCHEDULE WITH MODEL NUMBERS AND THE FINNL SUBMITTAL DOCUMENTS FROM THE KITCHEN EQUIPMENT CONTRACTOR(KEC).			

PLUMBING NOTES

NOTES	
A	PLUMBER TO PROVIDE BACKFLOW PREVENTERS IN WATER SUPPLY LINES AS REQUIRED BY LOCAL CODES
B	PLUMBER TO SPECIFY AND LOCATE EQUIPMENT AND UTILITIES FOR THESE LOCATIONS.
C	PLUMBER TO CONNECT ALL WATER LINES, GAS LINES, WASTE LINES, ETC. TO FULLY CONNECT ALL EQUIPMENT AND RUN CONDENSATE LINES FROM UNITS TO DRAINS AND THESE LINES TO BE NO SMALLER THAN THE STUB-OUT OF THE FIXTURE. PLUMBER TO PROVIDE GATE VALVES, CUT-OFFS, TRAPS, HYDROSTATIC SHOCK ELIMINATORS, PRESSURE REGULATORS AND MATERIALS NECESSARY TO CONNECT ALL LINES, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. FAUCETS, DRAIN OUTLET FITTINGS IN FIXTURES AND SPECIALTY ITEMS ARE TO BE FURNISHED BY THE KITCHEN EQUIPMENT SUPPLIER AS OUTLINED IN THE ITEM SPECIFICATIONS. ALL WORK TO BE PERFORMED IN FULL ACCORDANCE WITH THE APPLICABLE CODES RELATING TO INSTALLATION AND HOOK-UP OF EQUIPMENT. OMISSIONS OR ERRORS ON THE SCHEDULE DO NOT RELIEVE THE PLUMBING CONTRACTOR FROM COMPLETE FINAL PLUMBING RESPONSIBILITY.
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E	ALL DIMENSIONS GIVEN ARE FROM COLUMN CENTERLINES AND/OR FINISHED WALLS AND ARE IN INCHES TO 4'-0". ELEVATIONS GIVEN ARE FROM FINISHED FLOORS. ALL ROUGH-INS SHOWN ARE TO BE RUN INSIDE WALLS (EXCEPT STUB-UPS) LOCATIONS INDICATE POINT OF EXIT FROM WALLS, CEILINGS OR FLOORS.
F	ALL FLOOR DRAINS STRAINERS TO SET FLUSH WITH FINISHED FLOOR AND TO SLOPE TO FLOOR DRAIN 1/4", SEE FLOOR DRAIN DETAIL. UNLESS OTHERWISE NOTED, DO NOT SLOPE FLOORS SO CLOSE TO DRAINS AS TO CREATE "PITS" OR "DIPS" IN FLOOR. MINIMUM RADIUS OF SLOPE TO BE 24" FROM CENTERLINE OF DRAIN.
G	PLUMBER TO RUN HARD COPPER DRAINLINE HIGH AS POSSIBLE IN WALK-IN VAULT FROM BLOWER COIL TO WALL THEN SLOPING DOWN TO A POINT 18" ABOVE FLOOR THEN THRU. WALL FORMING A "P" TRAP FLAT AGAINST WALL ABOVE DRAIN THEN SECURE LINES IN A NEAT MANNER AND EXTENDING TO DRAIN. FINISH WITH CHROMATONE PAINT - SEAL ALL PENETRATIONS.

2 PLUBMING SYMBOLS & NOTES_
1/4" = 1'-0"

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT DERRICK YORK 26797 STATE OF TEXAS
4-19-23

CASTLEBERRY HIGH SCHOOL CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

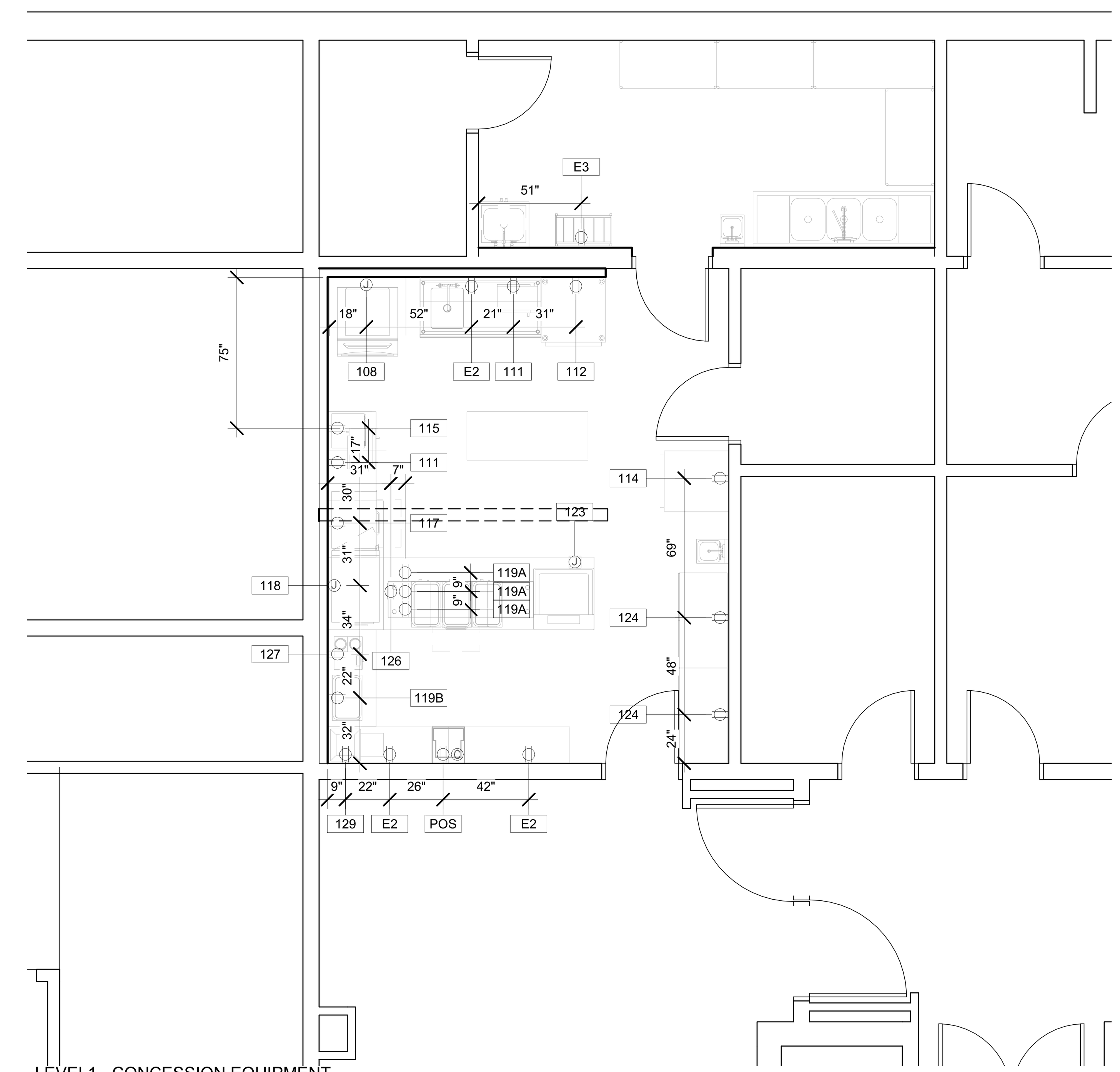
No.	Date

JOB NO. 1531
DATE: February 22, 2023

KITCHEN EQUIPMENT PLUMBING PLAN

K102

4/19/2023 10:57:55 AM



1 LEVEL1 - CONCESSION EQUIPMENT ELECTRICAL PLAN
1/4" = 1'-0"

ELECTRICAL ROUGH-IN SCHEDULE

ITEM	VOLT	PHASE	TYPE	HEIGHT	LOAD			NOTES	CORD AND PLUG	NEMA
					AMPS	KW	H.P.			
E1	120	1	DCO	18"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E2	120	1	DCO	4'-2"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E3	120	1	DCO	6'-0"	16.0			FOR BAG'N'BOX SYSTEM. VERIFY REQUIREMENTS	YES	5-20
108	120	1	J-BOX	6'-0"	16.3			B.T.C. ON ICE MAKER - VERIFY REQUIREMENTS WITH OWNER EXISTING EQUIPMENT	NO	
111	120	1	DCO	18"	13.4			FOR MICROWAVE OVEN	YES	5-15
112	120	1	DCO	4'-0"	16.0			FOR REACH-IN REFRIGERATOR	YES	5-20
114	120	1	DCO	4'-0"	9.4			FOR REACH-IN FREEZER	YES	5-15
115	120	1	DCO	4'-2"	16.0			FOR COUNTER TOP DEEP FRYER	YES	5-20
117	120	1	DCO	18"	7.5			FOR DRAWER WARMER	YES	5-15
118	208	3	J-BOX	4'-2"	29.0			FOR MULTI COOK OVEN	NO	
119A	120	1	DCO	STUB UP 6"	10.0			FOR HOT FOOD WELL - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLES		
119B	120	1	DCO	4'-2"	10.0			FOR HOT FOOD WELL - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLES		
123	120	1	J-BOX	DFA	7.0			B.T.C. ON ICE BEVERAGE DISPENSER THRU SS CHASE - FIXTURE MOUNTED RECEPTACLE PROVIDED BY FABRICATOR	NO	
124	120	1	DCO	4'-2"	6.3			FOR REACH-IN MERCHANDISER	YES	5-15
126	120	1	DCO	STUB UP 6"	7.5			FOR DRAWER WARMER - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLE	YES	5-15
127	120	1	DCO	4'-2"	15.0			FOR COFFEE MAKER	YES	5-15
POS	120	1	DCO	18"	12.0			CLEAN DEDICATED POWER FOR POS	YES	5-15
	-	-	CONDUIT	18"	-			DATA RUN TO MANAGER'S OFFICE	NO	

ELECTRICAL SYMBOLS

SYMBOLS	ABBREVIATIONS	
SCO	A	AMPERAGE (AMP)
DCO	AFF	ABOVE FINISHED FLOOR
QUAD OUTLET	BFF	BELOW FINISHED FLOOR
JUNCTION BOX	BTC	BRANCH TO CONNECTION
HEATING ELEMENT	BTF	BRANCH TO FIXTURE
FLOOR RECEPTACLE	DCO	DUPLEX CONVENIENCE OUTLET
DATA	DFA	DOWN FROM ABOVE
TELEPHONE	EL	ELEVATION ABOVE FINISHED FLOOR
MOTOR OUTLET	FP	FIRE PULL
SOLENOID	GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
LIGHT FIXTURE (LED LIGHT TO BE TRUE WHITE LIGHT)	HP	HORSE POWER
CONDUIT	JB	JUNCTION BOX
ELECTRICAL PANEL	KW	KILOWATTS
J-BOX W/ DISCONNECT	PH	PHASE (Ø)
	SCO	SINGLE CONVENIENCE OUTLET
	Sp	SWITCH & PILOT LIGHT
	SU	STUB UP ABOVE FINISH FLOOR
	Sw	SWITCH AS NOTED
	V	VOLTAGE (VOLT)
	W	WATTS

ELECTRICAL NOTES

NOTES

ALL ELECTRICAL OUTLETS SHOWN ON THIS PLAN ARE FOR FIXTURES AND EQUIPMENT SPECIFIED AS FURNISHED BY THE KITCHEN EQUIPMENT SUPPLIER, FOR FURTHER BUILDING ELECTRICAL REQUIREMENTS (TELEPHONE, CLOCK, SIGNS, EXHAUST FAN SWITCHING, ETC.) SEE OTHER PLANS.

ALL DIMENSIONS GIVEN ARE IN INCHES TO 4'-0" AND ARE FROM COLUMN CENTERLINES AND/OR FINISHED WALLS. ELEVATIONS GIVEN ARE FROM FINISHED FLOOR TO CENTERLINE OF OUTLET. ALL CONVENIENCE OUTLETS ARE TO SET HORIZONTALLY. ALL 120V OUTLETS NOT DESIGNATED WITH SPECIFIC LOADS TO BE RATED AT 20.0 AMPS.

ELECTRICIAN TO CONNECT ALL ELECTRICAL EQUIPMENT AND FIXTURES AND DO ANY INTERNAL WIRING REQUIRED IN THE FIXTURES AS REQUIRED BY THE SPECIFICATIONS. ALL ELECTRICAL OUTLET COVER PLATES ARE TO BE STAINLESS STEEL AND ARE TO BE FURNISHED BY THE ELECTRICIAN, AS WELL AS THE RECEPTACLE, UNLESS OTHERWISE SPECIFIED IN THE ITEM SPECIFICATIONS. KITCHEN EQUIPMENT SUPPLIER TO FURNISH A GALVANIZED JUNCTION BOX IN THE FIXTURE CUTOUT TO RECEIVE THE RECEPTACLE, UNLESS OTHERWISE NOTED. ALL DISCONNECT SWITCHES REQUIRED ARE TO BE FURNISHED AND INSTALLED BY THE ELECTRICIAN AT TIME OF INSTALLATION.

ALL WORK TO BE PERFORMED IN FULL ACCORDANCE WITH ALL APPLICABLE CODES RELATING TO HOOKUP, INSTALLATION AND WIRING OF EQUIPMENT.

2 ELECTRICAL SYMBOLS & NOTES
1/4" = 1'-0"

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WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
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REGISTERED ARCHITECT STATE OF TEXAS
4-19-23

CASTLEBERRY HS CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

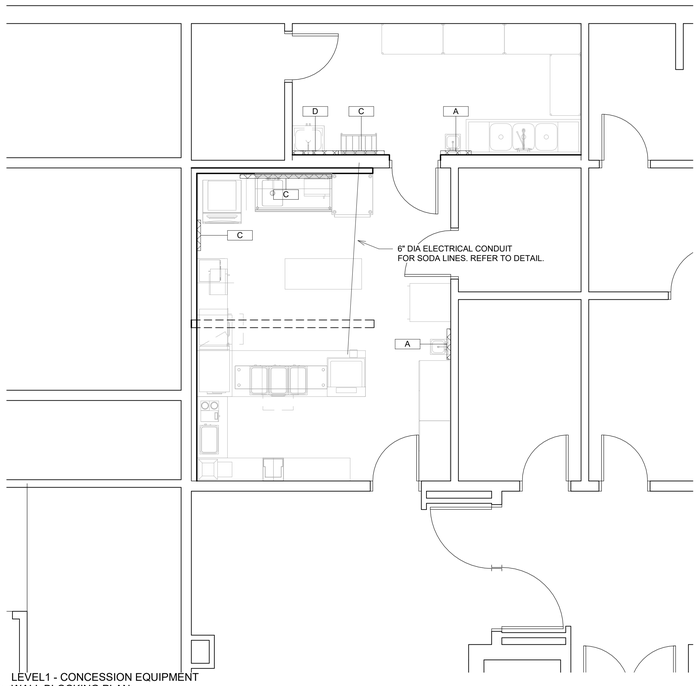
REVISIONS:
No. Date

JOB NO. 1531
DATE: February 22, 2023

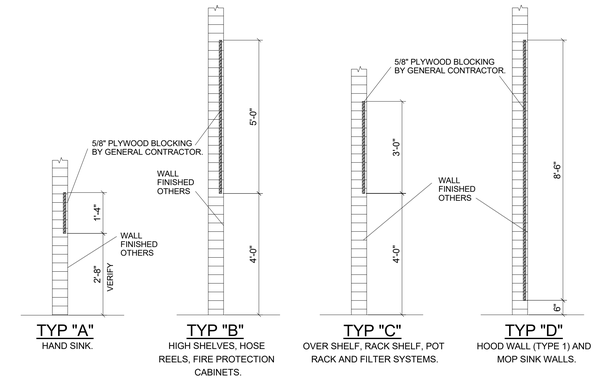
KITCHEN EQUIPMENT ELECTRICAL PLAN

K103

4/19/2023 10:57:58 AM



1 LEVEL1 - CONCESSION EQUIPMENT
WALL BLOCKING PLAN
1/4" = 1'-0"



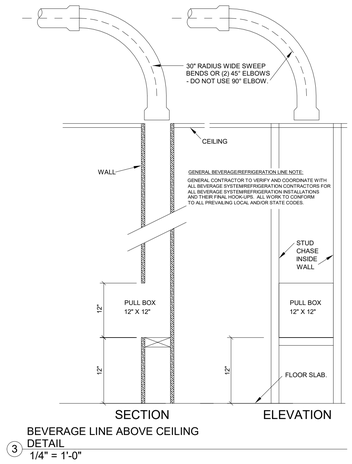
TYP "A"
HAND SINK.

TYP "B"
HIGH SHELVES, HOSE REELS, FIRE PROTECTION CABINETS.

TYP "C"
OVER SHELF, RACK SHELF, POT RACK AND FILTER SYSTEMS.

TYP "D"
HOOD WALL (TYPE 1) AND MOP SINK WALLS.

2 WALL BLOCKING DETAILS
1/4" = 1'-0"



3 BEVERAGE LINE ABOVE CEILING
DETAIL
1/4" = 1'-0"

4/19/2023 10:58:00 AM

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12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT
DERRICK TOON
26797
STATE OF TEXAS
4-19-23

CASTLEBERRY HS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

No.	Date

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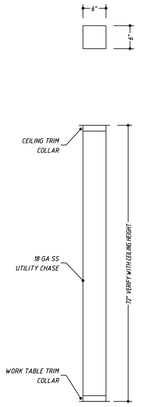
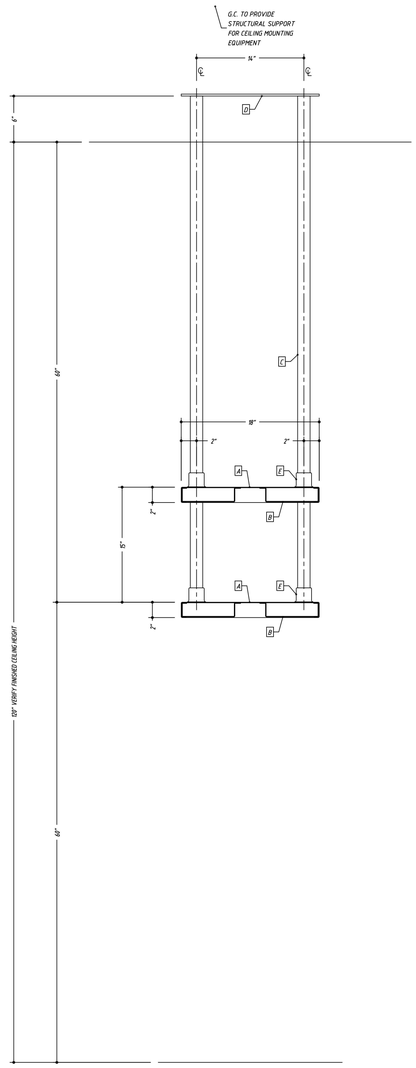
KITCHEN EQUIPMENT
WALL BLOCKING PLAN

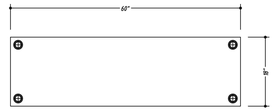
K104



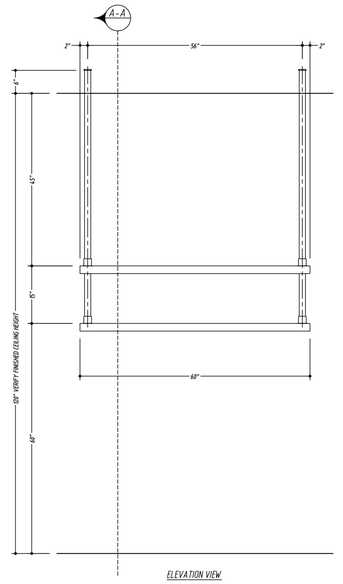
ELEVATION VIEW - ITEM #120, QTY 1 EA
SCALE: 3/4" = 1'-0"



SECTION VIEW A-A
SCALE: 1 1/2" = 1'-0"

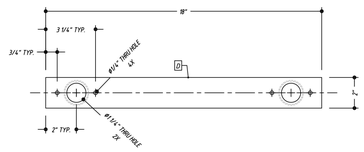


PLAN VIEW
SCALE: 3/4" = 1'-0"



ELEVATION VIEW
SCALE: 3/4" = 1'-0"

ITEM #125 BOM, QTY: 1 EA	
CALLOUT	DESCRIPTION
A	16 GA. TYPE 304 SS SHELF
B	14 GA. TYPE 304 SS UNDERBRACING
C	1 5/8" Ø 16 GA. TYPE 304 SS TUBING
D	1/4" X 2" SS TYPE 304 FLAT BAR
E	SS SHORT GUSSETS



PLAN VIEW
SCALE: 3" = 1'-0"

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT
DERRICK YORK
20797
STATE OF TEXAS
4-19-23

CASTLEBERRY HS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

No	Date
.	

JOB NO. 1531
DATE: February 22, 2023

CUSTOM EQUIPMENT SHOP DRAWINGS

K105

4/19/2023 10:58:06 AM

FOOD SERVICE EQUIPMENT SCHEDULE

Mark	Count	Description	Manufacturer	Model	Comments
100	2	Redi-Pak Five-Shelf Unit	Eagle Group	2460VG74-5	
101	3	Redi-Pak Five-Shelf Unit	Eagle Group	2448VG74-5	
102	1	Three-Compartment Sink	Eagle Group	314-16-3-18	
103	1	Pre-Rinse Wall Mount Mixing Faucet	T&S Brass and Bronze Works, Inc.	B-0133-12-CR-B	
104	1	Hand Sink	Advance Tabco	7-PS-23	
105	1	SODA RACK SYSTEM	BY VENDOR - EXISTING	EXISTING	
106	1	Mop Sink Storage Cabinet	Eagle Group	F1916-VSCS	
107	1	570 lb Ice Bin - EXISTING	Manitowoc Ice	D-570	
108	1	Ice Maker, Nugget Style	Manitowoc Ice	RNF0620A-161	
109	1	WORK TABLE W/ PREP SINK	JOHN BOOS	EPT8R5-3072SSK-L	
110	2	Wall Mounted Shelves	Eagle Group		
111	2	COMMERCIAL MICROWAVE OVEN	PANASONIC	NE-1054F	
112	1	Refrigerator, Reach-In	Traulsen	RHT132E-HHS	
113	1	Worktable-Rolled Edge	Eagle Group	T2460SE-CA	
114	1	Reach-In Freezer	Traulsen	RLT132WUT-HHS	
115	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
116	1	Worktable-Rolled Edge	Eagle Group	T2472SE-CA	
117	1	DRAWER WARMERS	HATCO	HDM-2B	
118	1	WIDE SERIES MULTI-COOK OVEN		VMC-H3HW-SX	
119	4	COUNTERTOP HEATED WELLS	HATCO	CHW-FUL	
120	1	STAINLESS STEEL CHASE	CUSTOM	CUSTOM	
121	1	Worktable-Rolled Edge	Eagle Group	T36132SE	
122	1	Hand Sink	Advance Tabco	7-PS-23	
123	1	ICE BEVERAGE DISPENSER	BY VENDOR - EXISTING	BY VENDOR - EXISTING	
124	2	GLASS DOOR MERCHANDISER - EXISTING	TRUE	BY VENDOR	
125	1	DOUBLE OVERSHELF CEILING MOUNTED	CUSTOM	CUSTOM	
126	1	DRAWER WARMERS	HATCO	HDM-2B	
127	1	KOFFEE KING THREE WARMER STEPPED RIGHT, POUR OVER LO-PROFILE COFFEE BREWER	BLOOMFIELD	8571	
128	1	Worktable-Rolled Edge	Eagle Group	T2448B	
129	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	
130	1	POS (BY OWNER)	Generic	Touch Screen Register	
131	2	SPEC-MASTER Plate Cabinet	Eagle Group	PC1860SE-CS	

PLUMBING GENERAL NOTES

1. PLUMBING CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS FOR A.D.A. PLUMBING FIXTURE AND STANDARD MOUNTING HEIGHTS.
2. PLUMBING CONTRACTOR TO COORDINATE ALL PIPING ROUTING ABOVE WITH MECHANICAL AND ELECTRICAL CONTRACTORS BEFORE INSTALLING.
3. ALL VALVES SHALL BE INSTALLED NO HIGHER THAN 2'-0" ABOVE THE CEILING. ACCESS DOORS TO BE INSTALLED AT ALL HARD CEILING LOCATIONS.
4. ALL PIPING PENETRATIONS SHALL BE SLEEVED. COMPLETELY GROUT AROUND OUTSIDE OF SLEEVE AND FILL SLEEVE VOID AROUND PIPE WITH FIBERFRAX FYRE-PUTTY.
5. AT ALL DISSIMILAR METAL CONNECTIONS, PROVIDE AND INSTALL DIELECTRIC UNIONS IMMEDIATELY TO MINIMIZE USE OF GALVANIZED PIPE MATERIAL.
6. DO NOT INSTALL PLUMBING VENTS WITHIN 10'-0" OF ANY ROOFTOP UNITS OR FRESH AIR UNITS / INTAKES. COORDINATE WITH MECHANICAL CONTRACTOR.
7. PLUMBING CONTRACTOR TO PROVIDE TRAP PRIMERS/GUARDS TO ALL FLOOR DRAINS, SHOWER DRAINS, OPEN SITE DRAINS AND FLOOR SINKS.
8. PLUMBING CONTRACTOR TO PROVIDE AND INSTALL ALL BACK-FLOW PREVENTERS TO KITCHEN EQUIPMENT AS REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
9. ALL CONCEALED EXISTING PIPING SHOWN IS BASED ON EXISTING M.E.P. DRAWINGS. FIELD VERIFY AS NECESSARY.
10. PLUMBING CONTRACTOR TO COORDINATE ROUTING OF ANY NEW SEWER PIPING UNDER EXISTING BUILDINGS WITH STRUCTURAL ENGINEER TO AVOID PIERS.

PLUMBING DEMOLITION GENERAL NOTES

1. CONTRACTOR TO VISIT SITE AND BE FAMILIAR WITH BUILDING MECHANICAL AND ELECTRICAL LAYOUTS.
2. ALL MATERIAL, EQUIPMENT, DUCTS, PIPE, ETC. TO BE REMOVED SHALL BE DISPOSED OF OFF SITE IN A LEGAL AND LAWFUL MANNER.
3. CAP ANY UNUSED PIPE AT FLOOR, WALL, OR CEILING. REMOVE MATERIAL NOT BEING REUSED.
4. IF ASBESTOS IS FOUND, CONTACT OWNER IMMEDIATELY. DO NOT WORK IN ANY AREA SUSPECTED TO CONTAIN ASBESTOS.
5. ALL EXISTING EQUIPMENT SHOWN IN APPROXIMATE LOCATION. ALL EXISTING CONCEALED PIPING SHOWN IS BASED ON THE MOST RECENT EXISTING M.E.P. AND CIVIL DRAWINGS AVAILABLE. FIELD VERIFY.
6. TAKE CARE NOT TO DESTROY INSULATION VALUE TO ANY WATER PIPING BEING REUSED. REPAIR AS NECESSARY.
7. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES AND RELOCATE AS REQUIRED BY NEW CONSTRUCTION.

PLUMBING PLAN NOTES

P1	INSTALL FLOOR SINK IN EXISTING FLOOR DRAIN LOCATION AND TIE INTO EXISTING SANITARY SEWER. SAWCUT SLAB AS NECESSARY.
P2	INSTALL NEW FLOOR DRAIN IN EXISTING FLOOR DRAIN LOCATION AND TIE INOT EXISTING SANITARY. SAWCUT SLAB AS NECESSARY.
P3	TIE INTO EXISTING PIPING.
P4	DOWN IN WALL/CHASE
P33	REMOVE AND RETURN EXISTING THREE COMPARTMENT SINK TO OWNER. DEMOLISH COLD WATER AND HOT WATER PIPING UP TO ABOVE CEILING. REMOVE AND DISCARD SANITARY SEWER PIPING DOWN TO BELOW SLAB.
P34	REMOVE AND DISCARD EXISTING SINK. DEMOLISH COLD WATER AND HOT WATER PIPING UP TO ABOVE CEILING. REMOVE AND DISCARD SANITARY SEWER PIPING DOWN TO BELOW SLAB.
P35	REMOVE AND DISCARD EXISTING FLOOR DRAIN.

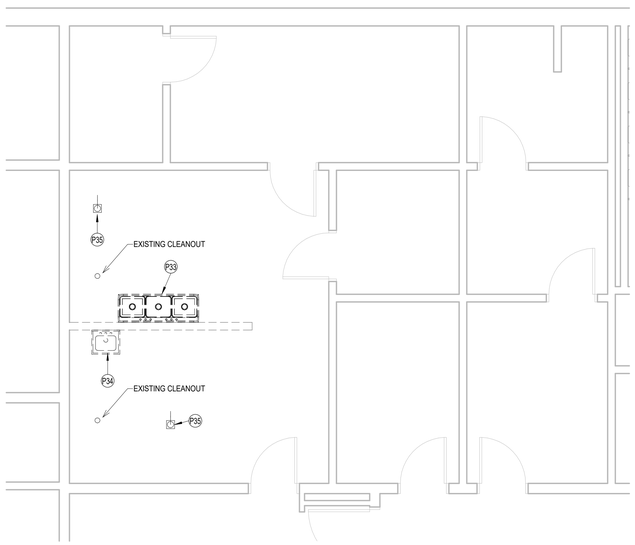
PLUMBING SYMBOLS

	SANITARY SEWER LINE
ES ES	EXISTING SANITARY SEWER LINE
	VENT LINE
EV EV	EXISTING VENT LINE
	COLD WATER LINE
CW CW	EXISTING COLD WATER LINE
	HOT WATER LINE
HW HW	EXISTING HOT WATER LINE
COND	CONDENSATE LINE
EC EC	EXISTING CONDENSATE LINE
	GAS LINE
GAS	EXISTING GAS LINE
	ACID WASTE LINE
A A	EXISTING ACID WASTE LINE
	CUT-OFF VALVE
	CUT-OFF VALVE
	HOSE BIBB
	CAP
	DRAIN
	GAS METER
	FLOOR SINK/O.S.D.
	PLUMBING RISER
	WATER METER
	GAS COCK (VALVE)
	PRIMARY/OVERFLOW ROOF DRAIN
V.T.R.	VENT THROUGH ROOF
F F	SPRINKLER LINE
EF EF	EXISTING SPRINKLER LINE
RD RD	PRIMARY ROOF DRAIN LINE
RD RD	EXISTING PRIMARY ROOF DN. LN.
ORD	OVERFLOW ROOF DRAIN LINE
ORD	EXISTING OVERFLOW RF. DN. LN.
SD SD	STORM DRAIN
SD SD	EXISTING STORM DRAIN LINE
	INDICATES SAWCUT SLAB AND PATCH TO MATCH AFTERWARDS
AIR	COMPRESSED AIR LINE
EA EA	EXISTING COMPRESSED AIR LINE
	TEMPERED WATER LINE
TP TP	EXISTING TEMPERED WATER LINE
GL GL	GREASE LINE
GR GR	EXISTING GREASE LINE
SEC	SECONDARY CONDENSATE LINE
SEC	EXISTING SECONDARY COND. LINE
SP SP	ELEVATOR SUMP LINE
SP SP	EXISTING ELEVATOR SUMP LINE

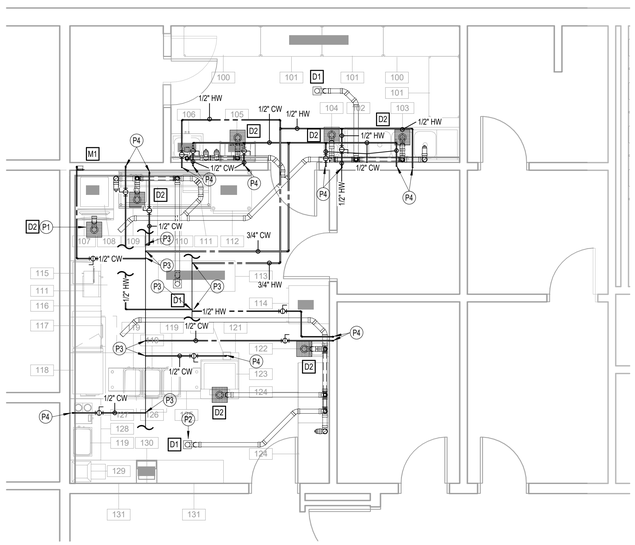
NOTE: NOT ALL SYMBOLS ARE USED

CONTRACTOR IS RESPONSIBLE FOR SAWCUTTING AND REPAIRING EXISTING SLAB AS NECESSARY FOR INSTALLATION OF NEW SANITARY SEWER. SEE SHEET PL701 FOR SANITARY SEWER AND VENT PIPING RISER.

TIE ALL NEW HOT AND COLD WATER PIPING INTO EXISTING 3/4" OR LARGER PIPING RESPECTFULLY. FIELD VERIFY ALL LOCATION OF ALL EXISTING PIPING.



1 PLUMBING DEMOLITION FLOOR PLAN
1/4" = 1'-0"



2 PLUMBING FLOOR PLAN
1/4" = 1'-0"

*PLUMBING CONTRACTOR SHALL PROVIDE AN OFFSET VACUUM BREAKER TUBE WHERE THE HEIGHT OF THE GRAB BAR CREATES A CONFLICT WITH THE FLUSH VALVE.

MINIMUM FIXTURE CONNECTION SCHEDULE

NAME OF FIXTURE	C.W.	H.W.	TRAP SIZE	WASTE	VENT	REMARKS
WATER CLOSET	1"	-	-	4"	2"	FLUSH VALVE WITH MAX. 1.28 GALLON FLUSH
URINAL	3/4"	-	3"	3"	2"	SIPHON JET TYPE W/MAX. 0.5 GAL. FLUSH
LAVATORY	1/2"	1/2"	1-1/4"	1-1/2"	1-1/4"	
COUNTER SINK	1/2"	1/2"	1-1/2"	2"	1-1/2"	
JANITOR SINK	1/2"	1/2"	3"	3"	2"	WALL HUNG OR FLOOR TYPE
ELEC. WATER COOLER	1/2"	-	1-1/4"	1-1/2"	1-1/4"	
FLOOR DRAIN	1/2"	-	3"	3"	2"	ALL FLOOR DRAINS TO HAVE TRAP PRIMERS

NOTE: ALL THE ABOVE FIXTURES ARE NOT NECESSARILY USED.

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER & NO.	SUPPLY	ELEC. DATA	ACCESSORIES
D1	FLOOR DRAIN	WADE 1103STD6			6" TOP SIZE, 3" DISCHARGE, TRAP PRIMER TAP
D2	FLOOR SINK	WADE 9143,6,15			12" x 12" x 8", 1/2 GRATE, TRAP PRIMER TAP, 3" DISCHARGE
M1	ICE MACHINE UTILITY BOX AND RPZ	GUY GRAY MIB1HAAB	COLD		MOUNT CONTROLS AT A.D.A. HEIGHT, PROVIDE WATTS LF-009 RPZ ON SUPPLY LINE

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

JAVIER GARCIA
118760
LICENSED
PROFESSIONAL ENGINEER
04-18-2023

CASTLEBERRY HS CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

No	Date
-	

EMA Engineering & Consulting, Inc.
Tyler | Austin | Houston | El Paso
DFW | San Antonio | Shreveport
Texas Firm Registration No. F-893
Louisiana Firm Registration No. EF-5818
DESIGN SOLVE ENHANCE www.EMAengineer.com

SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

JOB NO. 2320
DATE: April 18, 2023

PLUMBING FLOOR PLANS

PL201

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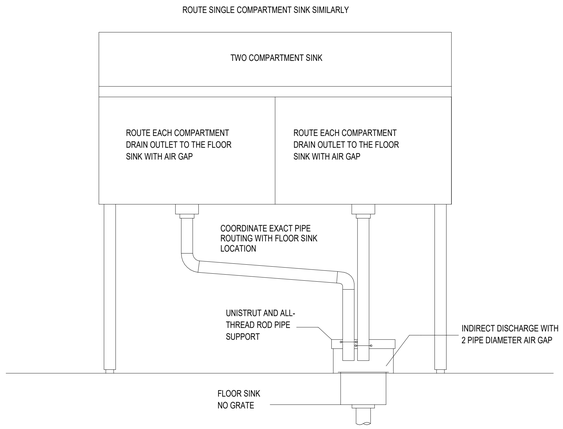
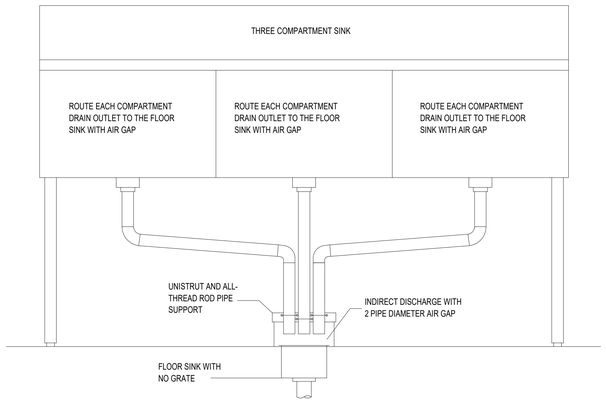
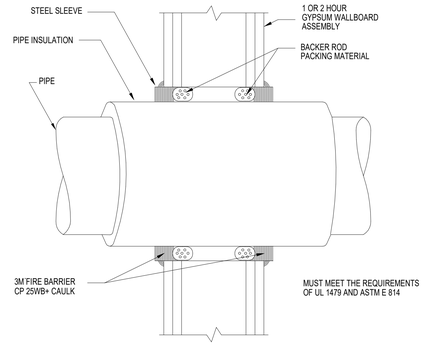


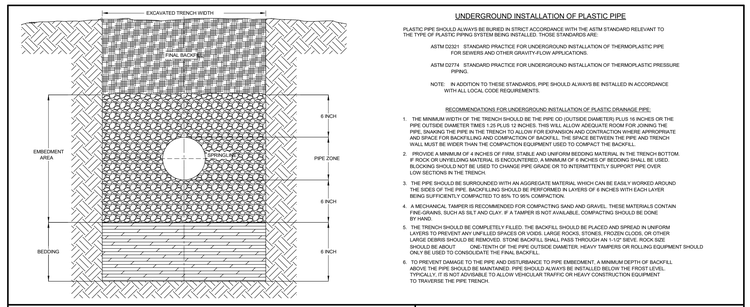
1 DRAIN OUTLET AT TWO-COMPARTMENT SINK
N.T.S.



2 DRAIN OUTLET AT THREE-COMPARTMENT SINK
N.T.S.



3 ONE AND TWO HOUR WALL PENETRATION DETAIL FOR INSULATED PIPE
N.T.S.



UNDERGROUND INSTALLATION OF PLASTIC PIPE

PLASTIC PIPE SHOULD ALWAYS BE BURIED IN STRICT ACCORDANCE WITH THE ASTM STANDARD RELEVANT TO THE TYPE OF PLASTIC PIPING SYSTEM BEING INSTALLED. THOSE STANDARDS ARE:

ASTM D2321 STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS.

ASTM D2774 STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING.

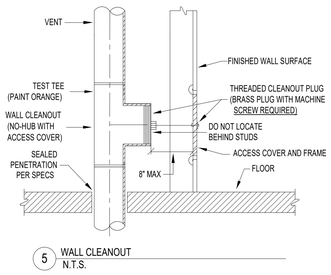
NOTE: IN ADDITION TO THESE STANDARDS, PIPE SHOULD ALWAYS BE INSTALLED IN ACCORDANCE WITH ALL LOCAL CODE REQUIREMENTS.

RECOMMENDATIONS FOR UNDERGROUND INSTALLATION OF PLASTIC DRAINAGE PIPE:

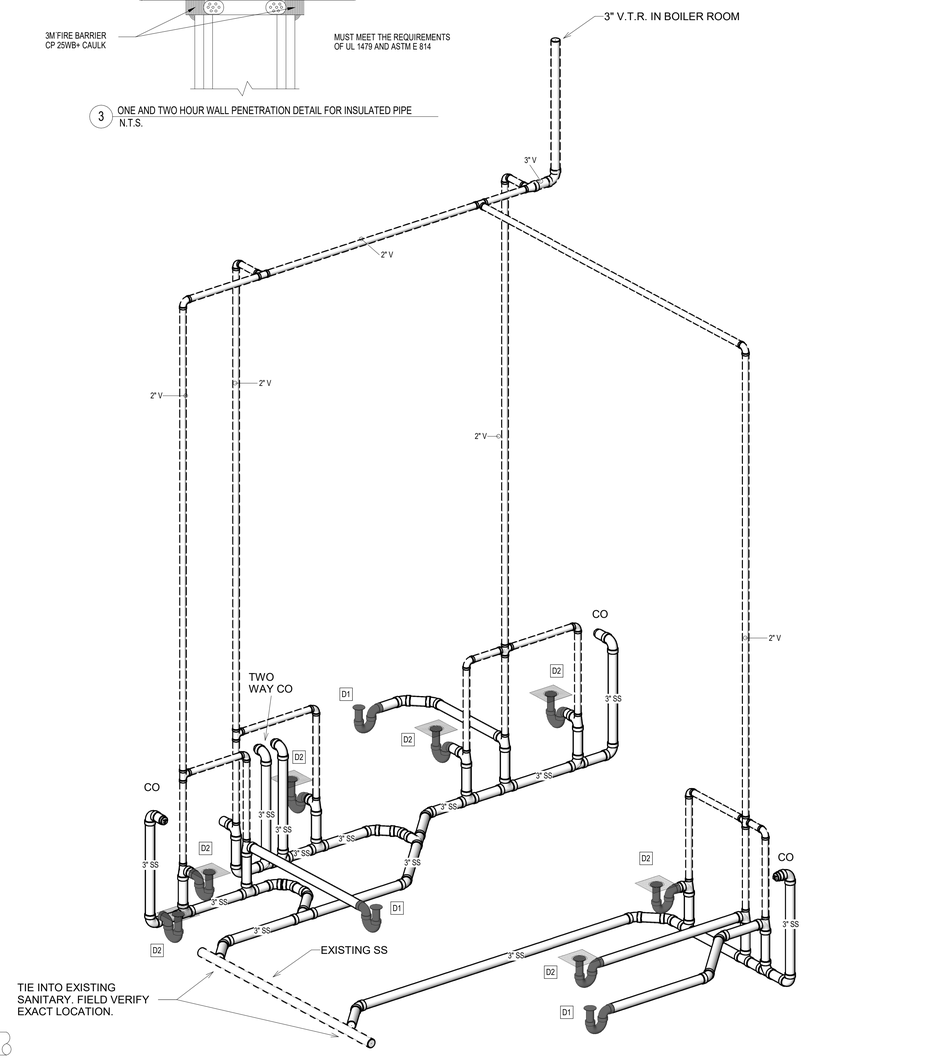
1. THE MINIMUM WIDTH OF THE TRENCH SHOULD BE THE PIPE OD (OUTSIDE DIAMETER) PLUS 16 INCHES OR THE PIPE OUTSIDE DIAMETER TIMES 1.25 PLUS 12 INCHES. THIS WILL ALLOW ADEQUATE ROOM FOR JOINING THE PIPE, SNAKING THE PIPE IN THE TRENCH TO ALLOW FOR EXPANSION AND CONTRACTION WHERE APPROPRIATE AND SPACE FOR BACKFILLING AND COMPACTION OF BACKFILL. THE SPACE BETWEEN THE PIPE AND TRENCH WALL MUST BE WIDER THAN THE COMPACTION EQUIPMENT USED TO COMPACT THE BACKFILL.
2. PROVIDE A MINIMUM OF 4 INCHES OF FIRM, STABLE AND UNIFORM BEDDING MATERIAL IN THE TRENCH BOTTOM. IF ROCK OR UNYIELDING MATERIAL IS ENCOUNTERED, A MINIMUM OF 6 INCHES OF BEDDING SHALL BE USED. BLOCKING SHOULD NOT BE USED TO CHANGE PIPE GRADE OR TO INTERMITTENTLY SUPPORT PIPE OVER LOW SECTIONS IN THE TRENCH.
3. THE PIPE SHOULD BE SURROUNDED WITH AN AGGREGATE MATERIAL WHICH CAN BE EASILY WORKED AROUND THE SIDES OF THE PIPE. BACKFILLING SHOULD BE PERFORMED IN LAYERS OF 6 INCHES WITH EACH LAYER BEING SUFFICIENTLY COMPACTED TO 85% TO 95% COMPACTION.
4. A MECHANICAL TAMPER IS RECOMMENDED FOR COMPACTING SAND AND GRAVEL. THESE MATERIALS CONTAIN FINE-GRAINS, SUCH AS SILT AND CLAY. IF A TAMPER IS NOT AVAILABLE, COMPACTING SHOULD BE DONE BY HAND.
5. THE TRENCH SHOULD BE COMPLETELY FILLED. THE BACKFILL SHOULD BE PLACED AND SPREAD IN UNIFORM LAYERS TO PREVENT ANY UNFILLED SPACES OR VOIDS. LARGE ROCKS, STONES, FROZEN CLODS, OR OTHER LARGE DEBRIS SHOULD BE REMOVED. STONE BACKFILL SHALL PASS THROUGH AN 1-1/2" SIEVE, ROCK SIZE SHOULD BE ABOUT ONE-TENTH OF THE PIPE OUTSIDE DIAMETER. HEAVY TAMPERS OR ROLLING EQUIPMENT SHOULD ONLY BE USED TO CONSOLIDATE THE FINAL BACKFILL.
6. TO PREVENT DAMAGE TO THE PIPE AND DISTURBANCE TO PIPE EMBEDMENT, A MINIMUM DEPTH OF BACKFILL ABOVE THE PIPE SHOULD BE MAINTAINED. PIPE SHOULD ALWAYS BE INSTALLED BELOW THE FROST LEVEL TYPICALLY. IT IS NOT ADVISABLE TO ALLOW VEHICULAR TRAFFIC OR HEAVY CONSTRUCTION EQUIPMENT TO TRAVERSE THE PIPE TRENCH.

UNDERGROUND INSTALLATION DETAIL OF PLASTIC PIPING SYSTEMS	Pea Gravel Installation

4 PEA GRAVEL INSTALLATION FOR PLASTIC PIPE
N.T.S.

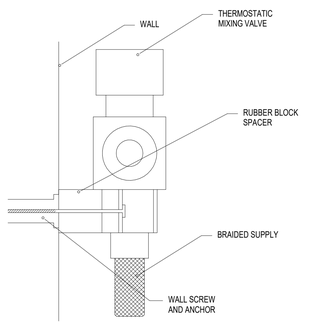


5 WALL CLEANOUT
N.T.S.

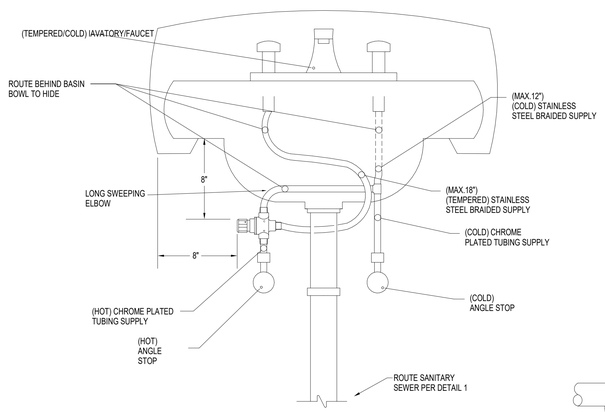


8 PLUMBING VENT RISER

NOTES:
1. THERMOSTATIC MIXING VALVE MUST HAVE BRACKET FOR MOUNTING TO WALL.
2. PROVIDE RUBBER SPACER BETWEEN WALL AND TMV.
3. WALL ANCHOR SYSTEM MUST BE USED.
4. STAINLESS STEEL SUPPLY LINES MUST BE KEPT TO MINIMUM LENGTH.

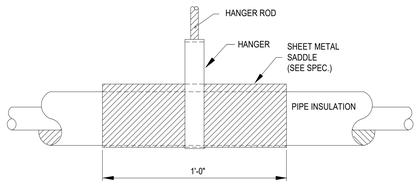


THERMOSTATIC MIXING VALVE WITH BRACKET



FINISHED FLOOR

6 TEMPERED & COLD SUPPLY DETAIL
N.T.S.



7 PIPE SUPPORT DETAIL
N.T.S.

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

JAVIER GARCIA
118760
LICENSED PROFESSIONAL ENGINEER
04-18-2023

CASTLEBERRY HS CONCESSIONS

215 Churchill Road, Fort Worth, Texas - 76114

REVISIONS:

No	Date
-	

JOB NO.	2320
DATE:	April 18, 2023

PLUMBING DETAILS

PL701

EMA Engineering & Consulting, Inc.
Tyler | Austin | Houston | El Paso
DFW | San Antonio | Shreveport
Texas Firm Registration No. F-893
Louisiana Firm Registration No. EF-5818
DESIGN SOLVE ENHANCE www.EMAengineer.com

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4/19/2023 8:19:52 AM

FOOD SERVICE EQUIPMENT SCHEDULE					
Mark	Count	Description	Manufacturer	Model	Comments
100	2	Redi-Pak Five-Shelf Unit	Eagle Group	2460VG74-5	
101	3	Redi-Pak Five-Shelf Unit	Eagle Group	2448VG74-5	
102	1	Three-Compartment Sink	Eagle Group	314-16-3-18	
103	1	Pre-Rinse Wall Mount Mixing Faucet	T&S Brass and Bronze Works, Inc.	B-0133-12-CR-B	
104	1	Hand Sink	Advance Tabco	7-PS-23	
105	1	SODA RACK SYSTEM	BY VENDOR - EXISTING	EXISTING	
106	1	Mop Sink Storage Cabinet	Eagle Group	F1916-VSCS	
107	1	570 lb Ice Bin - EXISTING	Manitowoc Ice	D-570	
108	1	Ice Maker, Nugget Style	Manitowoc Ice	RNF0620A-161	
109	1	WORK TABLE W/ PREP SINK	JOHN BOOS	EPT8R5-3072SSK-L	
110	2	Wall Mounted Shelves	Eagle Group		
111	2	COMMERCIAL MICROWAVE OVEN	PANASONIC	NE-1054F	
112	1	Refrigerator, Reach-In	Traulsen	RHT132E-HHS	
113	1	Worktable-Rolled Edge	Eagle Group	T2460SE-CA	
114	1	Reach-In Freezer	Traulsen	RLT132WUT-HHS	
115	1	Counter Top Deep Fryer	Perfect Fry Company	PFC187	
116	1	Worktable-Rolled Edge	Eagle Group	T2472SE-CA	
117	1	DRAWER WARMERS	HATCO	HDM-2B	
118	1	WIDE SERIES MULTI-COOK OVEN		VMC-H3HW-SX	
119	4	COUNTERTOP HEATED WELLS	HATCO	CHW-FUL	
120	1	STAINLESS STEEL CHASE	CUSTOM	CUSTOM	
121	1	Worktable-Rolled Edge	Eagle Group	T36132SE	
122	1	Hand Sink	Advance Tabco	7-PS-23	
123	1	ICE BEVERAGE DISPENSER	BY VENDOR - EXISTING	BY VENDOR - EXISTING	
124	2	GLASS DOOR MERCHANDISER - EXISTING	TRUE	BY VENDOR	
125	1	DOUBLE OVERSHELF CEILING MOUNTED	CUSTOM	CUSTOM	
126	1	DRAWER WARMERS	HATCO	HDM-2B	
127	1	KOFFEE KING THREE WARMER STEPPED RIGHT, POUR OVER LO-PROFILE COFFEE BREWER	BLOOMFIELD	8571	
128	1	Worktable-Rolled Edge	Eagle Group	T2448B	
129	1	MINI JETSTAR POPCORN POPPER	STAR MANUFACTURING	J4R	
130	1	POS (BY OWNER)	Generic	Touch Screen Register	
131	2	SPEC-MASTER Plate Cabinet	Eagle Group	PC1860SE-CS	

ELECTRICAL DEMOLITION GENERAL NOTES

(SOME NOTES MAY NOT BE USED)

1. UNLESS NOTED ON DRAWINGS, ALL LIGHTING, SWITCHES, OUTLETS AND OTHER ELECTRICAL DEVICES ARE TO REMAIN.
2. REFER TO SPECIFICATION SECTION 26 05 05, ELECTRICAL DEMOLITION REMODELING, FOR GENERAL DEMOLITION REQUIREMENTS.
3. ALL MATERIAL REMOVED AND NOT RETAINED BY THE OWNER SHALL BE DISPOSED OF OFF SITE IN A LAWFUL MANNER.
4. BEFORE DEMOLISHING PANELS, TRACE ALL BRANCH CIRCUITS TO CONFIRM THAT EXISTING LOADS HAVE BEEN RELOCATED TO NEW PANELS. IF A LOAD EXISTS THAT HAS NOT BEEN RELOCATED TO NEW PANELS, CONTACT THE ENGINEER FOR INSTRUCTIONS.

ELECTRICAL DEMOLITION PLAN NOTES

ED3	EXISTING RECEPTACLES AND DEVICES TO BE REMOVED. REMOVE EXISTING CONDUIT AND WIRING BACK TO SOURCE.

ELEC UTIL BILLS HAVE BEEN REQUESTED

ELECTRICAL GENERAL NOTES

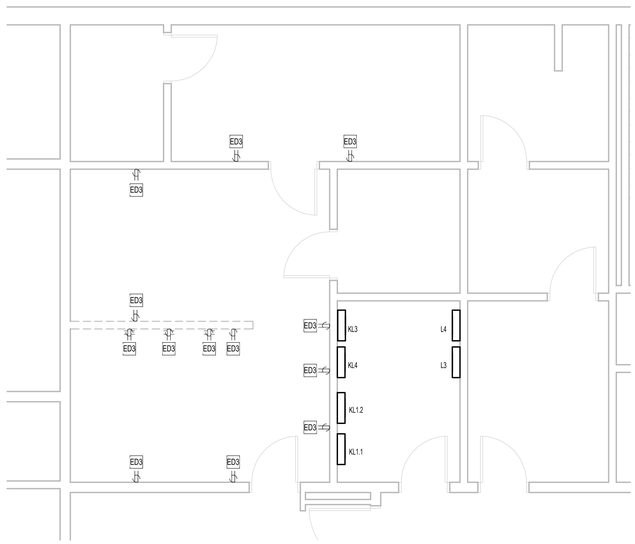
(SOME NOTES MAY NOT BE USED)

1. SEE SHEET EP701 FOR GENERAL NOTES APPLICABLE TO THE ENTIRE DRAWING SET.

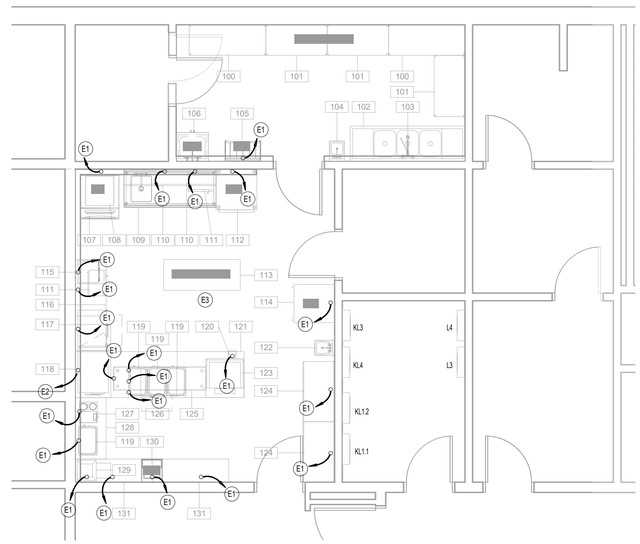
ELECTRICAL PLAN NOTES

E1	PROVIDE POWER TO NEW KITCHEN EQUIPMENT FROM EXISTING AVAILABLE SPACE IN EXISTING PANEL KL4 OR NEAREST AVAILABLE 120/208V PANEL. PROVIDE A NEW 20A 1P BREAKER WITH #12 WIRE.
E2	PROVIDE POWER TO NEW KITCHEN EQUIPMENT FROM EXISTING AVAILABLE SPACE IN EXISTING PANEL KL4 OR NEAREST AVAILABLE 120/208V PANEL. PROVIDE A NEW 40A 3P BREAKER WITH #8 WIRE.
E3	CONTRACTOR TO COORDINATE SURFACE MOUNTED CONDUIT LOCATIONS AND ROUTING WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.

ELECTRICAL ROUGH-IN SCHEDULE										
ITEM	VOLT	PHASE	TYPE	HEIGHT	LOAD			NOTES	CORD AND PLUG	NEMA
					AMPS	KW	H.P.			
E1	120	1	DCO	18"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E2	120	1	DCO	4'-2"	16.0			FOR KITCHEN USE. DEDICATED RECEPTACLE CIRCUIT. 20.0A BREAKER.		5-20
E3	120	1	DCO	6'-0"	16.0			FOR BAG'N'BOX SYSTEM. VERIFY REQUIREMENTS	YES	5-20
108	120	1	J-BOX	6'-0"	16.3			B.T.C. ON ICE MAKER - VERIFY REQUIREMENTS WITH OWNER.EXISTING EQUIPMENT	NO	
111	120	1	DCO	18"	13.4			FOR MICROWAVE OVEN	YES	5-15
112	120	1	DCO	4'-0"	16.0			FOR REACH-IN REFRIGERATOR	YES	5-20
114	120	1	DCO	4'-0"	9.4			FOR REACH-IN FREEZER	YES	5-15
115	120	1	DCO	4'-2"	16.0			FOR COUNTER TOP DEEP FRYER	YES	5-20
117	120	1	DCO	18"	7.5			FOR DRAWER WARMER	YES	5-15
118	208	3	J-BOX	4'-2"	29.0			FOR MULTI COOK OVEN	NO	
119A	120	1	DCO	STUB UP 6"	10.0			FOR HOT FOOD WELL - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLES		
119B	120	1	DCO	4'-2"	10.0			FOR HOT FOOD WELL - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLES		
123	120	1	J-BOX	DFA	7.0			B.T.C. ON ICE BEVERAGE DISPENSER THRU SS CHASE - FIXTURE MOUNTED RECEPTACLE PROVIDED BY FABRICATOR	NO	
124	120	1	DCO	4'-2"	6.3			FOR REACH-IN MERCHANDISER	YES	5-15
126	120	1	DCO	STUB UP 6"	7.5			FOR DRAWER WARMER - ELECTRICIAN TO PROVIDE WATERTIGHT TOMBSTONE RECEPTACLE	YES	5-15
127	120	1	DCO	4'-2"	15.0			FOR COFFEE MAKER	YES	5-15
POS	120	1	DCO	18"	12.0			CLEAN DEDICATED POWER FOR POS	YES	5-15
	-	-	CONDUIT	18"	-			DATA RUN TO MANAGER'S OFFICE	NO	



2 ELECTRICAL DEMOLITION FLOOR PLAN - LEVEL 0 - CONCESSION
1/4" = 1'-0"



1 ELECTRICAL FLOOR PLAN - LEVEL 0 - CONCESSION
1/4" = 1'-0"

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12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

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TEXAS P.E. 102427
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JOB NO.	2320
DATE:	April 18, 2023

ELECTRICAL FLOOR PLAN

EP101

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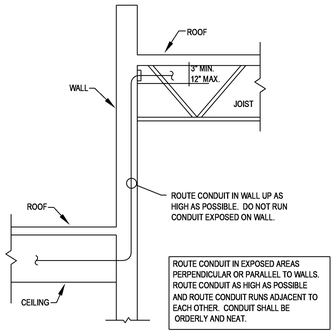
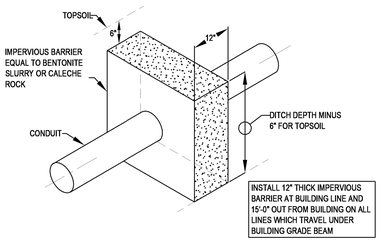
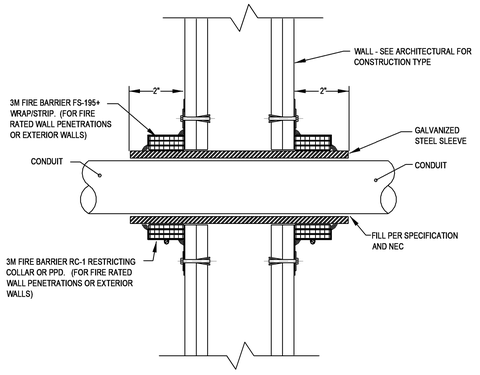


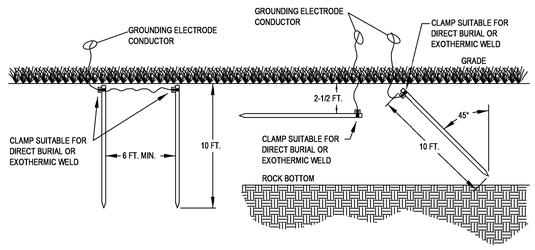
1 EXPOSED CONDUIT ROUTING
1/8" = 1'-0"



2 IMPERVIOUS BARRIER
1/8" = 1'-0"

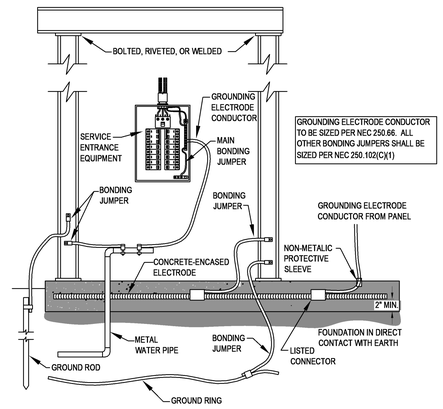


3 WALL PENETRATION
1/8" = 1'-0"

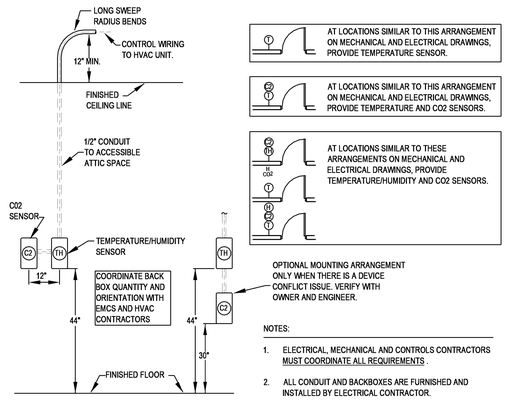


NOTE: ALL PIPE AND ROD ELECTRODES MUST HAVE 8 FEET OF LENGTH IN CONTACT WITH SOIL REGARDLESS OF ROCK BOTTOM IN ORDER TO ENSURE THAT THE UPPER END OF THE ELECTRODE IS FLUSH WITH OR BELOW GROUND LEVEL UNLESS THE ABOVEGROUND PORTION IS PROTECTED FROM PHYSICAL DAMAGE.

4 NEC GROUND ROD
1/8" = 1'-0"

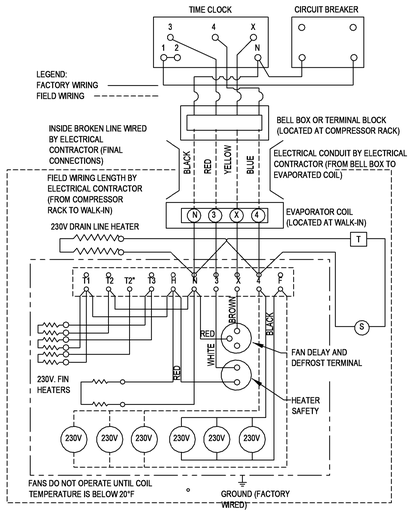


5 GROUNDING ELECTRODE SYSTEM
1/8" = 1'-0"



NOTES:
1. ELECTRICAL, MECHANICAL AND CONTROLS CONTRACTORS MUST COORDINATE ALL REQUIREMENTS .
2. ALL CONDUIT AND BACKBOXES ARE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR.
3. ALL SENSORS, CONTROL WIRING AND ASSOCIATED DEVICES ARE FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.

6 SENSOR MOUNTING DETAIL
1/8" = 1'-0"

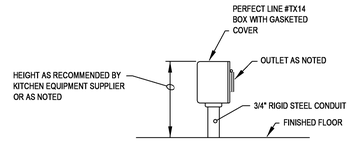


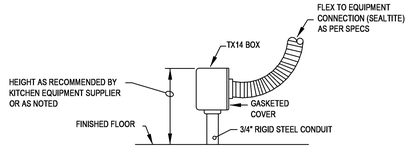
7 FOUR WIRE COLOR DECODED DEFROST SYSTEM
1/8" = 1'-0"

ELECTRICAL LEGEND - POWER SYMBOLS

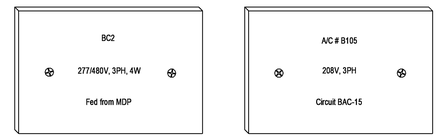
	BRANCH CIRCUIT - CONDUIT IN WALL or ABOVE CEILING. INDICATES DEVICES AND EQUIPMENT ON A CIRCUIT. NOT INTEDED TO SHOW ROUTING.
	BRANCH CIRCUIT OR FEEDER CONDUIT UNDER FLOOR or UNDERGROUND.
	SWITCH WIRE - SWITCH CIRCUIT
CL-1, 3, 5	HOME RUN WITH CIRCUIT DESIGNATION(S) - LETTER DENOTES PANEL
	PANELBOARD or SWITCHGEAR (SEE PANEL SCHEDULES AND RISER DIAGRAM)
	SPECIAL PANEL, EQUIPMENT RACK, CABINET, ETC. - SURFACE MOUNT; FLUSH MOUNT
TX	POWER TRANSFORMER - SEE PANEL SCHEDULE, RISER, AND SPECIFICATIONS.
	DISCONNECT / SAFETY SWITCH - SEE SCHEDULES FOR MORE INFORMATION.
	GROUND ; WEATHERHEAD
	CONCRETE IN-GRADE PULL BOX / HAND HOLE - PROVIDE AS SHOWN OR AS REQUIRED.
	JUNCTION BOX - @ 18" AFF OR AS NOTED ; FLUSH WALLS / FLUSH CEILING or FLOOR or ELSE.
	RECEPTACLE @ 18" AFF OR AS NOTED - DUPLEX ; QUAD, SIMPLEX.
	MULTI-POLE RECEPTACLE @ 18" AFF or AS NOTED ; NON-LINEAR TWISTLOCK MULTIPOLE @ 18" AFF or AS NOTED.
	GFCI DUPLEX RECEPTACLE @ 6" ABOVE BACKSPLASH IF SHOWN ON MILLWORK or 18" AFF ; WEATHERPROOF GFCI.
	DUPLEX RECEPTACLE W/ DUAL USB @ 6" ABOVE BACKSPLASH IF SHOWN AT MILLWORK or 18" AFF. SEE SPECIFICATIONS FOR MORE INFORMATION.
	NON-LINEAR RECEPTACLE @ 18" AFF or AS NOTED - DUPLEX ; QUAD.
	DUPLEX FLOOR W/ BRASS COVER PLATE & 3/4" C TO ACCESSIBLE ATTIC SPACE or AS NOTED.
	FLOOR BOX - 2 GANG (RFB2/CFB2) W/1X DUPLEX; 4 GANG (RFB4/CFB4) W/2X DUPLEX. SEE SPECS FOR MORE INFO.
	FLOOR BOX - 6 GANG ; 8 GANG. SEE SPECS FOR MORE INFO.
	FLOOR BOX - 10 GANG; CUSTOM FLOORBOX AS NOTED, SEE SPECS FOR MORE INFO.
	POKE-THRU FLOOR BOX - 3X RECEPTACLES & COMM. SEE SPECS FOR MORE INFO. WALKERBOX EVOLUTION 8AT or APPROVED EQUAL, OR AS NOTED.
	POWER POLE - POWER & DATA
	PLUGMOLD WITH RECEPTACLES AT 12" OC
SR	SURFACE - MOUNT RACEWAY - SEE SPECIFICATIONS FOR MORE INFORMATION.
	MOTOR - W / MOTOR SWITCH, OVERLOADS SQ.D. CLASS 2510, NEMA ENCL. (TYPE K) or AS NOTED. FINAL CONNECTION BY ELECTRICAL CONTRACTOR - MOTOR (GENERAL) ; EXHAUST FAN ; SUPPLY FAN ; PUMP.
S	MOTOR TOGGLE SWITCH.
	DOOR HOLD BACK - PROVIDE POWER SHOWN TO LOW VOLTAGE TX TO SERVE DEVICE(S).
	EMERGENCY POWER OFF (EPO) - SEE SPECIFICATIONS FOR MORE INFORMATION.
	BUZZER - EDWARDS #156G-6G1 OR APPROVED EQUAL AT 80" AFF.
84" ; 48"	PUSH BUTTON - EDWARDS #695 OR APPROVED EQUAL AT 44" AFF ; SIGNAL TX ABOVE CEILING.
WH	WATER HEATER - SEE PLUMBING SCHEDULE FOR MORE INFORMATION.
PS	PLUMBING SENSORS - PROVIDE POWER SHOWN TO LOW VOLTAGE TX TO SERVE DEVICE(S).
	DUPLEX RAISED FLOOR RECEPTACLE.

NOTES:
1. SOME SYMBOLS MAY NOT BE USED.
2. ACCESSIBLE DEVICES HIGHEST OPERABLE PART TO BE 46" MAXIMUM/18" MINIMUM A.F.F. - REFER TO ARCHITECTURAL DRAWINGS.
3. DIMENSIONS GIVEN A.F.F. ARE TO BOTTOM OF BOX.





8 KITCHEN RECEPTACLE DETAIL
1/8" = 1'-0"



PANELBOARD LABEL (TYPICAL) HVAC DISCONNECT SWITCH LABEL (TYPICAL)

NOTES:
1. ATTACH SECURELY WITH NON-CORRODING STAINLESS STEEL SCREWS, NON-CORRODING POP RIVETS ARE ACCEPTABLE, ADHESIVE ATTACHMENT IS NOT ACCEPTABLE.
2. LABEL ALL PANELBOARDS, SWITCHBOARDS, TRANSFORMERS, HVAC DISCONNECT SWITCHES, AND MOTOR CONTROL CENTERS AS REQUIRED, REFERENCE SPECIFICATION SECTION 260553.

9 ELECTRICAL EQUIPMENT IDENTIFICATION
1/8" = 1'-0"

ELECTRICAL GENERAL NOTES

(SOME NOTES MAY NOT BE USED)

1. BRANCH CIRCUIT - PROVIDE A SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT. MULTIPLE CIRCUITS SHALL NOT SHARE A COMMON NEUTRAL. NEUTRAL CONDUCTORS SHALL BE SIZED AS LARGE AS THE PHASE CONDUCTORS. NEUTRAL CONDUCTORS SHALL NOT BE OF A REDUCED SIZE.
2. CONDUIT - WHERE POSSIBLE, ALL CONDUIT AND/OR CABLING SHALL BE INSTALLED BETWEEN THE BOTTOM AND TOP CHORD OF JOIST. WHERE NO CEILINGS ARE SCHEDULED, ALL CONDUIT SHALL BE UP AGAINST BOTTOM OF THE TOP CHORD. DO NOT SUPPORT OR REST CONDUITS ON BOTTOM CHORD OF THE JOISTS.
3. CONDUIT - ROUTE CONDUIT IN EXPOSED AREAS PERPENDICULAR OR PARALLEL TO WALLS. ROUTE CONDUIT AS HIGH AS POSSIBLE AND ROUTE CONDUIT RUNS ADJACENT TO EACH OTHER. CONDUITS SHALL BE ORDERLY AND NEAT.
4. DEVICES - VERIFY ALL INSTALLATION HEIGHTS OF RECEPTACLES WITH ARCHITECTURAL CASEWORK DETAILS BEFORE ROUGH-IN.
5. EQUIPMENT - DURING THE SUBMITTAL PHASE, THIS CONTRACTOR SHALL SUBMIT LAYOUT OF ALL PANELS, SWITCHGEAR, TRANSFORMERS, CONTACTORS, ETC. IN EACH EQUIPMENT ROOM WHERE THIS EQUIPMENT IS LOCATED. ALL LAYOUTS MUST BE DRAWN TO SCALE AND DIMENSIONED.
6. UTILITY - THE CONTRACTOR AND SUBCONTRACTORS SHALL COORDINATE WITH ALL UTILITY COMPANIES AND THE OWNER'S REPRESENTATIVE TO DETERMINE THE LOCATION OF ALL EXISTING LINES AND UTILITIES BEFORE DITCHING IS PERFORMED. THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR REPAIR OF ANY CUT OR DAMAGED LINES OR UTILITIES THAT ARE NOT SHOWN ON ANY PLANS.
7. MECHANICAL - EXACT MECHANICAL EQUIPMENT LOCATIONS AND TYPE SHALL BE COORDINATED WITH MECHANICAL PLANS AND MECHANICAL CONTRACTOR. DO NOT INSTALL CONDUIT/CABLING WITHIN 3'-0" OF ANY HVAC UNIT UNLESS THE CONDUIT AND/OR CABLING SERVES THAT UNIT.
8. MECHANICAL - UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS, PROVIDE A LISTED MANUAL MOTOR-CIRCUIT SWITCH AS A DISCONNECTING MEANS AT EACH MOTOR. FOR MOTORS SHOWN WITH "MS" PROVIDE A LISTED MANUAL MOTOR -CIRCUIT SWITCH WITH OVERLOAD PROTECTION AS A DISCONNECTING MEANS AT EACH MOTOR.
9. MECHANICAL - SEE EXHAUST FAN SCHEDULE ON MECHANICAL SHEET FOR EXHAUST FAN SWITCHING, UNLESS CONTROLS ARE SPECIFICALLY NOTED ON THE DRAWINGS. WHERE "EMCS" IS MENTIONED, PROVIDE MECHANICALLY-HELD CONTACTORS AS NECESSARY FOR FAN CONTROL. COORDINATE CONTACTOR COIL ELECTRICAL REQUIREMENTS WITH MECHANICAL CONTROLS CONTRACTOR. WHERE "24/7" IS MENTIONED, PROVIDE A MOTOR-RATED SWITCH AT THE MOTOR ONLY. WHERE "SWITCH" IS MENTIONED, DO ONE OF THE FOLLOWING:
   A. IN KITCHEN, TIE ALL HOOD SUPPLY AND EXHAUST FANS TO HOOD CONTROLS. PROVIDE SWITCHES AS NECESSARY AT HOOD. FOR MORE INFORMATION, SEE KITCHEN HOOD DETAIL.
   B. IN SCIENCE LABS, TIE EXHAUST FANS TO UTILITY CONTROLLER PER LABORATORY UTILITY SHUT OFF SYSTEM DETAIL.
   C. IN ART, PROVIDE CONTROLS FOR KILN EXHAUST PER KILN EXHAUST FAN CONTROL DETAIL.
   D. IN BATHROOMS AND JANITORAL, EXHAUST FAN TO BE SWITCHED WITH THE LUMINAIRES IN THE SPACE PER THE EXHAUST FAN SWITCHING DETAIL.
   E. ELSEWHERE, SWITCH THE FAN WITH A MOTOR-RATED SWITCH ON THE WALL IN THE SPACE THE EXHAUST FAN SERVES.
10. CONDUIT - COORDINATE CONDUIT ROOF PENETRATIONS WITH MECHANICAL ROOF TOP UNITS AND/OR THRU HOODED PLUMBING PENETRATIONS TO CONDENSING UNITS.
11. MECHANICAL - REFER TO THE MECHANICAL SHEETS FOR ALL SENSOR LOCATIONS (THERMOSTAT, HUMIDISTAT, CO2, etc.), DUCT DETECTORS, CONTROL RELAYS, MOTORIZED DAMPERS, SFDs, etc. THIS CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONDUIT, BACK BOXES AND LINE VOLTAGE WIRING TO SENSORS, DEVICES, etc. AS REQUIRED TO ENSURE A COMPLETE AND OPERATIONAL SYSTEM. FOR MORE INFORMATION, REFER TO SPECIFICATIONS AND SENSOR INSTALLATION DETAIL.
12. DEVICES - VERIFY WHITEBOARD AND TACKBOARD LOCATIONS WITH ARCHITECTURAL PLANS. DO NOT INSTALL DEVICES IN THESE AREAS.
13. DEVICES - EXACT LOCATION OF ALL OUTLETS, DEVICES, & ETC. INSTALLED IN MOVEABLE FURNITURE SHALL BE COORDINATED WITH ARCHITECT AND OWNER.
14. DEVICES - REFER TO ELECTRICAL COMMUNICATION DRAWINGS FOR GENERAL LOCATION OF CONDUIT AND BOXES SUPPLIED BY THIS CONTRACTOR IN BASE BID.
15. BRANCH CIRCUIT - ALL COMPUTER POWER OUTLETS TO BE ISOLATED GROUND WITH #10 AWG NEUTRAL. DIFFERENT CIRCUITS SHALL NOT SHARE A COMMON NEUTRAL.
16. DEVICES - TAMPER RESISTANT RECEPTACLES SHALL BE PROVIDED IN ACCORDANCE WITH NEC ARTICLE 406.12.
17. MECHANICAL - ALL VARIABLE FREQUENCY DRIVES (VFD's) ARE TO BE PROVIDED BY THE MECHANICAL CONTRACTOR, INSTALLED AND POWERED BY THE ELECTRICAL CONTRACTOR, AND CONTROLLED BY THE CONTROLS CONTRACTOR. THIS CONTRACTOR TO PROVIDE ALL NECESSARY POWER WIRING FROM PANEL TO VFDs AND FROM VFDs TO EACH MOTOR.
18. MECHANICAL - FOR ALL UNITS WITH PLASMA AIR IONIZATION DEVICE. PROVIDE CONTROL WIRING AS REQUIRED BY MANUFACTURER FROM LOW VOLTAGE FAN CONTROL TERMINALS TO POWER INPUT TERMINALS ON IONIZATION DEVICE. PROVIDE STEP-DOWN TRANSFORMERS AS REQUIRED TO PROVIDE LOW VOTAGE POWER FROM UTILIZING THE CIRCUIT POWERING THE UNIT. COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH MECHANICAL INSTALLER. LOCATE EACH TRANSFORMER IN A NEMA 3R ENCLOSURE MOUNTED AT THE UNIT.

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12377 Merit Drive
Suite 1800
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No	Date
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JOB NO. 2320
DATE: April 18, 2023

ELECTRICAL DETAILS, SYMBOLS, & GENERAL NOTES

EP701

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TEXAS P.E. 118760
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TEXAS P.E. 102427
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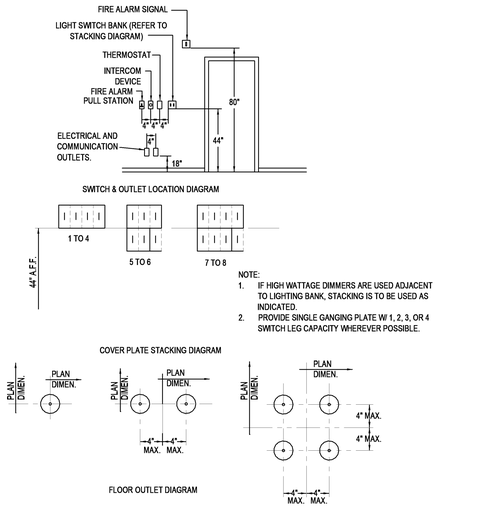
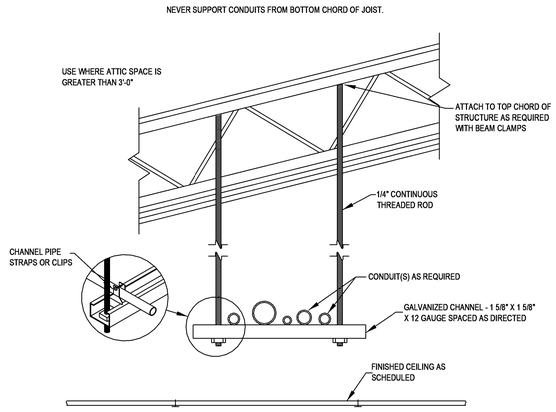
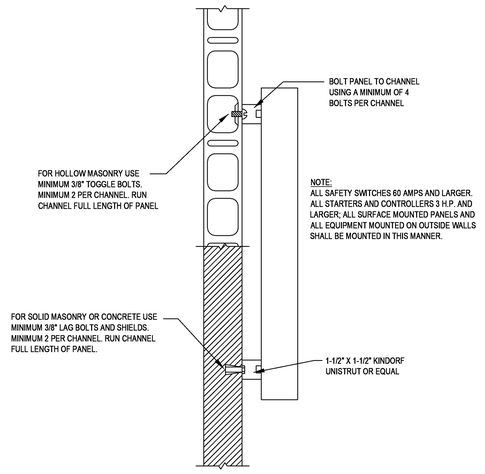


1 OUTLET DIAGRAM
1/8" = 1'-0"



2 CONDUIT SUPPORT
1/8" = 1'-0"



3 SURFACE EQUIPMENT MOUNTING DETAIL (VERTICAL)
1/8" = 1'-0"

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12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

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JAMES TATE III
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JOB NO.	2320
DATE:	April 18, 2023

ELECTRICAL DETAILS

EP702

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Project Manual

Castleberry ISD
High School Concessions and Admin Kitchen

WRA Architects, Inc.
12377 Merit Drive
Suite 1800
Dallas, Texas 75251
214.750.0077 voice
214.750.5931 fax
www.wraarchitects.com

REGISTERED ARCHITECT
DERRICK YORK
20752
STATE OF TEXAS
4-18-23

JOB NO. 2320
DATE: APRIL 18, 2023

Division 00-33

Castleberry Independent School District
5001 Melbourne Drive
River Oaks, Texas, 76114
817-252-2000
www.castleberryisd.net

PROJECT MANUAL

Castleberry ISD High School Concessions and Admin. Kitchen
River Oaks, Texas

April 18, 2023

Owner
Castleberry Independent School District
5228 Ohio Garden Road
Fort Worth, TX 76114
Telephone: 817-252-2000

Architect
WRA Architects, Inc.
12377 Merit Drive, Suite 1800
Dallas, TX 75251
Contact: Derrick York
Telephone: 214-750-0077
Electronic Mail: dyork@wraarchitects.com

Food Service
Bosma Design Solution, Inc.
2201 Long Praire Road
Flower Mound, TX 75022

Electrical Engineer
EMA Engineering
328 South Broadway Avenue
Tyler, TX 75702

WRA Architects Project Number: 2320

END OF DOCUMENT

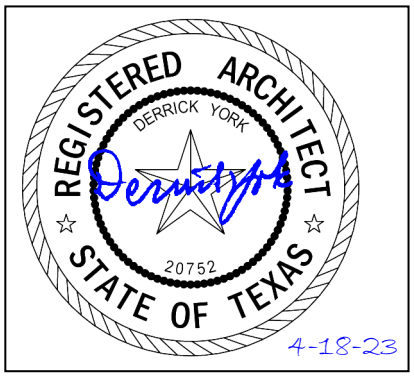
DOCUMENT 00 01 07

PROFESSIONAL SEALS PAGE

The specification sections listed below were prepared by or under the direct supervision of the Architect:

WRA Architects, Inc.
12377 Merit Drive, Suite 1800
Dallas, TX 75251

SEAL



DIVISION 11 – EQUIPMENT

11 40 00	Food Service Equipment

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DOCUMENT 00 01 0

PROFESSIONAL SEALS PAGE

The specification sections listed below were prepared by or under the direct supervision of the Architect:

EMA Engineering & Consulting
328 South Broadway
Tyler TX 75702

04/18/2023

DIVISION 22 PLUM ING

22 00 10	BASIC PLUMBING REQUIREMENTS
22 00 90	PLUMBING SUBMITTAL PROCEDURES
22 05 20	GAUGES, METERS, AND THERMOMETERS
22 05 24	VALVES - GENERAL
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22 11 17	DOMESTIC WATER PIPING AND APPURTENANCES COPPER
22 13 17	SOIL, WASTE AND SANITAR DRAIN PIPING, VENT PIPING, AND APPURTENANCES
22 33 34	ACCESS DOORS
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DIVISION 26 ELECTRICAL

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26 05 05	SELECTIVE DEMOLITION FOR ELECTRICAL
26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL S STEMS
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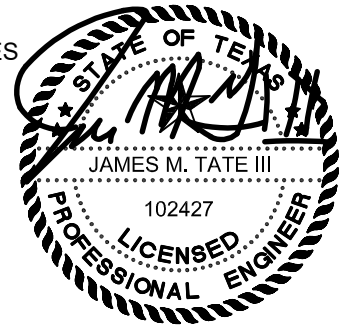
26 09 16	ELECTRICAL CONTROL COMPONENTS
26 20 00	LOW VOLTAGE ELECTRICAL DISTRIBUTION
26 27 26	WIRING DEVICES
26 43 00	SURGE PROTECTIVE DEVICES



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Section 11 40 00 - FOODSERVICE EQUIPMENT

Part 1: GENERAL

1.1 SUMMARY

A. The work covered by this section includes the furnishing of all labor, materials, accessories, and special services necessary to complete the Foodservice Equipment Work as specified herein and where shown and scheduled on the drawings.

B. It is the intent of the Contract Documents for each and every item and/or component to be complete with all necessary devices for the item and/or component to properly function and perform in a manner equal to the manufacturer's stipulations.

C. The applicable provisions of the Contractor are a part of this specification.

D. The work shall include, but not be limited to, the following:

1 The purchase and/or fabrication, delivery, unpacking and setting up of all items.

2 Furnishing Contractor with all controls for items requiring electrical connections including as hereinafter noted, or shown on the Contract Drawings.

3 Furnishing Contractor with the control valves, pressure reducing valves, faucets, and specialty fittings as hereinafter noted, or shown on the Contract Drawings.

4 Supervising the mechanical and electrical connections and testing each item for performance, and the replacement of any item which fails to perform as claimed by the manufacturer.

5 Start up and demonstrations to be conducted by Factory Qualified Representative and Equipment Supplier in the proper operation and maintenance of each piece of equipment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. All plumbing, electrical and ventilation work required in connection with this equipment will be done by Contractor. The work to be done by Contractor shall include roughing-in to points indicated on dimensioned utility requirements rough-in plans, mounting of trim items such as faucets, sink wastes, prerinse sprays, siphon breakers and the final connection from the roughing-in point to the various pieces of equipment requiring such connections and the supplying of all necessary materials and labor for this work except as hereinafter noted.

B. The Contractor is to see that all plumbing lines are flushed free of foreign matter before connecting to food service fixtures.

C. Water inlets shall be located above the positive level to prevent siphoning of liquids into the potable water system. Wherever conditions shall require submerged inlet, a suitable approved type of check valve and vacuum breaker shall be placed on the fixture by the Contractor to form part of same to prevent siphoning. If exposed and design dictates, piping and fittings shall be chrome plated.

D. Final plumbing connections to all equipment to be by Plumbing contractor. All required tubing, misc. fittings, traps, etc. shall be supplied by the Plumbing contractor unless otherwise specified. All exposed plumbing lines (including indirect waste) to be hard copper (connections using lead free solder) and shall be painted with chrome or alumium paint.

E. All line and disconnect switches, safety cut-offs and fittings, convenience outlets, outlet boxes, wiring, conduit, control panels, fuse boxes or other electrical controls, fittings and connections will be furnished and installed under Contractor. Starting switches are to be provided by the Foodservice Equipment Supplier under this Section. Those starting switches furnished loose as standardized by Foodservice Equipment manufacturers (other than fabricated items) shall be mounted and wired complete by the Contractor.

F. All 120-volt convenience outlets not designated with specific loads are to be rated 20.0 amps. Electrical Contractor is to confirm any additional outlets as requested by Architect, Owner and/or General Contractor. GFCI as required by code. GFCI receptacles to be readily accessible per the written code in NEC and if not readily accessible per the written words of the code, then GFCI breaker shall be provided.

G. Refrigeration work shall be done by the Foodservice Equipment Supplier as hereinafter listed in the Contract Documents, except for electrical and plumbing connections to compressors, blower coils, controls, etc. These final connections will be made by Contractor. Drain lines from walk-in cooler/freezer blower coils to be furnished and installed by Refrigeration System Installer.

H. Any sleeves or conduit required for installation of refrigeration lines, syrup lines or CO2 tubing will be furnished and installed by the Contractor.

I. All traps, grease traps, line strainers, valves, stops, shut-offs and fittings necessary for equipment specified will be furnished and installed by the Contractor.

J. Necessary stainless steel seamless exhaust ducts of size and capacity required to operate fixtures specified, together with final approved connection between roughed-in vent openings and the ceiling connection will be furnished and installed by Foodservice Equipment Supplier unless otherwise noted in Contract Documents.

K. Ventilating fans and all ductwork between same and the exhaust hood duct collars and from same to discharge opening in building will be furnished and installed by Contractor.

L. The Contractor shall interwire fire protection system, walk-in coolers and freezers, exhaust ventilators, lights, exhaust fans as required for complete operation as designed and furnish wall mounted light and exhaust fan switches.

1.3 QUALITY ASSURANCE

A. Qualification of Suppliers:

1 Commercial Foodservice Equipment Suppliers shall submit satisfactory evidence of compliance with the following qualifications and conditions to be approved.

a. Successful completion of jobs of comparable scope

b. Have manufacturer's authorization to distribute and install specified factory items of equipment.

c. Maintain a permanent staff experienced in the installation of foodservice equipment and preparation of professional style shop drawings and brochures.

d. Maintain or have access to fabrication shop meeting all requirements of Section 3.8 Qualified Fabricators.

e. Maintain or have access to a readily available stock of repair and replacement parts, together with authorized service personnel.

B. Operation, Maintenance Manuals and CD videos:

1 Foodservice Equipment Supplier shall furnish three (3) bound sets of dimensional prints, data sheets, spare parts lists and operating instructions for each piece of mechanical equipment. These are to be prepared and submitted to the Consultant for review and approval before demonstration of equipment to the Owner.

a. All manuals shall be bound in hard durable covers bearing the job name and date of submission. Also, provide electronic copy of Operation and Maintenance Manuals in PDF format, same order of equipment legend. Provide on CD or DVD.

b. Provide CD videos on all manufactured pieces of equipment. Insert CD sleeves in all manuals. Foodservice Equipment Supplier may combine all video library onto DVD.

1.4 PLANS AND SPECIFICATIONS

A. Specifications and drawings have been prepared to form the basis for procurement, erection, start-up and adjustment of all equipment in this contract. Plans and specifications shall be considered as mutually explanatory and work required by one, but not by the other, shall be performed as though required by both. Items required by one, but not by the other shall be provided as though required by both. Work shall be accomplished as called for in specifications and shown on drawings, so that all items of equipment shall be completely functional for purpose for which they were designed. When there is any discrepancy between drawings and specifications, bidder should seek clarification of any discrepancies from the Architect/Consultant prior to bidding.

B. Should the drawings disagree in themselves, or the specifications with the drawings, the better quality, more stringent, and/or greater quantity of the work or materials shall be complete without additional cost to the Owner.

1.5 SUBMITTALS

A. One complete submittal package shall be sent to the Contractor for review, coordination and processing as specified in Division 1 unless otherwise stated by Contractor. This submittal is to be within terms set by Architect and to coincide with job conditions. Consultant shall require one complete digital submittal package in PDF format of the following sheets set up as detailed below:

1 Equipment arrangement plan
2 Drain Plan
3 Plumbing plan
4 Electrical plan
5 Ventilation plan
6 Special conditions plan
7 Shop drawings
8 Manufacturer's drawings

B. All drawings to be original prepared detailed arrangement plans from Architect's dimensioned plans (not reproduced from the Foodservice Contract Documents) and rough-in plans showing dimensioned locations, sizes, elevations and capacities of all utilities listed per Contract Documents for general use. All responsibility for correct voltage, locations, capacities and quantities of all utility services resides with the Kitchen Equipment Supplier (KES) in the preparation of these submittals.

C. Items A-1 through A-6 above shall be prepared at 1/4" to 1'0" scale.

D. Item A-7 shall be prepared 3/4" to 1'0" scale with sections at 1-1/2" to 1'0" scale.

E. It is advised that Foodservice Equipment not be ordered until submittals have been reviewed and stamped by Foodservice Equipment Consultant.

F. Product data brochures complete with:

1 Cover page listing name of Project, Architect, Contractor, Foodservice Equipment Consultant and Kitchen Equipment Supplier and brochure shall be in electronic PDF format

2 Index of Items

3 Individual descriptive cover sheet to include item number, manufacture, description, accessories and options checked off, finishes and notes for Architect/Owner to select any color, finish, lettering etc. required. Include color charts if color selection is required. Kitchen Equipment Supplier shall indicate with a check mark on what accessories and options to be furnished with the equipment specified.

4 Manufacturer specification sheet complete with dimensions, options and complete description of utility options and requirements.

5 For custom fabricated items, list name of Qualified Fabricator selected for project

6 Cover sheet must be included for Items that are Owner or Vendor furnished and Spare Numbers.

7 Buy out items such as walk-in cooler/freezer, exhaust hood, sneeze guards, serving counters and floor troughs shall be prepared on large format sheet sizes and in the same manner as custom fabricated equipment.

G. Provide all project information to Foodservice Consultant in its original electronic format at completion of project.

H. ALL submittal product data books are to be created in original PDF format. Using a Third-Party software (i.e. Bluebeam or other) is not acceptable and will not be eligible for review by Consultant.

I. Consultant will not perform a cloud based review of any submittals. Our system is not set up for cloud review, submitalls will be downloaded and then uploaded as reviewed on the architect system or server.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Equipment shall be delivered only after the building is weather and vandal safe

B. Storage: Store equipment in an area convenient to the point of installation in such a way that it can be protected from the weather and job hazards.

C. Protection: Wrapping and protective coverings shall remain on all items until ready for use and in the case of stainless steel items, until installation is complete and the job is ready for cleaning.

1.7 JURISDICTION TRADE AGREEMENTS AND RESTRICTIONS

A. Include the work specified, shown or reasonably inferable as part of foodservice equipment. Portions of this work may be sub-contracted to those qualified to do such work, as may be necessary because of jurisdictional trade agreements and restrictions.

1.8 REGULATIONS AND CODES

A. In addition to complying with applicable laws, statutes, building codes and regulations of local public authorities, comply with the following:

1 National Sanitation Foundation (to bear label)
2 Underwriters' laboratories, Inc. (to bear label)
3 American Gas Association Laboratories
4 National Fire Protection Association
5 Occupational Safety and health Act
6 Americans with Disabilities Act
7 Texas Accessibility Standards
8 Current Applicable Building Code
9 Current Applicable Plumbing Code
10 Current Applicable Mechanical Code
11 Current Applicable Electrical Code

B. The Architect/Owner shall be responsible for submission of Foodservice drawings to the proper governing authorities for code review and compliance, including, but not limited to, ADA, Health Department, DADS or other related agencies. Architect/Owner shall notify consultant of any code violations prior to building and inspection so that the design can be modified to comply.

1.9 WARRANTIES

A. Warrantee in writing all equipment and fabrication against defects and workmanship for a period of one (1) year from date of acceptance.
1 Each piece of mechanical equipment shall be listed, together with the authorized service and repair agency, which the Owner should call should malfunctions occur within the one (1) year guarantee period.

B. Refrigeration system compressors shall be CFC free and warranted for five (5) years by the manufacturer. Free refrigeration service, including parts and labor, to be furnished for one (1) year from date of acceptance.

Part 2: PRODUCTS

2.1 MATERIALS

A. Refrigeration Systems:
1 Self-contained refrigerators: whether the units are top mounted or cabinet mounted, they shall be started by Foodservice Equipment Supplier and shall be tested for maintenance of
2 Fractional-horsepower compressors remotely installed within a fabricated closed base body fixture shall be located in a partitioned compartment fitted with a louvered door. The compressor shall be securely anchored to #14 gauge galvanized steel channels positioned 4" above bottom of the fixture body and fitted with sound absorbing isolation pads.
a. A cord and cap assembly prewired to a control switch installed near front of the compressor compartment shall be provided

B. Motors and Heating Elements:
1 Motors: Up to and including 1/2 H.P. shall be wired for 120 volt, single phase service. Motors larger than 1/2 H.P. shall be wired for 208 volt, single or three phase as indicated.
2 Heating elements having a connected load up to and including 1000 watts shall be wired for 120 or 208 volt, single phase service, or as indicated on the design drawings.
a. Any heating element larger than 1000 watts or any combination of elements in one fixture totaling more than 1000 watts shall be wired for 208 volt, single or three phase service, as indicated on the design drawings.
b. Fixtures having multiple heating elements may be wired for three phase services with the load balanced as equally as possible within the fixture.
3 Wiring shall be properly protected in NEMA and UL approved metal enclosures.

C. Switches and Controls:
1 Each motor driven appliance or electrically heated unit shall be equipped with a suitable control switch or starter of a type meeting the requirements of NEMA and UL codes.
a. All controls mounted on vertical surfaces of fixtures shall be set into recessed die stamped stainless cups or other approved indentations.

D. Faucets, Valves and Fittings:
   1 All sinks shall be equipped with chromium plated, swing spout faucets equal to T&S Brass and Bronze Works, Inc., #B-0231-EE or #B-0290-LL units for splash mounted or #B-0221-EE deck mounted, unless otherwise specified in the Item Specifications.
      a. Specialty faucets will be listed under Item Specifications
   2 For all other fittings, refer to Division 22
   3 Comply with ANSI/NSF Standard 61 Requirements
   4 All faucets and fittings shipping to the State of California must be lead-free and this overrides anything listed in the Item Specifications.

E. Metals and Alloys:
   1 Non-corrodible Alloy: Shall be stainless steel, type #304, U.S. standard gauges as indicated.
      a. All exposed surfaces shall have a #4 finish
      b. Surface finish marred by manufacture shall be ground smooth, polished and restored to match original finish
   2 Galvanized Metal:
      a. Where galvanized metal is specified, it shall be cooper-bearing galvanized iron, Armco, Toncan, or equal, re-rolled for smoothness and used in the largest possible sizes with as few joints as necessary.

F. Hardware and Casters:
   1 All hardware shall be of a heavy-duty type, satin finished chromium plated brass cast or forged or hi-lighted stainless steel of uniform design. All hardware shall be a well-known brand, and shall be identified by the manufacturer's name and number for easy replacement of broken or worn parts.
   2 Casters on custom built equipment shall be heavy-duty type, ball bearing and solid or disc wheel, with grease-proof rubber, neoprene or polyurethane tire. Wheel shall be 5" diameter, minimum width of tread 1-3/16", minimum capacity per caster 250 pounds, unless otherwise noted.
      a. Solid material wheels are to be provide with stainless steel rotating wheel guard.
      b. All casters shall have sealed wheel and swivel bearings, polished plated finish and be N.S.F. approved.

G. Tempered Glass:
   1 Fully tempered glass to be used in place of other glass products on all manufactured and custom fabricated equipment. All tempered glass to bear the etched logo indicating tempered glass and the manufacturer's number. The manufacture to meet the requirements of ANSI Z97.1 standard and federal standard CPSC16CFR 1201, as well as state and local codes, safety glazing material where the glazing might reasonably be exposed to human impact. Applicable codes should be checked for specific information and requirements.
   2 Handling and installation of tempered glass should receive the same as annealed glass. Careless handling and improper installation sometimes produces edge damage. The tempered glass should be replaced if there is such damage. Tempered glass cannot be cut or modified following heat treatment.
   3 Provide a beveled or radius edge around the perimeter of the tempered glass to eliminate all sharp areas that may cause injury to a person.

H. Laminated Plastic:
   1 Wherever laminated plastic materials are specified for cabinetwork, counter or top facings, they shall be Formica, Parkwood, Nevamar or approved equal. All material to be veneered with Urea based cement, waterproof and heatproof.
   2 Material to be applied directly over 3/4" marine grade plywood or close-grained plywood such as solid Mahogany or solid Birch, of selected smooth sanded stock to ensure a smooth ripple-free laminated surface where approved by Consultant.
   3 Exposed faces and edges faces with 1/16" material and corresponding back faced with approved backing and balancing sheet material. Top sheet shall be placed on and over finished edge.
      a. Rubber based adhesives are not acceptable
      b. Standard Fir plywood is not acceptable.

I. Thermometers:

1 All fabricated refrigerated compartments shall be fitted with dial type thermometers with chrome plated flush bezels. Thermometers shall be adjustable and shall be calibrated after installation.

J. Water Piping:

1 All manufactured and fabricated items having internal or external water piping are to make welded connections or connections using lead free solder.

2 All exposed plumbing lines, (including indirect waste) for supply and drain lines to be hard copper (connections using lead free solder) and shall be painted with chrome or aluminum paint.

3 Final water connections to be by Plumbing contractor. All required tubing, misc. fittings, traps, etc. shall be supplied by the plumbing contractor unless otherwise specified.

K. Water Filters:

1 All equipment requiring a water connection should be connected to a water filtration system sized as per manufacture recommendations. Primary water line should run through the filtration system prior to being connected to the equipment to filter out impuraties to help extend the life of the equipment.

L. Owner provided items of specific sizes

1 All plates and trays, and other items that are provided by Owner and can be different sizes should be verified prior to placing final order. Dealer to submit RFI to General Contractor/Owner requestion verification of plate size when a plate dispenser is specified, tray size when a tray dispenser is called out, etc.

2 All 120-volt convenience outlets not designated with specific loads are to be rated 20.0 amps. Electrical Contractor is to confirm any additional outlets as requested by Architect, Owner and/or General Contractor. GFCI as required by code. GFCI receptacles to be readily accessible per the written code in NEC and if not readily accessible per the written words of the code, then GFCI breaker shall be provided.

2.2 FABRICATION AND MANUFACTURE

A. Materials and Workmanship:

1 Unless otherwise specified or shown on drawings, all material shall be new, of best quality, perfect and with out flaws. Material shall be delivered and maintained on job in an undamaged condition.

2 Fabrication shall be equal to the standards for manufacture used by all first class equipment manufacturers, performed by qualified, efficient and skilled mechanics of the trades involved.

3 All items of standard equipment shall be the latest model at the time of delivery.

4 All fabricated work shall be the product of one manufacturer of uniform design and finish.

B. Sanitary Construction

1 All fabricated equipment is to be constructed in strict compliance with the standards of the National Sanitation Foundation as outlined in their bulletin on Foodservice Equipment entitle "NSF No. 2 Standard" dated February 2014, and in full compliance with the local and State Public Health Regulations in which the installation is to be made. All fabricated equipment shall bear the seal of approval of the National Sanitation Foundation.

C. Construction Methods:

1 Welding: Stainless steel shall be arc welded with stainless steel electrodes. Welds shall be non-porous, free of pits and flaws, peened to remove flux and other impurities and ground smooth.

a. Field joints necessary for delivery and assembly are to be solid welded by using the same materials and method as for shop welding. Field welded joints shall be ground smooth without dips and irregularities and finished to match original finish.

2 Bolt, Screw and Rivet Construction:

a. Wherever bolts are used to fasten trim to the paneling and body of equipment or to secure any exposed sheet metal surface, such bolts shall be of the concealed type.

b. Stainless steel bolts and screws of the same alloy composition, as the metal to which they are fastened shall be used.

c. Wherever threads of bolts and screws occur on the inside of fixtures and are either visible or might come in contact with a wiping cloth, such bolt or screw threads shall be capped with a stainless steel washer and stainless steel or chrome acorn cap nut.

d. If rivets are used to fasten rear paneling to the body of the fixture, such rivets shall be stainless steel. In no case shall iron rivets be used.

3 Sound deadening:

a. Schnee Butyl-Sealant 1/2" wide rope continuously between all frame members and underside of stainless steel table tops, over shelves and under shelves.

b. Tighten stud-bolts for maximum compression of sealant.

4 Hi-Lighting:

a. When hi-lighted finish is specifically indicated on Elevations, Details and/or Contract Documents for horizontal edges of stainless steel tops, splashes, raised rolled rims, shelf edges, exposed doors and handles, the Standard #4 finish shall be ground to #240 grit and shall be polished with compound to ensure mirror finish.

5 Painting:

a. All fixtures, unless made of stainless steel, shall be finished in gray hammer tone enamel, glossy and without blemish.

b. All materials shall be of the highest quality, air dried and applied in accordance with manufacturer's directions.

c. Where baked enamel finishes are specified, they shall be oven baked on the fixtures for a minimum of 1-1/2 hours at a minimum temperature of 300 dg. F.

D. Construction:

1 Table frames:

a. All tubular stands for open base tables or ware tables shall be constructed of 1-5/8" O.D. stainless steel tubing, with stringers and cross braces of the same material.

b. All joints between legs and cross braces shall be welded and ground smooth, full 360°

c. The top end of legs shall be closely fitted into fully enclosed gusset no less than 3" high, Component Hardware Group, Inc., model #A20-0206 stainless steel or approved equal.

d. Gussets to be fully welded to top hat channel reinforcing members, turned so set screw is not visible from the front.

e. Cross rails must be supplied to reinforce each leg on all tables not having stainless steel under shelves.

f. Legs anchored to gussets at top only and without cross rails are not acceptable except in the case of sinks.

2 Feet and Counter Legs:

a. All tubular legs will be wedged for appearance and close fit to United Show Case model # BF-158, or approved equal, stainless steel bullet shaped foot having a slightly rounded bottom to protect the floor.

-1 Top of feet to be fitted with a male threaded stem to fit into the legs and provide a total adjustment of 2" without threads being exposed.

-2 Bottom of tubular leg to be finished off smoothly to provide a sanitary fitting and prevent the accumulation of grease or other debris at this joint.

b. Cabinet type fixtures, unless otherwise specified, shall be mounted on 6" high die-stamped sanitary two piece stainless steel counter legs not less than 2-3/4" diameter at

-1 The upper part shall be stamped in a neat design with a flared inverted shoulder and shall be welded to a base plate designed for anchoring to the channel braces below cabinet type fixtures.

-2 Counter legs shall have an adjustment of 5" to 7" height

-3 All legs are to have one piece die-stamped closed 1-3/8" diameter bottoms to ensure sanitation. To be Deering Fabricators, 196 Asa Cash Road, Breman, Georgia 30110 model #DF6HGR or approved equal.

3 Table tops (Metal)

a. Metal table tops shall have all shop seams and corners welded, ground smooth and polished. All back welds to be peened and ground smooth.

b. All working tops on closed base fixtures shall be reinforced on the underside with a framework of 1-1/2" x 4" x 1-1/2" galvanized hat channels.

c. Cross channel closed end members shall be placed at each pair of legs. One angle or channel runner, running lengthwise, shall be provided below tops up to 30" wide.

d. All tops shall be reinforced so that there will not be any noticeable deflection and all reinforcements shall be stud welded to the underside of the top.

e. No rivets or bolts to be used through tops.

f. Field joints shall be reinforced so that there will not be any noticeable deflection and all reinforcements shall be stud welded to the underside of the top.

g. All metal tops shall be of #14 gauge stainless steel of the quality hereinbefore specified.

h. All metal tops shall be turned down as required by uniform design except where adjacent to walls or other pieces of equipment. The wall side shall be turned up a minimum of 8" and back 2-1/2" as required by uniform project design or as otherwise specified.

i. Ends of these splashes shall be closed.

4 Enclosed Bases:

a. All enclosed bases or cabinet bodies shall be of seamless #18 gauge stainless steel construction, enclosed on the ends and sides as required and called for under each particular items.

b. Ends of body to terminate at front or operator's side in a 2" wide mullion, vertical, completely enclosed. All intermediate mullions shall be completely enclosed.

c. The bases shall be reinforced at the top with a framework of 1-1/2" x 1-1/2" x 1/8" galvanized angles, with all corners of said framework mitered and welded solid.

d. Bottom of table top shall be reinforced with channels and gussets where necessary. Additional angles and channel cross members shall be provided to reinforce shelves and support tops.

e. Where sinks or other drop-in equipment occur, bottom sides of such equipment shall be reinforced with an angle crosswise of the table.

f. In the case of fixtures fitting against or between walls, the bodies shall be set in 1" or 2" from the wall line, but the tops will extend back to the wall line. This will permit adjustment to wall irregularities.

g. A vertical trim strip of the same material as the body shall be provided at each end of the fixture to close the gap between the back edge of the body and the wall or preferably the end of the body shall extend back to the wall line.

h. All free vertical corners of enclosed bodies shall be rounded on 3/4" radius and all corners against walls and other fixtures to be square.

i. These fixtures shall be fitted with 6" high counter style stainless steel legs as hereinbefore specified.

5 Sliding Doors:

a. Sliding doors shall be constructed of #18 gauge stainless steel. These shall be made pan-shaped, of double thickness, and without trim. Sliding doors shall have 3/4" thick sound deadening fiberglass or Celotex between the two thicknesses of metal and shall operate on quiet top-hung ball bearing rollers. Bottom edge of doors shall be square and fitted with a guide groove that rides in a nylon clip at the center point.

b. All doors shall be fitted with stops. Doors shall be fitted with pin tumbler type locks, master keyed to other fabricated items if specified under Item Specifications.

6 Hinged Doors:

a. All hinged doors for cabinet bodies and enclosed bases shall be constructed of #18 gauge stainless steel. They shall be of double pan construction with sound deadening insulation between the two pans. Doors shall be flush mounted without overlap and shall be fitted with semi-concealed stainless steel hinges or concealed torque-spring self-closing hinge assembly.

7 Drawers:

a. All drawer bodies shall be die-stamped out of one piece of #18 gauge steel material of the type and in the size called for in the Contract Documents. Each drawer body shall sit loosely in a channel frame so it can be lifted out for cleaning.

-1 All top edges shall be flanged out 1/2"

-2 All interior horizontal corners are rounded on a 1" radius and all interior vertical corners on a 2" radius

b. The supporting frame shall be of welded channel, or material called for in Contract Documents. Drawer face shall be welded to frame so that no screws or rivets will be exposed on the face.

-1 The face shall be of #16 gauge stainless steel insulated die-formed with full-length sanitary handle.

c. Drawer slides to be Component Hardware Group, Inc., model #S52-series heavy-duty stainless steel full extension type and are to be mounted on the channel frame and fitted with ball bearing stainless steel rollers. Slides and frame shall be reinforced such that the drawer will support a dead weight of 200 pounds when fully extended.

-1 Adjustable stops shall be provide for each drawer at the fully opened position.

-2 drawers on open base tables shall be fully enclosed in #18 gauge steel housing of material as identified in the Contract Documents.

d. Locks, where required, shall be cylinder lock assembly. No screws, bolts or fastening devices penetrating the sides of bottom of the drawer body will be permitted.

e. Drawer constructed similar to Component Hardware Group, Inc., model #S90-0020-N

8 Under shelves:

a. Unless otherwise specifically called for to be removable, all open base table undershelves to be #16 gauge stainless steel, notched and around table legs and fully welded. All edges to have 1-1/2" straight turn down with 1/2" turn back on 45-degree angle, at bottom edge. Underside of shelf to have #12 gauge galvanized hat channel bracing.

b. Undershelves specified to be removable shall be #18 gauge stainless steel, built in such a way as to be easily removable, using rolled turn down at front and back and at end section so that shelving will fit perfectly over the tubular frame. At end sections or otherwise where table legs occur, corners at legs are to be notched out to form a perfect fit around legs. At intersections of shelving, not over 28" long, shelving to run straight down 1" for strength. If required by width, shelves to have additional angle backing. All outside turn down corners of removable undershelves to have rounded edges.

9 Interior Shelves:

a. Removable interior shelves in cabinet bodies, enclosed bases and overhead cabinets, shall be of #18 gauge stainless steel. Such shelves as called for shall be made in removable sections and rest in 1-1/2" x 1-1/2" x 1/8" stainless steel angle frame, having all horizontal corners coved and constructed in full accordance with N.S.F. requirements.

b. Stationary interior shelves shall have 2" turn-up on back and ends and shall have joint between shelf turn-up and the body sealed and ground smooth to form a one-piece interior free of any crevices. The front edge shall be flanged down 1-1/2" and under 1/2" and finished with "Z" bar forming completely enclosed edge for maximum strength and sanitation. Shelves further braced with longitudinal centered 1-1/2" x 1-1/2" x 1/8" angle.

10 Elevated Shelves:

a. All elevated shelves shall be of #16 gauge stainless steel. All edges shall be rolled or turned down 2", except where shelves are adjacent to walls or other fixtures where they shall be coved up 1-1/2". All outside corners of rolled edged shelves shall be spherical. All exposed ends and backs of shelves shall be capped.

b. Shelves shall be mounted on stainless steel wall brackets of tubular, gusset or angle construction as called for in the Contract Documents.

c. Shelves may be mounted on 1" O.D. tubular stainless steel tubing with one upright at each corner of the shelf and in center where necessary. Uprights to be fastened to underside of shelf by means of stud-welded bolts and table tops with concealed fasteners.

d. Cantilever supports when called for shall have brackets secured to 1-5/8" O.D. stainless steel tubular standards at the back edge of the fixture. These Standards are to be carried through the top and are to be securely anchored to the lower framework. Where indicated on drawings, provide Component Hardware #A16-0206 welded sleeves where standards penetrate backsplashes.

11 Sinks:

a. All sinks shall be of the size and shape as per plan and constructed of #14 gauge stainless steel. The backs, bottoms and fronts shall be formed on one continuous sheet with the ends welded into place. Partitions for compartment sinks shall be of the same material, electrically welded in place.

b. Sinks shall have all corners both vertical and horizontal coved on a 3/4" radius electrically welded, ground smooth and polished. Solder in filleted corners will not be acceptable.

c. Partitions in coved corner sinks shall be of double thickness with half round 1-1/2" top edge.

d. Top edges of sinks at front and ends, except where fitted with integral type drain boards, shall be furnished with a 1-1/2" die-formed integral sanitary semi-roll rim.

e. Across the back of all sinks, unless otherwise specified, there shall be a 9" high back splash measured from rolled edge or approximately 12" from working surface, turned back across the top 2-1/2", with ends enclosed

-1 Unless otherwise specified, two (2) faucet holes on 8" centers are to be provided over the center line of partitions between compartments, 2-1/2" down from the top of splash.

f. Bottom of each compartment shall be pitched or creased to the center drain, and shall be provided with cast brass quick opening drain valve with removable stainless steel strainer equal to Fisher, model #22306 twist handle drain with chrome overflow. Handle to have front stainless steel welded clip support to sink.

g. Sinks shall be mounted on 1-5/8" O.D. stainless steel tubing legs, and fitted with stainless steel bullet shaped adjustable feet. Legs shall be fitted with die-formed enclosed sanitary closed stainless steel gussets welded to the underside of the sink.

h. All free standing sinks shall be 37" high to the top of the front edge and 46" high to the top of the splash. Sink depth from top of drainboard to bottom of tub shall be 14" or as otherwise specified. Lengths and widths given shall be overall.

12 Sink Inserts:

a. Sink inserts shall be of one piece deep-drawn construction in the size, material and gauge called for in the Contract Documents.

b. Sinks shall be welded integral with counter tops with no lap between.

c. Sink will be fitted with a cast brass quick opening drain valve with removable stainless steel strainer as specified under paragraph 2.2 11.f, or crumb cup drain (Component Hardware, #E38-1012) as required by Contract Documents.

d. Where sink bowls are exposed, the exterior shall also be polished to a #4 finish

13 Sink Drain Boards:

a. Sink drain boards shall be constructed of same material as the sinks and shall be welded integral to same.

b. Drain boards shall have 2-1/2" high rims with die-formed integral rolled edges to match sink edges.

c. Front, end and corners shall be coved on 3/4" radius, as called for in sink documents, electrically welded, ground and polished smooth. Solder filleting of these corners will not be accepted.

d. Drain boards shall be pitched approximately 1/8" per foot to properly drain into the sink.

14 Ware Table Tops:

a. These tops shall be #14 gauge stainless steel with all free edges rolled up 3" and finished with 1-1/2" diameter rolled rim and having rounded corners. Edges of ware tables next to high fixtures or walls shall cove up 12" and turned back 2-1/2" with ends enclosed (or as design dictates).

b. All tables shall slope, and slope shall be built in maintaining vertical crown where adjustable slope is not possible.

c. All corners of tops shall be coved on 3/4" radius.

d. Tables to be braced with 1" x 4" x 1" x #12 gauge galvanized hat channels with stainless steel exposed closed ends, between each pair of legs and down center line of top.

e. Leg gusset to weld to this hat channel and so masked off when sound-deadening material is applied. Gussets to be positioned so that "set-screw" hole is not visible.

f. Where tops fit to and into ware machines, they shall turn down into, extend up to, and fit watertight thereto.

g. On exit side of conveyor machines, tables to be provided with 10" high x 12" long sloping integral splashguard constructed of #14 gauge stainless steel (or as design dictates).

h. Silicon filling of gaps caused by poor fit will not be acceptable.

15 Counter Style Enclosed Units:

a. Where these custom fabricated units occur, framing is to be of 1-1/2" x 1-1/2" x 1/8" galvanized angles.

b. At corners, metal is to be mitered; at other meeting points, metal is to be butted and will conform to the shape of the top and bottom frame metal and then to be solid welded, ground and polished smooth and repainted as required hereinbefore.

c. Provide top and bottom framing for each counter food pan, cold pan, coffee urn, ice cream unit, ice bin, dish dispenser, whether a drop-in unit or a cutout for a portable unit.

d. Where plate shelves occur, frame horizontally 8-1/2" back from counter edge or as design dictates, and at bottom of shelf at counter edge.

e. At cut-outs for roll-in equipment, provide top and bottom angles crosswise of the counter 8" above the finished floor.

f. Base of counter shall be as specified with stainless steel interior shelving constructed as outlined under preceding paragraphs 2.2 D.4 and 2.2 D.8.

g. Counter shall be mounted on approved stainless steel feet as specified

h. Top of counter to be of #14 gauge Type #304 stainless steel as called for in these documents. Metal is to turn down at front and back at full 2" from the top of the top metal or as design dictates.

i. Such units as are to built in, as an integral part of the counter top will be shown in the Contract Documents. Wherever opening occur for roll-in equipment, the sizes of such openings are to be such as will accommodate the portable equipment plus such protective bumpers as will be required.

j. Unless counters are specified with plate shelves, metal on working side of counter is to be turned down flush with the bottom of built-in units and back a minimum of 1-1/2" to cover such structural angles as are required.

k. Front of counter and ends (where exposed) shall be stainless steel, laminated plastic or other material as required by the Contract Documents.

l. All display glass shelving shall be set into #18 gauge stainless steel formed channels. Top shelves shall be of the same width as the shelf below. All shelves shall be provided with appropriate sneeze or breath guards having stainless steel protective edges.

m. The shelves over bread and/or pastry sections shall be glass. (All shelving shall be 1/4" polished plate glass and protected with stainless steel channel edging where required). The shelves over salad sections shall be glass.

n. The supporting channels for all glass shelving shall have rubber isolation "buttons" secured to framework of supporting angles.

o. Serving shelf over hot food sections and/or bread sections shall be #18 gauge stainless steel with lights for the length of the sections.

p. All display shelving will have lights controlled by switch mounted in base of counter on operator's side. Lights to be of manufacturer and design approved by Consultant and located as design dictates. All lights are to have bulbs covered with plastic shields to meet requirements of local health department.

q. Such changes as are required in this general counter specification are described in the Contract Documents. The counter or counters shall be internally wired complete by the Foodservice Equipment Supplier.

r. Electric wiring as required shall be installed in such a way as to meet requirements of the Electrical Code of the job location.

s. Equipment Contractor is cautioned that it will be his responsibility to ascertain requirements of the city and local governing codes that will govern the requirements as described in the documents.

16 Trim Strips:

a. Trim is not an acceptable substitute for accuracy and neatness. When the Consultant elects to accept a trim strip in lieu of rebuilding an item, it is the responsibility of the Foodservice Equipment Supplier to provide same at no cost to the Owner.

b. All utility, refrigeration lines and/or soda lines should be sleeved in wall, ceiling or floor by General Contractor and/or appropriate trade. Bidder should seek clarification from the Architect, General Contractor or Consultant prior to bidding.

2.3 EQUIPMENT

A Each model number includes the code *B099 as a suffix. This code is known as the Specifier Identification System. It is not to be removed by the bidders. Its purpose is to identify the specifier to the vendors providing equipment in the event it is necessary to communicate questions, clarifications and comments, from prior to bid award through the final purchase. It is to be used on all correspondence including fax and e-mail when communicating with manufacturer representatives and factories.

B Manufacturer's names and model numbers are for establishing standards of quality, size and finish required, representing Owner's preference and basis of bid. Equipment is listed hereinafter with same Item numbers as shown on the Contract Drawings.

C Model numbers including the suffix "X" takes the place of part of the original model number or letter that represents the original size, shape or color of the equipment. KES shall verify the equipment by using the equipment key on the plan sheet, scale off of the construction document drawings, or furnish the appropriate size based on manufacturers recommendations.

KITCHEN EQUIPMENT AREA

Item	Quantity	Manufacturer	Model No.
100	2	EAGLE	2460VG74-5*B099 WIRE SHELVING

Red-i-Pak® Shelving Unit, 5-tier, 60"W x 24"D x 74"H, wire shelves with patented QuadTruss® design, (4) 74"H 2-piece posts, tapered split sleeves, Valu-Gard® green epoxy finish, packaged in (1) box

Set shelving heights as directed by Owner. Approved alternates are Advance Tabco and Quantum

Item	Quantity	Manufacturer	Model No.
101	3	EAGLE	2448VG74-5*B099 WIRE SHELVING

Red-i-Pak® Shelving Unit, 5-tier, 48"W x 24"D x 74"H, wire shelves with patented QuadTruss® design, (4) 74"H 2-piece posts, tapered split sleeves, Valu-Gard® green epoxy finish, packaged in (1) box

Set shelving heights as directed by Owner. Approved alternates are Advance Tabco and Quantum

Item	Quantity	Manufacturer	Model No.
102	1	EAGLE	314-16-3-18*B099 THREE COMPARTMENT SINK

Three compartment, 90"W x 27-1/2"D, 304 stainless steel construction, coved corners, 16" wide x 20" front-to-back x 13-1/2" deep compartments, 18" drainboards on left and right, 9-1/2"H backsplash with 1" upturn and tile edge, 8" OC splash mount faucet holes, 2" euro-style edges on front and sides, includes (3) 3-1/2" basket drains, galvanized legs and side crossrails, adjustable bullet feet

Lever Handle Drain, 1-1/2" or 2" IPS connection
P-Trap, nickel-plated

Item	Quantity	Manufacturer	Model No.
103	1	T&S BRASS	B-0133-12-CRVBE*B099 PRE RINCE FAUCET

EasyInstall Pre-Rinse Unit, 8" wall mount, 12" swivel nozzle, vacuum breaker, 44" stainless steel flex hose, 18" riser, 6" wall bracket, ceramic cartridge, lever handle, low lead, stream regulator tip, add-on faucet

Item	Quantity	Manufacturer	Model No.
104	1	ADVANCE TABCO	7-PS-23*B099 HAND SINK

Hand Sink, wall mounted, 9" wide x 9" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, drain with strainer plate and 1-1/2" IPS connection

Wrist Handles Only, for splash or deck mount hand sink faucet (1 pair hot and cold 4" long blades), fits faucets supplied after November 2015 with hot and cold color rings that do not have exposed screw head

P-trap, 1-1/2", 22 gauge

Item	Quantity	Manufacturer	Model No.
105	1	EXISTING	SODA RACK SYSTEM

Not in KES scope of work

Item	Quantity	Manufacturer	Model No.
106	1	EAGLE	F1916-VSCS*B099 MOP SINK CABINET

Mop Sink Cabinet, single width, 25"W x 22-1/4"D x 84-1/4"H, slanted top, holds (2) mops, (2) hinged doors with transverse rod handles and keyed locks, 8" deep mop sink with service faucet, (1) 12"D fixed overhead shelf, includes 30" spray hose and spray hose bracket, 430 stainless steel construction

Item	Quantity	Manufacturer	Model No.
107	1	MANITOWOC	D570*B099 ICE BIN

Ice Bin, 30"W x 34"D x 50"H, with side-hinged front-opening door, side grips, 532 lbs. application capacity, AHRI certified 17.9 cu. ft., for top-mounted ice maker, Duratech exterior

Legs, 6" adjustable stainless steel, standard

Item	Quantity	Manufacturer	Model No.
108	1	MANITOWOC	RNP0620A*B099 NUGGET ICE MAKER

Ice Maker, nugget style, air-cooled, self-contained condenser, 22"W x 23-5/8"D x 26"H, production capacity up to 591 lb/24 hours at 70°/50° (451 lb AHRI certified at 90°/70°), bite size nugget, high-load stainless steel bearings, stainless steel exterior

Arctic Pure® Plus Pre-Filter Assembly, 5 micron filtration includes head, shroud, hardware, mounting assembly, and (1) filter cartridge, (NOT stand-alone; should be used in conjunction with primary water filter assembly). Provide to plumber in advance for installing where shown and in an easy to access location

Provide quick water disconnect 48" long, size per drawing and manufacture recommendation

Item	Quantity	Manufacturer	Model No.
109	1	JOHN BOOS	314-16-3-18*B099 WORK TABLE WITH SINK

Work Table With Prep Sink, 72"W x 30"D x 40-3/4"H overall size, (1) 16"W x 20" front-to-back x 10" deep sink bowl on left, 5"H backsplash, (1) set of deck mount faucet holes 4" O.C. (faucet not included), 18/300 stainless steel, stainless steel legs and adjustable undershelf, 1" stainless steel adjustable bullet feet

Heavy Duty Faucet, deck mount, 10" swing spout, 4" centers, 1/4 turn ceramic cartridges, color coded hot/cold indicators, integral check valve, 1/2" NPT, chrome finish

Deck Mount Faucet Mounting Kit, includes (2) 1/2" supply nipples, (2) retainer nuts, (2) lock washers and (2) rubber washers

Twist Handle Lever Waste, for 3-1/2" industry standard sink opening, standard valve, basket strainer (includes an adapter for either 2" or 1-1/2" drain outlet)

Item	Quantity	Manufacturer	Model No.
110	2	EAGLE	WS1272-14/3*B099 WALL MOUNTED SHELVING

Shelf, wall-mounted, 72"W x 12"D, rolled front edge, 1-1/2"H up-turn on sides and rear, includes stainless steel mounting brackets stud welded to shelf, 14/304 stainless steel construction

Item	Quantity	Manufacturer	Model No.
111	2	PANASONIC	NE-1054F*B099 MICROWAVE

PRO Commercial Microwave Oven, 1000 watts, 0.8 cu. ft. capacity, (6) power levels, 2- and 3-stage cooking, 20 program memory capacity, touch control pad with Braille, 99-minute timer, programmable and manual operation, program list/cycle counter, self diagnostics, tone control, bottom energy feed, interior light, see-through door with "grab and go" handle, stainless steel front

Item	Quantity	Manufacturer	Model No.
112	1	TRAULSEN	RHT132E-HHS*B099 REACH IN REFRIGERATOR

Cabinet exterior front, one piece sides, louver assembly and doors are constructed of 20 gauge stainless steel with #4 finish. Cabinet interior and door liners are constructed of stainless steel. The exterior cabinet top, back and bottom are constructed of heavy gauge galvanized steel. Casters, 4-5/8" high (set of 4).

Removeable plug cylinder locks and guaranteed for life cam-lift, gravity action, self closing metal, glide hinges with stay open feature at 120°. Hinges include a concealed switch to automatically activate the interior lighting. Guaranteed for life. Doors have seamless, polished metal corners

Gasket profile and Santoprene® material simplify cleaning and increase overall gasket life. Anti-condensate heaters are located behind each door opening. Both the cabinet and door(s) are insulated with an average of 2" thick high density, non-CFC, foamed in place polyurethane.

Provide universal tray slides to fill compartment on 3" center

Item	Quantity	Manufacturer	Model No.
113	1	EAGLE	T2460SE*B099 WORK TABLE

Spec-Master® Series Work Table, 60"W x 24"D, 14/300 series stainless steel top, rolled edge on front and back, adjustable 18/300 series stainless steel undershelf with marine edge, Uni-Lok® gusset system, (4) stainless steel legs and adjustable bullet feet

Item	Quantity	Manufacturer	Model No.
114	1	TRAULSEN	RLT132WUT-HHS*B099 REACH IN FREEZER

Spec-Line Freezer, Reach-in, one-section, 24.2 cu. ft., self-contained refrigeration, stainless steel exterior and interior, standard depth, wide half-height doors with Santoprene® EZ-Clean Gaskets, (3) adjustable wire shelves per section, microprocessor controls, unit can be programmed to operate at -10° F

0 degrees Fahrenheit holding temperature, standard
Standard refrigerant, standard
Door hinged per plan
Casters, 4-5/8" high (set of 4)

Item	Quantity	Manufacturer	Model No.
115	1	PERFECT FRY	PFC187*B099 VENTLESS FRYER

Ventless Deep Fryer, countertop, semi-automatic, 2 gallon / 14 lb oil capacity oil capacity, 30 lbs/hr production, self venting, odorless, HEPA style air filtration, integral fire suppression, programmable controls, stainless steel construction

Basket Cover

Locking Latch
Air Filter Replacement Kit, carbon and HEPA filters
Perfect Filter, in-tank pressure oil filtration system, micro filtration up to 0.2”, operates at oil temperatures up to 347°F (175°C), filtration power up to 66 lbs, 4-5 min work cycle, dishwasher safe upper motor section, filter section and drip pan, includes oil tester with storage box and box of 100 filters, stainless steel
Oil Drainage Kit

Item	Quantity	Manufacturer	Model No.
116	1	EAGLE	T2472SE*B099 WORK TABLE

Spec-Master® Series Work Table, 72"W x 24"D, 14/300 series stainless steel top, rolled edge on front and back, adjustable 18/300 series stainless steel undershelf with marine edge, Uni-Lok® gusset system, (4) stainless steel legs and adjustable bullet feet

Item	Quantity	Manufacturer	Model No.
117	1	HATCO	HDM-2B*B099 DRAWER WARMER

Each drawer features adjustable sliding vents and individual thermostatic controls to hold a variety of hot foods safely for peak serving periods.
Independent temperature control and ON/OFF power switch on each drawer
Heavy duty construction with durable drawer frame and slides
Includes two full size stainless steel 150mm food pans
Adjustable vents control moisture on each drawer
Angled chrome handle deflects cart traffic
Easy to clean, black powder coated exterior

Item	Quantity	Manufacturer	Model No.
118	1	ALTO SHAAM	VMC-H3HW*B099 MULTI COOK OVEN

Vector® H Wide Series Multi-Cook Oven, electric, (3) individually controlled cooking chambers, holds (3) half-size sheet pans or (3) full-size hotel pans, programmable touch screen controls with Structured Air Technology®, double pane glass door, interior LED cavity lighting, ventless catalytic converter, includes: (1) wire rack and (2) jet plates per cooking chamber, USB port, stainless steel construction, 4" adjustable legs
Simple controls, standard
Door hinged per plan
Grill Pan, GN 1/1 (12-4/5" x 20-7/8")
Wire Rack, stainless steel, for HH Vector Series Ovens
Oven Peel, aluminum, 12” x 13” with 6” handle
Fry Basket, 12" x 20"
Pizza Screen, 16"
Egg Pan, (9) eggs, 1/2 sheet pan
Bread Form Pan, (5) indents
Pizza Pan, 9-1/4" dia., deep dish, nesting
Casters, 3", (2) rigid, (2) swivel with brakes
Grease Filter Kit, for Vector HHW models (Note: one kit required
Alto-Shaam, Non-Caustic cleaner, (1) 32 oz bottle

Item	Quantity	Manufacturer	Model No.

Item	Quantity	Manufacturer	Model No.
119	4	HATCO	CHW-FUL*B099 FOOD WARMER COUNTER TOP

Food Warmer/Cooker, electric, countertop, (1) 1/1 pan capacity, wet/dry operation, thermostatic controls, stainless steel construction

Food Pan, 20-3/4" X 12-3/4" X 6", each

Item	Quantity	Manufacturer	Model No.
120	1	CUSTOM	CUSTOM*B099 STAINLESS STEEL CHASE

Custom fabricated stainless steel chase, size and shape as per plan, detail, section, elevations and general specifications.

Custom fabricated stainless steel chase to hold electrical and beverage lines. Unit to be 6" x 6" square, approximately 6' long, KES to field verify actual length.

Item	Quantity	Manufacturer	Model No.
121	1	EAGLE	T36132SE*B099 WORK TABLE

Work Table, 132"W x 36"D, 14/300 series stainless steel top, rolled edge on front and back, adjustable 18/300 series stainless steel undershelf with marine edge, Uni-Lok® gusset system, (8) stainless steel legs and adjustable bullet feet

Item	Quantity	Manufacturer	Model No.
122	1	ADVANCE TABCO	7-PS-23*B099 HAND SINK

Hand Sink, wall mounted, 9" wide x 9" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, drain with strainer plate and 1-1/2" IPS connection

Wrist Handles Only, for splash or deck mount hand sink faucet (1 pair hot and cold 4" long blades), fits faucets supplied after November 2015 with hot and cold color rings that do not have exposed screw head

P-trap, 1-1/2", 22 gauge

Item	Quantity	Manufacturer	Model No.
123	1	EXISTING	ICE BEVERAGE DISPENSER

Not in KES scope of work

Item	Quantity	Manufacturer	Model No.
124	2	EXISTING	GLASS DOOR MERCHANDISER

Not in KES scope of work

Item	Quantity	Manufacturer	Model No.
125	1	CUSTOM	CUSTOM*B099 DOUBLE OVERSHELF CEILING MOUNTED

Custom fabricated double overshelf, size and shape as per plan, detail, section, elevations and general specifications.

#16 gauge stainless steel 12"/14"/16" wide over shelves on 1 5/8" O.D. stainless steel standards (20" from top of table to first over shelf) constructed as per details and general specifications.

Item	Quantity	Manufacturer	Model No.
126	1	HATCO	HDM-2B*B099 DRAWER WARMER

Each drawer features adjustable sliding vents and individual thermostatic controls to hold a variety of hot foods safely for peak serving periods.

Independent temperature control and ON/OFF power switch on each drawer

Heavy duty construction with durable drawer frame and slides
Includes two full size stainless steel 150mm food pans
Adjustable vents control moisture on each drawer
Angled chrome handle deflects cart traffic
Easy to clean, black powder coated exterior

Item	Quantity	Manufacturer	Model No.
127	1	BLOOMFIELD	8571-D3-120V*B099 COFFEE BREWER

Koffee King® Decanter Brewer, single, low-profile, pour-over, (3) warmers (all lower), stepped right, 16-7/8" H, 16-1/4" W x 14" D, ready-to-brew light, full-length sensing bulb, stainless steel construction, porcelain enameled plates

Provide quick water disconnect 48" long, size per plan and manufacture recommendation

Item	Quantity	Manufacturer	Model No.
128	1	EAGLE	T2448B*B099 WORK TABLE

Budget Series Work Table, 48"W x 24"D, 430 stainless steel top, rolled edge on front and back, adjustable galvanized undershelf, Uni-Lok® gusset system, (4) galvanized legs with adjustable plastic bullet feet

Item	Quantity	Manufacturer	Model No.
129	1	STAR	J4R*B099 MINI POPCORN POPPER

Mini JetStar 4oz Popper is outfitted with a 1000 watt, 4 oz. capacity, aluminum popping kettle with stainless steel exterior shell. A one-piece clear polycarbonate wrap body construction has a 3/16” thick polycarbonate door with full length hinge to stand up to commercial use. 50 watt flood light and 50 watt heated corn pan supplied.

Item	Quantity	Manufacturer	Model No.
130	1	BY OWNER	P.O.S

Not in KES scope of work

Item	Quantity	Manufacturer	Model No.
131	2	EAGLE	PC1860SE-CS*B099 DISH CABINET

Spec-Master® Series Plate Cabinet, open front, 60"W x 18"D, 14/304 stainless steel top, rolled front edge, 430 stainless steel cabinet body and fixed intermediate shelf, stainless steel legs and adjustable bullet feet

Item	Quantity	Manufacturer	Model No.
200	1	TRAULSEN	ADT132WUT-HHS*B099 REACH IN DUAL TEMP CABINET

Spec-Line Refrigerator/Freezer Dual Temp Cabinet, reach-in, one-section, self-contained refrigeration, stainless steel exterior, aluminum interior, standard depth, (2) wide half-height locking doors with Santoprene® EZ-Clean Gaskets, microprocessor controls, interior LED lighting, (2) adjustable wire shelves, 1/2 HP (refrigerator) and 1/2 (freezer),

Door hinged per plan
Casters, 4-5/8" high (set of 4)

Item	Quantity	Manufacturer	Model No.
201	2	HATCO	FSHC-7W1-EE*B099 MOBILE HEATED CABINET Holding Cabinet, Mobile Heated, thermostatically-controlled heat, electrical components, water reservoir, insulated, (1) door, digital temperature readout, adjustable humidity and temperature, (7) adjustable removable slides for 18" x 26" or 12" x 20" pans, slides on 1-3/8" centers, casters Black, designer side panel color Black, designer top color Stacking hardware mounted to bottom of cabinet for (2) FSCH-7W1 or FSCH-5W-1 units, in lieu of casters, stainless steel (Cannot be mounted to a lower unit on legs) (available at time of purchase only) Bumper hardware, only for use with standard casters

Item	Quantity	Manufacturer	Model No.
202	1	CONTINENTAL	BB50SN*B099 BACKBAR COOLER Refrigerated Back Bar Cooler, Shallow Depth, 50"W, 34-3/4"H, 13.0 cu. ft., front breathing, stainless steel top, (2) doors with locks, electronic controller with digital display and hi-low alarm, black enamel finish exterior, stainless steel interior back and side panels with reinforced stainless steel floor, epoxy coated steel shelves, self-contained refrigeration, R290 hydrocarbon refrigerant Condensing unit on the left, standard Left Door hinged on left and right door hinged on right, standard Casters, swivel, with brakes (4" diameter rubber tires) set of 4 (5"

Item	Quantity	Manufacturer	Model No.
203	1	SCOTSMAN	UN324A-1*B099 ICE MAKER Undercounter Ice Maker with Bin, nugget style, air cooled, 24" width, self contained condenser, production capacity up to 340 lb production/24 hours at 70°/50° (266 lb AHRI certified at 90°/70°), 80 lb bin storage capacity, H2 Nugget Ice, sealed maintenance-free bearings, stainless steel auger and evaporator, front facing removable air filter, recessed utility chase, unit specific QR code, ice scoop, includes 6" adjustable legs SSM Plus Water Filter Assembly, single system, 1.67 gallons per minute max flow, designed for cubers up to 650 lb, and for flakers, nuggets and nugget dispensers up to 1,200 lb, includes AquaArmor by AgION for antimicrobial protection Provide quick water disconnect 48" long, size per plan and manufacture recommendation

Item	Quantity	Manufacturer	Model No.
204	1	TRAULSEN	TF031D3*B099 EQUIPMENT STAND REFRIGERATED Spec-Line Flex Refrigerator and/or Freezer Equipment Stand, 31"W, 5.6 cu. ft. capacity, bottom mounted self-contained refrigeration, (2) drawers (locking), (2) independent electronic controls, LED temperature display, removable ABS drawer bins, stainless steel interior, top, front and sides, galvanized steel back and bottom, 2-3/4" casters, Hydrocarbon R290 refrigerant

Casters, 4" high (set of 4)

Item	Quantity	Manufacturer	Model No.
205	1	PERFECT FRY	PFC187*B099 VENTLESS FRYER

Ventless Deep Fryer, countertop, semi-automatic, 2 gallon / 14 lb oil capacity oil capacity, 30 lbs/hr production, self venting, odorless, HEPA style air filtration, integral fire suppression, programmable controls, stainless steel construction

Basket Cover
Basket, extra large, 32oz/6 servings
Locking Latch
Perfect Filter, in-tank pressure oil filtration system, micro filtration up to 0.2”, operates at oil temperatures up to 347°F (175°C), filtration power up to 66 lbs, 4-5 min work cycle, dishwasher safe upper motor section, filter section and drip pan, includes oil tester with storage box and box of 100 filters, stainless steel

Fire Alarm Signal Integration Kit
Oil Drainage Kit

Item	Quantity	Manufacturer	Model No.
206	1	TRAULSEN	TF031D3*B099 EQUIPMENT STAND REFRIGERATED

Spec-Line Flex Refrigerator and/or Freezer Equipment Stand, 31"W, 5.6 cu. ft. capacity, bottom mounted self-contained refrigeration, (2) drawers (locking), (2) independent electronic controls, LED temperature display, removable ABS drawer bins, stainless steel interior, top, front and sides, galvanized steel back and bottom, 2-3/4" casters, Hydrocarbon R290 refrigerant

Casters, 4" high (set of 4)

Item	Quantity	Manufacturer	Model No.
207	1	RATIONAL	CMP XS 6*B099 ELECTRICAL COMBI VENTLESS

Mode selector for cooking modes, separate controls for temperature, core temperature and time settings
LED illuminated display, visible from a distance
Clear control panel
High-performance fresh steam generator, pressureless
5 Programmable fan speeds
Integral, maintenance-free grease extraction system with no additional grease filter

ClimaPlus®humidity measurement, 5 stage setting and regulation
Rear-ventilated triple-pane cooking cabinet door, two hinged inside panes (for easy cleaning) with a special heat-reflecting coating

Item	Quantity	Manufacturer	Model No.
208	1	EAGLE	WCH-30*B099 WALL CABINET

Cabinet, wall mount, 30"W x 15"D x 28"H, enclosed front, sloped top, (2) removable double-panel hinged doors, fixed intermediate shelf with safety edges, back recessed with concealed mounting plate, 18/304 stainless steel construction

Item	Quantity	Manufacturer	Model No.
209	1	CUSTOM	CUSTOM*B099 BACK SERVICE COUNTER WITH SOLID

Custom fabricated back service counter with solid worktop built as per plan, detail, section, elevations and general specifications.

#14 gauge stainless steel sound deadened tops with turn downs as shown on plans. Table to be mounted on 1-5/8" O.D. stainless steel legs with #16 gauge stainless steel fully welded under shelf where indicated and provide 2" turn up on back side.

One (2) tier of three (3) 20" x 20" x 6" deep all stainless steel drawers. To be in #18 gauge stainless steel housing having 3/4" radius (vertical) exterior corners.

Provide sink quantity per plan, length, width and depth and location per plan and details. #14 gauge stainless steel with 1" radius corners and with 1" cove bottom. Provide with lever drain and attached overflow.

Item	Quantity	Manufacturer	Model No.
210	1	T&S BRASS	5F-8DLX12*B099 DECK MOUNT FAUCET Equip Faucet, 8" centers, deck mount, 12" swing nozzle, ceramic cartridge, 2" flange, low-lead, ADA Compliant

Item	Quantity	Manufacturer	Model No.
211	1	T&S BRASS	B-0133-12-CRVBE*B099 PRE RINSE FAUCET EasyInstall Pre-Rinse Unit, 8" wall mount, 12" swivel nozzle, vacuum breaker, 44" stainless steel flex hose, 18" riser, 6" wall bracket, ceramic cartridge, lever handle, low lead, stream regulator tip, add-on faucet, 1.15 GPM spray valve, 1/2" NPT, EPAct2005 compliant

Item	Quantity	Manufacturer	Model No.
212	1	HOBART	LXEH-1*B099 DISHWASHER UNDERCOUNTER LXe Dishwasher, undercounter, 208-240v/60/1ph(2W), accommodates optional two-level racking accessory, 23-15/16"W x 25-9/16"D x 32-15/16"H, high temperature sanitizing, 32 Racks/Hour, Fresh Water Rinse, .74 gal/rack, Delime Notification, Auto Chemical Priming, Service Diagnostics, Detergent and Rinse Aid Pump Water softening system 4,818 grains/lb capacity, 14 gallons regeneration volume, salt alarm, holds 2 bags of salt Drain water tempering kit for Lxe 3/4" brass pressure regulator Water hammer arrestor kit, includes 3/4" brass pressure regulator valve (4) Combination rack Trim Cover Splash reduction panel for top of machine and controls Pumped Drain Air Gap Kit Provide quick water disconnect 48" long, size per plan and manufacture recommendation

Item	Quantity	Manufacturer	Model No.
213	1	CUSTOM	Custom fabricated mobile service counter with solid worktop, built as per plan, detail, section, elevation and general specifications.

			Custom fabricated work table, 16 gauge 304 solid worktop, sound deadened built as per plan, detail, section, elevations and general specifications. Provide with 18 gauge stainless steel undershelf, stainless steel legs and casters with brakes on all four.
Item	Quantity	Manufacturer	Custom fabricated beverage counter, built as per plan, detail, Model No.
214	1	STAR	J4R*B099 MINI POPCORN POPPER Mini JetStar 4oz Popper is outfitted with a 1000 watt, 4 oz. capacity, aluminum popping kettle with stainless steel exterior shell. A one-piece clear polycarbonate wrap body construction has a 3/16” thick polycarbonate door with full length hinge to stand up to commercial use. 50 watt flood light and 50 watt heated corn pan supplied.

Part 3: EXECUTION

3.1 INSPECTION

A. Before beginning the installation of foodservice equipment, the spaces and existing conditions shall be examined by the Foodservice Equipment Supplier and any discovered deficiencies or discrepancies noted shall be reported to the Architect in writing.

1 Beginning installation shall constitute acceptance of the area.

3.2 PREPARATION

A. Foodservice equipment drawings are diagrammatic and intended to show layout, arrangement, mechanical and electrical requirements.

B. Make and check all measurements at the building before beginning fabrications. Coordinate measurements and dimensions with rough-in and space requirements.

3.3 INSTALLATION

A. Equipment shall be uncrated, fully assembled and set level in position for final connections. Parts shipped loose but required for connection shall be properly tagged and shall be accompanied by the necessary installation instructions.

B. Provide a competent, experienced foreman to supervise installation and final connections.

C. Contractor shall clean and flush all supply and drain lines before final connections.

D. Water inlets shall be located above the positive water level. Where conditions require submerged inlets, fixtures shall be equipped with vacuum breaker and approved check valve by the Contractor.

3.4 REMOTE REFRIGERATION SYSTEMS

A. The systems as indicated shall be complete and shall include all necessary labor to make a first-class installation. Contractor shall provide all necessary expansion valves, hand shut-off valves, dryers, sight glasses, thermostats, solenoid valves, high and low pressure controls, heat exchangers, line vibration eliminators and tubing. Provide schematic of proposed hookup to Consultant prior to installation for approval.

B. Heat exchangers are to be provided for all direct installations. Crankcase heaters to be provided in compressors for outside installation.

C. Furnish and install at each unit a liquid suction line shut-off valve as closely as practical to the equipment. Install in each system a pump down valve take-off connection.

D. Expansion valves shall be thermostatic type, adjustable super-heat. Back pressure regulating valves shall be used on multi-plexed systems.

E. All refrigeration lines shall be type "L" hard copper tubing as required by approved installation practices. Where conduits are provided by others, the tubing shall be soft copper pulled through this conduit. For exposed areas, hard copper tubing shall be run in such a manner as to not subject it to undue damage. All refrigerant lines in pipe sleeves or conduits shall be effectively caulked at ends to prevent entrance of water or vermin. All lines not in conduit shall be insulated with Armstrong Armaflex foamed plastic 1" insulation which is to be taped and glued at joints. No slit insulation will be accepted. All refrigerant piping shall be joined by use of Sil-Foz high temperature silver solder with proper fittings.

F. Finish exposed refrigerant lines within refrigerated compartments with Benjamin Moore "All Weather Aluminum" #137000 paint.

G. Armstrong Armaflex line insulation on exterior of buildings to be finished with two (2) coats of Armaflex finish "UV" resistant paint. This is to help prevent deterioration due to sun exposure.

H. Sizing of liquid and suction lines shall be according to ACRMA standards. All systems shall be subjected to a 20" vacuum for a period of 24 hours with no regain. Support all suspended lines with adjustable hangers 6'0" o.c. maximum.

I. Contractor shall provide CFC free refrigerant and oil, charge the system and run an operational check of three (3) days duration and provide oil separators in all instances where the condensing units are located above the refrigerating coil. Warranty shall be as hereinbefore described in Section 1.08.

3.5 FIELD QUALITY CONTROL

A. Inspection: Provide access to shop fabrication areas during regular working hours to facilitate inspection of the equipment, during construction, by the Architect or his authorized representative. Errors found during these inspections shall be corrected to the extend required within the scope of the plans, specifications and reviewed drawings.

B. Testing: After completion of final connections, thoroughly test all equipment for proper operation.
   1 Repair or replace any equipment producing objectionable noise
   2 Finishes marred during installation shall be repaired to the Consultant's satisfaction or replaced.

C. Start-up and Demonstration: Provide a start-up and operating demonstration of all equipment at a time of Owner's convenience.
   1 Arrange for the demonstration to be held in the presence of Authorized Representatives of the Architect and Owner.
   2 Demonstrations to be conduced by Factory Qualified Representative and Equipment Supplier in the proper operation and maintenance of the equipment.
   3 One (1) copy of Operation, Maintenance Manuals and CD videos as outlined in paragraph 1.3 B1.a to be delivered to the Kitchen Manager at the time of demonstration for use on-site.
   4 Foodservice Equipment Supplier is to furnish to the Owner, Architect and Foodservice Equipment Consultant confirmation of demonstration and delivery of Operation, Maintenance Manuals and a CD videos in the form of "A Letter" including a "Receipt" for the Manual and a copy of "Sign In" Sheet signed by all Demonstrators and Attendees.

D. Foodservice Equipment supplier to provide complete start-up of all equipment and demonstrate to Owner's satisfaction that all equipment within this scope of work performs to factory approved specifications. It is recommended that a Licensed Service company be subcontracted for this function.
   1 Acceptance of Equipment Installation Completion is dependent on this start-up.
   2 All temperature sensitive equipment shall be calibrated to standard operating temperatures. This includes, but is not limited to ovens, refrigerators, freezers, steamers, fryers, griddles, etc. In both cases the reason is so that cleaning and curing can occur in a timely manner with Owner's occupying the space so as to keep the equipment from rusting after cleaning and prior to use.
   3 There are two exceptions with Owners WRITTEN exclusion:
      a. Fryers: Owner can opt to perform the boil-out and original cleaning at their expense. A pre-paid service call to confirm temperature accuracy and performance shall be included in contract scope of work.
      b. Griddles: Owner can opt to clean and "Cure" this equipment at their expense. A pre-paid service call to confirm temperature accuracy and performance shall be included in contract scope of work.

4 It remains the Foodservice Equipment suppliers' responsibility to assure complete working conformance.

3.6 ADJUST AND CLEAN

A. Upon completion of installation and tests, remove all protective coverings and clean and service all equipment.

B. Make and check final adjustments required for proper operation of the equipment.

C. Clean up: Clean up all debris by the work of this sections, keeping the premises clean and neat at all times.

3.7 QUALIFIED FOODSERVICE EQUIPMENT SUPPLIERS

A. Kitchen and food serving equipment shall be furnished, installed and guaranteed by one of the following named kitchen suppliers:

1 Supreme Fixture Co., Inc Ms. Heather Brown
PO Box 193655 Little Rock, AR 72119
Phone: (501) 455-2552 Fax: (501) 455-0802 heather@supremefixture.com

2 Mission Restaurant Supply Mr. Brian Mosher
1126 S. St. Mary's Street, San Antonio, TX 78210
Phone: (210) 354-0690 Fax: (210) 534-3853 brianm@missionrs.com

3 Amundsen Commercial Kitchens Mr. Brian Abraham
7429 Tower St. Richland Hills, TX 76118
Phone: (405) 236-5961 Fax: brian@afeok.com

4 Bargreen Ellingson of Texas Mr. Dustin Kennedy
2450 Handley Ederville Road, Fort Worth, TX 76118
Phone: (817) 732-6200 Fax: (817) 732-6210 d.kennedy@bargreen.com

5 TriMark Mr. Michael Newman
2801 Sout Valley Parkway Suite 200, Lewisville, TX 75067
Phone: (972) 849-9307 Fax: michael.newman@trimarkusa.com

6 Edward Don and Co. Pam Corbel
36 West Beauregard #504, San Angelo, TX 76901
Phone: (325) 658-5878 Fax: (325) 658-7920 pamelacorbell@don.com

7 Pasco Brokerage, Inc. Ms. Kathryn Wimpee
6465 Chase Oaks Blvd, Plano, TX 75023
Phone: (972) 596-3350 Fax: (972) 596-2817 kathollon@pascoinc.net

3.8 QUALIFIED FABRICATORS

A. All fabricated items described in the documents, other than by the catalog number manufactured by an N.S.F. qualified Foodservice Equipment Fabricator who has the plant,shall be personnel and engineering facilities to properly design, detail and produce high quality foodservice equipment. All fabrication shall have N.S.F. labels and be by one manufacturer and be of uniform design and finish.

B. The Foodservice Equipment Contractor shall, if requested, submit a list of at least three (3) comparably-sized projects for which the intended Foodservice Equipment Fabricator has furnished custom fabricated equipment.

END OF SECTION

SECTION 22 00 10

ASIC PLUM ING RE UIREMENTS

PART 1 GENERAL

1.1 DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Basic plumbing requirements necessary to provide complete installation of all Division 22 work.

1.3 WORK INCLUDED

A. This section of work comprises furnishing of all materials, equipment, tools, scaffolding, rigging, hoisting, labor, and transportation necessary for the complete installation of the plumbing systems as shown on the plans and as specified herein.

B. Bidders shall determine the contents of a complete set of drawings and specifications and be aware that they may be bidding from a partial set of drawings, applicable only to the various separate contracts, subcontracts, or trades as may be issued for bidding purposes only. The contract documents and the complete scope of work for the project are illustrated on the combined Architectural, Structural, Mechanical, Heating, Ventilating, Air Conditioning, Plumbing, and Electrical, and each Bidder shall thoroughly acquaint himself with all the details of the complete set of drawings and specifications before submitting his bid.

C. All drawings and specifications form a part of the contract documents for each separate contract and shall be considered as bound therewith in the event partial sets of plans and specifications are issued for bidding only. The submission of bids shall be deemed evidence of the review and examination of all drawings, specifications, and addenda issued for this project as no allowances will be made because of unfamiliarity with any portion of the complete set of documents.

D. Plumbing Contractor is responsible for all final connections to specified plumbing fixtures and all owner furnished equipment requiring plumbing (drain, water, gas, condensate, air).

1.4 RELATED SECTIONS

A. The conditions of the Division 01 requirements and the contract requirements which include the General Conditions and the Supplementary Conditions apply to the work of this division.

1.5 CODES & REFERENCE STANDARDS

A. General
1. Perform all Division 22 work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are modified by the contract documents.
2. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.
3. When two or more codes or standards are applicable to the same work, then the stricter code or standard shall govern.
4. The date of the code or standard that is in effect on the date of issue of the contract documents except when a particular publication date is specified.
5. The Contractor shall be held responsible for verifying all local codes and ordinances that may alter any part of the plans or specifications. The Contractor shall bear all costs for correcting the deficiencies.
6. Where local codes and ordinances are not in writing or on record but a local precedence has been set, the Owner shall pay for any additional cost incurred.

1.6 APPLICABLE CODES AND STANDARDS FOR ALL DIVISIONS 22 WORK

A. International Building Code

B. International Gas Code

C. International Plumbing Code

D. International Mechanical Code

E. International Energy Conservation Code

F. National Electrical Code

G. American Society of Heating, Refrigerating and Air Conditioning Engineers Standards.

H. Occupational Safety and Health Administration Standards:
1. OSHA Standard 2207 - Construction Industry Standards
2. OSHA 29 CFR Part 1926 - Regulation of Excavation
3. Texas Underground Facility Damage Prevention Act (H.B. 2295)
4. All other applicable standards

I. National Fire Protection Association:
1. NFPA 90A Installation of Air Conditioning and Ventilating Systems

. Fire Sprinkler System:
1. NFPA 13
2. NFPA 14
3. NFPA 101 Section 8-3
4. All other applicable codes

K. National Appliance Energy Conservation Act of 1987

L. Texas State Board of Insurance Standards

M. Clean Air Act and Clean Air Act Amendments of 1990

N. State Codes:
1. Texas Department of Labor Boiler Rules and Regulations
2. All other applicable codes

O. Local Municipal Codes and Ordinances

P. Schedule of Abbreviations:
1. Reference Standards are listed in Division 22 using the abbreviations listed below:
   a. AABC (NSTSB) - Associated Air Balance Council
   b. AASHTO - American Association of State Highway and Transportation Officials
   c. ADA - Americans with Disabilities Act
   d. AGA - American Gas Association
   e. ANSI - American National Standards Institute
   f. ASME - American Society of Mechanical Engineers
   g. ASPE - American Society of Plumbing Engineers
   h. ASTM - American Society for Testing and Materials
   i. AWE - American Welding Society
   j. AWWA - American Water Works Association
   k. CISPI - Cast Iron Soil Pipe Institute
   l. CS - Commercial Standard
   m. CSA - Canadian Standards Association
   n. DIPRA - Ductile Iron Pipe Research Association
   o. DOT - Department of Transportation
   p. DOC - Department of Commerce

q. FCC - Federal Communications Commission
r. FM - Factory Mutual
s. FS - Federal Specification
t. IBC - International Building Code
u. ITL - Independent Testing Laboratories
v. NEC - National Electric Code
w. NFPA - National Fire Protection Association
x. NSF - National Sanitation Foundation
y. OSHA - Occupational Safety and Health Administration
z. PDI - Plumbing and Drainage Institute
aa. SMACNA - Sheet Metal and Air Conditioning National Association
bb. Texas Department of Health
cc. Texas Water Resource Commission
dd. UL - Underwriters Laboratories

1.7 QUALIT ASSURANCE

A. Provide complete installations of all systems.

B. Furnish all items of equipment, material, and labor to complete the Contract even though each and every item necessary is not specifically mentioned or shown.

C. In case of any conflict between the specifications, plans, and ordinances, the ordinances shall govern.

D. All materials furnished under this Contract shall be new, free from defects of any kind, of the quality and design hereinafter specified, and shall conform to the standards of Underwriter s Laboratories Inc., except for equipment which UL does not list or provide label service.

E. All plumbing equipment and fixtures shall be the same brand unless scheduled differently on plans.

1.8 CONTRACTOR S RESPONSIBILIT

A. Erect barricades, protective fencing, and signs to prevent injury to personnel on-site.

B. Make permanent connection to utilities or existing lines. Determine depth and location, and bid accordingly.

C. Relocate and repair any existing lines cut by general construction work.

D. Pay all costs in connection with metering devices.

E. Plans do not show exact location and elevations of lines, nor do they show all offsets required.

F. Deviate from plans as required to conform to the general construction and provide proper grading.

G. Maintain all utility services during construction to existing portions of job that remain.

H. Procure and pay for all necessary permits or licenses to carry out the work.

I. Obtain and pay for all the necessary certificates of approval which must be delivered to the Architect before final acceptance of the work.

. Periodically remove rubbish, clean or repair all surfaces marred by the work required under this contract.

K. Protect work from damage by other trades.

L. Make all tests required by law pay all costs in connection with the testing.

M. Where job conditions require changes in indicated locations and arrangements, make such changes without extra cost to Owner.

N. Provide motor starters, controls, relays, all low-voltage wiring, conduit, and wiring related to plumbing and other equipment and devices to form a complete working system. See Division 26 00 00.

1.9 DEFINITIONS

A. Approval:
   1. It is understood that approval must be obtained from the Architect in writing before proceeding with the proposed work.
   2. Approval by the Architect of any changes, submitted by the Contractor will be considered as general only to aid the Contractor in expediting his work.

B. Contractor:
   1. The Contractor engaged to execute the work included in a particular section only, even though he may be technically described as a Subcontractor to the General Contractor.
   2. If the Contractor engaged to execute said work employs Sub-Contractors to perform various portions of the work included under this Section, he shall be held responsible for the execution of same, in full conformity with Contract Document requirements.
   3. The Contractor shall cooperate at all times and shall be responsible for the satisfactory cooperation of his Subcontractors with the other Contractors on the job so that all of the various phases of the work may be properly coordinated without unnecessary delays or damage to any parts of the work of any Contractor.

C. Provide:
   1. Defined as requiring the furnishing and installing of the item or facility indicated, complete in all respects, and ready for operation unless otherwise specifically noted.

1.10 WARRANT

A. The Contractor shall warranty his work against defective materials and workmanship for a period of one year from date of acceptance of the job.

B. Neither the final payment nor any provisions in Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship.

C. He shall remedy any defects due thereto, and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from date of substantial completion.

D. The Owner shall give notice of observed defects with reasonable promptness.

E. This Guarantee shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

1.11 SITE VISIT

A. Before submitting his proposal, each bidder shall examine all plans and specifications relating to the work, shall visit the site of the project, and become fully informed of the extent and character of the work required.

B. No consideration will be granted for any alleged misunderstanding of the materials to be furnished or the amount of work to be done, it being fully understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying plans or required by nature of the site of which may be fairly implied as essential to the execution and completion of any and all parts of the work.

1.12 PRO ECT RECORD DOCUMENTS

A. The Contractor shall keep a set of plans on the job, noting daily all changes made in connection with the final installation including exact dimensioned locations of all new and uncovered existing utility piping outside the building.

B. Upon submitting his request for final payment, he shall turn over to the Architect/Engineer, for subsequent transmittal to the Owner, a clean, neatly marked set of reproducible plans showing as installed work and an electronic file with changes of materials.

C. In addition to the above, the Contractor shall accumulate during the job s progress the following data, in duplication (2 each), prepared in 3 ring binders of sufficient size, black in color, neat in appearance, and turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:
   1. All warranties, guarantees, and manufacturer s directions on equipment and material covered by the Contract.
   2. Approved fixture brochures.
   3. Copies of reviewed shop drawings.
   4. Set of operating instructions. Operating instructions shall also include recommended maintenance.
   5. Any and all other data and/or plans required during construction.
   6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
   7. The first page, or pages, shall have the names, addresses, and telephone numbers of the following:
      a. General Contractor and all sub-contractors.
      b. Major Equipment Suppliers.

1.13 TRAINING

A. Upon completion of the work and at a time designated by the Owner s representative, provide a formal training session for the Owner s operating personnel to include location, operation, and maintenance of all plumbing equipment and systems, some sections have further instructions.

B. Before proceeding with instruction, prepare a typed outline in triplicate listing the subjects that will be covered. Submit the outline for review by the Owner s representative.

C. At the conclusion of the instruction, obtain the signatures of the attendees on each copy of the outline to signify that they have a proper understanding of the operation and maintenance of the system. Submit the signed outlines to the Owner s representative and Engineer as a condition of final acceptance.

1.14 PLANS AND SPECIFICATIONS

A. The plans show diagrammatically the locations of the various lines, ducts, conduits, fixtures, and equipment and the method of connecting and controlling them.

B. It is not intended to show every connection in detail and all fittings required for a complete system.

C. The systems shall include but are not limited to the items shown on the plans.

D. Exact locations of these items shall be determined by reference to the general plans and measurements of the building and in cooperation with other Contractors, and in all cases, shall be subject to the approval of the Architect/Engineer.

E. The Architect/Engineer reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

F. Contractor, subcontractor, vendors, and suppliers are required to waive subrogation against Owner and Engineer.

1.15 UTILITIES, LOCATIONS, AND ELEVATIONS

A. Locations and elevations of the various utilities within the scope of this work have been obtained from the City and/or other substantially reliable sources and are offered separately from the Contract documents, as a general guide only, without guarantees as to accuracy.

B. The Contractor shall examine the site, shall verify to his own satisfaction the locations, elevations, and availability of all utilities and services required, and shall adequately inform himself as to their relation to the work the submission of bids shall be deemed evidence thereof.

C. The Contractor shall coordinate all services with the Utility Companies during construction, coordinate changes made by Utility Companies to the design of project, and coordinate with the Owner, Architect/Engineer, and Utility the scheduling of any shutdowns or delays that may occur in providing service.

D. The Contractor shall verify location, conduct all necessary tests, inspections, coordinate with Owner s representatives and utilities, and check for existing underground utilities and lines before ditching.

E. The Contractor shall be responsible for repair of any cut or damaged lines or utilities he uncovers. There are lines and utilities not shown on any plans.

F. Contractor is responsible for coordination of all existing and new utilities at site. Contractor is responsible for protecting and repairing any utilities damaged by installation of pipe. All existing and new landscaping/trees to remain and to be protected unless directed otherwise by Architect/Owner.

1.16 SUBSTITUTION OF PRODUCTS

A. Substitution of products specified herein will be considered only when a complete list of proposed alternative equipment is submitted to the Engineer in writing, supported by adequate technical and cost data. This includes a complete description of the proposed substitution, drawings, catalog cuts, performance data, test data, or any other data or information necessary for evaluation.

B. All proposed substitutions and data must be received by the Engineer no less than ten working days prior to the scheduled date for opening of bids.

C. The Engineer will consider all such submittals and the Architect will issue an addendum listing items that the Engineer considers acceptable. Only such items as specified or approved as acceptable will be installed on this project.

D. Manufacturers names are listed herein and on the plans to establish a standard of quality and design. Where a manufacturer s name is mentioned, products of other manufacturers will be acceptable, if, in the opinion of the Engineer, the substitute material is of equivalent quality or better than that of the material specified.

E. The Contractor s Bid represents that the bid price is based solely upon the materials and equipment described in the Bid Documents (including addenda, if any) and that he contemplates no substitutions or extras.

F. Requests for substitution are understood to mean that the Contractor:
1. Has personally investigated the proposed substitution and determined that it is equal or superior in all respects to that specified.
2. Will provide the same guarantee for the substitution that he would for that specified.
3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.

G. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
1. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
2. The specified product is unavailable through no fault of the Contractor.
3. The manufacturer refuses to warranty the specified products as required.
4. Subsequent information that the specified product is unable to perform properly or to fit in the designated space.
5. In the Engineer s sole judgment, the substitution would be in the Owner s best interest.

H. Revisions to the plumbing system shall be under the supervision of the Engineer at a standard hourly rate charged by the Engineer and shall be paid by the Contractor originating the changes.

1.17 PROTECTION OF EQUIPMENT AND MATERIALS

A. The Contractor shall take such precautions as may be necessary to properly protect his apparatus from damage.

B. This shall include the creation of all required temporary shelters to adequately protect any apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.

C. Failure to comply with the above to the satisfaction of the Owner s inspector will be sufficient cause for the rejection of the equipment in question and its complete replacement by this Contractor.

D. All apparatus shall be cribbed up from the floor or ground by the Contractor and covered with tarpaulins or other protective covering where necessary or directed.

1.18 FINAL INSPECTION

A. It shall be the duty of this Contractor to make a careful inspection trip of the entire project, assuring himself that the work on the project is ready for final acceptance before calling upon the Architect/Engineer to make a final inspection.

B. To avoid delay of final acceptance of the work, the Contractor shall have all necessary bonds, warranties, receipts, affidavits, etc., called for in the various articles of these specifications, prepared and signed in advance, together with a letter of transmittal, listing each paper included, and shall deliver the same to the Architect/Engineer at or before the time of said final inspection. The Contractor is cautioned to check over each bond, receipt, etc., before preparing for submission to verify that the terms check with the requirements of the specifications.

1.19 CUTTING AND PATCHING

A. All Subcontractors shall notify the General Contractor sufficiently ahead of construction of any floors, walls, ceiling, roof, etc., of any openings that will be required for his work.

B. He shall see that all sleeves required for his work are set at proper times so as to avoid delay of the job.

C. All necessary cutting of walls, floors, partitions, ceilings, etc., as required for the proper installation of the work under this Contract shall be done at the Subcontractor s expense in a neat and workmanlike manner, and as approved by the Architect/Engineer.

D. No joists, beams, girders, or columns shall be cut by any Contractor without first obtaining written permission of the Architect/Engineer.

E. Patching of openings and/or alterations shall be provided by the General Contractor.

F. All openings in firewalls and floors, such as thimbles, shall be completely sealed after installation for a completely airtight and watertight installation. Sealing material shall be non-combustible and UL approved. The installed sealing assembly shall not cause the fire rating of the penetrated structure to be decreased.

G. All openings in exterior walls shall be sealed watertight.

1.20 IDENTIFICATION

A. Refer to Section 22 05 54.

1.21 MANUFACTURER S INSTRUCTIONS

A. All equipment and devices shall be installed in accordance with these plans and specifications, manufacturer s instructions, and applicable codes.

B. Where specifications call for installation of a product to be in accordance with manufacturer s instructions and/or where manufacturer s instructions are required for installation of a product, it shall be the Contractor s responsibility to obtain the necessary applicable manufacturer s instructions and install the product in accordance with the manufacturer s instructions.

C. It shall be the Contractor s responsibility to install all equipment, materials, and devices shown on the plans and as called out in these specifications even if manufacturer s instructions are absolutely unattainable.

1.22 RELATED WORK

A. The various specification sections for this division may or may not include related work listings.

B. All related work shall be coordinated and provided by the Contractor regardless of whether specifically identified or not.

1.23 ELECTRICAL WIRING AND EQUIPMENT FOR PLUMBING S STEMS

A. All wiring, conduit, boxes, equipment (controls, thermostats, relays, contactors, motor starters, heaters, switches), and any other control devices or equipment required to form a complete and properly operating system, shall be the responsibility of this Contractor.

B. The Electrical Contractor shall only provide line voltage (including hook-up) to all plumbing equipment.

C. All controls and devices shall be low voltage unless otherwise noted or shown on the plans. Where line voltage controls or devices are noted, the Contractor shall provide complete wiring diagrams (approved by the Engineer) to the Electrical Contractor prior to final hook-up.

D. The Plumbing and Electrical plans are based on the equipment and devices scheduled as shown on the plans or as called for in the specifications. Should any plumbing equipment or device be changed or approved from those which are shown or noted, all electrical and/or plumbing changes shall be made at the expense of the trade or Contractor initiating the change with no expense to the Owner, Architect, Engineer, or their representatives.

E. All wiring provided by this Contractor shall be installed in a workmanlike manner using tie wraps, labels, anchors and etc. Loose wiring is not acceptable.

F. All conduit and boxes required in all walls for control purposes (thermostats, switches, etc.) shall be provided by electrical contractor.

G. All conduit required in attic, clear spaces, or on roof shall be by electrical Contractor.

1.24 OPERATION PRIOR TO COMPLETION

A. When any piece of plumbing equipment is operable and the Contractor needs to operate the equipment, he may do so providing that he properly supervises the operation.

B. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner.

C. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install clean filter media, properly adjust and complete all punch list items before final acceptance by the Owner.

D. The date of acceptance and the start of the warranty may not be the same date.

1.25 SAFET GUARDS

A. Contractor shall furnish and install all safety guards required. All belt driven equipment, projecting shafts, and other rotating parts shall be enclosed or adequately guarded.

1.26 FLAME SPREAD PROPERTIES OF MATERIALS

A. All materials and adhesives used for plumbing and insulation shall conform to NFPA and UL life and flame spread properties of materials.

B. The composite classifications shall not exceed 25 for a flame spread rating and 50 for a smoke developed rating as listed for the basic material, the finishes, adhesives, etc., specified for each system and shall be such when completely assembled.

1.27 ASBESTOS

A. No asbestos or asbestos containing materials shall be permitted in this project.

1.28 LEAD MATERIALS

A. No lead or lead containing materials shall be allowed in any domestic or potable water supply piping, valves, fixtures, components, equipment, or any other item.

1.29 REFRIGERANTS

A. Chlorofluorocarbons (CFCs) shall not be allowed in any equipment on this project.

B. Comply with ASHRAE Std 15 and ASHRAE Std 34.

1.30 REFRIGERANT RECOVER AND REC CLE

A. Refrigerants shall not be released to the environment.

B. Contractor shall provide recovery and recycle equipment that has been certified by the Electrical Testing Laboratories or Underwriters Laboratories.

C. Contractor shall also provide properly trained and certified (in accordance with EPA) personnel for refrigerant work during installation, demolition, start-up, servicing, etc.

1.31 ACCESS CLEARANCE

A. Proper access to all installed equipment shall be provided. This Contractor shall label all points of access immediately upon installation with a marker pen.

B. A minimum of 3 feet shall be maintained in front of all access points.

C. If another trade violates this space, this Contractor shall immediately notify the General Contractor to correct this condition.

D. When equipment is installed above lay-in ceiling this Contractor shall coordinate with the Ceiling Contractor to provide access without removing part of T-bar ceiling.

E. No speakers, lights, fire alarm equipment, etc. shall be installed in lay-in ceiling tiles where access is to be gained.

PART 2 PRODUCTS

2.1 NOT APPLICABLE

PART 3 EXECUTION

3.1 TESTING

A. After all plumbing systems have been completed and put into operation, subject each system to an operating test under design conditions to ensure proper sequence and operation throughout the range of operation regardless of the season the Contractor shall test all plumbing equipment.

B. Perform a smoke test on all sanitary sewers and camera all lines and provide owner with a videotape.

C. Perform gas piping pressure test to comply with HB 1611 and all required City or governing body tests.

D. Make adjustments as required to ensure proper functioning of all systems.

E. Special tests on individual systems are specified under individual sections.

3.2 AS BUILT DRAWINGS

A. Upon substantial completion, Contractor shall submit as-built drawings showing all deviations between contract drawings and actual installed conditions.

B. Show location of all valves in gas and water piping. Submit to Owner.

END OF SECTION

SECTION 22 00 0

PLUM ING SU MITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMAR

A. This section supplements Division 01 Submittal Procedures and contains additional requirements applicable to Division 22 submittals.

1.2 SECTION INCLUDES

A. This section includes, but is not limited to:
1. Plumbing submittal procedures
2. List of required Division 22 submittals to the engineer
3. This section applies only to the Division 22 specifications. Submittals required by other specification divisions are not included here, even though the same subcontractor may be providing work under other divisions.

1.3 RELATED SECTION

A. Division 01 - Submittal Procedures

1.4 DEFINITIONS

A. Product Data: Illustrations, standard schedules, performance charts, instructions, and brochures furnished by the contractor, subcontractor, manufacturer, or supplier to illustrate materials or equipment or to illustrate some portion of the work. Provide a summary of scheduled items with all data in schedules.

B. Shop Drawings: Drawings, diagrams, schedules, and other data specifically prepared for the work by the contractor, subcontractor, manufacturer, or supplier to illustrate some portion of the work.

C. Equipment/Material Submittal Package: A compilation of the product data, shop drawings, and other items as required by the specifications, submitted near the start of the work. Typically, the specifications require the initial submittal package to be submitted within a certain number of days after the work starts.

D. Quality Assurance Submittal: Items submitted before and during the execution of a particular portion of the work for the purpose of guarding against defects and deficiencies.

E. Quality Control Submittal: Items submitted at the completion of a particular portion of the work for the purpose of evaluating completed activities and elements of the work for conformance with contract requirements (e.g. start-up reports).

F. Closeout Submittals: Items submitted at or near the completion of the contract.

1.5 SUBMITTALS

A. The materials, workmanship, design, and arrangement of all work installed under this contract shall be subject to the review of the architect, engineer, and owner.

B. Manufacturers: Manufacturers submitted shall be as per the acceptable manufacturers listed in each specification section or referenced schedule. For additional manufacturers requiring approval, reference the Substitution of Products article in Section 22 00 10.

C. Required Submittals: Refer to the Submittals article of each individual Division 22 specification section for the required items to be submitted.

D. Contractor’s Coordination Submittals: The contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the project, but such data shall

remain between the contractor and his subcontractors and will not be reviewed by the engineer.

E. Electronic Submittals: E-mail or other electronic forms of submittals from the contractor are required. The procedures described in this section shall be as follows:
1. The contractor shall supply one electronic copy of the submittal.
2. The electronic files will either be e-mailed to the architect or posted to a project management and information exchange website, depending on the architect's requirements. The architect and contractor can distribute copies of the files as desired.
3. The engineer will retain an electronic copy of the submittal and all responses.

F. Coordination Correspondence: The contractor may desire to verify the acceptability of a particular item prior to assembling the initial submittal package. The contractor may send material directly to the engineer for comments and feedback. This communication will be treated as normal coordination correspondence and will not be tracked or documented as a formal submittal. The engineer may or may not respond to such correspondence. If the engineer agrees, in writing, to the use of a particular item, then that same material shall be included in the initial submittal package along with a copy of the correspondence.

G. Unapproved Products: If materials or equipment are installed before being reviewed and approved by the engineer, the contractor shall be liable for the removal and replacement of such unapproved materials and equipment, at no additional expense to the owner. Additionally, if the removal and replacement of unapproved materials or equipment necessitates the removal and replacement of other related materials or equipment, then the contractor shall be liable for the removal and replacement of the related materials and equipment at no additional expense to the owner.

H. Product Data:
1. Where the content of manufacturer submittal literature includes data not pertinent to the submittal, clearly indicate which portions of the contents are being submitted for review. Catalogs, pamphlets, or other documents submitted to describe items on which review is being requested shall be specific and identifications in catalogs, pamphlets, etc., of items submitted shall be clearly made in a contrasting ink or highlighting. Data of a general nature shall not be acceptable.

I. Shop Drawings:
1. Scale and measurements: Make shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the item.
2. Electronic shop drawing submittals are required.
3. Shop drawings must include domestic water entry rooms with backflow prevention and all water heater rooms.

1.6 QUALIT ASSURANCE/CONTROL SUBMITTALS

A. Quality assurance and quality control submittals may be in the form of documentation or may be in the form of completed physical work that is offered for review by the engineer, architect, or owner.

B. If documentation is the subject, then submit in a manner similar to the initial submittal package.

C. If completed physical work is the subject, then the work shall not be concealed, nor shall subsequent work be performed, until the engineer's representative has reviewed the work. If the work is concealed, or if subsequent work is performed, before the engineer's representative has reviewed the work, then the contractor shall be liable for removal and replacement at no additional expense to the owner.

D. Sequencing:
1. Within 30 calendar days after the contractor has received the owner's notice to proceed, provide the complete submittal package.
2. After the engineer has reviewed the submittal package, make necessary revisions to the submittals as directed by the engineer and resubmit.
3. After the submittal has been reviewed by the engineer, proceed to purchase materials and perform the work.

E. Scheduling:
1. Failure to submit items that meet the requirements of the contract documents in ample time for review shall not entitle the contractor to an extension of contract time, and no claim for extension by reason of such default shall be allowed. The contractor may be held liable for delays so

occasioned.

PART 2 PRODUCTS

2.1 NOT APPLICABLE

PART 3 EXECUTION

3.1 SUBMITTALS

A. Make submittals of product data, shop drawings, samples, quality assurance submittals, quality control submittals, and other items in accordance with the requirements of this section, applicable sections in Division 22, and additional requirements of each individual Division 22 specification section.

B. Grouping of Submittals:
1. The submittal package shall be coordinated and included in a single submission. Multiple submissions are not acceptable except where prior written approval has been obtained from the engineer. Partial submittals may be rejected, without being reviewed, as not complying with the provisions of the contract.
2. In the case that multiple submissions are approved, it is the responsibility of the contractor to maintain and update a submittal checklist. The contractor shall ensure that all applicable submittal sections are submitted to the Engineer. If a submittal section is not submitted, it will be considered rejected until reviewed by the Engineer.
3. If submittal sections are submitted as individual submittal files, the submittal sections will be grouped and returned as one file with one set of submittal responses.

C. Electronic Submittal Organization:
1. Electronic submittals are to be submitted as a single PDF file. Within the PDF file, each section shall be bookmarked.
2. Provide an electronic submittal cover sheet that lists at least the following:
a. Project name
b. Date
c. Name and address of architect
d. Name and address of engineer
e. Name, address, and telephone number of prime contractor
f. Name, address, and telephone number of HVAC contractor
g. Name, address, and telephone number of HVAC supplier
3. Provide an electronic index sheet listing all items submitted.
4. The contractor shall call to the attention of the engineer, clouded in the submittal and noted after the index sheet, any instance in which the submittals are known to differ from the requirements of the contract documents.
5. Organize all required items by specification section. The material for each specification section shall be organized as follows:
a. Provide an electronic section cover sheet that lists the same information as the submittal cover sheet, plus the specification number and title and the name, address, and telephone number of the vendor or vendor’s representative, if applicable.
b. Refer to the individual Division 22 specification sections for any required organization of the submittal material within each submittal section.
c. Bookmarked sections shall be arranged by specification section number in numerical order.
d. Submit in accordance with these procedures and procedures described in Division 01 Submittal Procedures.
e. Submittals not organized as described here may be rejected, without being reviewed, as not complying with the provisions of the contract.

D. Response to engineer’s review:
1. Review comments:
a. Review comments of the engineer will either be shown on the returned sets to the contractor or shown on a document attached to the sets. If the comments are on an attached document, then the engineer will place a note on the submittal referring to the attached comments. In such cases, the engineer’s signature will appear only on the attached document. If the

attached, signed document becomes physically separated from the submittal, then the submittal will no longer be considered as being a reviewed submittal.

2. Complete rejection:
   a. If the submittal is not complete or does not meet the requirements of this specification section, then the engineer may reject the entire submittal and return the submittal without further review or comment. In such cases, the entire submittal shall be completely revised and resubmitted. The resubmittal shall be given a new submittal number and shall be documented and processed as a separate submittal from the original.
3. Held for completion:
   a. If the submittal is not complete but is only missing some minor item, the engineer may, at the engineer's sole discretion, hold the submittal rather than rejecting and returning the submittal. In such cases, the engineer will notify the architect and contractor that the submittal is being held for completion. The contractor will be given a predetermined amount of time to provide the missing item. Upon receipt of the missing item, the engineer will insert the missing item into the submittal package and proceed with the review process.
4. Partial rejection:
   a. The engineer may reject only certain portions of the submittal. In such cases, only those rejected portions or items need to be revised and resubmitted.
5. Provide as corrected:
   a. The engineer may note a required change to a submitted item, but may not consider the change serious enough to require a resubmittal. In such cases, the engineer will note that the item is to be provided as noted or corrected. In such cases, the contractor may proceed to provide the item. However, if subsequent observations reveal that the noted change was not made, then the contractor shall be liable for removal and replacement of the item at no additional cost to the owner.
6. Reviewed without comment:
   a. The contractor may proceed to provide all materials and equipment.

E. Close-out Submittals:
   1. Provide close-out submittals in accordance with the requirements of Division 1.

Se tion	S it on t e ollo ing	1	2	3	4	A S
22 0 24	**Val e Gene al**					
	Full port					
	Bronzed body					
	Ball valves					
22 0 30	**Pi e and Pi e Fitting Gene al**					
	Hangers					
	Dissimilar Metals Union					
	Unions					
	Escutcheons					
	Sleeves					
	Hanger rods					
	Concrete anchors					
	Beam Clamps					
	Fire Penetration Products					
22 0 4	**Pl ing Identi i ation**					
	Valve tags and chains					
	Valve chart					
	Piping markers					
	18 gauge copper wire for underground gas piping					
	Equipment labels					
	Nametag fasteners					
	Underground warning tape					

Se tion	S it on t e ollo ing	1	2	3	4	A S
22 0 20	**Pi ing In lation**					
	Closed cell only in concrete masonry walls					
	2” wrap for concealed roof drain piping					
	2” wrap at roof drain deck pan					
	2” rigid on exposed roof drains or					
	2” wrap with PVC jacketing on exposed roof drains					
	Domestic hot and cold water pipe insulation					
	(1” for hot water and 1” for lines in exterior walls)					
	Flange, fitting, valve Insulation					
	Insulation metal shield					
	Sealant, adhesive, finish					
22 11 1	**Do e ti ate Pi ing and A tenan e**					
	Type K - underslab					
	Type L - underground/above slab					
	CPVC piping					
	PEX-A piping					
	Pipe Fittings					
	a. Up to 1-1/2”- 95-1/2 tin, 4 copper, 1/2 silver					
	b. 2” and up - SILFOS 15 silver, 80 copper, 5 phosphorus					
	c. Pressfit fittings					
	CPVC fittings					
	PEX-A with cold expansion fittings					
	PEX manifolds					
	Valves - same as valve general					
	Water hammer arrestors					
	Freeze protection heat trace					
22 13 1	**Soil a te and Sanita D ain Pi ing and A tenan e**					
	Schedule 40 PVC pipe and fittings					
	Schedule 40 cast iron pipe and fittings					
	No hub and bell spigot					
	CPVC/cast iron on first 20’ of dishwasher discharge					
	Cleanouts					
	Closet Flanges					
	Trap Guards					
	Trap primers					
	Pressure differential (automatic)					
	Electronic					
	Automatic flush valve					
	Plumbing Void Systems					

Se tion	S it on t e ollo ing	1	2	3	4	A S
	Sand backfill embedment for C.I. Pipe					
	Pea gravel embedment for PVC pipe					
	Copper DWV on exposed kitchen indirect waste					
22 13 1	**Conden ate Pi ing**					
	Copper type M or DWV					
	Schedule 40 PVC painted exterior w/ 4'-0" oc hangers					
	Schedule 40 CPVC painted exterior w/ 4'-0" oc hangers					
	Insulation thickness and thermal conductivity (K)					
	Hangers - see 22 05 30					
	Insulation - See piping insulation					
	Fittings, unions					
22 14 01	**Roo D ainage and A tenan e**					
	Primary roof drains					
	Emergency roof drains					
	Schedule 40 PVC pipe and fittings					
	Schedule 40 cast iron pipe and fittings					
	Hangers - see 22 05 30					
	Schedule 40 perforated PVC pipe					
	Black Swan adhesive					
	Downspout Nozzles					
	Insulation - See piping insulation					
	Plumbing Void Systems					
	Sand embedment for cast iron pipe					
	Pea gravel embedment for PVC pipe					
22 1 14	**Co e ed Ai Pi ing S o**					
	Reciprocating air compressor					
	Screw Air compressor					
	Compressed air piping and fittings					
	Filters					
	Regulators					
	Quick connections					
	Air reels					
	Refrigerated air dryers					
	Aftercoolers					
	Valves - see Valves General					
	Hangers - see 22 05 30					
22 16 01	**Nat al Ga Pi ing and A tenan e**					
	Schedule 40 black steel pipe and fittings					
	Gas regulators					
	Paint for roof and up wall installations					
	Cut off valves, unions, inspection ports					
	Polyethylene gas piping below grade					

Se tion	S it on t e ollo ing	1	2	3	4	A S
	Roof supports					
22 16 03	**P o ane Ga Pi ing and Fitting**					
	Black steel schedule 40 pipe and fittings					
	Gas regulators					
	Paint for roof and up wall installations					
	Polyethylene gas piping below grade					
	Cut off valves, unions, inspection ports					
	Roof supports					
22 33 34	**A e Doo**					
	Stainless steel for kitchens and locker/shower areas					
	Primer steel access doors for general use					
	Verify sizes per specification					
22 40 01	**Pl ing Fi t e and Ca ie**					
	Water heaters					
	Gas-BTUH, tank size, electrical					
	Electric - KW size, electrical, tank size					
	Expansion tanks					
	Circulating pumps					
	Water closets - wall or floor mount					
	Urinals - wall mount					
	Lavatories - wall mount or counter mount					
	Floor drains and sinks					
	Mop sinks with stainless steel backsplash					
	Sinks-standard, ADA, TAS					
	Faucets-standard, ADA, TAS, sensor type					
	Electric water coolers-standard, ADA, TAS					
	Plaster traps					
	Oil and sand separators with alarm panel					
	Oil separators with alarm panel					
	Grease interceptors					
	Hose bibbs - exterior, interior, roof					
	Acid dilution basin					
	Carriers					
	Sump pumps - GPM, total head, electrical					
	Lift stations - GPM, total head, electrical					
	Commercial washer, dryer					
	Whirlpools					
	Showers - ADA, one, two, three, column					
	Thermostatic mixing valves					
	Wash fountains - 120 volt					
	Shop drawings for all water heater rooms and domestic water entry with RP backflow preventer, and booster pumps					
22 66 4	**C e i al a te and Vent Pi ing**					

Se tion	S it on t e ollo ing	1	2	3	4	A S
	CPVC acid waste piping and fittings					
	Schedule 40 acid waste pipe-Orion, Ipex, Fuseal, George Fischer, urn					
	Dilution Basins					
	Limestone					
	Acid floor drain					
	Inspectors Port					
	Hangers - See 22 05 30					

1 - Reviewed
2 - Furnish as corrected in comments, resubmit not required
3 - Revise and Resubmit based on comments
4 - Rejected based on comments

END OF SECTION

SECTION 22 0 20

GAUGES METERS AND T ERMOMETERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Thermometers

B. Pressure gauges

C. Pete s plugs

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 30 - Pipe and Pipe Fittings - General

C. Section 22 33 34 - Access Doors

D. Section 22 40 01 - Plumbing Fixtures and Fixture Carriers

1.4 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

PART 2 PRODUCTS

2.1 THERMOMETERS

A. Type:
   1. 9 adjustable angle thermometer

B. Construction:
   1. Temperature range:
      a. Fahrenheit degrees as approved by the Engineer.
   2. Window:
      a. Unbreakable Plexiglas.
      b. Furnish with separable socket.
   3. Manufacturer/Model:
      a. Trerice BX91403 □
      b. MIL OCO SX935

2.2 PRESSURE GAUGES

A. Type:
   1. 4 dial type pressure gauge

B. Manufacturer/Model:
   1. Trerice 500X
   2. MIL OCO P4509LX

C. Construction:
   1. Pressure range:
      a. As approved by the Engineer.
   2. Cast aluminum case
   3. Double strength clear glass window
   4. Stainless steel movement
   5. Phosphor bronze tube
   6. Brass socket
   7. Furnish with a Trerice No. 880 lever handle gauge cock.

D. Accuracy: 1/2 of 1 of scale range.

2.3 PETE S PLUGS

A. Provide two sets of suitable pressure and temperature gauges for use with the plugs.

PART 3 EXECUTION

3.1 INSTALLATION

A. Furnish and install thermometers, pressure gauges, and Pete s plugs where indicated on plans in accordance with manufacturer's instructions.

B. Install thermometers at each pump for domestic hot water systems.

C. Install pressure gages across each pump over one horsepower.

END OF SECTION

SECTION 22 0 24

VALVES GENERAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. General requirements for valves

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 20 - Gauges, Meters, and Thermometers

C. Section 22 05 30 - Pipe and Pipe Fittings - General

D. Section 22 11 17 - Domestic Water Piping and Appurtenances

E. Section 22 16 01 - Natural Gas Piping and Appurtenances

1.4 REFERENCES

A. ASTM 763 - Standard Specification for Copper Alloy Sand Castings for Valve Applications

B. ASTM 61 - Standard Specification For Steam or Valve Bronze Castings

C. ASTM C27450 - Standard Specification for Brass Rod, Bar & Shapes

D. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges Pipe Fittings

E. ASTM A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications

F. ASTM - American Society of Testing Materials

G. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service

H. ASTM B813 - Standard Specification for Liquid & Paste Fluxes for Soldering of Copper and Copper Alloy Tube

I. ASTM B828 - Standard Practice for Making Capillary oints by Soldering of Copper and Copper Alloy Tube and Fittings

. ASTM B88 - Standard Specification for Seamless Copper Water Tube

K. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings

L. CSA - Canadian Standards Association

M. PDI - Plumbing & Drainage Institute

1.5 QUALIT ASSURANCE

A. Manufacturer to stamp valve to show that shell and seat tests have been successfully completed.

1.6 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

PART 2 PRODUCTS

2.1 MATERIAL SPECIFICATIONS

A. Bronze - 150 psi maximum: ASTM B62

B. Bronze - 300 psi maximum: ASTM B61

C. Cast Iron: ASTM A126, Class B

D. Cast Carbon Steel: ASTM A216/A216M, Grade WCB

E. Forged Carbon Steel: ASTM A105/A105M, Grade II

F. Brass - Lead free, dezincification resistant arsenical brass, 125 psi maximum, ASTM 763 or ASTM B283/B283M.

2.2 CONSTRUCTION

A. Provide valves designed for repacking under pressure when fully opened.

B. Equip with packing suitable for intended service.

C. Furnish with gland followers.

D. Provide valves rated greater than the design temperature and pressure for the intended system.

E. All domestic cold water and hot water valves 2 and less shall be full port ball valves with stainless steel ball.

F. All domestic cold water and hot water valves 2-1/2 and larger to gate valves.

2.3 MANUFACTURERS

A. Apollo

B. Crane

C. Grinnell

D. enkins

E. omar, T-100NGD

F. Kennedy

G. Milwaukee Valve Company

H. Nibco

I. Stockham

. Walworth

K. Watts

L. Hammond

M. Kitz

PART 3 EXECUTION

3.1 INSTALLATION

A. Install valves and stops inaccessible locations.

B. Provide where shown or as required to make system complete and readily maintained.

C. Provide access doors for all inaccessible valves.

D. Provide as-built drawings locating all valves in gas and water lines.

END OF SECTION

SECTION 22 0 30

PIPE AND PIPE FITTINGS GENERAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Pipe

B. Pipe fittings

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 24 - Valves - General

C. Section 22 07 20 - Piping Insulation

D. Section 22 11 17 - Domestic Water Piping and Appurtenances

E. Section 22 13 17 - Soil, Waste, and Sanitary Drain Piping, Vent Piping, and Appurtenances

F. Section 22 13 18 - Condensate Piping

G. Section 22 14 01 - Roof Drainage Piping and Appurtenances

H. Section 22 15 14 - Compressed Air Piping (Shops)

I. Section 22 16 01 - Natural Gas Piping and Appurtenances

. Section 22 40 01 - Plumbing Fixtures and Fixture Carriers

K. Section 22 66 54 - Chemical Waste and Vent Piping

1.4 REFERENCES

A. ASME - American Society of Mechanical Engineers

B. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

C. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

E. UL - Underwriters Laboratory

F. NFPA 90A & NFPA 90B - Installation of Air Conditioning & Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems

G. CISPI-310 - Cast Iron Soil Pipe Institute

H. CSA - Canadian Standards Association

1.5 QUALIT ASSURANCE

A. Valves:
   1. All valves to be from a single manufacturer.

B. The welder, employed on this project, shall have passed qualification tests as prescribed by the National Pipe Welding Bureau, or other reputable testing laboratory using qualification procedures as recommended by the ASME Boiler Construction Code or the American Welding Society Standards.

1.6 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

B. Submit product data indicating dimensions, general assembly, and use.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. The type of pipe and fittings necessary for each system are specified in the section on that system.

2.2 DISSIMILAR MATERIALS

A. Use approved adapters such as Di-Electric Unions manufactured for making piping connections between dissimilar materials such as copper and brass or copper and steel.

2.3 ESCUTCHEONS

A. Usage:
   1. All exposed lines passing through floors, walls, and ceilings.

B. Material:
   1. Chrome plated steel

C. Flange size:
   1. As necessary to cover penetrated openings.

D. Plate size:
   1. As necessary to fit pipe or insulation and securely lock in place.

E. Manufacturer/Model:
   1. Engineered Brass Company, Type CF

2.4 SLEEVES

A. Application:
   1. Provide sleeves for all pipes and conduits which pass through a concrete slab, masonry wall/concrete wall, sheetrock wall (fire rated or not fire rated), roof, or other portion of the building structure.

B. Above Grade and/or dry locations:
   1. Material:
      a. 20 or 22-gauge galvanized steel.
   2. Size:
      a. As necessary to allow free passage of the insulated pipe.

C. Below Grade and/or moist locations:
   1. Material:
      a. ASTM D2665 Schedule 40 PVC. When PVC not allowed by code, use schedule 40 galvanized steel.
      b. Return Air Plenum:
         1) Schedule 40 galvanized steel.

D. Passing through fire-rated enclosures:
   1. Material:
      a. Galvanized or black steel pipe.
      b. Non-combustible.
      c. PVC will not be allowed.

E. Penetration Seal: (All Sleeved Penetration Locations- fire rated or non-fire rated)
   1. Seal penetration with 3M Fire Barrier Sealant CP 25WB or one-component ceramic fiber-based putty fill, void, or cavity material, UL rated material classified for use in through-penetration firestop systems nos. 124, 125, 150, and 151.
   2. Flame Spread/Smoke Contribution:
      a. 0/0 in accordance with ASTM E84.

2.5 VALVES, UNIONS, STOP COCKS, ETC.

A. Applications:
   1. Ball Valves:
      a. Provide accessible valves at each group of plumbing fixtures and at each piece of equipment on all piping systems for isolation of fixtures and equipment. All valves shall be full port valves.

B. All Other Valves, Unions, Stop Cocks, Etc.:
   1. Provide at each group of plumbing fixtures and at each individual fixture, at each piece of equipment, at all inlet and outlet connections for hot and cold water and gas.
   2. Provide Di-Electric Unions at connection of dissimilar pipe materials to prevent electrolysis.

C. Type:
   1. Suitable for 125 lbs. working pressure.

2.6 PIPE SUPPORTS

A. Hangers:
   1. 2 and Smaller Piping:
      a. May be split cast ring type with fastening device in walls and chases.
   2. Copper Piping:
      a. Copper plated ferrous hangers.
   3. All Other Above Ceiling Locations:
      a. Adjustable clevis type. Hangers to accommodate circumference of pipe and saddles.

B. Hanger Rods:
   1. Type:
      a. Minimum 3/8 inch diameter with machine threads.

C. Minimum Steel Hanger Rod Diameter for Individually Suspended Horizontal Pipes:
   1. 2 and smaller diameter pipe:
      a. 3/8
   2. 2-1/2 to 3 - 1/2 diameter pipe:
      a. 1/2
   3. 4 to 5 diameter pipe:
      a. 5/8
   4. 6 diameter pipe or larger:
      a. 3/4

D. Hanger Manufacturers:
   1. Anvil
   2. Elcen
   3. ERICO
   4. F&S Manufacturing
   5. Fee & Mason
   6. PHD

E. In wall pipe supports:
   1. Metal strut, manufactured pipe clamps

F. In wall pipe support manufacturer:
   1. Holdrite or Equivalent

G. Refer to Specification Sections 22 13 17 and 22 14 01 for void system requirements.

PART 3 EXECUTION

3.1 PIPE INSTALLATION

A. Install piping in a neat and workmanlike manner.

B. Install each of the piping systems to provide for expansion and contraction.

C. Solder all joints when the system is not under strain.

D. Expansion Offsets:
   1. Copper Piping:
      a. Use developed length Copper Tube Handbook 411-R as published by Copper Development Association, Inc.
   2. Steel Piping:
      a. Use developed per Carrier System Design Manual, Part 3 Piping Design.

E. Furnish necessary spring pieces and offsets as required.

F. Conceal all of the piping systems in chases, above ceilings, in walls, and in finished areas.

G. Run Exposed piping only in machinery spaces and unfinished areas as specified or as shown on the plans.

H. Install all necessary fittings and offsets to hold the piping close to walls and ceilings.

I. Where these lines run exposed, obtain a clearance from the Engineer in writing before making the installation.

. Install piping in the most advantageous manner possible with respect to headroom, valve access, openings, equipment clearances, and clearances for other work.

K. Give particular attention to piping in the vicinity of equipment.

L. Preserve the maximum access to various equipment parts for maintenance.

M. Do not cut or weaken any structural member.

N. Cut all pipes accurately to measurement determined at the site.

O. After cutting pipe, ream it to remove burrs.

P. Install piping neatly, free from unnecessary traps and pockets. Work into place without springing or forcing.

Q. Use fittings to make all changes in direction.

R. Field bending and mitering are prohibited.

S. Make all connections to equipment using flanged joints or unions.

T. Make reducing connections with reducing fittings only.

U. Do not allow piping to pass through or over designated electrical rooms or technology spaces.

V. Compression fittings are not allowed.

3.2 VALVES, UNIONS, STOP COCKS, ETC.

A. Locate all valves so that their bonnets may be easily removed.

B. Move all flange valves shown in horizontal positions so that valve stem is inclined one bolt hole above the horizontal position.

C. Make up all screwed pattern valves placed in horizontal lines so that their valve stem is inclined at an angle of 30 degrees above the horizontal position.

D. All valve stems must be true and straight at the time the system is tested for final acceptance.

E. Pack all valves and leave perfectly tight at the completion of the work.

F. Provide access doors as required for these valves.

G. Furnish locations of all access doors to the Architect/Engineer.

3.3 PIPING OINTS

A. Screwed Pipe oints:
1. Provide full cut pipe threads.
2. Assemble joints with an approved compound applied to only the male threads.
3. Leave a maximum of three pipe threads exposed where the joint is assembled.

B. Welded Pipe oints:
1. Fuse weld by using a metallic arc welding process.
2. Conform to the current recommendations of the American Welding Society for all welding operations.

C. Mechanical Coupling oints for Copper Systems:
1. Grooved-End-Tube Couplings: Ductile iron conforming to ASTM A536, Grade 65-45-12, coated with copper colored alkyd enamel. Housings cast with offsetting, angle-pattern bolt pads to provide rigidity. Coupling Gaskets: Grade “P” Fluoroelastomer compound with red and blue color code designed for operating temperatures from 0 deg F to 180 deg F.
   a. Center-leg gasket with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth.
   b. Installation Ready direct-push-installation.
   c. Reference shall always be made to the latest published Victaulic Selection Guide for Gaskets for proper gasket selection for the intended service.
   d. Basis of design Victaulic Style 607 or engineer approved equal.
2. Fittings: Fittings shall be manufactured to copper tubing sizes, with grooves designed to accept grooved end couplings of the same manufacturer. Fittings shall be wrought copper, conforming to ASTM B75/B75M alloy C12200 or ASTM B-152 alloy C11000 and ANSI B16.22, or bronze sand-casting ANSI B16.18 and UNS-C89836. Victaulic Copper Connection Fittings.

D. Solder oints:
1. Assemble with square cut pipe using a pipe cutter.
2. Hacksaw-cut pipe ends will not be acceptable.
3. Ream open pipe end to full size.
4. Burnish both the pipe and fitting absolutely clean.
5. Apply brazing flux to both the pipe and the fittings.
6. The use of corrosive acid flux will not be permitted.
7. Charge the pipe and fittings with nitrogen gas during the brazing.

E. Hubless Cast Iron Soil Pipe oints:
1. Make with an approved neoprene gasket and stainless steel retaining sleeve.
2. Mark no-hub gaskets with the manufacturer s name, ASTM C564, the word No-Hub , nominal diameter, and the CI symbol of the Cast Iron Soil Institute indicating it meets the standard.

3. Mark stainless steel couplings for no-hub All Stainless , name of manufacturer, words No-Hub , nominal diameter, and the CI symbol indicating it conforms to CISPI 310.
4. Install the hubless cast iron soil pipe systems in accordance with CISPI Pamphlet 100 - Installation Suggestions for CI No-Hub Pipe and Fittings.
5. Provide identifying markers for stainless steel couplings and neoprene gaskets to indicate compliance with CISPI 310.

F. Positive-Seal One Piece Elastomeric Compression-Type Gasket:
1. May be used for joining hub and spigot cast iron soil pipe as an alternate for lead or oakum joints or for drainage and waste system above and below ground.
2. Form the joint by inserting an approved gasket in the hub.
3. Lubricate the inside of the gasket and push the spigot end of the pipe into the gasket until seated, thus effecting a positive seal.
4. Use neoprene compression gaskets for cast iron soil pipe, marked as such, with ASTM C564 and the CI symbol of Cast Iron Soil Pipe Institute to indicate the gasket meets the standard.

G. PVC Pipe oints:
1. May be solvent cemented using the proper cement recommended for the particular materials.
2. Cut all pipe square and clean both pipe and fittings of all soil, dirt, oil, and grease.
3. Make solvent joints in accordance with the applicable ASTM Standards.
4. Allow joints to dry before testing.
5. If any leak occurs during the water test, then replace the defective joint.
6. Comply with requirements of the NSF Standard 14 for all solvent cements and primers and label to identify the laboratory certifying compliance for the particular cement and primer being used.
7. Plastic pipe and fittings for sewer and water pressure lines may also be joined by use of elastomeric (O-ring gasket) joints when the respective standards for the materials so specify. No-Hub fittings are not allowed on PVC sanitary sewer and storm drain piping under slab or underground.
8. Do not use pipes with cracked bells.
9. PVC pipe and pipe fittings are not allowed in any return air plenum serving mechanical systems. Use cast iron piping above slab for these installations.

3.4 SLEEVES

A. Above Grade and/or Dry Locations:
1. Walls:
a. Mount flush on both sides.
2. Floors:
a. Mount 2 inches above finished floor in pipe chases.

B. Below Grade and/or Moist Locations:
1. Install suitable flange in the center of wall or floor to form a waterproof passage.
2. Fill the void space around the pipe with jute twine or Oakum caulk or an asphalt based compound to insure a waterproof penetration.

C. Passing Through Fire-Rated Enclosure:
1. Fill the void space around the pipe in accordance with NFPA requirements.
2. Do not allow the sleeve installation to lower the fire rating of the assembly.

3.5 SECURING AND SUPPORTING OF PIPE

A. Support all pipe from the building structure by means of approved hangers and supports while maintaining required grade and pitch, preventing vibration, and providing for expansion and contraction.

B. Secure all hangers to approved inserts wherever possible.

C. Set hanger inserts in place when the concrete is poured.

D. If oists Are Used for Attachment:
1. 2 diameter or smaller:
a. May be attached to the bottom of joists.
2. Greater than 2 diameter:

a. Must be attached to the top cord of the joists.
3. Do not support any piping and trapeze hangers from joist bridging on roof and floor deck.

E. If Structural Steel Framing Is Used for Attachment:
1. Use approved beam clamps.
2. Where required, install channels to span between framing members.
3. Do not attach hangers to the roof deck or cross bracing.

F. Hanger Spacing:
1. Schedule 40 PVC Piping:
a. All Sizes:
1) 4 -0
2. Ferrous (Schedule 40) Piping:
a. 1/2 diameter pipe:
1) 6 -0 or less
b. 3/4 diameter pipe:
1) 8 -0 or less
c. 1-1/4 diameter pipe:
1) 10’-0” or less
d. Vertical:
1) Every Floor Level Minimum
3. Copper (Water Tube) Piping:
a. Smaller Than 1¼”:
1) 6 -0
b. 1 ½” and Larger:
1) 10 -0
c. Vertical:
1) 10 -0
4. Cast Iron Piping:
a. All pipe sizes:
1) One hanger per length of pipe and not exceeding 5 -0 O.C.
b. Vertical:
1) Every Floor Level Minimum

G. Vertical Lines:
1. Adequately support at their bases, either by a suitable hanger placed in the horizontal line near the riser or by a base fitting set on a pedestal or foundation.
2. Support from each floor slab by means of an approved clamp-type support which bears on the slab or beam.

H. Change of Direction:
1. Install supports within two feet of change of direction.
2. Brackets of approved type may be used along the walls.
3. Install hangers within 2 feet of each change in vertical or horizontal direction, pipe tees, and on each side of valves, strainers, etc.
4. Multiple horizontal pipes, smaller than 12 diameter pipe, may be supported on trapeze hangers. Space trapeze hangers in accordance with the schedule for pipe spacing based upon the smallest size pipe.
5. Properly size the trapeze members for the piping load they are to support. The number of pipes on the trapeze must be approved by the Engineer to prevent overloading of the building structure.
6. Where pipes are insulated, oversize the hanger accordingly to accommodate the outside diameter of the insulation. Provide half-round 16 gauge galvanized steel shields, not less than 12 long and rolled to fit the insulation diameter, between the insulation and the hanger.
7. When pipe is guided at top and bottom, cover the entire pipe circumference with metal shields.
8. Adhere metal shield to the insulation so that the metal will not slide with respect to the insulation.
9. Wood struts shall not be used to support piping in walls.

I. Refer to Specification Sections 22 13 17 and 22 14 01 for Plumbing Void Systems requirements.

3.6 EXCAVATION AND BACKFILLING

A. Excavation:
   1. Call utility companies before digging.
   2. Call Notifications Center before digging.
   3. Excavate trenches for underground piping to the required depths with bell holes being provided as necessary to ensure uniform bearing. Dig all bell holes after the trench has been graded.
   4. Refill excavation below the required grade of piping with fine granular material to the pipe grade.
   5. Where rock is encountered, excavate to a grade 3 inches below the lowermost part of the pipe and refill with fine granular materials to the pipe grade.
   6. Sheath, brace, pump or bail the trenches as required to protect workmen and structures and to permit execution of the work. A trench greater than 5 feet deep will not be permitted unless the sides are cut back at 45 degrees to 5 feet or less. If this cannot be accomplished, hire a Registered Engineer to design shoring.
   7. Install all underground piping below the frost line and in no case less than 18 inches below the surface.

B. Void System Under Piping:
   1. Refer to Specification Sections 22 13 17 and 22 14 01 for Plumbing Void Systems requirements.

C. Sand Embedment:
   1. Refer to Specification Sections 22 13 17 and 22 14 01 for Sand Embedment requirements for cast iron piping below slab.

D. Pea Gravel Embedment
   1. Refer to Specification Sections 22 13 17 and 22 14 01 for Pea Gravel Embedment for schedule 40 PVC piping below slab.

3.7 EQUIPMENT PLUMBING CONNECTIONS

A. Make all final connections to all pieces of equipment which require natural gas, water, drain, waste, or vent connections.

B. Provide all required shut-off cocks, valves, drain valves, and traps.

3.8 TESTING AND INSPECTION

A. Perform all tests as specified in Division 22 or as required by the Engineer or by the Local, Federal, and State Bureaus having jurisdiction and under their supervision during the progress and upon completion of work.

B. Include costs of all required tests in your bid.

C. Provide all apparatus, temporary pipeline, and all other requirements necessary for such tests.

D. Take all due precautions to prevent damage to the building or its contents incurred by such tests as the Contractor will be required to repay and make good any damage so caused at his own expense.

E. Immediately repair any leaks, defects, or deficiencies discovered as a result of the tests. Repeat until test requirements are in full compliance.

3.9 IDENTIFICATION OF PIPING AND EQUIPMENT

A. Mark all piping to show the service and direction of flow.

B. Place markers at each branch of tees, at equipment connections, and change of direction and at 20-foot intervals. Minimum of one (1) marker in each room.

C. Install valve tags on all valves.

D. Frame under glass cover and hang a typewritten list including the valve number, type of service, and location of each valve in the boiler mechanical room.

E. Mark all valve numbers corresponding to this system of identification on the as-built drawings which will be delivered to the Owner upon completion of the work.

END OF SECTION

SECTION 22 0 4

PLUM ING IDENTIFICATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Identification required for plumbing systems.

B. Code required identification not shown on plans nor specified herein shall be provided.

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 30 - Pipe and Pipe Fittings - General

1.4 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

B. Submit wording of nameplates with submittals.

C. Submit list of all products incorporated in this section.

1.5 REFERENCES

A. Comply with ANSI A13.1

B. USAS Code B31.8

C. NTSB-PSS-73-1

D. AGA

E. API

1.6 DESCRIPTION OF WORK

A. Provide signs for the following equipment identification:
   1. Water Heaters
   2. Piping
   3. Pumps
   4. Starters
   5. Valves

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Seton

B. Brady

C. Marking Services, Inc.

2.2 EQUIPMENT LABELS

A. Type:
1. Engraving-Stock, melamine plastic laminate, 3 layer.
a. Thickness:
1) Less than 25 square inches: 1/16 inch
2) 25 square inches or more: 1/8 inch

B. Color:
1. Black

C. Conform to FS L-P-287

2.3 LETTERING

A. Style:
1. Engraved standard print, unless otherwise indicated.

B. Size:
1. 3/16 inch to 1/4 inch

C. Color:
1. White letters, black background

2.4 SIGN INFORMATION

A. Plumbing Equipment:
1. Unit mark from Drawings/Owner
2. Voltage - Phase
3. Manufacturer and Model Number

2.5 NAMEPLATE FASTENERS

A. Securely attach nameplates to equipment with non-corroding stainless steel screws.

B. Non-corroding pop rivets are acceptable.

C. Stick-ons or adhesives will not be allowed.

2.6 PIPING AND CONTROL DIAGRAM SIGNS

A. Material:
1. 1/4 inch acrylic cover and backing screwed together with brass screw/bolts.
2. Size:
a. Minimum:
1) 12 x 17
b. Maximum:
1) 24 x 36

B. Provide a diagram in each mechanical room similar to the diagrams shown on the plans, and/or as required for the area served.

C. Provide pipe markers with the following features.
1. Letters from 1/2 to 3-1/2 :
a. Size letters to afford readability from the appropriate viewing position.
2. Repeated and reversed words for viewing from 360□around pipe.
3. Self-clinging, coiled markers that snap into place around pipe and do not require any other securement.
4. Integral directional arrows.

D. Letters on Field:
1. Identify the specific material conveyed, e.g., Domestic Cold Water , Domestic Hot Water , etc.

E. Model:
1. Less than 3/4 :
   a. Tags, same as Paragraph. Piping System Devices, color codes for hazard.
2. 3/4 up to 6 :
   a. Seton Setmark SNA snap-on.
3. Over 6 :
   a. Seton Setmark STR strap-on, with stainless steel spring straps.
4. Use Seton Ultra-Mark for outdoor use.

F. Piping System Devices (Valves, Thermometers, Pressure Gages, etc., and Pipe Less Than 3/4):
1. Identify with the following:
   a. Tags:
      1) Not less than 1-1/2 inch brass or aluminum tags, round, square, or octagonal.
   b. Stamp tags with minimum 1/2 high descriptive characters, 1/2 high numbers with black enamel-filled indentations.

G. Attachment:
1. Stainless steel or solid brass jack chain Seton A16, or stainless steel or brass S hooks

H. Underground Warning Tapes:
1. Provide materials that meet the codes or have the approvals listed below:
   a. Office of Pipeline Safety Regulation, USAS Code B31.8.
   b. GSA Public Building Service Guide Specification.
   c. National Transportation Safety Board Report NTSB-PSS-73-1.
   d. AGA Report 72-D-56.
   e. API Report API RP 1109.
2. Material:
   a. Plastic, continuous tape, color-coded, marked for hazard.
   b. For Non-metallic Piping System:
      1) Aluminum foil core encased in plastic.
   c. Metallic Piping:
      1) Plastic tape.
3. Color:
   a. Colored (not printed color) plastic, coded for material conveyed by piping.
4. Width:
   a. As scheduled for piping system burial depth.
5. Legend:
   a. Caution System Name Line Buried Below .
6. Tape Colors:

Utilit	**Colo**
Natural Gas, Oil, Dangerous Materials	Hi-Visibility Safety ellow
Communications	Safety Alert Orange
Water Systems	Safety Precaution Blue
Sewer Systems	Safety Green

7. Model:
   a. Metallic Piping System: Seton Polyethylene Tape.
   b. Non-Metallic Piping System: Seton Metallic Detection Tape.

I. Underground Gas Piping:
1. Attach No. 18 gauge copper tracer wire to the piping and terminate above grade at each end.

. Pipeline Markers for Pipe Beneath Pavement and Slabs:
1. Minimum 2 round, square, or octagonal, same as specified in Subparagraph: Piping System Devices.
2. Attachment:
   a. 1-1/2 screw, bolted to tag as anchor.

b. Anchor Setting Compound: Epoxy or epoxy grout, compatible with the pavement.

PART 3 EXECUTION

3.1 GENERAL

A. Contractor shall verify room numbers with Owner/Engineer before nameplates are fabricated.

B. The following shall be permanently and clearly identified:
1. Each valve and pump.

3.2 INSTALLATION

A. Install signs on non-removable panels. Attach to equipment with pop rivets or stainless steel screws.

B. Mount in an easily visible location.

C. All labeling identification shall conform to final room numbers. Coordinate with General Contractor, Architect , and Owner to secure construction room numbers.

D. Provide all additional signage required by local authority at no cost to the Owner.

E. Complete installation in accordance with ANSI A13.1 and manufacturer s installation instructions and with the Drawings. Fasten each unit securely in place with stainless steel screws.

F. Equipment Labeling:
1. Install on scheduled items of equipment, including the following:
   a. Water heaters
   b. Pumps
   c. Control panels and major control components
   d. Other items of equipment
   e. Include Mark Number and descriptive name from Drawing and Specification schedules
   f. Attach with corrosion resistant, stainless steel screws or pop rivets
   g. Install 1/2 diameter adhesive marker (color to be approved by Architect), and apply to T-bar below any mechanical equipment, valves, and fire dampers above lay-in ceilings.
2. Spacing:
   a. Where pipe passes through walls, floors, and other barriers.
   b. In Tunnel Vaults and Equipment Rooms:
      1) Maximum spacing, 10 feet closer where piping is congested, and where piping continuity is obscured from view.
   c. Piping in Tunnels:
      1) Maximum spacing 100 feet
   d. Other Places:
      1) Maximum spacing 50 feet

G. Piping System Color Coding:
1. Designate for painter the following:
   a. Types of piping services
   b. Direction of flow
   c. Other information required for proper identification.

H. Surfaces to be Painted:
1. Bare piping
2. Insulation covering of insulated piping

I. Paint according to the following schedule:

S te	**Pa tel Colo**
Exposed Domestic Cold Water	Blue
Waste and Vent	None
Exposed Gas Piping	Black

. Piping System Devices (Valves, Thermometers, Pressure Gages, etc.):
1. Identify with the following information:
   a. System
   b. Device number
   c. Device Function
2. Device Chart:
   a. Key devices to device chart
   b. Give complete description of device function and system.

K. Key devices to drawings as follows:
1. Floor plans
2. Schematic drawings of piping systems

L. Underground Warning Tapes:
1. Tape Widths:

Pi ing	**ial De t**	**Ta e idt**
10		2
20		3
27		6
30		9
40		12
50 or more		18

M. Recommended Tape Bury Depth:
1. Minimum Depth:
   a. 6 .
2. Distance Between Pipe and Tape:
   a. Minimum 12 .
3. Maximum Depth:
   a. 12 .

N. Tie tape to pipe where pipe leaves the ground.

O. Pipeline Markers for Pipe Beneath Pavement and Slabs.
1. Location:
   a. Accuracy:
      1) Plus or minus 6 from piping centerline.
   b. Flat Edge Pavement and Slabs:
      1) Set within 6 of pavement or slab edge.
   c. Concrete Curbs:
      1) Set in top of curb.
   d. Spacing:
      1) Each change in direction, each edge of pavement or slab, maximum spacing of 100 .

P. Legend:
1. Same as tags plus an engraved or stamped line set marker with line parallel to buried line.

Q. Attachment:
1. Drill hole for anchor bolt, full depth of bolt plus 1/2 set full tag and bolt in epoxy, flush with pavement or slab.

END OF SECTION

SECTION 22 0 20

PIPING INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Fiberglass insulation
   1. Applications:
      a. Above ground domestic cold water
      b. Roof drains
      c. Horizontal portions of waste lines above grade which receive condensate from air handling units
      d. Condensate drain lines
      e. Domestic hot water piping
      f. Hot water storage tanks
      g. Storm shelter water supply tanks

B. Closed Cell Insulation
   1. Closed cell insulation for piping in concrete masonry unit walls only.

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 11 17 - Domestic Water Piping and Appurtenances

C. Section 22 13 17 - Soil, Waste and Sanitary Drain Piping, Vent Piping and Appurtenances

D. Section 22 14 01 - Roof Drainage Piping and Appurtenances

1.4 SUBMITTALS

A. Product Data:
   1. Provide submittal data on all equipment specified in this section in accordance with Section 22 00 10, General Conditions, and Division 01.
   2. Submit product data indicating typical catalog of information.
   3. Submit product data sheets indicating dimensions, general assembly, and ratings.
   4. Submit manufacturer s installation instructions and method of application.

1.5 REFERENCES

A. Refer to Section 22 00 10 for complete names of references identified in this section.
   1. ASTM E84 - Fire and Smoke Ratings
   2. ASTM C547 - Standard Specifications for Mineral Fiber Pipe Insulation
   3. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)
   4. ASTM C795 - Standard Specifications for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
   5. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
   6. NFPA 255 - Surface Burning Characteristics of Building Materials
   7. UL 723 - Composite Surface Burning Characteristics

1.6 DEFINITIONS

A. Concealed:
1. Hidden from sight as in trenches, chases, furred spaces, walls, pipe shafts, or hung ceilings.

B. Exposed:
1. Not concealed as defined above. Normally open and visible to building occupants (such as gymnasiums).

1.7 QUALIT ASSURANCE

A. Fire Hazard Rating:
1. All insulation used on the project must have a flame spread rating not exceeding 25 and a smoke developed rating not exceeding 50 as determined by test procedures ASTM E84, NFPA 255, or UL 723. Insulation used in plenums must be listed and labeled as such.
2. These ratings must be tested on the composite of insulation, jacket or facing, and adhesive.
3. Components such as adhesives, mastics, and cements must meet the same individual ratings as minimum requirements.

B. Quality Controls:
1. All insulation shall be the product of reputable manufacturers.
2. All insulation shall be applied by mechanics skilled in the use of various materials, and in the employ of a concern regularly engaged in the insulating business. Submit qualifications of insulator with insulation submittals.
3. The materials shall be applied in accordance with the special materials as required by these specifications and by the manufacturer's standards.
4. Poor workmanship or appearance will be cause for rejection.

C. Insulations shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or polybrominated diphenyl ether fire retardants.

D. Fiberglass insulations shall have a minimum of 50 percent recycled glass content certified and UL Validated.

E. Fiberglass insulations shall have a bio-based, formaldehyde-free binder and be UL GREENGUARD Gold certified.

PART 2 PRODUCTS

2.1 GENERAL

A. Pipe covering insulation shall be manufactured for the sizes required for the particular system and shall be suitable for installation on piping systems defined.

2.2 PIPE INSULATION

A. Fiberglass Insulation Manufacturers:
1. ohns Manville
2. Knauf Insulation
3. Owens/Corning
4. Manson Insulation

B. Thickness:
1. Domestic Cold Water Piping:
a. 1 □ inch pipe diameter or smaller: □ inch thick
b. 1 □ inch pipe diameter or larger: 1 inch thick
2. Condensate Lines:
a. 1 □ inch pipe diameter or smaller: □ inch thick
b. 1 □ inch pipe diameter or larger: 1 inch thick
3. Waste Lines Which Receive Condensate:
a. 1 □ inch pipe diameter or smaller: □ inch thick

b. 1 □ inch pipe diameter or larger: 1 inch thick
4. Roof Drain Piping: 2inch
5. Domestic Hot Water Piping (Up to 140□F):
   a. 1 □ inch pipe diameter or smaller: 1 inch thick
   b. 1 □ inch pipe diameter or larger: 1 □ inch thick
6. Outdoor Piping: 2 inch

C. Construction for fiberglass insulation (Above ground and crawlspace):
1. Fiberglass preformed pipe covering insulation complying with ASTM C547, Type I (850 degrees F) or Type IV (1000 degrees F) ASTM C585, ASTM C411, ASTM C795, and UL/ULC Classified. Fiberglass bonded with a bio-based thermosetting resin.
2. Provide insulation with factory applied, white AS SSL, vapor retarder jacket complying with ASTM C1136. Thermal conductivity ASTM C 335 (k-value) at 75 degrees F mean temperature shall be 0.23 Btu x in. /h x sq. ft. x degrees F, or less. Service temperature range of 0 degrees F minimum to 1000 degrees F maximum.
3. Flame spread/Smoke-developed Rating (ASTM E84) of 25/50. Must be ULEnvironment GREENGUARD Gold certified and UL Validated Formaldehyde-free.

D. Closed Cell Insulation Manufacturers (for concrete masonry wall installations only):
1. Armacell
2. Aeroflex

E. Construction for Closed Cell Insulation (for concrete masonry wall installations only):
1. Type: EPDM Closed-cell flexible elastomeric foam pipe insulation
   a. Performance Criteria: Resistant to ultraviolet and biological degradation as demonstrated by ASTM G7 and ASTM G90.
   b. Temperature Range: -90□F to 220□F
   c. Water Vapor Permeability (Dry Cup): Less than 0.03 per inch when measured by ASTM E96/E96M.
   d. Thermal Conductivity: 0.25 BTU-IN/HR-F2-□F or less at 75□F mean temperature

2.3 FLANGE, VALVE, AND FITTING INSULATION

A. PVC Fitting Covers/ acket Manufacturers:
1. Proto LoSmoke PVC
2. eston PVC

B. Metal Fitting Cover/ acket Manufacturers:
1. RPR Products
2. Ideal Products

C. Exposed Piping:
1. Provide molded or mitered covers with full thickness matching adjacent covering.
2. Finish with white glass, reinforced white vapor barrier coating, or white .020-inch thick PVC jacketing with self-seal lap.

D. 2□ Inch Diameter and Larger Concealed Piping:
1. Insulate fittings and valves with molded or mitered fitting covers.
2. Finish with white vapor barrier coating reinforced with white 10 x 10 reinforced mesh.

E. 2 Inch Diameter and Smaller Concealed Piping:
1. Insulate fittings and valves with mineral wool and insulating cement to a thickness equal to or greater than adjoining straight pipe.
2. Molded or mitered fittings finished with white vapor barrier coating reinforced with reinforced mesh may be provided.

F. Underground Piping (hot water only):
1. Provide mitered covers with full thickness matching adjacent covering.
2. Field fabricated miter joints are not acceptable.
3. No insulation is required on underground domestic cold water piping.

G. Outdoor Piping:

1. Metal jacketing shall be 0.016 minimum aluminum or stainless steel with moisture barrier, secured in accordance with jacket manufacturer s recommendations.
2. Use preformed fitting covers matching jacket used on straight pipe, with all joints sealed with metal jacketing sealant.

2.4 SEALANT, ADHESIVE, AND FINISH

A. Sealant:
   1. Manufacturers:
      a. Foster 95-44
      b. Childers CP-76
      c. Vimasco Corporation
      d. Mon-Eco Industries
   2. Usage:
      a. Valve Covers
      b. Anchors
      c. Hangers
      d. Metal acketing
      e. Flashing Penetrations

B. Adhesive:
   1. Manufacturers:
      a. Foster 85-20/85-60
      b. Childers CP-127
      c. Vimasco Corporation
      d. Mon-Eco Industries
   2. Usage:
      a. Longitudinal laps of the vapor barrier jacket
      b. Butt joint covers.

C. Weather Barrier Mastic
   1. Manufacturers:
      a. Foster 46-50
      b. Childers CP-10
      c. Vimasco Corporation
      d. Mon-Eco Industries
   2. Usage:
      a. Used on above ambient piping/duct to protect insulation from weather.
      b. Use in conjunction with reinforcing mesh.

D. Vapor Barrier Coating:
   1. Manufacturers:
      a. Foster 30-33 Vapor Out
      b. Childers CP-33 Chil Out
      c. Vimasco Corporation
      d. Mon-Eco Industries
   2. Usage:
      a. Glass fabric reinforcement.
      b. Vapor stops.
      c. Completing factory installed vapor retarders.

E. Reinforcing Mesh
   1. Manufacturers:
      a. Foster Mast Afab
      b. Childers Chil-glass 10
      c. Vimasco Corporation
      d. Mon-Eco Industries
   2. Usage:
      a. Glass fabric reinforcement

2.5 INSULATION SHIELD

A. Field-fabricated:
   1. Material:
      a. High-density fiberglass insulation
   2. Construction:
      a. Insulation to support the bearing area at hangers and supports with a shield of galvanized metal extending not less than 4 inches on either side of the support bearing area, covering at least half of the pipe circumference. When pipe is guided at top and bottom, metal shields should cover the whole pipe circumference. Adhere metal shield to insulation so that metal will not slide with respect to insulation.
   3. Schedule:
      a. 3 and smaller pipe diameter:
         1) 12-inch insulated section, 18 gauge metal shield
      b. Greater than 3 pipe diameter:
         1) 12-inch insulated section, 16 gauge metal shield

B. Factory-made:
   1. Manufacturer:
      a. Pipe Shields, Inc. or equal.
   2. Type:
      a. Proper shield for service and pipe span.
   3. Construction:
      a. Extend insulation at least 1 inch beyond metal.

C. Insulation shall not compress at hanger.

PART 3 EXECUTION

3.1 SITE INSPECTION

A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers recommendations.

C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.2 PROPERTIES

A. Ensure that all pipe and fitting surfaces over which insulation is to be installed are clean and dry. Remove materials that will adversely affect insulation application.

B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.

C. Ensure that pressure testing of piping and fittings has been completed prior to installing insulation.

3.3 INSTALLATION

A. General:
   1. To ensure that it will achieve its highest possible performance and serve its intended purpose, install all insulation materials and accessories in accordance with manufacturer’s published instructions (latest edition) and industry practices detailed by the North American Commercial and Industrial Insulation Standards Manual (latest edition). Install insulation on piping subsequent to installation of heat tracing, painting, and acceptance tests.

2. Install insulation on piping subsequent to installation of heat tracing, painting, and acceptance tests.
3. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.
4. Maintain the integrity of factory-applied vapor barrier jacketing on all pipe insulation, protecting it against puncture, tears, or other damage. All staples used on cold pipe insulation shall be coated with suitable vapor barrier coating to maintain vapor barrier integrity.
5. All cold water, hot water, and condensate drains routed in concrete masonry units shall be insulated using closed cell insulation as noted in this specification.

3.4 PIPE

A. Insulation size shall match pipe size.

B. Insulation to be continuous through wall and ceiling penetrations.

C. Apply insulation to clean, dry pipes.

D. Butt insulation joints firmly together and apply butt strip. All pipe insulation terminations shall be tapered and sealed.

E. Butt pipe insulation against hanger inserts. Seal jacketing according to type used.

F. Seal longitudinal laps and butt strips with sealant in addition to the self-sealing laps.

G. Seal joints with adhesive and staple at 2 O.C. with outwardly clenching staples.

H. Seal all joints with vapor barrier coating.

3.5 VALVES, FLANGES, AND FITTINGS

A. Insulate all valves, flanges, and fittings with covers secured with Velcro with equivalent thickness and composition installation on straight pipes.

B. Finish with 1/4 inch layer of Foster 30-33 or Childers CP-33 reinforced with reinforcing mesh.

C. Factory made covers equal to Proto Corporation or eston are acceptable.

3.6 CONTROL VALVE COVERS

A. Fabricate special covers, complete with troweled-on vapor seal, shaped to accommodate the valve stem. Insulation thickness shall be same thickness as adjoining pipe.

B. Seal covers to valve insulation properly with adhesive so that the seal may be broken with a knife blade without damage to either part. Arrange so that cover can be removed and replaced as necessary for operation of the valve.

C. Finish valve cover with glass cloth and two coats of vapor barrier coating.

D. Factory made covers are acceptable. Provide submittal.

3.7 ROOF DRAIN PIPING

A. Seal vapor tight to prevent any moisture from entering into the insulation.

B. Roof drains for canopies do not require insulation.

C. Roof drains that are exposed shall be insulated as described in the paragraph on exposed piping.

D. Roof drain laterals which serve primary roof drains shall be insulated.

E. No insulation is required on concealed secondary roof drain piping.

F. Insulate all roof drain bodies (primary and secondary), first 3-feet of vertical pipe on secondary laterals, and primary roof drain piping to a point seven feet downstream of the first elbow.

3.8 WASTE LINES WHICH RECEIVE CONDENSATE

A. Insulate from the drain receptor (i.e. floor sink, hub drain) all the way to where the drain line changes to a vertical stack.

3.9 REPAIRS AND REPLACEMENT

A. Replace any insulation that gets wet, whether now dry or not.

B. Repair any damage caused by condensation due to improper insulating.

3.10 ALL EXPOSED PIPING

A. All exposed piping insulation to be pre-formed pipe insulation with white PVC jacket and white PVC fittings (no exceptions). All exposed roof drain primary and secondary downspouts, water piping, condensate piping, and any other piping that requires insulation shall be insulated down to the floor level using the pre-formed pipe insulation and PVC jackets and fittings.

3.11 OUTDOOR PIPING

A. Metal jacket shall be applied per manufacturer s recommendations. Longitudinal joints shall be applied so they will shed water completely and be sealed completely with 1/8” bead of metal jacketing sealant under each lap. Circumferential joints shall be closed using preformed butt strips in accordance with manufacturer s recommendations.

3.12 SHIELDS

A. Metal jacketing shall be 0.016-inch minimum aluminum or stainless steel with moisture barrier, secured in accordance with jacket manufacturer s recommendations. Use bands and seals of the same material. Use preformed fitting covers matching jacket used on straight pipe, with all joints weather sealed with 1/8” bead of metal jacketing sealant under each lap.

3.13 SHIELDS AND HANGERS

A. Piping hangers or anchors are not to be in direct contact with pipe. Hangers are to be on the outside of the insulation with pipe shields at each hanger.

B. At the location of hangers or supports for pipes run above ground and finished with a vapor seal insulation, provide rigid sections of cork, high density fiberglass, Foamglas, calcium silicate, or high density polyurethane, the same thickness as adjacent insulating material to adequately support the pipe without compression of the insulating material and cover with a vapor seal that is bonded to the adjacent insulation as described for fittings in the lines. Wood inserts shall not be allowed. Hangers and supports for piping insulation to receive a vapor barrier shall be installed exterior to the insulation.

C. Material Changes:
1. Wherever there is a change in materials on lines that are vapor sealed, apply a suitable adhesive that is compatible with both materials, tapes, etc., as required to maintain the vapor barrier.

D. Apply insulation around the hanger ring or anchor and pipe and carry vapor barrier upward and outward along the hanger rod or anchor members to a point not less than 12 inches from the adjacent pipe.

E. Take care to avoid puncturing the vapor seal.

F. Finish insulation as specified for flanges, and seal over adjacent vapor barrier jacket.

3.14 FIELD QUALIT ASSURANCE

A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

3.15 PROTECTION

A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

B. The insulation contractor shall advise the general and/or the mechanical/plumbing contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

END OF SECTION

SECTION 22 0 00

COMMISSIONING OF PLUM ING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

B. Division 01 Section Building Systems Commissioning .

1.2 SUMMAR

A. This section includes commissioning process requirements for Plumbing systems, assemblies, and equipment.

B. Related Section:
1. Division 01 Section Building Systems Commissioning for general commissioning process requirements.

1.3 DESCRIPTION

A. Refer to Division 01 Section “Building Systems Commissioning” for the description of commissioning.

1.4 DEFINITIONS

A. Refer to Division 01 Section “Building Systems Commissioning” for definitions.

1.5 SUBMITTALS

A. Refer to Division 01 Section “Building Systems Commissioning” for CxA’s role.

B. Refer to Division 01 Section “Submittals” for specific requirements. In addition, provide the following:
1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities.
3. O&M manuals
4. Test reports

1.6 QUALIT ASSURANCE

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer’s calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

A. Refer to Division 01 Section “Building Systems Commissioning” for requirements pertaining to coordination during the commissioning process.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout, and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the plumbing contractor of Division 22 shall ultimately be responsible for all standard testing equipment for the plumbing systems and controls systems in Division 22. A sufficient quantity of two-way radios shall be

provided by each contractor.

B. Special equipment, tools, and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 F and a resolution of or - 0.1 F. Pressure sensors shall have an accuracy of or - 2.0 of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

A. With assistance from the installing contractors, the CxA will prepare Functional Testing Forms for all commissioned components, equipment, and systems

B. Red-lined Drawings:
1. The contractor will verify all equipment, systems, instrumentation, wiring, and components are shown correctly on red-lined drawings.
2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
4. The contracted party, as defined in the Contract Documents will create the as-built drawings.

C. Operation and Maintenance Data:
1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.
3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

D. Systems manual requirements:
1. The Systems Manual is intended to be a useful information resource containing all of the information related to the systems, assemblies, and Commissioning Process in one place with indexes and cross-references.
2. The GC shall include final approved versions of the following information for the Systems Manual:
   a. As-Built System Schematics
   b. Verified Record Drawings
   c. Test Results (not otherwise included in Cx Record)
   d. Periodic Maintenance Information for computer maintenance management system
   e. Recommendations for recalibration frequency of sensors and actuators
   f. A list of contractors, subcontractors, suppliers, architects, and engineers involved in the project along with their contact information
   g. Training Records, Information on training provided, attendees list, and any ongoing training
3. This information shall be organized and arranged by building system, such as fire alarm, chilled water, heating hot water, etc.

4. Information should be provided in an electronic version to the extent possible. Legible, scanned images are acceptable for non-electronic documentation to facilitate this deliverable.

3.2 CONTRACTOR S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meetings.

C. Participate in Plumbing systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

D. Provide information requested by the CxA for final commissioning documentation.

E. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

F. Prepare preliminary schedule for Plumbing system orientations and inspections, operation and maintenance manual submissions, training sessions, equipment start-up, and task completion for owner.

G. Update schedule as required throughout the construction period.

H. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CxA.

I. Assist the CxA in all verification and functional performance tests.

. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

K. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.

L. Participate in, and schedule vendors and contractors to participate in the training sessions.

M. Provide written notification to the CM/GC and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
   1. Service Water Heating Systems and components such as hot water heaters, circulation pumps, and controls.

N. The equipment supplier shall document the performance of his equipment.

O. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.

P. Provide training of the Owner’s operating staff using expert qualified personnel, as specified.

Q. Equipment Suppliers
   1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
   2. Assist in equipment testing per agreements with contractors.
   3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

R. Refer to Division 01 Section “Building Systems Commissioning” for additional Contractor responsibilities.

3.3 OWNER’S RESPONSIBILITIES

A. Refer to Division 01 Section “Building Systems Commissioning” for Owner’s Responsibilities.

3.4 DESIGN PROFESSIONAL S RESPONSIBILITIES

A. Refer to Division 01 Section “Building Systems Commissioning” for Design Professional’s Responsibilities.

3.5 CXA S RESPONSIBILITIES

A. Refer to Division 01 Section “Building Systems Commissioning” for CxA’s Responsibilities.

3.6 TESTING PREPARATION

A. Certify in writing to the CxA that Plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify in writing that testing procedures have been completed and that testing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

F. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.7 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Plumbing testing shall include the service water heating system.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Tests will be performed using design conditions whenever possible.

E. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

F. The CxA may direct that set points be altered when simulating conditions is not practical.

G. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the Plumbing system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.8 PLUMBING S STEMS, SUBS STEMS, AND EQUIPMENT TESTING PROCEDURES

A. Functional Performance Tests: The CxA may modify these procedures during the Construction Phase once all systems are known and all required documentation has been provided.

B. Plumbing Instrumentation and Control System Testing: Assist the CxA with preparation of testing plans.

3.9 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT

A. Refer to Division 01 Section “Building Systems Commissioning” for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.10 APPROVAL

A. Refer to Division 01 Section “Building Systems Commissioning” for approval procedures.

3.11 DEFERRED TESTING

A. Refer to Division 01 Section “Building Systems Commissioning” for requirements pertaining to deferred testing.

3.12 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.

B. Refer to Division 01 Section “Building Systems Commissioning” for the AE and CxA roles in the Operation and Maintenance Manual contribution, review, and approval process.

END OF SECTION

SECTION 22 11 1

DOMESTIC ATER PIPING AND APPURTENANCES COPPER

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Domestic hot water piping.

B. Domestic cold water piping.

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 24 - Valves - General

C. Section 22 05 30 - Pipe and Pipe Fittings - General

D. Section 22 33 34 - Access Doors

E. Section 22 40 01 - Plumbing Fixtures and Fixture Carriers

1.4 REFERENCES

A. ASTM 763 - Standard Specification for Copper Alloy Sand Castings for Valve Applications

B. ASTM 61 - Standard Specification for Steam or Valve Bronze Castings

C. ASTM C27450 - Standard Specification for Brass Rod, Bar & Shapes

D. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges & Pipe Fittings

E. ASTM A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications

F. ASTM - American Society of Testing Materials

G. ASTM B813 - Standard Specification for Liquid & Paste Fluxes for Soldering of Copper & Copper Alloy Tube

H. ASTM B828 - Standard Practice for Making Capillary oints by Soldering of Copper and Copper Alloy Tube and Fittings

I. ASTM B88 - Standard Specification for Seamless Copper Water Tube

. PDI - Plumbing & Drainage Institute

K. ANSI/NSF 61

1.5 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

B. Submit product data sheets.

PART 2 PRODUCTS

2.1 UNDERGROUND PIPING

A. Type:
1. 2 Inch Diameter and Smaller:
a. Type L soft drawn commercially pure copper
2. 2□ Inch Diameter:
a. Type L hard drawn commercially pure copper
3. 3 Inch Diameter or Larger:
a. Type L hard drawn commercially pure copper

B. All copper meets ASTM B88 Standards.

2.2 UNDER SLAB PIPING

A. Type:
1. 2 Inch Diameter and Smaller:
a. Type K soft drawn commercially pure copper
2. 2□ Inch Diameter and Larger:
a. Type K hard drawn commercially pure copper

B. No joints will be permitted in piping runs beneath concrete slabs. All joints shall be made in accessible areas above the slab (behind access doors in walls, in mechanical closets, etc.).

C. All copper meets ASTM B88 Standards.

2.3 INTERIOR PIPING

A. Type:
1. Type L hard drawn commercially pure copper.

B. All copper meets ASTM B88 Standards.

2.4 PIPE FITTINGS

A. Copper Piping:
1. Unions:
a. 150 lb. standard, 300 lb. water-oil-gas service copper with ground joints.

B. Dissimilar Metal:
1. Di-Electric Unions

2.5 PIPE OINTS

A. Copper Piping:
1. Type: Solder fittings
a. Solid string, hard solder
b. Wire, hard solder
c. Cored solder will not be allowed
2. Type: Grooved
a. Coupling Gaskets: Grade “P” Fluoroelastomer compound with red and blue color code designed for operating temperatures from 0 deg F to 180 deg F.
b. Center-leg gasket with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth.
c. Installation Ready direct-push-installation
d. Reference shall always be made to the latest published Victaulic Selection Guide for Gaskets for proper gasket selection for the intended service.
e. Basis of design Victaulic Style 607 or engineer approved equal
3. Type: Press-connect fittings

a. Copper and copper alloy fittings with EPDM elastomeric sealing element.
b. Unpressed fittings shall leak and not hold pressure.
c. Press connect fittings may not be used on elbow at main water entry under slab. Use Silfos sweat fittings on all elbows on main water entry.

4. Approved Manufacturers:
   a. Viega ProPress
   b. Nibco
   c. Mueller Industries Streamline PRS
   d. Apollo
   e. Merit Brass
5. Material:
   a. Solder (1½" and Smaller):
      1) 95-1/2 tin, 4 copper, and 1/2 silver
   b. Solder (2" and Larger):
      1) "SILFOS15", 15 silver, 80 copper, 5 phosphorous
   c. Flux:
      1) Non-corrosive, lead-free paste
6. Use a cast brass adapter when connecting copper pipe to screwed brass pipe.
7. Brand:
   a. Silvabrite or similar brand

B. Conform to ASTM B813 and ASTM B828.

2.6 VALVES

A. Type:
1. Check Valves:
   a. 125 lb. bronze check valve with Buna-N disc.
2. Ball Valves:
   a. 150 psi, bronze 1/4 turn ball valve with full port, stainless steel ball.
   b. 300 psi, bronze 1/4 turn ball valve with full port, stainless steel ball. ASTM 61
   c. 125 psi, lead-free dezincification resistant arsenical brass □ turn ball valve with full port, stainless steel ball C46500 or CW 511L, ASTM 763, or C46750.
3. Temperature and Pressure Relief Valves:
   a. ASME rated valve
4. Copper Grooved Butterfly Valves:
   a. Valves 2-1/2 - 6 , 300 psi (2065 kPa) maximum pressure rating, with copper tubing sized grooved ends. Cast bronze body to UNS C87850. (Alloy code shall be cast or stamped into the valve body.) Elastomer encapsulated ductile iron disc, ASTM A536, Grade 65-45-12, with integrally cast stem. Bubble tight, dead-end, or bi-directional service, with memory stop for throttling, metering, or balancing service. Valve may be automated with electric, pneumatic, or hydraulic operators. Basis of design Victaulic Series 608 or engineer approved equal.
5. Balancing Valves:
   a. All domestic cold water and hot water balancing valves 2" down will be s NSF Certified in accordance with ANSI/NSF 61 for cold 73□F/ 23□C and hot 180□F/ 82□C potable water service and ANSI/NSF 372. Valves ½" to 3/47" will have removable flow cartridge that limits flow within /-5 of flow range. Basis of design Victaulic 76X or 78BL or engineer approved equal.
6. Gate Valves:
   a. 125 lb. rising stem, double-disc bronze gate valves larger than 3 inches.
7. Water Main Valves:
   a. 150 lb. AWWA valve.
   b. 300 lb. bronze sealed spring cage, strainer
8. Cast Iron: ASTM A126, Class B
9. Cast Carbon Steel: ASTM A126, Grade WCB
10. Forged Carbon Steel: ASTM A105/A105M, Grade II
11. Backflow Preventers: Refer to Section 22 40 01 - Plumbing Fixtures and Fixture Carriers.

B. Manufacturers:
1. Apollo

2. Crane
3. Grinnell
4. enkins
5. omar, T-100NGD
6. Kennedy
7. Milwaukee Valve Company
8. Nibco
9. Stockham
10. Walworth
11. Watts
12. Hammond
13. Kitz
14. Victaulic

C. Provide valves where required to adequately control and isolate the various domestic water piping systems.

D. Provide valves at the connection point of all equipment.

E. Provide Di-Electric Unions at connection of dissimilar metal.

2.7 CONSTRUCTION

A. Provide valves designed for repacking under pressure when fully opened.

B. Equip with packing suitable for intended service.

C. Furnish with gland followers.

D. Provide valves rated greater than the design temperature and pressure for the intended system.

E. All domestic cold water and hot water valves 2 and less shall be full port ball valves.

2.8 WATER HAMMER ARRESTORS

A. Water Hammer Protective Devices:
1. Usage:
a. Provide on hot and cold water supply lines. Locate between last two flush/solenoid valves on supply lines or per manufacturer's recommendations.
b. In single toilets locate within 3 feet of fixture or per manufacturer's recommendation.
2. Type:
a. As recommended by the manufacturer for the particular application.
b. Locate arrestor on shop drawings with size.
3. Manufacturer/Model:
a. Wade Shokstop
b. Sioux Chief "Hydra-Rester"
c. PPP "SC Series"
d. Mifab "MWH Series"
4. Air chambers are not allowed.

2.9 FREE E PROTECTION HEAT TRACE AND DOMESTIC HOT WATER LA OUT FORICC (IECC)-2015

A. Freeze Protection Heat Trace Tape:
1. Usage:
a. Provide on hot and cold water supply lines where freezing of the piping is a concern.
2. Type:
a. Self-regulating heating cable, 5 watt per liner foot. Provide control panel and all necessary controls and wiring.
3. Manufacturer/Model:
a. Raychem XL-Trace

B. Domestic Hot Water Layout for ICC (IECC)-2015:

1. Usage:
   a. At all sinks/lavatories associated with water closets and/or urinals and handwashing lavatories in kitchens require the domestic hot water circulation loop will be routed down in wall to within two feet of the faucet, routed horizontally for multiple sinks/lavatories, then routed back up to above ceiling in order to meet the 2015 International Energy Conservation Code.

PART 3 EXECUTION

3.1 INSTALLATION

A. All products to comply with ANSI/NSF 61.

B. Install in accordance with the plans and Section 22 05 30.

C. Drainage:
   1. Minimum Slope:
      a. 1/8 inch per 10 feet.
   2. Where constant pitch cannot be maintained for long runs, establish intermediate low points and rise to higher level.
   3. Slope branches to drain toward mains or risers.
   4. Terminate low points of risers with drain valve piped to nearest hub or floor drain unless otherwise indicated.

D. Water Hammer Arrestors:
   1. Install in accordance with PDI-WH 201.

E. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.

F. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.

G. See the latest copy of the manufacturer's Field Assembly and Installation Instruction Pocket Handbook (I-100).

3.2 VALVES

A. All valves, trap primers, etc. that are located behind access doors shall be located directly behind door and within 24" of plane of door.

3.3 INSTALLATION

A. ProPress elbow is not acceptable on water supply elbows at location of main water stub up. Use SilFos sweated fittings on all water supply elbows larger than 2". 2" water supply line can be soft drawn copper with no elbow.

B. Install valves and stops in accessible locations.

C. Provide where shown or as required to make system complete and readily maintained.

D. Plumbing contractor to provide strainers, spools (for future pressure reduction valve), associated cut-off valves, reduced pressure zone, and flood control valve at all building main water entry backflow preventer assemblies. Also, route drain from the backflow preventer (RP) to the exterior of the building.

E. Isolation valves shall be located:
   1. Restroom Gang - Above lay-in ceilings adjacent to gang restrooms. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valves.
   2. Individual (private) Restrooms - Above lay-in ceilings adjacent to restroom. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valve.
   3. Individual Fixtures - Above lay-in ceilings adjacent to restroom. When hard ceilings are present provide 18"x18" (minimum) ceiling access panel to access valve

4. Isolation valves on the domestic cold water shall be provided in corridors to allow isolation of buildings wings, sections, and areas.
5. Provide cut-off valve on main water entry upstream of strainer and backflow preventer (if backflow preventer is inside building).
6. Each exterior wall hydrant and each roof hydrant shall be provided with an accessible cut-off valve.

F. Press fitting manufacturer shall provide a duplicate set of all tools required to maintain and/ or modify press fittings. Required tools are to be given to the owner. One set of tools shall be provided for each campus.

3.4 FIELD QUALIT CONTROL

A. Properly test water distribution systems with 80 PSI hydrostatic pressure test.

B. Do not install trap primers, flush valves, or other pressure sensitive devices until all tests are completed.

C. Repair all leaks in pipes, fittings, and accessories during this test period.

D. Repeat 80 PSI hydrostatic test until no leaks are found for an entire 8-hour period.

E. Make joints in accordance with ASTM B828.

F. A factory trained field representative (direct employee) shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products.

3.5 STERILI ATION

A. Solution:
1. Strength:
a. Minimum 50 parts per million
2. Agents:
a. Liquid Chlorine:
1) Conform to U.S. Army Specification 4-1
b. Calcium Hydrochloride:
1) Federal Specification O-C-114
c. Chlorinated Lime:
1) Federal Specification O-C-114

B. Procedure:
1. Perform sterilization after testing has been satisfactorily completed.
2. Pump solution into a 1/4 inch opening provided in the water main next to the water meter.
3. Conduct the sterilization process under the direction of the local health department.
4. After sterilization, flush the system with clean water until the residual chlorine content is less than 3 ppm.
5. After flushing, the local health department will test and verify the cleanliness of the system.

3.6 PLUMBING SCHEDULE

A. Minimum Size:
1. Water Closets (flush valve):
a. 1-1/4 cold water
2. Urinals:
a. 3/4 cold water
3. Sinks:
a. 1/2 cold water, 1/2 hot water
4. Mop & Service Sinks:
a. 1/2 cold water, 1/2 hot water
5. Hose Bibbs:
a. 3/4 cold water
6. Drinking Fountains:
a. 1/2 cold water

7. Lavatories:
   a. 1/2 cold water, 1/2 hot water

3.7 EMCS FLOW SENSOR

A. EMCS contractor to furnish flow sensor (full water main size) and the plumbing contractor to install inside the building downstream of the backflow preventer (RP) or downstream of the initial water main stub up inside the building if the backflow prevention device is located in the yard. EMCS contractor to make all necessary connections for EMCS interface.

END OF SECTION

SECTION 22 13 1

SOIL ASTE AND SANITAR DRAIN PIPING VENT PIPING AND APPURTENANCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Drain and vent piping within the building and underground laterals.

B. Pea gravel embedment for schedule 40 PVC piping below slab.

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 11 17 - Domestic Water Piping and Appurtenances

C. Section 22 13 18 - Condensate Piping

D. Section 22 33 34 - Access Doors

E. Section 22 40 01 - Plumbing Fixtures and Fixture Carriers

F. Section 22 66 54 - Chemical Waste and Vent Piping

1.4 REFERENCES

A. Refer to Section 22 00 10 for complete names of references identified in this section.
   1. Commercial Standard CS-188-59
   2. ASTM D2665 - Standard Specifications for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

1.5 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

B. Submit product data on pipe, pipe fittings, trap primers, covers, cleanouts, etc.

PART 2 PRODUCTS

2.1 DRAIN PIPE AND FITTINGS

A. Material: (Pipe material for above and below slab for ducted return mechanical system)
   1. Schedule 40 PVC pipe and fittings conform to ASTM D2665.
   2. “Foam Core PVC” not allowed.

2.2 VENT PIPE AND FITTINGS

A. Material: (Pipe material for above and below slab for ducted return mechanical system)
   1. Schedule 40 PVC pipe and fittings conform to ASTM D2665.

2.3 CLEANOUTS

A. Size:
   1. Identical with the line size up to a maximum diameter of 4 inches.

B. Type:
   1. Compatible with the surrounding floor/wall.

C. Manufacturers:
   1. ay R. Smith
   2. osam
   3. Mifab
   4. Sioux Chief
   5. Wade W-6000
   6. urn

2.4 PLUGS

A. Wade 8590, Tapped brass cleanout plug only. PVC plugs not allowed.

B. Applications:
   1. Each change in direction of soil lines
   2. End of each continuous waste line
   3. Foot of each riser within the building
   4. 50 ft. intervals in interior horizontal lines

C. Construction: Secure covers with vandal-proof screws

D. Finished Floors:
   1. Covers: Chromium-plated, flush mounted, cast bronze with scoriated top surface.

E. Walls/Painted Surfaces:
   1. Covers:
      a. Furnish stainless steel covers.

F. Exterior Locations:
   1. Traffic Areas:
      a. Covers: Flush mounted, cast bronze covers with scoriated top surface
   2. Non-Traffic Areas:
      a. Encase in a 14 x 14 x 6 concrete pad
      b. Manufacturer/Model:
         1) Wade W-8500 series

2.5 CLOSET FLANGE

A. Size: 4” to match sanitary sewer piping.

B. Type:
   1. PVC or cast iron to match sanitary sewer piping.
   2. PVC flanges to be provided with stainless steel ring for reinforcement.
   3. Offset toilet flanges are not allowed.

C. Manufacturer:
   1. Oatley or equal

2.6 TRAP PRIMERS - AUTOMATIC

A. Type:
   1. Fully automatic valve with diaphragm operated piston.

B. Size:
   1. Inlet:
      a. 1/2 inch
   2. Outlet:

a. 1/2 inch

C. Features:
1. Activated by a pressure drop.
2. No adjustment required.
3. Equipped with distribution unit for 1 to 4 traps.
4. Can be located anywhere in an active cold water line of 1□ inch or less that is directly serving one or more flush valves.
5. Provide copper tubing (type K) from trap primer to protected trap.

D. Application:
1. Provide automatic trap primers at all floor drains and floor sinks on entire project that are within 20 feet of a water closet supply line.
2. Provide a minimum of one union on each side of each trap primer, unless a means of detaching the trap primer is provided integrally in the trap primer, in which one union is permissible.

E. Manufacturer/Model:
1. Precision Plumbing Products, Inc. PO-500.

F. Furnished with AG-500 air gap fitting with alignment legs.

2.7 TRAP PRIMERS - ELECTRONIC

A. Type:
1. Fully electronic trap primer valve.

B. Size:
1. Sized per manufacturer according to the number of trap primer tie-ins required.

C. Features:
1. Atmospheric vacuum breaker
2. Pre-set 24-hour adjustable timer
3. Manual override switch
4. 120 volt electrical
5. 3/4 inch FNPT connection
6. Calibrated manifold for equal flow (total as required)
7. Flush mount cabinet

D. Application:
1. Provide electronic trap primer systems as noted on the drawings. Coordinate with the electrical contractor.
2. Allow one foot of elevation for every 20 foot of trap primer supply line.
3. Provide a minimum of one union on each side of each trap primer system, unless a means of detaching the trap primer is provided integrally in the trap primer, in which one union is permissible.

E. Manufacturers:
1. Precision Plumbing Products, Inc. Model PT (coordinate the number of outlets required).
2. Furnished with flush mount cabinet with Model D-1416 access door.

2.8 TRAP PRIMERS - FLUSH VALVE AUTOMATIC

A. Type:
1. Fully automatic flush valve primer

B. Size:
1. Inlet
a. 1/2 inch
2. Outlet
a. 1/2 inch

C. Features:
1. Activated by flush valve operation

2. No adjustment required
3. Equipped with distribution for one trap
4. Provide copper tubing from flush valve trap primer to protected trap.
5. Include vacuum breaker with flush valve primer assembly.

D. Application:
1. Provide flush valve automatic trap primers at all floor drains and floor sinks on entire project that are within 20 feet of a water closet supply line.

E. Manufacturer/Model:
1. Precision Plumbing Products, Inc. FVP-1VB
2. Flush valve manufacturer (if applicable).

2.9 3/8 INCH PEA CLEAN PEA GRAVEL FOR SCHEDULE 40 PVC PIPING BELOW SLAB

A. Provide 3/8” clean pea gravel aggregate as backfill for all schedule 40 PVC piping below slab. Provide a minimum of 6 inches of pea gravel cover over pipe and under pipe. Compact to 85 to 95 .

2.10 EXPOSED INDIRECT WASTE LINES IN KITCHENS AND CONCESSIONS

A. All exposed indirect waste lines in kitchens and concessions to be DWV copper material. All joints to be soldered and turned down with elbow above floor sink or hub drain (discharge below elbow to be cut at 45-degree angle).

PART 3 EXECUTION

3.1 INSTALLATION

A. Location:
1. Install a 12-gauge copper tracer wire on all underground sewers outside of building.

B. Slope:
1. Desired: 1/4 inch per foot
2. Minimum:
a. 1/8 inch per foot for diameter of 4 inch and larger if approved by local authority and it is impractical to use 1/4 inch per foot.

C. Drain Pipe and Fittings:
1. Reduction fittings:
a. Use to connect two pipes of different diameter.
2. Directional changes:
a. Use 45-degree wyes, long sweep quarter bends, and sixth, eighth, and sixteenth bends. Sanitary tees may be used on vertical stacks. Use long sweeps at all locations sanitary tees are used.
b. Embed pipe on sand cushion approximately 2 pipe diameters below (minimum 4”) and at least one diameter on each side and top in trench.
c. No hub couplings of any type cannot be used underground.

D. In kitchens install schedule 40 cast iron pipe and fittings from dishwasher, braising pans, and steamer discharges to grease interceptor inlet. All fittings picking up PVC branches along the way must be schedule 40 cast iron, as well.

E. Crawlspace Location:
1. All pipe to be suspended from structure with hangers.

F. Traps:
1. Provide at each fixture unless a trap is built into the fixture.
2. Provide a deep seal trap and trap primers at each floor drain and hub drain.
3. Place traps so that the discharge from any fixture will pass through only one trap before reaching a building drain.
4. Place each trap as near to the fixture as possible. Do not exceed the distances stated in the governing codes up to a maximum of 8 feet.

G. Trap Guards:
1. Install per manufacturer's recommendations.

H. Trap Primers:
1. Provide trap primers at all floor drains, floor sinks and hub drains on entire project.
2. Provide unions on each side of trap primer for service.
3. Manufacturer shall provide field start-up and review of installation on trap primers.
4. Use PEX tubing

I. Hub Drains:
1. Install with the top of the hub 1/2 inch above the finished floor, unless otherwise shown on the drawings.

. Cleanouts:
1. See table below for cleanout requirements whether shown on plans or not.
2. Install so that they open in a direction opposite to the pipe flow or at a right angle.
3. At all wall cleanouts, install tapped brass cleanout plug behind wall escutcheons.
4. Install vertically above the flow line of the pipe for wye branch and end-of-line cleanouts.
5. Place cleanouts above the floors in pipe chases so that they will be accessible through doors or bring through a wall and provide with flush covers.
6. Set cleanouts flush in floor slabs.
7. Place cleanouts in accessible locations. Exact locations of each shall be approved by the Architect before installation. Locate all cleanouts within 2-feet of access door or cover.
8. Location of all cleanouts shall be shown on the shop drawings.

INTERIOR AND EXTERIOR CLEANOUTS		
LOCATION	**DESCRIPTION**	**ACCESSORIES**
Interior horizontal drain lines.	Every 100'-0" (O.C.)	All cleanouts in walkways and floors to have scoriated non-slip cover.
Change in direction of the building drain.	At the change in direction greater than 45 degrees. If multiple changes in direction occur in a maximum of 40 feet only one cleanout is required (at the first change in direction	
Base of stack.	A cleanout shall be provided at the base of each waste or soil stack.	Provide with access door or escutcheon. No more than 2 inches from cleanout.
unction of building drain and building sewer.	Provide a two-way cleanout exterior of building at junction of building drain and sewer.	Two-way cleanout to be installed per detail with concrete cover.
Concealed piping cleanouts.	Cleanouts on concealed piping or under a floor less than 24 inches in height must extend up through the finished wall or floor.	Provide with scoriated non-slip cover.

9. All cleanouts must be the same size as the piping they serve. On all lines larger than 4 inches, the cleanout shall not be less than 4 inches.
10. Cleanouts up to 4 inches in diameter must have 18-inch clearance. All cleanouts larger than 4 inches must have 36-inch clearance.
11. Access shall be provided at all cleanouts.
12. All cleanouts shall have long radius sweeps at change in direction to allow the insertion of the plumbing snake for cleaning purposes. Short radius fittings will not be allowed.
13. Provide wall cleanout after last plumbing fixture and in the ADA stall. Wall cleanout to be installed 12" above the flood rim of the ADA water closet.

K. Plugs:
1. Install temporary plugs in all open sanitary drain pipes during construction to prevent any foreign objects from entering the pipe.
2. All floor drains to have plugs until substantial completion.

L. Vent Piping:
1. Connections:
   a. Connect two or more vents together and extend as one vent through the roof, where practical.
   b. Make vent and waste connections to stacks by using 45-degree wyes, long sweep quarter bends, sixth, eighth, or sixteenth bends. Sanitary tees may be used on the vertical stacks.
2. Flashing:
   a. Use minimum 10-inch square, 4-pound lead flashing.
   b. Flange the flashing to the lead sleeve.
   c. Extend the flashing up and around the vent pipe.
   d. Turn the flashing down inside the pipe at least 2 inches to make an absolutely watertight joint.
   e. For single-ply rooftop systems, flash according to the roofing specifications.
3. Location:
   a. Do not locate any vent within 15 feet of an outside air intake.
4. Mop Sinks:
   a. Mop sinks to be installed after substantial completion.
5. Termination:
   a. 12 inch above roof deck or 2 inch above parapet, whichever is greater.

3.2 TESTING

A. Temporarily plug sanitary drain piping.

B. Fill the pipes with water.

C. Test the system in sections so that no section has a pressure less than 10 feet of water.

D. If the level of water has been decreased by leakage after a 24-hour period, then locate and repair all leaks.

E. Repeat the test until there is no perceptible decrease in the water level over a 24-hour period.

F. Sewer Pressurization Test:
1. Provide smoke pressure test after plumbing top out/before sheetrock is installed and again at substantial completion.
2. All smoke test on the sanitary sewer system is to be performed before ceiling tiles are installed, no exception.
3. After all water tests are complete, perform smoke test to ensure there are no air leaks in building. Fill all p-traps with water and temporarily cap all vents prior to testing.
4. Procedure for Plumbing Sewer Pressurization Test Using a Visual Smoke Indicator:
   a. Contact your local city water department, some cities may provide and supervise a smoke test for your facility.
   b. Prior to the test, notify the local fire and police departments that you are conducting a smoke test of the facility.
   c. Prior to the test, turn off the fire alarms. The smoke will activate the alarm. After the test is complete the building will have to be ventilated to clear smoke and then the alarm can be reactivated.
   d. ou are required to have a blower with adjustable pressure control and liquid smoke or white smoke bombs.
   e. Inflatable ball stops are required to block off the sewer line at the building manhole that connects to the city sewer main line.
   f. All sewer vents on the facility have to be sealed to properly conduct the test. (Duct tape over the openings is acceptable.)
   g. Ladders, portable lights, two-way radio communication, and standard hand tools are required for access above ceilings, floor drains, etc.
   h. A minimum of three helpers are required to conduct the test.

i. Prior to the test, identify rooms or problem areas that should be observed first. Plumbing drawings are required to identify the locations of vents, traps, restrooms, etc.
j. This test will pressurize the sewer piping (approximately 1.25" S.P.) and identify any deficiencies.
k. If there are questions, contact EMA Engineering & Consulting: Phone 903-581-2677.

5. Provide TV video of all main sanitary sewers in building and to city main. Notify Owner's representative when video is to be made 48 hours prior to work.

G. ob Photographs:
1. Contractor is to provide digital photographs of all pipe showing sand embedment prior to covering trenches.

3.3 PLUMBING BRANCH SCHEDULES

A. Minimum size:
1. Water Closets (flush valve):
a. 3 waste, 2 vent
2. Urinals:
a. 2 waste, 1-1/2 vent
3. Sinks:
a. 2 waste, 1-1/2 vent
4. Mops & Service Sinks:
a. 3 waste, 1-1/2 vent
5. Floor Drains:
a. 3 waste, 1-1/2 vent
6. Drinking Fountains:
a. 2 waste, 1-1/2 vent
7. Lavatories:
a. 2 waste, 1-1/2 vent

END OF SECTION

SECTION 22 33 34

ACCESS DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Access doors

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 24 - Valves - General

C. Section 22 11 17 - Domestic Water Piping and Appurtenances

D. Section 22 13 17 - Soil, Waste and Sanitary Drain Piping, Vent Piping and Appurtenances

E. Section 22 13 18 - Condensate Piping

F. Section 22 16 01 - Natural Gas Piping and Appurtenances

G. Section 22 40 01 - Plumbing Fixtures and Fixture Carriers

H. Section 22 66 54 - Chemical Waste and Vent Piping

1.4 SUBMITTALS

A. Provide submittal data on all items specified in this section in accordance with Specification Section 22 00 10, General Conditions, and Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acudor

B. Elmdor

C. Mifab

2.2 ACCESS DOORS

A. Locations requiring access doors:
1. Concealed valves
2. Traps
3. Trap primers
4. Controls
5. Cleanouts
6. Equipment above hard ceilings.
7. Other equipment requiring accessibility for operation and maintenance.

B. Type:

1. Hinged flush-type steel framed door with straps and exposed narrow border.

C. Minimum size:
1. 18 x 18 unless otherwise indicated.
2. 24” x 24” for equipment above hard ceilings.
3. Conform to architectural panel pattern for acoustical ceilings.
4. Confirm size with Building Inspector and Engineer.

D. Construction:
1. Hinges:
a. Concealed continuous type.
2. Locking Device:
a. Flush cam type, screwdriver operated.

E. Fire Rating:
1. Same or better fire rating than the surrounding area.

F. Access doors located in kitchens, restrooms, or areas where water is present shall be stainless steel.

2.3 FACTOR PAINTING

A. Apply prime coat of rust inhibiting paint, unless located in wet area.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer s instructions and recommendations.

B. In suspended acoustical ceilings, provide a beaded pin or other approved means for identification and easy removal where necessary.

C. Access doors shall only be installed in areas/locations that are readily accessible.

D. Doors shall be installed in such a manner that door will open 180 degrees.

E. Access doors in walls, serving cut-off valves, trap primers, and cleanouts shall be coordinated with the architect/engineer. Top of access doors to be below bottom of wall mount lavatory apron. Access doors will not be allowed in walls above this height unless coordinated with the architect/engineer.

END OF SECTION

SECTION 22 40 01

PLUM ING FIXTURES AND FIXTURE CARRIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 01 Specifications, and Section 22 00 10, apply to this Section.

1.2 SECTION INCLUDES

A. Water Heaters

B. Thermometers

C. Pressure Gages

D. Pete's Plugs

E. Expansion Tanks

F. Circulating Pumps

G. ADA Accessories

H. Water Closets

I. Urinals

. Mop sinks

K. Lavatories

L. Wash Fountains

M. Electric Drinking Fountains

N. Sinks

O. Fixture carriers

P. Thermostatic Mixing Valves

Q. Back Flow Preventers

R. Emergency Fixtures

S. Utility and Washer Boxes

T. Floor Drains and Floor Sinks

U. Floor Drains and Floor Sinks for ALTRO Floor

V. Whirlpools

W. Commercial Washers and Dryers

X. Ice Makers

. Interceptors (Refer to Section 22 13 19)

1.3 RELATED SECTIONS

A. Section 22 00 10 - Basic Plumbing Requirements

B. Section 22 05 30 - Pipe and Pipe Fittings - General

C. Section 22 11 17 - Domestic Water Piping and Appurtenances

D. Section 22 13 17 - Soil, Waste, and Sanitary Drain Piping, Vent Piping, and Appurtenances

E. Section 22 33 34 - Access Doors

F. Section 22 66 54 - Chemical Waste and Vent Piping

G. Section 26 09 18 - Laboratory Utility Shut-Off System

1.4 REFERENCES

A. ASHRAE 90-75 - American Society of Heating, Refrigerating & Air Conditioning Engineers, Inc. (Energy Conservation Standard in New Buildings)

B. PDI-WH 201 - Plumbing & Drainage Institute (Water Hammer Arresters)

C. ANSI 21.22 - American National Standards Institute (Relief Valves & Automatic Gas Shutoff Devices)

D. ANSI 358.1 - American National Standards Institute (Emergency Eyewashes and Shower Equipment)

E. AGA - American Gas Association

F. ADA - Americans With Disabilities Act

G. TAS - Texas Accessibility Standards

H. ASSE 1069 - Performance Requirements for Automatic Temperature Control Mixing Valves

I. ASSE 1070 - Water Temperature Limiting Devices

. ASSE 1071 - Performance Requirements for Mixing Valves for Emergency Showers

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 22 00 10, General Conditions, and Division 01.

B. Indicate on submittal construction materials, finishes, sizes, quantities, and related hardware.

C. Product Data:
1. Plumbing fixtures
2. Carriers
3. Fixture trim

D. Certification:
1. Submit certification that complete system complies with test requirements of municipality, State, and other public authorities having jurisdiction over system.

E. Provide closeout documents as required in Division 01, Section 22 00 10.

1.6 QUALIT ASSURANCE

A. Provide faucets, fittings, supply stops, and similar devices of one manufacturer.

B. Verify that the voltage is the same as scheduled on the electrical drawings. If not, change at no cost to the Owner.

C. Regulatory Requirements:
   1. Comply with requirements in the following order of precedence:
      a. Codes, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction over installation, inspection, and testing, including local codes.
      b. Provisions specified in this section.
      c. Local Plumbing Code.

1.7 HANDLING

A. Deliver fixtures crated and in undamaged condition.

B. Replace damaged fixtures with new fixtures.

PART 2 PRODUCTS

2.1 GENERAL

A. All plumbing fixtures shall be new and as shown on the plans.

B. Furnish plumbing fixtures with carriers shown and all necessary trimming.

C. All porcelain enameled cast iron to be acid resistant.

D. All supplies shall be IPS brass with stops.

E. All exposed finished metal parts shall be chromium plated.

F. Rough bodied parts shall be heavily nickel plated.

G. Galvanized nipples will not be permitted.

H. Traps for lavatories, sinks, etc. shall be 17 gauge three-piece chrome plated cast brass with cleanout and IPS tailpiece and chrome plated sleeve.

I. All escutcheons on supplies and waste shall be heavy cast brass set-screw type.

. Furnish faucets and supply stops with renewable seats.

K. All storage tanks and/or tank type water heaters to be installed with heat traps either in the vertical piping at the water heater connection or in the water heater inlet/outlet connection port.

2.2 WATER HEATERS

A. Type:
   1. Commercial Grade Electric:
      a. ASME Code Section IV (more than 58 KW)
      b. Minimum Working Pressure:
         1) 160 psi
   2. Commercial Grade Gas:
      a. ASME Code Section IV (more than 200,000 BTU input)
      b. AGA Seal of Certification
      c. Minimum Working Pressure:
         1) 150 psi

B. Tank Construction:
   1. Insulation:
      a. Heavy density fiberglass insulation trimmed with a baked enamel steel jacket.
   2. Cleanout:
      a. Boiler type hand-hole
   3. Temperature and Relief Valve:
      a. Comply with ANSI 21.22

b. Discharge line from valve to be same size as valve outlet
4. Coatings:
a. 316 stainless steel tank construction.

C. Low NOx Requirements:
1. All water heaters/boilers shall meet the TNRCC and TCEQ standards for low NOx as follows:
a. ≤ 75 MBTU 55 PPM
b. > 75 ≤ 400 MBTU 55 PPM
c. > 400 MBTU 30 PPM
2. Boilers/water heaters not meeting these standards will be rejected.

D. Approved Manufacturers:
1. A.O. Smith
2. Bradford White
3. Heat Transfer Products
4. Larrs
5. Lochinvar
6. Rheem
7. State

E. Warranties:
1. Commercial Grade Electric:
a. 3-year warranty on storage tank
b. 1-year warranty on parts
2. Commercial Grade Gas:
a. 5-year warranty on heat exchanger
b. 1-year warranty on parts

F. Provide a 4-inch thick concrete housekeeping pad and drain pan for all floor mount water heaters.

G. Neutralization kits on condensate drain line for all high efficient (90 AFUE or greater) water heaters, equal to M Boiler Works, Inc.

H. Each room containing a boiler (greater than 200,000 BTUH or 120 gallons of storage) from which carbon monoxide can be produced shall be provided with a carbon monoxide detector.

2.3 CARBON MONOXIDE DETECTOR

A. Approved Manufacturers:
1. Marcurco - CM-6 / CM-12
2. Equivalent

B. Provide and install carbon monoxide detector with a manual reset in each boiler (greater than 200,000 BTUH or 120 gallons of storage) room.

C. The carbon monoxide detector and all heater(s)/boiler(s) in common room shall be interlocked to disable the burners when the measured level of CO rises above 50 ppm.

D. The carbon monoxide detector shall disable the burners upon loss of power to the detector.

E. The carbon monoxide detector shall be calibrated in accordance with the manufacturer's recommendations or every eighteen months after installation of the detector. A record of calibration shall be posted at or near the boiler and be readily accessible to an inspector.

F. Mount, install, and wire per manufacturers recommendations.

2.4 EXPANSION TANK

A. Approved Manufacturers:
1. Thrush-Amtrol Model Therm-X-Trol
2. Watts - DETA Series
3. Bell & Gossett PTA Series

4. Watts-PLT

B. Provide and install expansion tank at each water heater installation per manufacturer s requirements. All expansion tanks shall bear ASME seal that serves boilers (greater than 200,000 BTUH or 120 gallons of storage).

2.5 CIRCULATING PUMPS

A. Approved Manufacturers:
1. Armstrong
2. Bell & Gossett PL Series
3. Grundfos
4. Astro

B. Pumps are to be 100 bronze construction (Lead-Free).

2.6 THERMOMETERS

A. Type:
1. 9 adjustable angle thermometer

B. Construction:
1. Temperature range:
a. Fahrenheit degrees as approved by the Engineer.
2. Window:
a. Unbreakable Plexiglas.
b. Furnish with separable socket.
3. Manufacturer/Model:
a. Trerice BX91403 □
b. MIL OCO SX935

2.7 VACUUM RELIEF VALVES

A. Type:
1. Male NPT, low profile, and lead-free.

B. Manufacturer/Model:
1. Watts LFN36
2. Mifab
3. Cash Acme

C. Construction:
1. Low profile
2. All lead-free brass body
3. Protective cap
4. Testes and rated to ANSI 21.22
5. CSA certified
6. Maximum temperature 250 degrees F.

2.8 PRESSURE GAUGES

A. Type:
1. 4 dial type pressure gauge

B. Manufacturer/Model:
1. Trerice 500X
2. MIL OCO P4509LX
3. Range is minimum 1 □ times working pressure of T & P Valve.

C. Construction:
1. Pressure range:
a. As approved by the Engineer.
2. Cast aluminum case

3. Double strength clear glass window
4. Stainless steel movement
5. Phosphor bronze tube
6. Brass socket
7. Furnish with a Trerice No. 880 lever handle gauge cock.

D. Accuracy: 1/2 of 1 of scale range.

2.9 PETE S PLUGS

A. Provide two sets of suitable pressure and temperature gauges for use with the plugs.

2.10 ADA ACCESSORIES

A. P-Trap and water supplies with stop guards
1. Usage: Each ADA lavatory
2. Size: Verify with fixture
3. Manufacturer/Model:
a. Truebro Lav-Guard 102 or 105 (verify usage)
b. Plumberex Pro Extreme X4333 and X4114 (verify usage)

2.11 SCIENCE LAB AND PREP. ROOM (WATER AND GAS) SOLENOID VALVES

A. Refer to Section 26 09 18 for laboratory utility shut off.

2.12 WATER CLOSETS, URINALS, AND LAVATORIES

A. Approved Manufacturers:
1. American Standard
2. Kohler
3. Sloan
4. urn

2.13 CARRIERS FOR WATER CLOSETS, URINALS, LAVATORIES, AND ELECTRIC WATER COOLERS

A. Water Closets:
1. Wade 300 Series
2. Watts
3. Mifab
4. urn
5. osam

B. Urinals:
1. Wade 400 Series
2. Watts
3. R Smith
4. Mifab
5. urn
6. osam

C. Lavatories:
1. Wade 520 Series
2. Watts
3. R Smith
4. Mifab
5. urn
6. osam

D. Electric Water Coolers:
1. Wade 400
2. Watts
3. .R. Smith
4. Mifab

5. urn
6. osam

2.14 WATER H DRANTS

A. Approved Manufacturers:
1. Woodford
2. Wade
3. MAPA
4. Mifab
5. osam
6. R Smith
7. urn
8. Prier Products

B. All frost proof water hydrants mounted in building or roof shall be designed to not require an independent drain line unless specifically stated on construction drawings.

2.15 FAUCETS

A. Approved Manufacturers:
1. American Standard
2. Sloan
3. Chicago
4. Delta
5. Symmons
6. Moen
7. T & S Brass
8. urn AquaSpec
9. Speakman
10. Elkay
11. ust

2.16 SINKS

A. Approved Manufacturers:
1. Elkay
2. ust

2.17 ELECTRIC WATER COOLERS

A. Approved Manufacturers:
1. Elkay
2. Halsey-Taylor
3. Oasis
4. Acorn
5. Murdock

B. All electric water coolers shall have vandal resistant bubbler and pushbutton activation mechanism.

C. All electric water coolers shall have mechanical control valves to provide operation and water flow in the event of loss of electrical power.

2.18 MOP SINKS

A. Approved Manufacturers:
1. Fiat
2. Stern Williams
3. Acorn
4. Creative Industries Terrazzo Products, Inc.

2.19 SHOWERS

A. Approved Manufacturers:
   1. Acorn
   2. Bradley

2.20 WASH FOUNTAINS

A. Approved Manufacturers:
   1. Acorn
   2. Bradley
   3. Willoughby
   4. Sloan

2.21 FLOOR DRAINS/FLOOR SINKS

A. Approved Manufacturers:
   1. .R. Smith
   2. osam
   3. Mifab
   4. Sioux Chief
   5. Wade
   6. Watts
   7. urn

2.22 KITCHEN FLOOR DRAINS AND FLOOR SINKS

A. Kitchen floor drains to be 10 x10 constructed of AISI 304 stainless steel with a vertical outlet. Floor drains to be furnished with a floor drain top, ACO adjustable feet, light duty heel safe grates, silt basket, and stainless steel ACO p-trap.

B. Kitchen floor sinks to be 10”x10” constructed of AISI 304 stainless steel with a vertical outlet. Floor sinks to be furnished with a floor sink top, ACO adjustable feet, light duty heel safe half grate. Silt basket, and stainless steel ACO p-trap.

2.23 FLUSH VALVES

A. Approved Manufacturers:
   1. Manual:
      a. Sloan 111 Series Water Closets, 186 Series Urinals
         1) urn 6000, WSI Water Closets, -6003-WSI Urinals
      b. Provide offset vacuum breaker tube for conflicts with grab bars, as needed, in ADA/TAS water closet stalls.

2.24 THERMOSTATIC MIXING VALVES

A. Approved Manufacturers:
   1. Acorn Controls
   2. Apollo
   3. Bradley
   4. Conbraco
   5. Leonard
   6. Powers
   7. Symmons
   8. Watts
   9. Lawler

B. Thermostatic mixing valves for showers shall comply with ASSE 1069.

C. Thermostatic mixing valves for lavatories and sinks shall comply with ASSE 1070. Provide inlet check stops and inlet y-strainers.

D. Thermostatic mixing valves for emergency fixtures shall comply with ASSE 1071.

2.25 BACKFLOW PREVENTERS

A. Reduced Pressure one
1. Bronze or FDA approved epoxy coated cast iron body.
2. Maximum Working Pressure: 175 psi
3. Provide full line size strainer before reduced pressure zone assembly.
4. Provide air gap assembly.

B. Vacuum Breakers (Atmospheric)
1. Bronze bodied
2. Non-spilling type
3. Rated for 150psi maximum operating pressure
4. Elastomers - Nitrile
5. Poppet - Acetal/Polypropylene

C. Vacuum Breakers (Pressure)
1. Bronze bodied
2. Elastomers - Nitrile
3. Union End Ball Valves
4. Rated for 150 psi maximum operating pressure

D. Approved Manufacturers:
1. Apollo
2. Conbraco
3. Watts
4. urn
5. Ames

2.26 EMERGENC FIXTURES

A. Comply with ANSI 358.1

B. Approved Manufacturers:
1. Acorn Safety
2. Bradley
3. Guardian Equipment
4. Haws
5. Encon Safety Products
6. Water Saver

2.27 SCIENCE/BIOLOG /CHEMISTR LABS

A. Plumbing Contractor to provide acid p-trap, supplies with stops, thermostatic mixing valve (equal to Leonard 270LF), and all final connections. All sinks and faucets furnished by others, installed by Plumbing Contractor.

2.28 INTERCEPTORS

A. Refer to Section 22 13 19.

2.29 STORM SHELTER WATER SUPPL TANKS

A. Lochinvar FVG - glass-lined storage tank (non-ASME)

B. A.O. Smith T V - NSF-approved glass lining (non-ASME)

C. Lochinvar FVG - glass-lined storage tank (ASME)

D. A. O. Smith T V - NSF-approved glass lining (ASME)

2.30 UTILIT AND WASHER BOXES

A. Oatey

B. Guy Gray

PART 3 EXECUTION

3.1 PREPARATION

A. All equipment surfaces coming in contact with walls, floors, or surfaces of other fixtures shall be ground truly flat and shall be bedded with fine dental plaster.

B. Install an approved vacuum breaker or backflow preventer on each water supply line serving a plumbing fixture which has a water supply below the rim of the fixture. Vacuum breakers shall be designed to prevent any possible backflow through them. Where these are installed in chrome plated lines, they shall be chrome plated to match.

C. Provide and install a check valve on the cold water supply serving each and every water heater on project.

D. Temperature and pressure relief line to be piped full-sized and in copper to exterior of building, or as noted on plans.

E. Set water heater storage temperature to 140□F.

3.2 INSTALLATION

A. Plumbing contractor is required to provide a mock up for coordination purposes of flush valve and grab bar rough-in locations for water closets in the ADA/TAS stall at each age level in the facility.

B. Furnish and completely install all fixtures shown on plans and as specified.

C. Properly anchor all fixtures, lines, or equipment to construction.

D. Clean all plumbing fixtures before final inspection and acceptance by the Architect.

E. Install all fixtures to proper heights as shown on the plans and in the codes. Refer to Texas Accessibility Standards. Coordinate height with plans. If different from engineering plans, contact the Architect for the correct height. Do not install until written approval is issued by the Architect. If fixture cannot be installed to proper height given, contact Architect for direction. No cost changes will be allowed for changes to piping to correct the problem.

F. Install Handi Lav-Guard Kits per manufacturer on ADA lavatories.

G. Provide and install thermostatic mixing valves at all ADA lavatories, sinks, wash stations, and lavatory systems. Set tempered water supply to 90 to 95 degrees F(tempered), unless noted otherwise by owner.

H. Provide and install thermostatic mixing valves at all emergency showers/eyewashes to 85 degrees F (tepid), unless noted otherwise by owner.

I. Electrical Contractor to provide 120V to Science Lab/Prep. Room solenoid valves. Electrical Contractor to make final 120V tie-in to solenoid valves.

. Install water heater expansion tank on cold water entering the water heater or storage tank.

K. All tankless water heaters to be installed per manufacturer’s recommendations. All multiple tankless water heater arrangements must be provided with manufacturer’s shop drawings showing all components, piping arrangement, and controllers.

L. Horizontal -Strainers shall be located:
1. On domestic water main entry into the building provide a horizontal -strainer downstream of the building isolation valve and upstream of the backflow preventer.
2. Where infrared controlled lavatories or hand sinks are provided downstream of the supply stops exposed under the fixture.

3. In gang or private (individual) restrooms directly downstream of the isolation valves behind the access panel.

M. Provide backflow preventer (reduced pressure zone) at all ice makers/machines, coffee/drink dispensers, and soap dispensers at mop sinks, and where shown on architectural and plumbing drawings. Discharge from R.P. . to be drained to nearest floor sink/drain/mop sink.

N. Provide framing support attached to building structure for all roof hose bibs. Install per manufacturer's recommendations.

O. Install vacuum relief valves on the cold water supply line at an elevation no less than 12” above top of storage tank/water heater.

P. Plumbing contractor to provide strainers, spools (for future pressure reduction valve), associated cut-off valves, reduced pressure zone, and flood control valve at all building main water entry backflow preventer assemblies. Also, route drain from the backflow preventer (RP) to the exterior of the building.

3.3 FIELD QUALIT CONTROL

A. Inspect all faucets, flush valves, stop valves, and other equipment for proper amount of water discharged. Adjust as required to meet low water consumption and ADA/Texas Accessibility Standards.

B. Correct any faucet or other equipment as directed by the Architect/Engineer.

C. Protect all drains during construction. Install covers on all floor drains and floor sinks until substantial completion.

D. Do not install mop sinks until substantial completion.

END OF SECTION

TA LE OF CONTENTS

SECTION 26 00 00

ELECTRICAL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, apply to this Division. Refer to these articles in the specifications for additional information.

B. Provide all materials, equipment, labor, and transportation required to install a complete and working electrical system. It is the intent of the drawings and specifications to provide complete installations even though each and every item necessary is not specifically mentioned or shown.

C. Bidders shall determine the contents of a complete set of Drawings and Specifications and be aware that they may be bidding from a partial set of drawings, applicable only to the various separate contracts, subcontracts, or trades as may be issued for bidding purposes only. The submission of bids shall be deemed evidence of the review and examination of all existing conditions on site and all drawings, specifications, and addenda issued for this project as no allowances will be made because of unfamiliarity with any portion of the complete set of documents or site conditions.

D. Perform all Division 26 work in strict accordance with the requirements and recommendations stated in the latest adopted version of all federal, state, and local codes, ordinances, and standards (NFPA, NEC, IECC, etc.) except when requirements are modified by the Authority Having urisdiction.

E. Where local codes or practices exceed or conflict with the NEC, it shall be the Contractor's responsibility to perform the work in accordance with the local code prevailing and local interpretations thereof by the Authority Having urisdiction. This Contractor shall bear all costs for correcting any deficiencies due to non-compliance.

1.2 REFERENCES AND STANDARDS

A. CSA - Canadian Standards Association.

B. NEC - the abbreviation is the National Electrical Code (NFPA Ch 70). Where used, this shall mean the latest adopted version of the NEC.

C. NEMA - National Electrical Manufacturers Association

D. NFPA - National Fire Protection Association. Where used, this shall mean the latest adopted version of the NFPA.

E. UL - Underwriters' Laboratories (One of several listing agencies accepted by the NEC)

1.3 ABBREVIATIONS

A. AFF - Above finished floor

B. AFG - Above finished grade

C. AH - Authority Having urisdiction

D. ALT - Alternate

E. ATS - Automatic transfer switch

F. CLG - Ceiling

G. DFA - Down from above

H. DISC - Disconnect

I. EOR - Engineer of Record

. EWC - Electric water cooler

K. EXIST / EX - Existing

L. FAP - Fire alarm plan

M. FACP - Fire alarm control panel

N. FAGA - Fire alarm graphic annunciator

O. FARA - Fire alarm remote annunciator

P. GND, GRN - Ground

Q. GFCI - Ground-fault circuit interrupters

R. LED - Light Emitting Diode

S. MTS - Manual transfer switch

T. MCC - Motor control center

U. NC - Normally closed

V. NO - Normally open

W. NTS - Not to scale

X. NIC - Not in contract

. PNL - Panel

. RTU - Roof-top unit

AA. SFD - Smoke / Fire Damper

BB. TX - Transformer

CC. T P - Typical

1.4 DEFINITIONS

A. Owner's Representative - Indicates the entity designated or hired to represent an owner on a project. This entity could be the owner themselves, an Architect or could be another third party hired to represent the owner. Verify who will be representing the owner on this project before bidding.

B. Contract Documents - Shall include, but not limited to Drawings, Specifications, Addenda, etc.

C. Approval - It is understood that approval must be obtained from the Owner's Representative in writing before proceeding with the proposed work. Approval by the Owner's Representative of any changes, submitted by the Contractor, will be considered as general in nature and only to aid the Contractor in expediting his work.

D. As required - Indicates that the contractor shall perform the work or provide the material as indicated in accordance with manufacturer's installation instructions and in accordance with the latest adopted version of applicable codes or regulations.

E. Contractor - Where the word(s) contractor or this contractor is used herein it refers to the contractor engaged to execute the work under this division of the specifications only, even though they may be

technically described as a sub-contractor.

F. Directed - Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Owner's Representative, requested by the Owner's Representative, and similar phrases.

G. Furnish - The term furnish means to equip with what is needed, supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

H. Indicated - The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

I. Install - The term install describes operations at the Project site including setting in position, connecting or adjusting for use, the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

. Or equal - Indicates that the contractor may substitute equipment by another manufacturer if the salient features of the equipment indicated by manufacturer's name and / or described are adequate in the judgment of the Owner's Representative.

K. Provide - Furnish and install all material and labor required for a complete installation ready for operation as required in accordance with the intent of the Contract Documents.

L. Shall - Indicates a mandatory requirement or requirements.

M. See NEC 100 for additional definitions used in these specifications, unless otherwise noted.

1.5 COORDINATION

A. For additional requirements, see Section 01 30 00 - Administrative Requirements.

B. Electrical service to all portions of existing buildings at the construction site not involved with the project shall remain in operation throughout construction. Provide all required temporary electrical service in the base bid to all required areas to satisfy OSHA requirements.

C. All metering and temporary electrical service charges and / or costs of utilities shall be paid by the Contractor.

D. The Drawings are not to be construed as shop drawings but indicate the extent, general locations, arrangement, etc., of conduit systems and equipment. Electrical drawings are diagrammatic and shall not be scaled for exact size. If the contractor has any questions regarding the layout of a particular device or equipment item, he shall contact the Owner's Representative for clarification. This Contractor shall, in laying out their work, refer to other sections of the specifications and other drawings such as air conditioning, structural, plumbing, architectural, civil, etc., to eliminate conflicts and undue delays in the progress of the work. Where items are furnished by other trades require connections by this Contractor, they shall be held responsible for providing rough-in drawings and assistance upon request.

E. In the event of interferences, piping or equipment requiring set grades or elevations shall have precedence over conduit, luminaires, outlet boxes, etc.

F. Plans, specifications, and other documents have been prepared and developed with reasonable professional care and coordination. It is the intent that all documents are supportive and complimentary, one to the other and as such what is required by one shall be considered as required and binding as if indicated by all. Work indicated shall include, regardless of whether or not specifically stated, such supportive or required items or work as consistent with what is indicated, is reasonably inferable from what is indicated, and / or is common construction procedure or knowledge with regard to what is indicated.

G. In the event of a conflict between manufacturer's installation instructions and the Drawings, the manufacturer's installation instructions shall govern.

H. Should discrepancies be found among the Contract Documents and / or an interpretation is required, and a decision or interpretation to the contractor is not rendered by the Owner's Representative, it shall be assumed the contractor has reviewed all the documents to find the most costly method or items in question which then shall be required. One document does not take precedence over another when interpreting a discrepancy.

1.6 SUBMITTALS

A. The submittals required in this Division shall conform to and be submitted in accordance with the General Conditions, Instructions to Bidders, Division 1 and requirements listed in all sections of Division 26.

B. Provide submittals in PDF format. Paper submittals shall be rejected.

C. Shop drawings, manufacturer's data materials lists, etc., are required for all equipment and material where submittals are required.

D. Each submittal shall contain data relevant to the particular equipment (including options). The data shall be identified by highlighting , arrows, underlining, etc. Do not submit pages of non-relevant information. Broad general data is not acceptable. If equipment submitted is not as specified in the Contract Documents, then the submittal shall contain specific details prominently identifying any differences in form, fit or function. If the equipment submitted is not as specified, then the Contractor shall be responsible for any additional costs necessary to install and connect the equipment. This includes, but is not limited to, increased panelboard size, circuit breaker size, disconnect size or circuit size.

E. Submit warranty information on all equipment specified in this division. Warranty shall start at the time of substantial completion, unless otherwise indicated in subsequent sections.

F. Submit dimensional layout of all electrical equipment locations, drawn to scale, with equipment locations shown. Clearances shall be in accordance with NEC and local codes. Panelboard and switchgear submittals will be rejected without dimensioned room or equipment location layouts.

G. Some products require that a color selection be coordinated with the Owner's Representative. Information regarding such products shall be submitted to the Owner's Representative for review.

H. If materials or equipment are installed before being reviewed without comment by the engineer, the contractor shall be liable for the removal and replacement of such unapproved materials and equipment, at no additional expense to the owner. Additionally, if the removal and replacement of unapproved materials or equipment necessitates the removal and replacement of other related materials or equipment, then the contractor shall be liable for the removal and replacement of the related materials and equipment at no additional expense to the owner.

I. Failure to submit items that meet the requirements of the contract documents in ample time for review shall not entitle the contractor to an extension of contract time, and no claim for extension by reason of such default shall be allowed. The contractor may be held liable for delays so occasioned.

1.7 CLOSEOUT SUBMITTALS

A. This Contractor shall accumulate during the job's progress the below list of data and shall keep it updated during construction as a set of Record Documents:
   1. Exact dimensioned locations of all new and existing switchgear, devices, luminaires, controls, all other equipment and new or existing site utilities.
   2. All warranties, as described in this section and in each subsequent specification section.
   3. All shop drawings.
   4. Submittals.
   5. Set of operation and maintenance manuals.
      a. Each operating and maintenance manual shall apply specifically to the equipment installed. In those cases where one manual covers a general class of equipment, the contractor shall be required to identify (highlighting, underlining, etc.) those portions which apply to the installed equipment.
   6. Repair parts lists of all major items and equipment.

7. Additional items that may be required in Divisions 00 and 01.

B. Upon submitting their request for final payment, this contractor shall turn over to the Owner's Representative, all data mentioned above in the form of a PDF file.

C. Organize all information by specification section and put them in the O&M manual.

1.8 QUALIFICATIONS

A. For a product or manufacturer to be considered, all products shall be submitted ONL from manufacturers that:
1. Specialize in the manufacturing of the products specified for a minimum of five (5) consecutive years.
2. Has been producing this product for at least two (2) years.

1.9 ADDITIONAL MATERIALS

A. Additional materials to be a dollar cost in the base bid. At the end of the project the contractor shall generate a dollar amount credited back to the owner for any unused items.

B. Include the following cost on a dollar basis in the base bid:
1. All costs to provide five (5) additional communication outlet or signal locations, all required boxes, labor and conduit as directed by the Owner's Representative. Devices, plates, and wiring by Communications Contractor(s).
2. All costs to provide one (1) additional electrical circuit as required for fire alarm system signal power expanders or fire safety control circuits including all required circuit breakers, wiring, conduit, labor, and devices as specified and directed by the Owner's Representative.
3. All costs to provide five (5) additional electrical circuits, all required circuit breakers, wiring, conduit, labor, and devices as specified and directed by the Owner's Representative. Each circuit to be priced with a rating of 20 amps and a distance of 100 feet to furthermost device. Each circuit to include eight (8) duplex receptacles.

C. See Additional Materials section throughout the rest of Division 26 for additional materials requirements.

1.10 ATTIC STOCK

A. Furnish attic stock to the owner at substantial completion as a part of the base bid.

B. See Attic Stock section throughout the rest of Division 26 for additional attic stock requirements.

1.11 QUALIT ASSURANCE

A. Certification: This contractor shall be certified / licensed to install the products and equipment they are providing.

B. Regulatory Requirements: All products provided under this division shall be manufactured and listed for the intended use and environment installed.

C. See Manufacturers section below for more information.

1.12 DELIVER , STORAGE, AND HANDLING

A. For additional requirements, see Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. For additional requirements, see Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

C. Storage and Protection: Material shall be stored in a clean and dry location until installation.

D. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish.

1.13 EXISTING FIELD CONDITIONS

A. The drawings are prepared from the best information available and reflect all conditions commensurate with this information. However, the contractor should visit the site prior to submitting a proposal and should verify the locations, sizes, depths, pressures, etc., of all existing utilities and familiarize themselves with working conditions, hazards, existing grades, soil conditions, obstructions, etc. If it becomes evident that existing site conditions will impair the proper operation of the utilities, the Owner's Representative shall be notified in writing.

B. All proposals shall take these existing conditions and any revisions required into consideration, and the lack of specific site information on the drawings shall not relieve the contractor of any responsibility.

C. This Contractor shall familiarize themselves with working conditions to the extent that they shall be responsible for damage to concealed piping, wiring and other equipment meant to remain, and shall repair any damage caused by their negligence at no cost to the owner.

1.14 WARRANT

A. This Contractor shall guaranty fully all workmanship, material, equipment, systems, etc., provided by them for a period of one (1) year after substantial completion of the project, unless otherwise indicated in other specification sections. The use of building equipment for temporary service and testing does not constitute the beginning of the warranty. This guaranty means that this Contractor shall make good to the owner, at no cost, any defects that become apparent during the year following substantial completion. This guaranty is in addition to any other guaranties or warranties and is not intended to limit such other guaranties or warranties.

B. Neither the final payment nor any provisions in the Contract Documents shall relieve this Contractor, or the Contractor, of the responsibility for faulty materials or workmanship.

C. The contractor shall remedy any defects due thereto, and pay for any damage to other work resulting there from, which shall appear.

D. This Warranty shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Unless otherwise noted, products shall be only from manufacturers that have been in business for at least five (5) consecutive years.

2.2 SUBSTITUTION OF PRODUCTS

A. Substitutions: Shall meet any Division 01 requirements in addition to the substitution requirements listed here.

B. All proposed substitutions are subject to PRIOR APPROVAL and must be received by the Engineer and / or Owner's Representative no less than ten business days prior to the schedule date for opening of bids.

C. Items noted as No Substitutes or No Alternates shall be as specified only. No substitutions will be accepted.

D. Only such items as specified or approved as acceptable will be installed on this project.

E. Substitution of products specified herein will be considered only when a complete list of proposed alternative equipment is submitted to the Engineer and / or Owner's Representative in writing, supported by adequate technical and cost data. This includes a complete description of the proposed substitution, drawings, catalog cut sheets, performance data, test data, or any other data or information necessary for proper evaluation.

F. Manufacturers' names are listed herein and on the plans to establish a standard of quality and design. Where a manufacturer's name is mentioned, products of other manufacturers may be considered if, in the opinion of the Engineer and / or Owner's Representative, the substitution is of equivalent quality or better than that of the material specified.

G. The Contractor's Bid represents that the bid price is based solely upon the materials and equipment described in the Contract Documents and that he contemplates no substitutions or extras.

H. Requests for substitution are understood to mean that the Contractor:
1. Has personally investigated the proposed substitution and determined that it is equivalent or superior in all respects to that specified.
2. Will provide the same guarantee for the substitution that they would for that specified.
3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.

I. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
1. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
2. The specified product is unavailable through no fault of the Contractor.
3. The manufacturer refuses to warranty the specified products as required.
4. Subsequent information that the specified product is unable to perform properly or to fit in the designated space.

. Revisions to the electrical system caused by substitutions shall be under the supervision of the Engineer at a standard hourly rate charged by the Engineer and shall be paid by the Contractor originating the changes.

2.3 PERFORMANCE REQUIREMENTS

A. All materials, components, products, assemblies, equipment, etc. shall be new, free from defects, listed (by an NEC accepted listing agency), and approved / rated for the environment and purpose.

PART 3 EXECUTION

3.1 EXAMINATION

A. For additional requirements, see Section 01 30 00 - Administrative Requirements (Coordination and verification of existing project / site conditions before starting work).

3.2 INSTALLATION

A. The Contractor shall obtain all permits required to commence work and, upon completion of the Work, obtain and deliver to the Owner's Representative a Certificate of Inspection by an AH in the project city and state. The Contractor shall pay required permit fees.

B. All work shall be done by experienced craftsmen skilled in the applicable trade.

C. All equipment shall be installed in strict compliance with manufacturer's installation instructions and properly torqued using a calibrated torque tool.

D. All panels, enclosures, devices, equipment and associated conduits, whether provided by this Contractor or any other, shall be flush-mounted and cleanly recessed in all finished spaces unless otherwise noted on the Drawings.

E. Unprofessional and incomplete work shall be rejected and corrected at no additional expense. The judgement of professionalism and completeness of work shall be made by the Engineer and / or Owner's Representative and shall be final.

F. All electrical connections shall be made per NEC 110.14 and torqued per manufacturer's instructions.

G. Where existing utilities already exist or where renovation / addition work is to be done, maintain all utility services during construction to existing structures and / or portions of a project that are to remain in place and operational.

H. This Contractor assumes all responsibility for the safety of their personnel on the project during construction. The Contract Documents do not include materials, procedures, components, etc., required to ensure construction safety. Refer to General Conditions for additional information.

I. This Contractor shall be responsible for damage to the project caused by this Contractor's failure to recognize hazards associated with items such as lack of power, scheduling of work (tardiness), inexperienced workmen, excessive cutting, etc. This Contractor shall repair at no expense to the owner any such damage.

. Contract Documents do not show exact location and elevations of lines. Deviate from drawings as required to conform to the general construction, provide proper grading and installation.

3.3 INTERFACE WITH OTHER WORK

A. Cooperation with trades of adjacent, related or affected materials or operations, and / or trades performing continuations of this work under subsequent contracts is considered a part of this work in order to affect timely and accurate placing of work and to bring together, in proper and correct sequence, the work of such trades, including under the general contractor Division 1 and Division 23.

B. The Electrical Contractor shall coordinate installation of the electrical system with the General Contractor, Mechanical, Plumbing, and Communications Contractors to insure a complete working system for the Owner.

C. The Electrical plans are based on the equipment and device schedules shown on the drawings or as called for in the specifications. Should any mechanical equipment or device associated devices be changed or accepted from those which are shown or noted, all electrical and / or mechanical changes shall be made at the expense of the trade or contractor initiating the change with no expense to the Owner's Representative, Engineer, etc.

D. Coordinate all utility services and / or revisions with utility companies.

E. Make permanent connection to new utilities or existing lines. Determine depth and location, and bid accordingly. Relocate and repair any existing lines cut by general construction work.

F. Provide all lighting contactors with control relay. Coordinate required coil voltage with controls system.

3.4 CONTRACTOR COORDINATION - ELECTRICAL / MECHANICAL (DIV 23)

A. Electrical Contractor to provide the following:
   1. All line voltage wiring, conduits, back boxes and hook-up to all HVAC equipment including required fused or non-fused safety switches.
   2. All boxes and conduit into accessible attic space for all thermostats and sensors. Coordinate with Mechanical Drawings for exact locations and requirements.
   3. All contactors and relays shown on the Electrical Drawings only.
   4. All conduit and back boxes for control wiring in all mechanical spaces to protect control wiring from damage. Conduit and back boxes to be required from 6” above each piece of equipment or control to a common 12” square NEMA 1 enclosure provided by Electrical Contractor and mounted directly above the EMCS / BMS controls in that space. Coordinate all required conduit paths with mechanical contractor before bidding and again before installing. Mechanical contractor to provide Electrical Contractor with conduit paths required for controls wiring on a drawing with adequate dimensions for bidding.

B. Mechanical Contractor to provide the following:
   1. All contactors and relays for mechanical equipment control. Coordinate control voltage between trades as required.
   2. All HVAC motor starters (with heaters as required) and / or VFDs.
   3. All associated HVAC equipment, thermostats, controls, control wiring, etc.

4. All HVAC related relays, contactors, and switches required to start / stop Mechanical Equipment other than switches shown on and required by Division 26.

3.5 CONTRACTOR COORDINATION - ELECTRICAL / PLUMBING (DIV 22)

A. Electrical Contractor to provide the following:
1. All line voltage wiring, conduits, back boxes and hook-up to all plumbing equipment including required fused or non-fused safety switches.

B. Plumbing Contractor to provide the following:
1. All plumbing equipment.
2. All relays, contactors, and switches required to control Plumbing Equipment other than switches shown on and required by Division 26.

3.6 CONTRACTOR COORDINATION - ELECTRICAL / CONTROLS (DIV 23, 25)

A. Electrical Contractor to provide the following:
1. All junction boxes (standard one or multi-gang) required for controls contractor. Coordinate with controls contractor for exact locations.
2. Various relays, devices, wiring and other equipment for control equipment as indicated or required per details on Electrical Drawings.

B. Controls Contractor to provide the following:
1. All required relays associated with controls in specifications.
2. All hardware, software and sensors related to controls.
3. All conduit required above ceiling.
4. All control wiring.

3.7 CONTRACTOR COORDINATION - ELECTRICAL / COMMUNICATIONS (DIV 27)

A. Electrical Contractor to provide the following:
1. All receptacles and direct connection to all communications systems and equipment as shown and as required.
2. All building interconnect and service entry conduits as indicated on drawings. Unless otherwise noted, provide two (2) schedule 40 PVC 4 conduits buried at a depth of 24 . Provide concrete or fiberglass pull boxes as shown or as required and rated for the location and traffic. Provide intermediate pull boxes for every 500 feet of conduit run or for every pair of 90 deg radius bends.
3. All ground conductors and bonding to the building grounding system for all communications equipment panels and racks. See Section 26 05 26 - Grounding and Bonding, notes on drawings and details for more information.
4. All required standard back boxes as required for wall-mounted devices furnished by Communications Contractor.
5. All raceway / conduit as required for accessibility of all communications systems cabling as listed below and as indicated on the drawings and details (whether furnished under a Division 01 allowance, by the Owner, Division 26 and / or Division 27).
   a. Provide raceway / conduit for cabling in above-ceiling spaces at the following locations:
      1) All wall penetrations.
      2) All HVAC duct penetrations (Per NEC 800).
      3) All cabling travelling through a plenum or other environmental air space (Per NEC 800).
   b. Provide raceway / conduit for all cabling from wall-mounted back boxes to accessible spaces per Communications Device Backboxes detail. Coordinate exact size and locations with communications contractor before installation.
   c. Provide full raceway / conduit for all cabling in exposed ceilings or when cabling is to be exposed on walls. Coordinate exact size and locations with communications contractor before installation.
6. Installation of all special boxes and equipment cabinets furnished by Owner or Communications, Security, and Safety Contractor(s).

B. Communications Contractor to provide the following:
1. All communications systems complete with equipment, cabling, special backboxes, hardware, and all other required devices.
2. Furnish all special boxes in timely manner to the electrical contractor for installation as required.

3. All attachments for all communications cable above accessible ceilings to be supported from the building structure and bundled.

3.8 CONTRACTOR COORDINATION - ELECTRICAL / ELECTRONIC SAFET & SECURIT (DIV 28)

A. Electrical Contractor to provide the following:
   1. All receptacles and direct connection to all security and safety equipment as shown and as required.
   2. All ground conductors and bonding to the building grounding system for all security and safety equipment panels. See Section 26 05 26 - Grounding and Bonding and details for more information.
   3. All required standard back boxes as required for wall-mounted devices furnished by security and safety contractors.
   4. All raceway / conduit as required for accessibility of all security and safety systems cabling (whether furnished under a Division 01 allowance, by the Owner, Division 26 and / or Division 28) as listed below and as indicated on the drawings and details.
      a. Provide raceway / conduit for all cabling in above-ceiling spaces at the following locations:
         1) All wall penetrations.
         2) All HVAC duct penetrations (Per NEC 800).
         3) All cabling travelling through a plenum or other environmental air space (Per NEC 800).
      b. Provide raceway / conduit for all cabling from wall-mounted back boxes to accessible spaces per Communications Device Backboxes detail. Coordinate exact size and locations with security and safety contractor before installation.
      c. Provide full raceway / conduit for all cabling in exposed ceilings and when cabling is to be exposed on walls. Coordinate exact size and locations with security and safety contractor before installation.
   5. A dedicated circuit for the Fire Alarm Control Panel (FACP). Provide power to all Fire Safety Control Function devices as shown on the drawings. Each circuit breaker shall be labelled as FIRE ALARM CIRCUIT in the panel directory and labelled FIRE ALARM at the lockout clip on the circuit breaker.
   6. All fire safety control circuits shall be of fail safe operation and shall not have backup power. These circuits shall be controlled by a power relay located within three (3) feet of the breaker panel. These circuits shall be switched by a power relay controlled by the fire alarm system and wired by the Electrical Contractor.

B. Fire Alarm Contractor to provide the following:
   1. All security and safety systems complete with equipment, cabling, special backboxes, hardware, and all other required devices.
   2. Final connection of all duct-mounted smoke detectors to the fire alarm system. Detector housings and control relays are to be mounted by the Division 23 Contractor.

3.9 CONTRACTOR COORDINATION - ELECTRICAL / OTHER

A. Electrical Contractor to provide required hook-up to line voltage at all electromagnetic door holder / release, fire / smoke dampers, smoke dampers, etc. Provide required relays and wiring to fire alarm panels and coordinate with other specified work.

B. Line voltage and hook-up to all building automation equipment (Division 25) including required manual safety switches with fuses / heaters of required size.

3.10 EQUIPMENT CONNECTIONS

A. This Contractor shall bring all required electrical service to all equipment items furnished under other sections of these specifications or by the Owner, make final connections, and leave equipment ready for operation. This Contractor shall coordinate with any affected trade to assure correct operation of the equipment item, i.e., phase rotation, switching, control location, accessibility, etc.

B. When the contractor is uncertain about the method of installation, proper location, etc., they shall ask for further instructions or details. Failure to request such information will not excuse non-compliance.

C. All roof mounted mechanical equipment shall be served through and concealed in curb. Penetration through side of curb is not permitted. If not possible, then contractor shall notify the Owner's

Representative in writing providing a no cost alternative.

3.11 INSTALLATION - OTHER WORK

A. Cutting and Patching:
   1. All cutting required by the installation of sleeves, conduit, equipment, etc., shall be coordinated with the General Contractor, but performed by this Contractor. Patching shall be by General Contractor. This Contractor shall not cut any structural element or any finished work without written permission from the Owner's Representative.
   2. This Contractor shall cut and patch all paving as required by the installation of buried conduit or wire.

B. Concrete Work:
   1. This Contractor shall provide all forming, reinforcing and concrete as indicated or required for equipment bases, transformer pads, etc. Work shall conform to the applicable portion of Division 03 - Concrete.

C. Painting:
   1. All painting except touch-up shall be provided under Division 09 - Painting unless otherwise noted on Drawings. All exposed conduit, equipment, etc., shall be left clean and free from rust or grease and ready for the painter.
   2. Where equipment finishes are damaged, this Contractor shall obtain touch-up paint in matching colors from the equipment manufacturer and paint as required.

D. Trenching and Backfill:
   1. This Contractor shall perform all trenching, excavation, shoring, pumping and backfill required in the installation of their work. All trenches shall be maintained dry until all circuits have been satisfactorily tested and then filled in tamped 6 layers immediately after approval of tests by the Owner's Representative. All backfill shall be free of construction debris and any other foreign material which might damage any circuit runs. Stability of backfilled soil shall match adjacent undisturbed soil.
   2. All exterior raceway or cable shall be laid with at least a minimum cover as indicated in the NEC.
   3. The contractor shall exercise all possible care to avoid damage to trees and roots in excavation. Where possible, the contractor shall excavate beyond the drip line of trees. If it is necessary to cut roots 1 to 2 1/2 in diameter, the contractor shall excavate around, cut clean and paint severed ends of roots with a tree wound sealer. Do not cut roots 2 1/2 and larger.

E. Flashing and Waterproofing:
   1. All building penetrations to the outside shall be flashed and counter-flashed as required to eliminate leaks. Provide link-seal fitting on all below grade conduit penetrations greater than 2 .

3.12 PROTECTION

A. The Contractor shall continuously maintain adequate protection of stored materials and installed equipment. Fixtures and equipment, whether located inside or outside, shall be tightly covered with sheet polyethylene or waterproof tarpaulin as protection against dirt, rust, moisture and abuse from other trades. Adequate air circulation shall be provided under any protective sheet to prevent condensation build-up. Materials and equipment shall not be stored where it can come into direct contact with the ground. Conduit, conduit hangars, cable tray and equipment shall not be used by other trades as supports for their equipment, scaffolds or personnel. At the completion of the work, equipment, luminaires, exposed supports and piping shall be cleaned of loose dirt, construction debris, overspray, etc., to the satisfaction of the Owner's Representative. Repairs made necessary by damage shall be paid for by the Contractor.

3.13 QUALIT CONTROL

A. For additional requirements, see Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. For additional requirements, see Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

3.14 S STEM STARTUP

A. All circuit and operational tests of the electrical systems shall be made by this Contractor and repeated until equipment meets or exceeds testing requirements.

3.15 CLEANING

A. For additional requirements, see Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Where all work has been finally tested, this Contractor shall clean all work installed by them, including all luminaires, equipment, and all exposed work.

END OF SECTION

SECTION 26 0 0

SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Selective demolition of electrical and lighting systems and equipment and the off-site removal of the portions of those systems and equipment not reused, in a code-compliant and lawful manner.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

B. Section 26 05 53 - Identification for Electrical Systems

PART 2 PRODUCTS

2.1 NOT USED.

PART 3 EXECUTION

3.1 ELECTRICAL EXAMINATION

A. Verify existing field measurements, circuiting arrangements, wiring and equipment served in areas as shown on the Drawings. Adjust all circuiting, wiring and materials to be provided as required by job conditions.

B. Verify abandoned wiring and existing equipment.

C. Drawings are based on casual field observation and existing record documents. Report discrepancies to the Engineer before disturbing existing installation.

D. The Contractor accepts all existing conditions when beginning demolition, whether or not those conditions are reflected in the Contract Documents.

3.2 LIGHTING EXAMINATION

A. Where new lighting is being added to an existing installation, the new luminaires shall match the input voltage, style, finish, CCT, mounting height, etc. unless otherwise indicated on the Drawings.

B. When new luminiares or replacement LED lamps or retrofit kits are replacing existing lighting, field verify the input voltage, lamp pin requirements, switching arrangement and dimming technology before submitting to ensure a complete and working system.

C. For exterior lighting replacement, field verify existing conditions to determine pole quantities, bolt patterns, styles, finish, location, orientation, mounting height, etc. to install.

D. Emergency interior and exterior lighting: If the unswitched phase conductor needed for proper operation does not exist, provide a new unswitched phase conductor to each luminaire as needed for proper operation. The unswitched phase conductor must come from the same branch circuit that powers the luminaire.

3.3 PREPARATION

A. Disconnect electrical systems in walls, floors and ceilings as shown or required.

B. Coordinate utility service outage with the respective utility company and the Owner.

C. Provide temporary wiring and connections to maintain required existing systems that must remain operational during construction.

D. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Verify phasing on existing equipment and coordinate new phasing before energizing revised service.

E. Disconnect and remove abandoned wiring, devices, conduits, panels and distribution equipment unless otherwise specified in the drawings.

F. Clean and repair existing raceway, boxes, wiring devices, etc. that are to remain in place or are to be reinstalled.

3.4 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provision of Division 01 and this section.

B. Remove, relocate and extend existing installations to accommodate new construction as required.

C. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floor, and patch surfaces.

D. Remove concealed abandoned raceway to its source.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

F. Remove abandoned wiring to the source of the supply.

G. Mark all unused breakers as spares and turn them off.

H. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls, floors and patch surfaces.

I. Disconnect and remove electrical devices and equipment serving equipment that has been removed.

. Disconnect and remove abandoned luminaires, lighting controls, contactors, time clocks, etc. Remove brackets, stems, hangers and other accessories.

K. Extend existing conduit, raceway and box installations using materials and methods compatible with existing electrical installations or as specified.

L. Confirm with Owner's Representative regarding the handling and disposal/reuse of removed material, equipment, devices, luminaires, etc.

M. Where demolition of equipment or materials is required, this Contractor shall minimize cutting and exercise all due caution to leave undamaged surfaces, material and equipment meant to remain.

N. All existing items that are to be removed shall remain property of the owner unless declared as salvage. Salvage materials shall become property of the contractor and be removed from the site. Items declared as the owner's property shall be neatly stored on the site as directed by the owner.

O. Existing electrical equipment (except cast-in-place conduit) such as panelboards, wiring devices, luminaires, junction boxes, etc., shall be removed from the job unless othewise noted.

P. Please note that demolition of the HVAC system will require electrical work and coordination. Refer to the complete set of construction documents for additional information regarding the phasing of the demolition and construction.

3.5 MAINTAIN EXISTING ELECTRICAL

A. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

B. Maintain access to existing wiring, devices, boxes, panels, distribution equipment, etc. to remain in place, operational and accessible. Modify installation or provide access panels as required.

C. Where a circuit is interrupted by removal of a device or luminiare from that circuit, install wire and conduit as required to restore service to the remaining devices and luminaires on that circuit.

D. Repair adjacent construction and finishes damaged during demolition and extension work.

3.6 REPAIR / RESTORATION

A. Clean and repair existing materials and equipment, in areas of revision, which remain or which are to be reused.

B. Panelboards:
1. Clean exposed surfaces and check tightness of all electrical connections.
2. Replace damaged circuit breakers and provide closure plates for vacant positions.
3. Provide typed circuit directory showing revised circuiting arrangement as specified, on all existing panelboards and switchboards.
4. Verify room names and numbers with Owner's Representative and indicate correct room names and numbers that are permanent for the facility.

C. Labelling Requirements:
1. Install identification on all existing unmarked equipment to remain in accordance with Section 26 05 53 - Identification for Electrical Systems. Replace all lost nameplates, labels or markers.

3.7 RE-INSTALLATION

A. Install all relocated materials and equipment under the provisions of Divisions 01 and 26.

END OF SECTION

SECTION 26 0 1

LO VOLTAGE ELECTRICAL PO ER CONDUCTORS AND CA LES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. This section includes conductors for power circuits, including terminations and connectors.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems

1.3 REFERENCES AND STANDARDS

A. ICEA S-61-402 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

B. NECA 1 - Standard Practices for Good Workmanship in Electrical Construction

C. UL 44 - Thermoset-Insulated Wires and Cables

D. UL 83 - Thermoplastic-Insulated Wires

E. UL 493 - Thermoplastic Insulated Underground Feeder and Branch Circuit Cables

F. UL 1569 - Conductor properties

1.4 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26.

B. Submit product data for the following:
1. Building wiring and all conductors on this project.
2. Conductor terminations.
3. Connectors.

1.5 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below:
1. Record of all actual locations of components and circuits.

1.6 QUALIT ASSURANCE

A. General work practices for electrical construction shall be in accordance with NECA 1.

B. Regulatory Requirements: All products provided under this section shall be listed for the intended use.

1.7 DELIVER , STORAGE, AND HANDLING

A. Storage and Protection: Material shall be stored in a clean and dry location until installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Conductors shall be manufactured in the United States. Acceptable manufacturers are:
   1. Alan Wire (Sikeston, MO)
   2. Cerrowire (Hartselle, AL)
   3. Encore Wire (McKinney, TX)
   4. General Cable (Highland Heights, K)
   5. Southwire (Carrollton, GA)

B. All other manufacturers shall require pre-approval in accordance with Section 26 00 00 - Electrical.

2.2 MATERIALS

A. All feeders to be soft-drawn annealed copper.

B. All branch circuit conductors shall be soft-drawn annealed copper.

C. Aluminum is permissible ONL where specifically indicated on the Drawings. Aluminum used shall be AA-8xxx rated and compact stranding is preferred.

2.3 MANUFACTURED UNITS

A. Manufactured Power Circuit Conductors:
   1. Conductors for shall be rated for at least 600 volts and 90 C. No exceptions.
   2. Conductor insulation shall be type THHN / THWN-2 or XHHW-2.
   3. Conductors shall be 12 AWG or larger.
   4. Conductors that are 8 AWG and larger shall be stranded. Conductors that are 12 AWG and 10 AWG may be stranded if crimp on fork terminals are used for device terminations. Otherwise, 12 AWG and 10 AWG shall be solid conductors. Never place bare stranded conductors directly under device screws.
   5. Conductors sized 6 AWG and smaller shall have factory colored insulation.

B. MC Cable: Unless othewise noted on the Drawings, MC cable is allowed ONL for luminaire whips. Total length not to exceed six (6) feet. MC cable must meet all requirements listed in this section including (but not limited to) separate full-size neutrals, conductor material, isolated ground, installation per NEC, etc.
   1. Conductor Insulation: The insulation over the conductors shall be type THHN 90 C dry with an extruded polypropylene protective covering.
   2. Armor: A zinc coated galvanized steel armor shall be applied over the cabled wire assembly with an interlock in compliance with UL 1569 Section 13. Armor shall be colored to identify the voltage and number of conductors.
   3. Fittings: Fittings shall be listed and identified as MCI-A for such use with metal clad interlocking armor ground. Connectors shall be of steel or malleable iron and shall have saddle clamp to insure a tight termination of MC or MCI-A cable to box.

C. Manufactured Conductor Terminations and Connectors:
   1. All accessory materials such as connectors, splice and tap fittings, and terminations shall be of a type designed or intended and suitable for the use. They shall be compatible with the conductor material. Installation, compression, and torque settings shall be per manufacturer's recommendations.
   2. Conductors shall be connected and terminated using suitable clamps, pressure connectors, compression terminals or lugs and hardware of the proper size and listed for the application.
   3. Only connection devices that require the complete removal of the conductor jacket or insulation and result in a connection to the complete conductor surface area are suitable for use. Insulation piercing type connectors, press in type connectors or Wago style connectors shall NOT be used.
   4. Splices and taps shall have a mechanical strength and insulation rating at least as that of the conductors.
   5. Compression systems shall include crimped die index and company logo for purposes of inspection.

PART 3 EXECUTION

3.1 EXAMINATION (SITE VERIFICATION)

A. Do not install the conductors until conduit / raceway system is complete.

B. Before installing the conductors for any branch circuit or feeder, verify that the conductor ampacity is at least as large as the rating of the overcurrent device protecting it, except where approved for use (per NEC) for motor loads. In the event that the conductors would not be adequately protected, notify the Engineer before installation.

3.2 INSTALLATION

A. More than one conductor shall not be installed in any termination unless the termination is marked as suitable for more than one conductor.

B. Wire Sizing: Provide conductors sized as indicated on Drawings unless modified as described below. Where conductor sizes have been omitted from Drawings, bid shall include conductors with ampacity as least as large as the overcurrent protection device protecting the conductors, or at least as large as the amp rating of the load being served, whichever is greater. In such cases, notify the Engineer before installation for size verification.

C. Wire Lengths: For 120v branch circuits, 12 AWG wire shall not be run more than 90', 10 AWG wire shall not be run more than 120', 8 AWG wire shall not be run more than 150', etc.

D. Neutral Conductors: Provide a separate neutral conductor for each feeder or branch circuit. Multiple circuits shall not share a common neutral. Neutral conductors shall be sized as large as the phase conductors. Neutral conductors shall not be of a reduced size.

E. Equipment Grounding Conductors: Provide equipment grounding conductors in accordance with Section 26 05 26 - Grounding and Bonding for Electrical Systems.

F. Number of Current Carrying Conductors (CCC) per conduit:
1. 12 AWG Wire - no more than six (6) CCCs in a single conduit.
2. 10 AWG Wire - no more than nine (9) CCCs in a single conduit.
3. ELSE - no more than three (3) CCCs in a single conduit.
4. When more than three (3) CCCs are in a single conduit, the electrician is responsible for derating conductors per NEC requirements to ensure all loads do NOT exceed a 5 voltage drop from the service entrance conductors.
5. The equipment grounding conductor shall not be counted for the preceding statements.

G. Installation in Raceways:
1. All conductors shall be installed in a raceway.
2. All conductors installed in a raceway shall be pulled together. Use an approved wire pulling compound when pulling large conductors.
3. Do not bend any conductor either permanently or temporarily during installation to radii less than four times the outer diameter of conductors.
4. Do not exceed manufacturer's recommended values for maximum pulling tension.
5. When installing conductors in existing conduit, the interior of the existing conduit shall be cleaned and inspected for damage prior to the installation of the new conductors to insure that there is nothing that will damage the conductor insulation.
6. The pulling device used shall be per manufacturer's installation instructions and shall be suitable to prevent damage to the conductors and the raceway.

H. Terminations:
1. Use pressure type lugs or connectors for terminations or splices of all stranded conductors. Use ring tongue type terminators on all control wiring. More than one conductor shall not be installed in any termination unless the termination is marked as suitable for more than one conductor. With the written approval of the Engineer, an exception to this may be allowed for the installation of the surge protective devices required in Section 26 43 00 - Surge Protective Devices.
2. Conductors shall not be supported solely by their terminations.
3. Terminations shall be made such that the stripped length of the conductor is no longer than required for the terminal, lug, or connector.
4. Conductive antioxidant shall be applied on all connections per manufacturer's instructions, regardless of conductor material.

I. Splices:
1. Conductor splices shall be kept to a minimum.
2. Where splices are required, they shall be in a box or enclosure. Splices within a conduit run are not acceptable.

. Color Coding:
1. Provide factory colored insulated conductors for 6 AWG and smaller.
2. Color code larger insulated conductors with an approved field-applied tape 2 wide on each end of conductors.
3. If existing wiring in renovation or addition work has a consistent color coding, then match the existing and note in record documents. Otherwise, colors shall be as follows:

Line	**20 120V**	**240 20 V 1**	**240 120V**	**4 0 2 V**
A	Black	Black	Black	BROWN
B	Red	n/a	Orange	ORANGE
C	Blue	Red	Blue	ellow
Neutral	White	White	White	Gray
Ground	Green	Green	Green	Green
Isolated Ground	Green ellow	Green ellow	Green ellow	Green ellow

4. Switch leg shall be the same color as the un-switched phase wiring. Travelers, and special systems as selected by the Contractor. Note in record drawings.

K. Identification: All conductors in a panelboard shall be identified by means of tags or tape.

L. MC Cable: Where allowed, install MC cable to meet all NEC requirements.
1. Support: All MC cable shall be supported by dedicated -cable hangers or cable tray. Where suspended from the ceiling or roof structure, use split-ring hangers or wrought-iron hanger rods.
2. Fittings: Follow manufacturer’s instructions for cable preparation for installation of fittings. Cleanly cut the cable end with metal clad cable rotary cutting tool to ensure flush seating of the cable into the fitting. Properly torque fitting securement screws. Provide anti-shorting bushings at both ends of each length of cable.
3. Conductors in Enclosures: Provide neat and workmanlike installation with conductors tied with nylon wire ties in terminal cabinets, gutters, and similar locations.

3.3 SITE TESTS

A. Perform in accordance with manufacturer's printed testing procedures, applicable industry standards, ANSI standards, IEEE standards, and NEMA standards. Provide calibrated testing equipment in good working order and which complies with the above requirements. The below test shall be performed after the conductors have been pulled into the conduit and after terminations have been added, but before final connections are made. Document all readings and testing and make documentation available to Owner upon request.

B. Feeder Insulation Test: The insulation of new service entrance conductors and each new feeder run shall be tested using a megger. Readings must indicate not less than one (1) megohm to be acceptable.

C. Branch Circuit Insulation Test: The insulation of each new branch circuit shall be tested using an ohm meter. Readings must indicate not less than one (1) megohm to be acceptable.

END OF SECTION

SECTION 26 0 26

GROUNDING AND ONDING FOR ELECTRICAL S STEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Grounding and bonding shall include the solid grounding of the various electrical systems and equipment and the proper bonding of all electrical system components and equipment to meet NEC 250 and all other applicable codes and ordinances. These systems shall be provided for the proper protection of life, equipment, circuits, and systems.

B. Permanently ground entire lighting and power systems in accordance with the latest adopted version of the NEC, including service equipment, distribution, panelboards, switch and starter enclosures, motor frames, devices, transformers, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

C. Grounding and bonding requirements specified in this section may be supplemented in other sections of these Specifications.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

1.3 REFERENCES AND STANDARDS

A. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

B. IEEE 1100 (Green book) - Recommended Practice for Powering and Grounding Electronic Equipment.

C. NFPA 54 - National Fuel Gas Code

D. NFPA 78 - Lightning Protection Code

E. NFPA 99 - Health Care Facilities Code

F. UL 467 - Safety Standard for Grounding and Bonding Equipment.

G. UL 486 A & B - Wire Connectors

1.4 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26 requirements.

B. Product Data: Submit data on grounding electrodes and connections.

1.5 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below.

1.6 DELIVER , STORAGE AND HANDLING

A. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging and with plastic sheathing.

1.7 COORDINATION

A. Complete grounding and bonding of building reinforcing steel (rebar) to the satisfaction of the local AH prior to concrete placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer List
1. Apache Grounding
2. Copperweld, Inc.
3. ILSCO Corporation
4. nVent (Cadweld, Critec, Erico)
5. O- Gedney Co.
6. Thermoweld
7. Thomas & Betts

2.2 PERFORMANCE REQUIREMENTS

A. General:
1. All materials used for grounding and bonding and all work performed shall conform to requirements of NEC, IEEE 142, and be listed for the application and environment.
2. All grounding and bonding shall be in strict accordance with NEC 250, 517, etc.
3. Grounding electrode system shall have a resistance to earth of five (5) ohms or less. Where this cannot be met, provide two additional ground rods to form a triple ground rod installation. Under no conditions shall the system have a resistance greater than twenty-five (25) ohms to ground, per NEC 250, at any location in the system.

B. Ground Rods:
1. Copper cladding permanently bonded to a high-strength steel core.
2. 3/4 inch by 10 feet (19mm by 3m) straight, conform to UL 467.

C. Conductors:
1. Grounding Conductor: Copper, insulated (green) where required or uninsulated where allowed in the Specifications or by code, sized per drawings or NEC Table 250.95.
2. Bonding umpers - Insulated conductor, sized to be minimum cross-sectional area greater than or equal to that of the equivalent grounding conductor as determined from NEC Table 250.95.
a. Where braided bonding jumpers are indicated or otherwise required, provide copper tape, braided 3/0 AWG bare copper wire, terminated with copper ferrules.
3. Grounding Ring around a building - 2 AWG uninsulated copper, otherwise sized per NEC.
4. Grounding Ring around a utility transformer - 2 AWG uninsulated copper (unless sized per drawings), otherwise sized per NEC or by utility requirements.

D. Connections:
1. General: All connectors shall be listed and labeled as grounding connectors for the materials used.
2. Welded Bond - Exothermic welded connection or bond such as Cadweld . No phosphorous or any other caustic, toxic or explosive substance may be used.
a. Provide exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.
3. Clamps - Listed bronze connectors, suitable for grounding and bonding applications, in configurations required for a particular installation.

E. Buss Bars:
1. Bare annealed copper bars, 1/4 x 4 x 20 unless otherwise noted on the drawings.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove paint, rust, mill oils, and all surface contaminants at connection points.

3.2 APPLICATION

A. Unless otherwise indicated, the below list of connection styles shall be followed.

B. Outdoor Below Grade Grounding Connections:
1. Welded bond only, no exception.

C. Outdoor Above Grade Grounding Connections:
1. Clamps may be used. Use welded bond where clamping is not accessible or practical.

D. Indoor Grounding and Power Connections:
1. Clamps may be used. Use low-smoke/low emission welded bond where clamping is not accessible or practical.

3.3 INSTALLATION

A. General:
1. Ground and bond electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements, then follow the Drawings or Specifications.
2. Bond all ground electrodes together to form the grounding electrode system including metal underground water pipe, metal frame of the building or structure, concrete encased electrodes, ground ring, rod and pipe electrodes and plate electrodes.
3. At all electrical system components, assemblies, circuits, etc. that are over 120v to ground, provide locknuts and / or listed fittings per NEC 250.97 for bonding of metal raceways. In case of oversized, concentric or eccentric knockouts, comply with NEC 250.92(B). The use of snap-in, wedge-type, or pivot-type connectors is prohibited.
4. Permanently attach equipment and grounding conductors prior to energizing equipment.
5. Refer to Drawings for additional special grounding systems or grounding requirements not mentioned here.

B. Concrete Encased Electrode:
1. Fabricate with twenty (20) feet (6m) of conductor laid lengthwise in excavation for foundation or footings. Install so conductor is within two (2) inches (50mm) of the bottom of the concrete. Where base of foundation is less than twenty (20) feet (6m) in length, coil excess conductor at base of foundation. Bond conductor to reinforcing steel at four (4) locations, minimum. Extend conductor below grade and connect to building grounding electrode.

C. Main Electrode:
1. Provide a building ground rod and bond it to the grounding electrode system. Where ohmic values exceed 5 ohms to ground, the building ground rod shall consist of three ground rods, arranged in an equilateral triangular pattern located at least five (5) feet outside an exterior building wall or as otherwise directed. Space fiveteen (15) feet apart and drive into the earth to a point two (2) feet below finished grade to top of rods. Grounding electrode conductor shall form a continuous loop around rods, and conductor shall be properly bonded to each rod by a fusion weld similar to Cadweld .
2. Extend grounding electrode conductor from this ground rod(s) to the grounded service conductor (neutral) in the building main switchboard at an accessible point on the ground bus per NEC 250.24.
3. Install grounding electrode conductor of 3/0 AWG copper.

D. Main Bonding umper: Shall be sized in accordance with NEC 250.66, if not indicated on the Drawings, and installed within the same enclosure as the point of bonding of the system neutral service entrance.

E. Water Pipe Electrode: A ten (10) foot minimum length of electrically-continuous underground metal water pipe. Bond around insulating joints or sections, insulating pipe, and water meters to make pipe electrically continuous.

F. Fuel Gas Piping:
1. Each above ground portion of a gas piping system upstream from the equipment shutoff valve shall be made electrical continuous and bonded to the building grounding electrode system, as required in NFPA 54.

2. Gas piping shall not be used as a grounding electrode.

G. Transformers: Ground as a separately derived source.
1. Where transformer secondary includes a neutral, the neutral shall be bonded to the equipment enclosure and connected to the system ground conductor.
2. Size bonding jumper per NEC Table 250.66.
3. Grounding conductor shall be in raceway and shall be bonded to nearest available point of interior metal water piping system.

H. Equipment Grounding Conductor (EGC):
1. Comply with NEC 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.
2. All power circuits shall be provided with a separate copper insulated EGC run in the raceway with the power conductors. The conduit shall not be used as the sole means of grounding. The insulation of the EGC shall be green.
3. Bonding to the EGC shall be provided at each end of metallic conduit runs and at all boxes and enclosures.
4. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

I. Isolated Ground (IG) Equipment Grounding Conductor:
1. All branch circuits and feeders that require an IG equipment grounding conductor shall be provided with a separate copper insulated IG equipment grounding conductor run in the raceway with the power conductors. The IG equipment grounding conductor shall be provided in addition to the normal EGC. The insulation of the IG equipment grounding conductor shall be green with a yellow stripe.
2. Conduits and boxes of IG circuits shall be bonded to the normal EGC as stated above. At outlet locations, the IG equipment grounding conductor shall connect only to the isolated ground terminal of an isolated ground outlet. There shall be no connection, either directly or indirectly, between the normal EGC and the IG equipment grounding conductor at any point other than at the source of a separately derived system (transformer) or at the service entrance.
3. The following circuits shall be provided with an IG equipment grounding conductor:
   a. Feeders providing power to panels equipped with an IG buss.
   b. All branch circuits originating at a panel with an IG buss.

. Exterior Lighting:
1. All metallic outdoor poles and luminaries on metallic or non-metallic lighting poles shall be grounded by bonding in an approved manner to the circuit grounding conductor. In addition to this, bond pole to a 6 AWG bare copper wire which shall also be bonded to a ground rod. Install the ground rod adjacent to the pole base with the top driven at least two (2) feet below grade.

K. Grounding Busses:
1. Provide a copper buss bar where indicated on Drawings or in rooms containing any of the below list. Provide a 2 AWG insulated grounding electrode conductor from the grounding electrode system to each grounding buss.
2. Provide in each IDF and MDF room.
3. Provide at each CATV / MATV head-end mounting board.
4. Provide at each building communications rack.
5. Provide at each sound reinforcement equipment rack.

L. Communications Systems:
1. Bond each server, patch panel, data and other communications equipment ground (buss type or grounding conductor type) at each piece of equipment and each equipment rack back to the copper grounding buss installed in the room with a bare 6 AWG ground wire.

M. Engine Generator Neutral:
1. Ground the generator neutral as a separately derived system per NEC 250.20(D), unless noted otherwise on Drawings.
2. Sign: Provide a sign at the service entrance equipment indicating type and location of on-site generator. See Section 26 05 53 - Identification of Electrical Systems for more information.

N. Lightning Protection System:

1. Bond grounding conductors or grounding conductor conduits to lightning protection down conductors or grounding conductors in compliance with NFPA 78.
2. Bond electric power system ground directly to lightning protection system grounding conductor at closest point to electric service grounding electrode. Use bonding conductor sized same as system ground conductor and installed in conduit.

O. Other Grounding Systems:
1. Other buildings served from common service:
a. The main building service is the source for electric service.
b. Bond grounding conductor of building main feeder to grounding electrode system.

3.4 CONNECTIONS

A. General:
1. Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
2. Use electroplated or hot-tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series. Make connections with clean bare metal at points of contact.
3. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps. Aluminum to galvanized steel connections will be with tin-plated copper jumpers and mechanical clamps.
4. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
5. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening valves specified in UL 486A and UL 486B.

B. Exothermic Welded Connections:
1. Use for connections to structural steel and for underground connections except those at test wells. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
2. Terminate insulated EGCs for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground buss in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushing and bare grounding conductors.

C. Compression Type Connections:
1. Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.

D. Moisture Protection:
1. Where insulated ground conductors are connected to ground rods or ground busses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.

3.5 SITE TESTING

A. Testing:
1. Test the electrical system after installation is complete. Inspect and test for stray currents, unintended ground shorts, and proper physical condition of grounding system. Correct any deficiencies and re-test to verify satisfactory installation.
2. Document all readings and testing and make documentation available to Owner upon request.
3. Perform ground resistance and continuity testing in accordance with IEEE 142.
4. Perform leakage current tests in accordance with NFPA 99.
5. Use true-RMS meters for all voltage and current measurements.
6. Test telecommunications grounding riser to verify continuity.

7. Check all isolated ground receptacles for correct polarity.
8. Test all subpanels of separately derives systems to verify subpanel neutral is isolated from ground.
9. Test isolated power systems for the sound reinforcement system to verify isolation of ground system from other building systems.
10. Verify continuity and isolation of audio system ground buss and grounding riser.

END OF SECTION

SECTION 26 0 33

RACE A S AND OXES FOR ELECTRICAL S STEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide all raceway and conduits, outlet boxes, pull and splice boxes, poke-thru boxes, wireways, gutters, and associated fittings as indicated on the Drawings and as required for feeders, branch circuits, splices, taps, equipment connections, and for compliance with regulatory requirements. All locations shown on the Drawings are approximate unless dimensioned.

B. Provide complete, separate conduit systems for all electrical systems on this project to include, but not limited to service entrance, feeders, branch circuit, control wiring furnished by this contractor, emergency and standby power and lighting circuits, critical power, communication systems, and other electrical systems as required.

C. Provide outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation constructed with knockouts or threaded hubs in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Provide outlets as shown, as required and per NEC.

1.2 RELATED REQUIREMENTS

A. Divisions 27 and 28 - Communications and Security

B. Section 26 00 00 - Electrical

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems

D. Section 26 05 53 - Identification for Electrical Systems

E. Section 26 20 00 - Low-Voltage Electrical Distribution

1.3 REFERENCES AND STANDARDS

A. ANSI C80.1 - inc-Coated Rigid Steel Conduit

B. ANSI C80.4 - inc Coated Electrical Metallic Tubing

C. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing

D. ANSI / NEMA Publication No. OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers and Box Supports, and Cast Aluminum Covers.

E. ANSI / NEMA Publication No. OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

F. ANSI 77 - Load Ratings for Underground Boxes

G. ETL PVC-001 - PVC-Coated Rigid Steel Conduit

H. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80) and Fittings

I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

. NEMA FB 1 - Metallic Fittings, Cast Metal Boxes and Conduit Bodies

K. NEMA RN 1 - PVC Externally Coated Galvanized Rigid Steel Conduit and IMT

L. NEMA 250 - Enclosure Ingress Protection Testing

M. UL 1 - Flexible Metal Conduit

N. UL 5 - Surface Metal Raceways and Fittings

O. UL 6 - Rigid Metal Electrical Conduit

P. UL 360 - Liquid tight Flexible Steel Conduit

Q. UL 467 - Electrical Grounding and Bonding Equipment

R. UL 514 - Electrical Outlet Boxes and Fittings

S. UL 651 - Rigid Nonmetallic Conduit

T. UL 797 - Electrical Metallic Tubing

U. UL 870 - Safety Standard for Wireways, Auxiliary Gutters and Associated Fittings

1.4 ABBREVIATIONS AND ACRON MS

A. This specification uses the acronyms and abbreviations from the NEC unless otherwise noted.

1.5 DEFINITIONS

A. Back Box - unction box (j-box), back box, pull box and similar.

B. Raceway - Conduit, raceway, tubing, wireway and similar.

C. See NEC 100 for additional definitions used in these specificatoins, unless otherwise noted.

1.6 DESIGN REQUIREMENTS

A. All conduit, wireway, raceways, boxes, fittings, installation hardware, accessories, and similar products whether directly or indirectly referenced in the Specifications or Drawings shall be:
   1. Suitable and listed for the space / area / environment where they are installed.
   2. Installed / mounted / suspended per latest adopted version of the NEC, NECA Standard of Installation and manufacturer's installation instructions. This work includes but is not limited to clamping, cutting, threading, bending, assembly, supporting, patch coating, etc.

B. Boxes and fittings shall be made of the same material as the conduit material they are installed with, unless modified below or otherwise noted on the Drawings.

1.7 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26 requirements.

B. Submit from the following list, all items used on this project: Rigid metal and non-metallic conduit, flexible metal and nonmetallic conduit, liquid-tight flexible metal and non-metallic conduit, tubing, all fittings, surface raceways, wireways, pull boxes, back boxes, hand holes, mounting hardware, accessories, etc.

C. Submit on all cover plates, extension rings, fittings, labeling, and supports for conduits inside and on roof.

1.8 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in Section 26 00 00 - Electrical and any additional requirements listed below:
   1. Record actual routing of all conduits larger than 3/4 .

1.9 DELIVER , STORAGE AND HANDLING

A. Protect all conduit from corrosion, entrance of debris, moisture and sunlight, prior to and after installation.

1.10 COORDINATION

A. Coordinate mounting heights, orientation and locations of back boxes for outlets mounted above counters, benches, back splashes, etc.

B. Conduit systems shall not be covered or otherwise concealed until review has been made and approvals obtained from the AH .

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Raceways, Wireways, Gutters and Conduits: Aflex, Atkore (AFC, Allied, Power Strut, T Cope), American Conduit, Calbond, Cantex, Carlon, Champion, Hoffman, Hubbell, KorKap, Nepco, Nucor, Omega, Plasti-Bond, Perma-Cote, Pittsburgh, Sedco, Spang, Square-D, Thomas & Betts, Western Tube and Wheatland, Walker and Wiremold.

B. Surface-mount Raceways: Hubbell, Mono-Systems, Panduit, Tehalit and Wiremold.

C. Boxes and Fittings: Appleton, Atkore (AFC, Allied, Power Strut, T Cope), Cantex, Eaton, ECN Korns, Hoffman, Hubbell, Keystone, Lew, Madison, nVent Caddy, Orbit Industries, Raco, Regal, Stahlin, Steel City, Thomas & Betts and Walker.

D. Others: Where specifically listed on Drawings.

2.2 GENERAL PERFORMANCE REQUIREMENTS

A. Minimum conduit / raceway size shall be 1/2 for all circuits.

B. Fittings shall be threaded or compression type. Set screw or bolt-on fittings are NOT acceptable.

C. All fittings shall have an insulated throat bushing, no exceptions.

D. See Section 26 05 19 - Low Voltage Conductors for information on where MC cable is allowed. Where and when allowed, it shall be installed per manufacturers instructions and NEC requirements.

2.3 RIGID METAL CONDUIT - STEEL (RMC)(IMC) - PER ANSI C80

A. Steel: Hot-dipped galvanized rigid steel (GRC) and galvanized intermediate metallic conduit (IMC) with zinc-coated threads and an outer coating of zinc chromate.

B. Fittings: Per NEMA FB 1.
1. Malleable iron, either cadmium plated or hot-dipped galvanized. Die cast zinc.
2. Clamps shall be steel.
3. Use deflection and expansion couplings with bonding jumpers at all expansion joints where required.

2.4 RIGID METAL CONDUIT - ALUMINUM (RAC) - PER ANSI C80

A. Aluminum: Rigid aluminum conduit shall be threaded only.

B. Fittings: Per NEMA FB 1
1. Aluminum fittings required.
2. Use deflection and expansion couplings with bonding jumpers at all expansion joints where required.

C. Conditions: Aluminum conduit shall not be installed in direct contact with concrete or masonry construction.

2.5 PVC COATED RIGID METAL CONDUIT - NEMA RN 1

A. Steel: Galvanized rigid steel conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6 and ETL PVC-001.

B. Fittings: Per NEMA FB 1.
1. Malleable iron or steel, PVC coated (40 mils) exterior, urethane coated (2 mils) interior.
2. Use fittings listed and labeled as complying with UL 514B.

C. Conditions: The installer shall be certified by a manufacturer to install coated conduit.

2.6 ELECTRICAL METALLIC TUBING (EMT) - ANSI C80.3

A. Galvanized thin wall steel or aluminum tubing.

B. Fittings: Per NEMA FB 1.
1. Die cast zinc, pressure cast, malleable iron or steel. Clamps shall be steel. Where aluminum tubing is allowed, aluminum fittings are required unless otherwise noted.

C. Conditions: Aluminum conduit shall not be installed in direct contact with concrete or masonry construction.

2.7 RIGID NONMETALLIC CONDUIT (RNC)

A. PVC: Schedule 40 PVC, NEMA TC 2, high impact resistant.

B. RTRC: Fiberglass, NEMA TC 14, standard wall.

C. Fittings: Per NEMA TC 3 & 14, solvent weld socket type.

D. Conditions: Do NOT use PVC for elbows in sizes 1-1/2 and larger.

2.8 FLEXIBLE METAL CONDUIT (FMC)

A. Steel: Spiral-wound, square interlocked, hot-dipped galvanized steel.

B. Aluminum: Spiral-wound, square interlocked aluminum.

C. Fittings: Per NEMA FB 1.
1. Cadmium plated two-screw, double-clamp malleable iron. Hot-dipped galvanized two-screw, double-clamp malleable iron. Pressure cast. Steel cast. inc coated, aluminum.

2.9 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LFC)

A. Steel: Spiral-wound, square interlocked, hot-dipped galvanized steel strip with a bonded outer jacket of PVC.

B. Fittings: Per NEMA FB 1.
1. Cadmium plated, compression type, malleable iron. Hot-dipped galvanized, compression type, malleable iron. Terminations shall be insulated throat type.
2. Aluminum: Copper free (1 or less).

2.10 WIREWA S / GUTTERS

A. Steel: Not less than 16-gauge sheet steel. Size and length shall be as indicated on drawings. Otherwise, provide dimensions per NEC 366 & NEC 376, but never smaller than four (4) inches by four (4) inches. Construction shall be oil-tight, dust-tight and rain-tight with hinged fully gasketed cover. Finish shall be ANSI gray epoxy paint over rust-inhibiting prime coat.

B. Fittings: Lay-in type with removable top, bottom and sides, captive screw drip shield.

2.11 SURFACE RACEWA S - SINGLE CHANNEL

A. Steel: Not less than 0.04 thickness sheet steel. One piece for up to seven (7) - 12 AWG wire capacity. Two (2) piece for eight (8) or more - 12 AWG wire capacity. In unfinished spaces, finish shall be enamel over rust-inhibiting prime coat, not less than 0.25 square inch cross section.

B. PVC: Rigid PVC, not less than 0.20 square inch cross section. Two (2) piece construction, minimum five (5) - 12 AWG wire capacity.

C. Finish: In all spaces, coordinate color with Owner's Representative.

D. Fittings: Provide all required manufacturer's standard accessories and fittings for a complete installation.

2.12 SURFACE RACEWA S - DUAL CHANNEL

A. Aluminum: Two compartment, with receptacles and data devices as noted on electrical and technology drawings.

B. PVC: McKinney TDG - Both Wiremold AL4320 and Panduit T-70 non-metallic raceway (may be used in new construction), two compartment, with receptacles and data devices as noted on electrical and technology drawings.

C. Finish: In all spaces, coordinate color with Owner's Representative.

D. Fittings: Provide all required manufacturer's standard accessories and fittings for a complete installation.

2.13 GENERAL OUTLET / BACK BOX / UNCTION BOX

A. All boxes shall meet NEMA OS 1 (metallic) and NEMA OS 2 (nonmetallic).

B. Cast Boxes: NEMA FB 1, Type FS or FD malleable iron or aluminum. Furnish gasketed cover by box manufacturer and provide threaded hubs.

C. Masonry Boxes: Shall have gang capacity and extension ring covers to match the number of devices installed.

D. Floor-mounted Back Boxes: Shall be adjustable and gasketed.

E. Outlet and Pull Boxes: Single or ganged back boxes.
   1. Interior: Standard box shall be 2-1/8 deep or better. Use 3-1/2 deep boxes as needed and 1-1/2 shallow boxes as required for wall depth.
   2. Exterior: Standard box shall be 3-1/2 deep NEMA 3R or better.
   3. In Ground or Concrete: NEMA 4 cast iron box with external recessed flanged cover. Depth as required.

F. Box Ganging: Gang type boxes shall be used where multiple devices are located adjacent to one another, including ceiling, wall and cast in floor boxes.

G. Box Barriers: In boxes with multiple switches, where the voltage between adjacent switches exceeds 150 volts to ground, provide an enclosure equipped with identified, securely installed barriers between adjacent devices.

H. Wall Plates: As specified in Section 26 27 26 - Wiring Devices.

2.14 PULL / SPLICE BOXES AND HAND HOLES

A. Surface Mounted Cast Metal Box: NEMA 250, Cast aluminum with ground flange, neoprene gasket and stainless steel cover screws.

B. In-Ground Cast Metal Box: NEMA 250, Type 6, cast aluminum with flanged (smooth/nonskid) cover, recessed cover box for flush mounting.

C. Handholes: Fiberglass with weatherproof nonskid cover with pre-cut 6 inch x 6 inch (150 mm x 150 mm) cable entrance at center bottom of each side.

2.15 ROOFTOP CONDUIT SUPPORTS

A. Supports shall be adjustable height. Metal parts to be stainless steel or galvanized steel.

B. This product shall be used ONL when conduits are indicated on the drawings to be run on the roof.

C. Approved Products:
1. Miro Industries model 24-R-AH, 48-R-AH, 24AH and 48AH.
2. PHP Systems model PP10.

PART 3 EXECUTION

3.1 PREPARATION

A. Place conduit sleeves in the cavities of walls and floor slabs for the free passage of conduits.

B. Set all conduit sleeves in place a sufficient time ahead of concrete placement so as not to delay the work.

C. Apply caulking for all conduit sleeves through floors and through exterior walls.

D. Plugs or caps shall be installed before concrete placement begins.

3.2 GENERAL INSTALLATION

A. The Drawings indicate an approximate location of boxes for switches, lighting outlets, power outlets, raceways, etc. The Drawings may not give complete and accurate information in regard to locations of such items. The exact locations shall be determined by reference to the Drawings and by actual measurements during construction of the building, subject to approval by the Owner's Representative.

B. The Owner's Representative reserves the right to adjust locations of raceway and boxes up to six (6) feet in any direction prior to rough-in to accommodate intended purpose at no additional cost.

C. Ground and bond all raceway and boxes in accordance with Section 26 05 26 - Grounding and Bonding for Electrical Systems.

D. Identify all raceway and boxes in accordance with Section 26 05 53 - Identification for Electrical Systems.

E. All installations shall meet NEC requirements for acceptable fill ratings. NO exceptions. No derating shall be allowed without explicit permission from the EOR. Listed partitions are acceptible in gutters or similar for proper partitioning.

3.3 CONDUIT AND RACEWA APPLICATION

A. General Application:
1. Raceway Systems: All raceway shall be verified with the AH before use. In the case of questionable or denied use, the contractor shall be required to use a raceway system permitted by the AH at no additional cost.
2. Conduit Sleeves: Provide RMC sleeves at all locations where conduits pass through beams, outside walls, fire rated walls, or structural members. The size of these sleeves shall be such as to permit readily the subsequent insertion of conduit of the proper size with adequate clearance for movement due to expansion and contraction. Where conduits pass through outside walls, the inside diameter of each pipe sleeve shall be at least 1/2 greater than the outside diameter of the service pipe. After the conduits are installed, fill the annular space between the conduit and its sleeve with a mastic or caulk. Use packing as required to accomplish this. At fire rated wall penetrations, use fire barrier.
3. Surface-mount Raceway: Not permitted except as noted on the Drawings or in locations where concealing conduit is not possible.
4. Wireway / Raceway: Where required or shown on the Drawings. It shall be solid, without knockouts, with hinged cover, placed so that cover is gravity closed.

5. Branch Circuits: Shall not be installed in or under the ground floor slab unless specifically required on the Drawings or pre-approved by the EOR. No exceptions.

B. Underground:
1. Acceptable Conduit: RMC and PVC.
2. Fittings: All elbows shall be galvanized steel or fiberglass, no PVC. Other fittings shall match conduit material.
3. Boxes: Shall be cast metal, concrete or fiberglass. Shall be ANSI 77 traffic rated for the location.
   a. Street / Drive: Vehicle Tier 22 rated.
   b. Sidewalk: Personnel or vehicle Tier 8 rated.
   c. Grass: Personnel Light Duty rated.
4. Conditions: Conduit risers from elbow to above grade shall be RMC.

C. Imbedded in / Passing through concrete:
1. Acceptable Conduit: RMC.
2. Fittings: Shall match the conduit material.
3. Masonry Boxes: Galvanized steel masonry rated box.
4. Conditions:
   a. PVC allowed only where required by utility provider.
   b. Where allowed, conduit imbedded in concrete shall not be larger than 3/4 . Verify with project Structural Engineer prior to placing.

D. Crawlspace:
1. Acceptable Conduit: PVC.
2. Fittings: Shall match the conduit material.
3. Boxes: Shall match the conduit material.

E. Wet and Damp Locations:
1. Acceptable Conduit: RMC.
2. Fittings: Shall be rated for the space and shall match the material of the conduit they are installed with.
3. Boxes: Recessed shall match conduit material. Surface-mount shall be stainless steel.

F. Concealed / Exposed Dry Locations:
1. Acceptable Conduit - EMT.
2. Fittings: Shall match the conduit material.
3. Boxes: Malleable iron or cast aluminum (type FS / FD), with threaded hubs and gasketed covers.
4. Conditions: Do not use aluminum in cinder-fill walls.

G. Existing Walls:
1. Acceptable Conduit:
   a. Concealed: FMC and EMT.
   b. Surface-Mount: Surface-Mount Raceway and EMT.
2. Fittings: Shall match the conduit material.
3. Conditions: Surface-mount raceway shall be used in finished spaces. EMT may be used only in unfinished spaces, unless otherwise directed on the Drawings.

H. Indoor Equipment Connections:
1. Acceptable Conduit: FMC and LFC (Liquid-Tight FMC).
2. Fittings: Shall match the conduit material.
3. Boxes: Shall match the conduit material.
4. Conditions:
   a. Where FMC or FNC are used, total length not to exceed 72” above ceiling, 48” exposed below ceiling.
   b. In kitchen or similar spaces, use LFC unless otherwise directed on the Drawings.
   c. Install flexible conduit to all recessed luminaires in accessible ceilings. Do not use more than four (4) flexible metal conduits per junction box to supply luminaires in a location. Do not supply a luminaire from another with any raceway or FMC. Suspend junction boxes and conduits from high roofs with hangers and trapeze.

I. Outdoor Above Grade:
1. Acceptable Conduit: RMC.

2. Fittings: Shall match the conduit material.
3. Boxes: Weatherproof cast steel or cast aluminum.
4. Conditions: Conduits may be used on a roof ONL where indicated on the Drawings and shall be supported per the Specifications.

. Outdoor Equipment Connections:
1. Acceptable Conduit: LFC (Liquid-Tight FMC).
2. Fittings: Shall be rated for the space or environment.
3. Boxes: Shall be rated for the space or environment.
4. Conditions: Flexible conduit types shall not exceed 72 in length.

K. Corrosive Environments:
1. Acceptable Conduit: PVC and LFNC.
2. Fittings & Boxes: Shall be rated for the space or environment.
3. Conditions: Flexible conduit for equipment connections only unless otherwise noted on the Drawings.

L. Hazardous Locations:
1. Acceptable Conduit: RMC.
2. Conditions: All conduit, boxes, fittings, hardware, etc. shall be rated for hazardous location.

M. Passing Through a Firewall:
1. Acceptable Conduit: EMT and RMC.
2. Conditions: Provide fire caulking at all penetrations.

3.4 CONDUITS AND RACEWA INSTALLATION

A. General:
1. Unless otherwise indicated on the Drawings, conduits shall be concealed in walls, partitions and above the ceiling. In rooms where ceilings are not present or scheduled, orient conduit parallel or perpendicular to structure.
2. Completely install each entire conduit system before pulling in any conductors. Clean the interior of every run of conduit before pulling in conductors. See Section 26 05 19 - Low Voltage Power Conductors for additional requirements for installation of conductors in raceways.
3. Conduits shall be continuous between enclosures such as outlet, junction and pull boxes, panels, cabinets, motor control centers, etc. The conduit must enter and be secured to enclosures so that each system is electrically continuous throughout. Where knockouts are used, provide double locknuts, one on each side. At conduit terminations, provide insulated throat fittings. Where conduits terminate in equipment having a ground buss, such as in switchgear, and panelboards, provide conduit with an insulated grounding bushing.
4. In mechanical spaces, install final equipment connections down from overhead where possible.
5. Capping
   a. Cap open ends of raceways until conductors are installed to prevent ingress of dirt and moisture.
   b. Cap or close ends and unused openings in wireways and gutters.
6. Sealing
   a. Seal both ends of all conduits that serve as a passageway for control wiring, data, etc. through a rated wall to prevent air / gasses / contaminates from moving from one space to another.
   b. Seal both ends of underground conduits as required to prevent ingress of water and other contaminates from outside.
   c. All sSealant shall be fire caulk, putty packs, etc. to maintain the rating of the wall.
7. RNC shall be adequately solvent welded at joints to form a tight, waterproof connection. Provide insulated ground wire in all PVC conduit and extend to ground buss.
8. Provide two (2) spare 1 inch conduits stubbed into attic space at flush mounted electrical cabinets.
9. Moisture traps: Provide junction box with drain fitting at low points in conduit system to avoid moisture traps.
10. Grounding: The installation shall comply with all NEC grounding requirements. See Section 26 05 26 - Grounding and Bonding for Electrical Systems for additional grounding requirements.
11. Use expansion-deflection fittings on conduits two (2) inches and larger crossing structural expansion joints and on exposed conduit runs where necessary. Provide bonding jumpers across fittings in metal raceway systems. Provide fittings to accommodate expansion and deflection where

raceway crosses seismic, control and expansion joints.

B. Support:
1. Install conduits parallel and supported on unistrut or equal trapezes and anchored with split ring hangers, conduit straps or other devices specifically designed for the purpose. Wire ties are not permitted. Do not attach raceway to ceiling support wires or other piping systems.
2. Securely fasten and support all conduit runs. Provide required clamps, straps, clips, hangers and brackets. Raceways installed in joists shall be secured to joists with clamps at 20'-0 maximum spacing. Raceways installed parallel to joists shall be supported by caddy clips (1 inch or smaller) or in unistrut / threaded rods / beam clamps trapeze at 15'-0 centers. Raceways installed perpendicular to bottom of joists shall be secured with individual conduit hangers at 10'-0 maximum spacing or unistrut / threaded rods / beam clamps at 15'-0 maximum centers. Raceways supported by straps at walls shall be supported per NEC. Support all raceways within one (1) foot of each box, cabinet, disconnect, bend or other raceway termination.
3. Raceways shall be supported with 2-hole straps. Single hole straps are not acceptable.
4. Support raceway using coated steel or malleable iron straps, clevis hangers, and split hangers.
5. Support group related raceway using conduit rack system made of steel channel. Provide space on each for 25 percent additional raceways.
6. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.

C. Raceway Spacing:
1. Maintain clearance between raceway and piping for maintenance purposes.
2. Maintain twelve (12) inch (300 mm) clearance between raceway and surfaces with temperatures exceeding 104 F (40 C). (Excluding roof mounted conduits.)

D. Raceway Bends:
1. Make bends with standard ells or conduit bent in accordance with the NEC. Make field bends using equipment designed for the particular conduit material and size involved. Bends must be free from dents or flattening. Use no more than the equivalent of three (3) 90-degree bends in any run between terminals and cabinets, or between outlets and junction boxes or pull boxes. Provide conduit bodies to make sharp changes in direction, as around beams. Provide factory elbows for bends in metal conduit larger than two (2) inch (50 mm) size.

E. Concealed Locations:
1. Install concealed conduit as directly and with the largest radius bends as possible. Conceal conduit in finished areas.

F. Pull String:
1. Provide a Greenlee 431 or equal (240 lbs.) nylon pulling line in conduits where wiring is not installed under Division 26 work, such as controls, signal, and similar systems. Identify both ends of the line by means of labels or tags reading Pulling Line .

G. Fire Rated Walls:
1. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping to comply with the latest applicable edition of the UL Fire Resistance Directory, Volumes I and II.

H. Raceway Routing:
1. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

I. Rooftop Installation:
1. RMC installed on the roof shall be securely fastened in place and supported on approved supports at least every ten (10) feet. Additionally, conduit shall be securely fastened and supported within three (3) feet of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.
2. LFC on the roof shall be securely fastened in place by an approved means within twelve (12) inches of each box, cabinet, conduit body, or other conduit termination, and shall be supported and secured at intervals not to exceed 4.5 feet. Flexible conduit shall not lay on roof.

. Raceway Assemblies:

1. Bring conduit to shoulder of fittings fasten securely.
2. Provide conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

K. Surface Raceway:
1. Provide flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
2. Provide insulating bushings and inserts at connections to outlets and corner fittings.

3.5 WIREWA AND GUTTER INSTALLATION

A. Install wireways and surface raceways where noted or as required. Field apply a 90 grey zinc paint coating over cuts or scratches before any other finish is applied.

B. Serve surface-mount raceways from flush outlet boxes mounted behind raceway where possible and as directed.

3.6 COMMUNICATION S STEMS CONDUIT INSTALLATION

A. This Contractor shall provide all raceways and conduits for all communication systems shown and / or required per Specifications and as shown on the Electrical and Communications Drawings. Communication systems may include but are not limited to fire alarms, intercoms, data, security, antenna and media management.

B. This contractor shall provide a conduit pathway (minimum 12 long) above ceiling for fire alarm, data, AV systems, etc. between all spaces and the corridor, where walls go to deck. Coordinate exact conduit sizes and quantities (range from one (1) 1” to two (2) 4” conduits) with low voltage Contractors and Installers.

C. Raceways and conduit requirements shall be coordinated by this Contractor with each communication systems Contractor and the General Contractor.

D. See Divisions 25, 27 and 28 for additional requirements.

3.7 ROOFTOP CONDUIT SUPPORT APPLICATION AND INSTALLATION

A. All roof-mounted conduits are to be supported and secured using an approved pipestand product manufactured for the purpose of supporting piping and conduit.

B. Supports shall be mounted onto a 12” x 24” x 2” concrete block.

C. Concrete block shall be placed over a ½” traffic block which is securely attached with mastic to the roof.

D. Electrical conduit, gas piping, and condensate may be mounted onto the same support.

3.8 BACK BOXES, OUTLETS AND FITTINGS APPLICATION

A. Back Boxes: Sizes and configuration shall be as required for the intended service and shall conform to and be applied in accordance with NEC Table 314.16(A). Provide extension rings, expandable bars sets, supports, gaskets for weatherproof type etc., where required.

B. Ceiling-mounted Boxes: Provide supports and attachments to properly support ceiling and bracket-type devices or luminaires. Where the box shall support the device, the box shall be rated for the weight of the device / luminaire supported.

C. Voice & Data Outlet: Provide back boxes at each voice and data outlet. Communications wiring, device and plate to be provided by communications Contractor. See Divisions 27 and 28 for additional requirements.

3.9 BACK BOXES, OUTLETS AND FITTINGS INSTALLATION

A. Do not connect or install outlet boxes back-to-back.

B. Mounting height of a wall-mounted outlet box means the height from finished floor to bottom of box.

C. Unless otherwise shown or specified, install boxes for switches at 44 and receptacles at 18 AFF. Verify door swings with Drawings and schedules and locate switches and pull stations on the strike side of the door unless otherwise noted.

D. Where back boxes are required for switches, receptacles, data jacks, thermostats, CO_2 sensors, etc. and are shown next to each other, all devices shall be installed at the same height and, where possible, provide a gang back box and cover them with a multi-gang cover plate.

E. Where boxes are indicated adjacent to each other, mount these boxes in a symmetrical pattern with all tops at the same elevation.

F. Install boxes as required to facilitate cable installation in raceway systems.

G. Provide boxes in conduit runs of more than 100 feet or as required in Division 26.

H. Protect boxes in such a manner as to prevent foreign material, such as plaster, from entering boxes. Boxes shall be thoroughly cleaned of foreign materials before pulling conductors.

I. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26 - Wiring Devices, as indicated on the Drawings or as indicated in the details.

. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

K. Accessible Ceilings: Install outlet and junction boxes no more than six (6) inches (150 mm) from ceiling access panel or from removable recessed luminaire. Provide suitable access doors for all boxes mounted above gypsum / hard or otherwise inaccessible ceilings.

L. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

M. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

N. Install adjustable steel channel fasteners for hung ceiling outlet box.

O. Do not fasten boxes to ceiling support wires or other piping systems.

P. Support boxes independently of conduit.

Q. Install gang box where more than one device is mounted together. Do not use sectional box.

R. Provide plaster rings for all boxes in plastered walls and ceilings.

S. Install gang box with plaster ring for single device outlets.

T. Provide boxes so that covers are readily accessible and easily removable after completion of the installation.

U. Provide all standard boxes, pull junction, wiring device and / or splice boxes for all systems in ceilings, walls and slabs.

V. All low voltage systems in attic or crawl spaces specified in Division 23 / 25 are not included.

W. At all ceiling-mounted receptacle and luminaire locations (exit light, pendants, linear direct / indirect, etc.), provide a heavy-duty dual bar hanger with ceiling ties to support the back box. Provide Cooper Industries BA50F or approved equal with appropriate back box for the application.

X. All outlet boxes shall be mounted between joists / studs and supported by both adjacent joists / studs, not just one. All outlet boxes shall be supported by a rigid box support or mounting bracket that stretches the entire length between the joists / studs and is mechanically fastened to joists / studs at each end. Outlet boxes shall not be supported from only one side or by only one joist / stud regardless of stud material.

. Plates shall cover any cracks between box and tile. Use oversize plates where necessary.

. At all exit lights installed in grid ceilings (T-grid), provide a Cooper Industries BA50F or approved equal.

3.10 FLUSH BOXES

A. Mount all outlet boxes such that finished installation with mud ring is within 1/4 inch of the finished wall or ceiling line unless otherwise indicated. Provide knockout closures to cap unused knock out holes where knock out holes have been removed. Install outlets flush with finish walls or ceiling surfaces for concealed wiring.

B. Provide galvanized steel extension rings where required to extend the box forward in conformance to NEC requirements. Attach ring with at least two machine screws. Install electrical boxes and fittings in compliance with NEC requirements and in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that the boxes and fittings serve the intended purposes. Under no circumstances shall a conduit enter/exit an extension ring. Conduits shall enter / exit the electrical box only.

C. Locate boxes and conduit bodies to ensure accessibility of electrical wiring. Install blank cover plates, painted to match surrounding, at pull boxes, junction boxes and all others to which no luminaire or device is to be attached.

D. Securely fasten outlet boxes in position using clips or other suitable means. Secure boxes rigidly to the substrate upon which they are being mounted. Solidly embed boxes in concrete or masonry. Boxes shall not be permitted to move laterally, or to be supported only by EMT or conduit.

3.11 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 07 84 00 - Firestopping.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

C. Locate outlet boxes to allow luminaires positioned as indicated on the Drawings.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.12 AD USTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.13 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

3.14 EXISTING WORK

A. For any renovation, it is intended to reuse the existing conduits if they prove to be adequate in size and integrity, unless otherwise noted on the Drawings.

END OF SECTION

SECTION 26 0 3

IDENTIFICATION FOR ELECTRICAL S STEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Identification required for electrical equipment and systems.

B. All identification required by code or ordinance shall be provided, whether or not shown on Drawings or specified herein.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

B. Section 26 20 00 - Low-Voltage Electrical Distribution

1.3 REFERENCES AND STANDARDS

A. ANSI 535.4 - Safety labels and signs

B. Federal Specification (L-P-387) - labelling, materials and color standards

1.4 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01 and Division 26.

B. Product Data:
1. Submit product data for sign materials. Refer to Electrical Identification detail on the Drawings for additional information.
2. Submit manufacturer’s catalog literature for each product required.
3. Submit Electrical Identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

1.5 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below:
1. After the owner’s room number list is finalized, submit a list of all electrical identification tags. The list shall include the actual text that will appear on each tag. Include the owner’s and architects room numbers on all tags. Upon request, this list shall be submitted to the Owner's Representative for review.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of three (3) years experience.

1.7 DELIVER , STORAGE AND HANDLING

A. Accept identification products on site in original containers. Inspect for damage.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

PART 2 PRODUCTS

2.1 MATERIALS

A. General Requirements:
1. Lettering shall be Arial font.
2. All means of identification referenced in this section shall be of sufficient durability to withstand the environment per NEC 110.21. Where plastic is used outdoors, it shall be UV rated or treated.
3. Colors shall conform to FS L-P-387.
4. Thickness for signs and engraved labels shall be 1/16 thick minimum.

B. Signs: For identifying multiple electrical services.
1. Outdoors: Aluminum.
2. Indoors: Plastic.
3. Appearance: White with black lettering, lettering to be 1/4 tall minimum.

C. Equipment Labels: For panelboards, switchboards, switchgear, disconnects, equipment, etc.
1. Outdoors: UV rated engravable plastic (L-P-387).
2. Indoors: Engravable plastic (L-P-387).
3. Appearance:
a. Non-Emergency - White with black lettering, lettering to be 1/4 tall minimum.
b. Emergency - Red with black lettering, lettering to be 1/4 tall minimum.

D. Electrical Safety Labels: For arc flash labelling.
1. Inside building or enclosure to be self-adhesive vinyl.
2. Appearance: Industry standard colors and layout.

E. Marker Labels / Sleeves: For circuit identification and other labelling.
1. Marker Label - 2 or wider write-on marker label with white writing portion and clear laminating portion for protection.
2. Marker Sleeves - 2 or wider sleeve colored to identify electrical systems per requirements in Part 3.

F. Wire Markers: For circuit or voltage identification.
1. Conductor Marking: Electrical tape.
2. Circuit Marking: Tubing type, cloth tape, split sleeve.
3. Appearance: Colors to match requirements in Part 3.

G. Underground Warning Tape:
1. Four (4) inch wide plastic tape.
2. Appearance: Colored red and yellow with suitable warning legend describing buried electrical lines.

H. Mechanical Fasteners: Stainless steel screws, non-corroding pop rivets.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate with the Owner's Representative to obtain a list of the finalized owner’s room number list before ordering identification tags.

B. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 APPLICATION OF EQUIPMENT LABELLING

A. Main Service Disconnecting Means:
1. Mark the label on the main service disconnecting means with the calculated fault current listed on the panel schedule along with the issue date of the Drawings per NEC 110.24(A). The calculated fault current shall be labelled Maximum Fault Current and the date shall be labelled Date Calculations Performed .
2. Provide a sign at each service at each structure per NEC 230.2(E).

B. Panelboards, Switchboards, Switchgear:

1. Circuit directory shall be frame mounted inside the door with heat-resistant transparent face and a directory card that is type written and completely filled out.
2. Circuit directory shall coordinate each breaker with the proper load served. Each circuit shall be uniquely identifiable per NEC 408.4(A) including room numbers. Room numbers shall be as directed by Owner.
3. Circuit directory shall indicate all spares and spaces in erasable pencil.
4. Equipment Label shall indicate the high leg per NEC 408.3.

C. Instantaneous Fault Current (AIC): Electrician to field-mark the equipment labels with the calculated instantaneous fault current (as shown on panel boards) per NEC 110.24(A) and use the issue date of the drawings as the calculation date.

D. When series rated panels are specifically allowed, provide a label affixed by the manufacturer indicating the tested and approved series rating combinations per NEC 240.86. Provide an additional label affixed behind the panel door to be field marked in accordance with NEC 110.22(C).

3.3 INSTALLATION OF EQUIPMENT IDENTIFICATION

A. General:
1. Install all identification per manufacturer's installation instructions, NEC and NECA standards.
2. Install all labels in an easily visible location and parallel to equipment lines.
3. Provide signs and tags for equipment requiring identification as shown on Drawings and for equipment as required by the NEC.
4. All signs and tags to be mechanically fastened. Double-sided tape or other fastening methods are not acceptable.
5. Provide for each main disconnect not grouped together.
6. Install signs on outside of cover for safety switches and time clocks.
7. Install signs on outside top, not on door, and at each circuit for panelboards, switchboards and motor control centers.
8. All labeling identification shall contain both the owner’s and architect’s room names and numbers. Coordinate with General Contractor to secure construction room numbers.
9. Provide all additional signage required by the AH at no cost to the Owner.
10. Install identification only when ambient temperature and humidity conditions are within range recommended by the manufacturer.

B. Conduit Identification:
1. When any of the below systems are required to be run in conduits (per Drawings, Div. 27, Div. 28, AH or Owner Requirements), conduits shall be colored with painted band, marker labels or marker sleeves every ten feet (10') maximum and at back box locations using paint or marker labels. All colors shall be by system per the below list:
   a. Fire Alarm System: Red
   b. Voice / Data cabling: Blue
   c. Security System: Green
   d. Intercom, A/V, etc. (Media Mgmt.): ellow
   e. CATV / MATV: Black
   f. Lighting Controls: Orange

C. Back Box Cover Identification:
1. When any of the below systems are required to be run in conduits (per Drawings, Div. 27, Div. 28, AH or Owner Requirements), identify the back box covers per system. by painting the entire cover or by using marker labels. Marker labels not acceptable for back box covers for Fire Alarm. See below for colors.
2. Cover Identification: Paint the entire cover or use marker labels. Marker labels not acceptable for back box covers for Fire Alarm. See below for colors.
3. Back Box Cover Information: Label the back box with the source panel and circuiting using Marker Labels or Sharpie. Label as Future Use if there are no conductors pulled.
4. Back Box Cover Color:
   a. Fire Alarm System: Red
   b. Voice / Data cabling: Blue
   c. Security System: Green
   d. Intercom, A/V, etc. (Media Mgmt.): ellow

e. CATV / MATV: Black
f. Lighting Controls: Orange
g. Other (unless otherwise specified herein): White

D. Electrical Distribution Nameplates:
1. Application: Panelboards, Switchboards, Switchgear, Transformers, MCCs, etc.
2. Identification: Sign or Equipment Label with mechanical fasteners, per NEC 408.4(B).
3. Information shall include (Example in parenthesis):
a. Panel designation (CHAC).
b. Voltage, phase and wires (277/480v 3ph 4w).
c. Source of service (Fed from MSB).

E. Electrical Equipment Nameplates:
1. Application: Safety switches, disconnects for HVAC, motors, time clocks, water heaters, etc. and enclosure for controls, relays, contactors, solenoids, other electrical assemblies.
2. Identification: Sign or Equipment Label with mechanical fasteners.
3. Information shall include (Example in parenthesis):
a. Load served (A/H C206) or (Parking Lot Lighting).
b. Voltage and phase (480v 3ph).
c. Circuits used (CHAC-15,17,19).

END OF SECTION

SECTION 26 0 3

PO ER S STEM STUDIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide calculation of various parameters of the new and / or existing electrical system along with feedback to the Electrical Contractor to ensure:
   1. Proper adjustment of all adjustable breakers for efficient operation.
   2. Proper labelling for equipment and personnel safety.

B. Performing Protective Device Coordination Studies.

C. Performing Arc Flash analysis.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

1.3 REFERENCES AND STANDARDS

A. ANSI / IEEE Standard 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.

B. NFPA 99 – Health Care Facilities Code.

1.4 COORDINATION

A. Coordinate special tests and / or equipment start-up as specified or implied in related sections.

1.5 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 1, and Division 26 requirements.

1.6 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below:

PART 2 PRODUCTS

2.1 PERFORMANCE / DESIGN CRITERIA

A. Submit studies in accordance with ANSI / IEEE Standard 242.

B. Submit one-line diagram for each electrical service. Key all equipment and components on diagram to items in the studies.

PART 3 EXECUTION

3.1 GENERAL

A. This Contractor shall coordinate with the submitted equipment manufacturer to provide the below studies per the requirements in the Specifications. This Contractor shall coordinate all wire and conduit sizes and feeder lengths to the equipment manufacturer for the purposes of conducting the studies.

B. The submitted equipment manufacturer shall provide the below studies, complete with a report including any cautionary items, equipment adjustments and proper equipment labels.

3.2 APPLICATION

A. Short-Circuit Current Study (SCCS):
1. Provide a short-circuit current analysis for each main switchboard and all downstream distribution as required to complete the breaker coordination study and arc flash study requirements below. Short-circuit analysis shall calculate short-circuit levels at service transformer secondary, switchboard main breaker, each feeder breaker and all levels of downstream distribution equipment. Assume infinite source buss at the utility transformer primary if the primary short-circuit current information cannot be obtained from the utility company.
2. Coordinate the Short Circuit Current Ratings (SCCR / Withstand Rating) of mechanical equipment with the available short circuit current. The SCCR of all electrical and mechanical equipment shall exceed the available short circuit current.
3. Label each switchboard and panelboard with the Instantaneous Fault Current per Section 26 05 53 - Identification for Electrical Systems.

B. Overcurrent Protective Device Coordination Study (Breaker Coordination) (BCS):
1. Provide a time-current coordination study for each system. Coordination study shall compare the operating levels and times of the protective devices to the withstand levels and times that the equipment can sustain without damage or failure. Determine electronic trip unit settings necessary to achieve optimal selective coordination throughout the entire electrical distribution system. Determine setting for all adjustments of trip units of all electronic circuit breakers that are linked by zone-selective interlocking.
2. Provide a breaker coordination study for the entire electrical distribution system when any of the following happen:
   a. Where service entrance equipment is added or changed.
   b. Where distribution panels or sub-panels are added or changed.
   c. Where feeders are changed.
   d. Where the utility transformer is changed.
3. Provide a breaker coordination study for all affected electrical distribution equipment including switchboards, panelboards, MCCs, disconnects, safety switches, etc. when any of the following happen:
   a. Where electrical panels are added or changed but the service entrance equipment is not changed.
   b. Where any mechanical equipment is changed including chillers, cooling towers, air handlers, condensers, pumps, or rooftop units.
4. Submit the short circuit and OCPD coordination to the AH / city upon request. The level of detail and format shall conform to city requirements.
5. Adjust settings of adjustable circuit breakers to achieve selective coordination of the system. Notify the Engineer if selective coordination cannot be achieved.
6. Overcurrent Protective Device Coordination Study shall be performed in accordance with NEC and NFPA 99.

C. Arc Flash Hazard Study (AFHS):
1. This contractor required to provide, as a part of this project, an arc flash and fault study with all required labels for the service entrance equipment and all downstream electrical panelboards and switchboards per NEC 110.16 and 110.21(B).
2. This requirement may be met by one of the following methods:
   a. Coordinate this requirement with the equipment manufacturer to provide both the study and the required labels. (usually less expensive)
   b. Hire a qualified firm to provide the study and labels.

END OF SECTION

SECTION 26 0 00

COMMISSIONING OF ELECTRICAL S STEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Commissioning:
1. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
   a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
   b. Verify and document proper performance of equipment and systems.
   c. Verify that O&M documentation is complete.
   d. Verify that the Owner's operating personnel are adequately trained
2. The systems to be commissioned include: electrical switchgear and panels, emergency power systems (if included), UPS Systems (if included), electrical and lighting controls, fire alarm system, and life safety systems and controls.
3. Commissioning requires the participation of affected Division contractors to ensure that all systems are operating in a manner consistent with the Contract Documents. All affected Division contractors shall be familiar with all parts of the commissioning plan issued by the CA (Commissioning Authority) and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
4. Commissioning Team:
   a. The members of the commissioning team consist of the Commissioning Authority (CA), the designated representative of the owner, the General Contractor (GC or Contractor), the Architect and Design Engineers, the Mechanical Contractor (MC), the Electrical Contractor (EC), the Controls Contractor (CC), the Fire Alarm Contractor, and any other installing subcontractors or suppliers of equipment. The Owner's building or plant operator/engineer is also a member of the commissioning team.

1.2 COMMISSIONING AUTHORIT

A. The commissioning authority and/or agency shall be selected and employed by the building owner. The commissioning agent shall be a licensed professional engineer in the State where the work will be performed, and shall be experienced in the commissioning of mechanical and electrical systems of the type installed in this project. Experience in construction process, direct digital control systems, test and balance and ASHRAE Guideline 1 - 1998 is mandatory. The commissioning agent shall not be associated with or employed by a mechanical contractor, or equipment supplier.

1.3 COMMISSIONING PLAN

A. Commissioning Plan:
1. The commissioning plan provides guidance in the execution of the commissioning process. ust after the initial commissioning scoping meeting the CA will provide the plan, which will continue to evolve and expand as the project progresses. The Specifications will take precedence over the Commissioning Plan.

B. Commissioning Process:
1. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
2. Commissioning during construction begins with a scoping meeting conducted by the CA where the commissioning process is reviewed with the commissioning team members.
3. Additional meetings will be required throughout construction, scheduled by the CA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.

Generally, these meetings will be included with or will be sequential with regular subcontractor meetings.

4. Equipment documentation is submitted to the CA during normal submittals, including detailed start-up procedures.
5. The CA works with the Subs in developing startup plans and startup documentation formats, including prefunctional checklists to be completed, during the startup process.
6. In general, the checkout and performance verification proceeds from simple to complex from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
7. The Subcontractors, under their own direction, execute and document the prefunctional checklists and perform startup and initial checkout. The CA documents that the checklists and startup were completed according to the approved plans. This may include the CA witnessing start-up of selected equipment and systems.
8. The installing contractors, suppliers and manufacturers, develops specific equipment and system functional performance test procedures with the assistance of the CA.
9. The procedures are executed by the Subcontractors, under the direction of, and documented by the CA.
10. Items of non-compliance in material, installation or setup are corrected at the Subcontractor's expense and the system retested.
11. The CA reviews the O&M documentation for completeness. All O&M documentation must be submitted and approved before the start of training.
12. Commissioning shall be completed before Substantial Completion.
13. The CA reviews, pre-approves and coordinates the training provided by the Subs and verifies that it was completed.
14. Deferred testing is conducted, as specified or required.

1.4 RESPONSIBILITIES

A. General Contractor (GC):
1. Facilitate the coordination of the commissioning work by the CA, and with the CA ensure that commissioning activities are being scheduled into the master schedule.
2. Include the cost of commissioning in the contract price.
3. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CA.
4. In each purchase order or subcontract written, include requirements for submittal data, Systems/O&M data, commissioning tasks and training.
5. Ensure that all Subs execute their commissioning responsibilities according to the Contract Documents and schedule.
6. A representative shall attend a commissioning scoping meeting and other necessary meetings scheduled by the CA to facilitate the Commissioning process.
7. Coordinate the training of owner personnel.
8. Prepare Systems/O&M manuals and Systems manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

B. Warranty Period:
1. Ensure that Subcontractors execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Ensure that Subs correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

C. Electrical Contractors and Sub-Contractors:
1. The commissioning responsibilities applicable to each of the subcontractors are generally as follows (all references apply to commissioned equipment only). Specific requirements are shown in the appropriate Divisions.
2. Construction and Acceptance Phases
   a. Include the cost of commissioning in the contract price.
   b. In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, Systems/O&M data and training.
   c. Attend a commissioning scoping meeting and other meetings necessary to facilitate the Commissioning process.
   d. Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment as part of the normal submittal process.

e. Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.
   1) Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.
   2) The Commissioning Authority may request further documentation necessary for the commissioning process.
f. Provide a copy of the Systems/O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and approval.
g. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
h. Provide assistance to the CA in preparing the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
i. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists from the CA for all commissioned equipment. Submit to CA for review and approval prior to startup.
j. During the startup and initial checkout process, execute the prefunctional checklists for all commissioned equipment.
k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
l. Address current A/E punch list items before functional testing
m. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem solving.
n. Perform functional performance testing under the direction of the CA for specified equipment. Assist the CA in interpreting the monitoring data, as necessary.
o. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, and A/E and retest the equipment.
p. Prepare Systems/O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
q. Prepare redline as-built drawings for all drawings and final as-builds for contractor-generated coordination drawings.
r. Provide training of the Owner's operating personnel as specified.
s. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

D. Warranty Period:
   1. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
   2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

E. Equipment Suppliers:
   1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
   2. Assist in equipment testing per agreements with Subs.
   3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone data logging equipment that may be used by the CA.
   4. Provide information requested by CA regarding equipment sequence of operation and testing procedures.
   5. Review test procedures for equipment installed by factory representatives.

F. Commissioning Authority (CA):
1. The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the A/E. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance - that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools or the use of tools to start, checkout and functionally test equipment and systems, except for specified testing equipment supplied and installed by the CA.
   a. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
   b. Coordinate the commissioning work and, with the GC, ensure that commissioning activities are being scheduled into the master schedule.
   c. Revise, as necessary, Commissioning Plan-Construction Phase.
   d. Plan and conduct a commissioning scoping meeting.
   e. Request and review additional information required to perform commissioning tasks, including Systems/O&M materials, contractor start-up and checkout procedures.
   f. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
   g. Review and approve normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, along with A/E reviews.
   h. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
   i. Approve pre-functional tests and checklist completion by reviewing prefunctional checklist reports and by selected site observation and spot checking.
   j. Approve systems startup by reviewing start-up reports and by selected site observation.
   k. Review the functional performance test procedures for equipment and systems developed by the subcontractors and suppliers. This may include energy management control system trending, or manual functional testing.
   l. Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
   m. Review equipment warranties to ensure that the Owner’s responsibilities are clearly defined.
   n. Oversee and approve the training of the Owner’s operating personnel.
   o. Compile and maintain a commissioning record.
   p. Review and approve the preparation of the Systems/O&M manuals.
   q. Provide a final commissioning report.

1.5 WARRANT PERIOD

A. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
1. Return to the site at 10 months into the 12-month warranty period and review with facility staff the current building operation and the condition of outstanding issues. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the Systems/O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

B. Scheduling:
1. The CA will work with the GC according to established protocols to schedule the commissioning activities. The CA will provide sufficient notice to the CM and GC for scheduling commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division contractor for the equipment being tested.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and left on site.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications.

PART 3 EXECUTION

3.1 MEETINGS

A. Scoping Meeting:
1. Within 90 days of commencement of construction, the CA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the GC. Information gathered from this meeting will allow the CA to revise the Commissioning Plan to its “final” version, which will also be distributed to all parties.

B. Miscellaneous Meetings:
1. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular subs. The CA will plan these meetings and will minimize unnecessary time being spent by Subs.

3.2 REPORTING

A. The CA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.

B. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

C. A final summary report by the CA will be provided focusing on evaluating commissioning process issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report.

3.3 SUBMITTALS

A. The CA will provide appropriate contractors with a specific request for the type of submittal documentation the CA requires to facilitate the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the request will include the manufacturer and model number, the manufacturer’s printed installation and detailed start-up procedures, full sequences of operation, Systems/O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority. All documentation requested by the CA will be included by the Subs in their Systems/O&M manual contributions.

B. The Commissioning Authority will review and approve submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures and only secondarily to verify

compliance with equipment specifications. The Commissioning Agent will notify the appropriate persons as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.

C. The CA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided with the Specifications.

3.4 START-UP, PREFUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery may have very simplified PCs and startup.

B. General:
1. Prefunctional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

C. Start-up and Initial Checkout Plan:
1. The CA shall assist the commissioning team members responsible for start-up of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed. Parties responsible for prefunctional checklists and start-up are identified in the commissioning scoping meeting and in the checklist forms. Parties responsible for executing functional performance tests are identified in the testing requirements.
   a. The CA assist in the development of checklists that indicate required procedures to be executed as part of start-up and initial checkout of the systems and the party responsible for their execution.
   b. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form may have more than one trade responsible for its execution.
   c. The subcontractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CA's checklists with the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
   d. The full start-up plan could consist of something as simple as:
      1) The contractor and CA prefunctional checklists.
      2) The manufacturer's standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
      3) The manufacturer's normally used field checkout sheets.
   e. The subcontractor submits the full startup plan to the CA for review and approval.
   f. The CA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
   g. The full start-up procedures and the approval form may be provided to the CM for review and approval, depending on management protocol.

D. Execution of Prefunctional Checklists and Startup:
1. Four weeks prior to startup, the Subs and vendors schedule startup and checkout with the GC and CA. The performance of the prefunctional checklists, startup and checkout are directed and executed by the Sub or vendor. When checking off prefunctional checklists, signatures may be required of other Subs for verification of completion of their work.
2. The CA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as approved).
3. For lower-level components of equipment the CA shall observe a sampling of the prefunctional and start-up procedures.

4. The Subs and vendors shall execute startup and provide the CA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
5. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off.

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup:
1. The Subcontractors shall clearly list any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CA within two days of test completion.
2. The CA shall work with the Subcontractors and vendors to correct and retest deficiencies or uncompleted items. The CA will involve the CM or GC and others as necessary. The installing Subcontractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA recommends approval of the execution of the checklists and startup of each system using a standard form.

3.5 FUNCTIONAL TESTING

A. This sub-section applies to all commissioning functional testing for all divisions.
1. Objectives and Scope:
a. The objective of functional testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
b. In general, each system should be operated through all modes of operation where there is a specified system response. Verifying each sequence in the sequences of operation is required.
2. Development of Test Procedures:
a. Before test procedures are written, the CA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Each Sub or vendor responsible to execute a test, shall provide assistance to the CA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CA shall provide a copy of the test procedures to the Sub(s) who shall review the tests for feasibility, safety, equipment and warranty protection. The CA may submit the tests to the A/E for review, if requested.
b. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
3. Test Methods:
a. Functional testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results. The CA will determine which method is most appropriate for tests that do not have a method specified.
4. Coordination and Scheduling:
a. The Subs shall provide sufficient notice to the CA regarding their completion schedule for the prefunctional checklists and startup of all equipment and systems. The CA will schedule functional tests through the GC and affected Subcontractors. The CA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.
b. In general, functional testing is conducted after prefunctional testing and startup has been satisfactorily completed. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation:
1. The CA shall witness and document the results of all functional tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the GC for review

and approval and to the Subs for review. The CA will include the filled out forms in the Commissioning Report.

B. Non-Conformance:
1. The CA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported on a standard non-compliance form.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will be documented on the procedure form.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.
4. As tests progress and a deficiency is identified, the CA discusses the issue with the executing contractor.
   a. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
      1) The CA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence
   b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
      1) The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the GC and to the Subcontractor representative assumed to be responsible.
      2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Owner.
      3) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CA. The CA reschedules the test and the test is repeated until satisfactory performance is achieved.

C. Cost of Retesting:
1. The cost for the Subcontractor to retest a prefunctional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
2. The Contractor shall respond in writing to the CA at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
3. The CA retains the original non-conformance forms until the end of the project.

D. Failure Due to Manufacturer Defect:
1. If 10 , or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable. In such case, the Contractor shall provide the Owner with the following:
   a. Within one week of notification, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided within two weeks of the original notice.
   b. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
   c. The Owner will determine whether a replacement of all identical units or a repair is acceptable.
   d. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval:
1. The CA notes each satisfactorily demonstrated function on the test form. The CA recommends acceptance of each test using a standard form. The Owner gives final approval on each test using

the same form, providing a signed copy to the CA and the Contractor.

3.7 S STEMS/OPERATION AND MAINTENANCE (O&M) MANUALS

A. The following Systems/O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

B. Each Division shall compile and prepare documentation for all equipment and systems covered in that Division and deliver this documentation to the GC for inclusion in the Systems/O&M manuals, according to this section, prior to the training of owner personnel.

C. The CA shall receive a copy of the O&M manuals for review.

D. Field checkout sheets and logs should be provided to the CA for inclusion in the Commissioning Record Book.

E. Review and Approvals:
1. Review of the commissioning related sections of the Systems/O&M manuals shall be made by the A/E and by the CA.

3.8 TRAINING OF OWNER PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

B. The CA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

3.9 WRITTEN WORK PRODUCTS

A. Written work products of Contractors will consist of the start-up and initial checkout plan described and the filled out start-up, initial checkout and prefunctional checklists, manufacturer’s factory and field testing and inspection forms, contractors’ inspection and functional testing forms, Systems/O&M Manuals, training plans and training records.

B. These work products will be supplied to the CA to be included in the final commissioning report.

END OF SECTION

SECTION 26 0 16

ELECTRICAL CONTROL COMPONENTS

PART 1 GENERAL

1.1 SUMMAR

1.2 SECTION INCLUDES

A. Time switches for circulating pumps.

1.3 RELATED SECTIONS

A. Section 26 00 00 - Electrical

B. Section 26 00 90 - Electrical Submittal Procedures

C. Section 26 05 53 - Electrical Identification

D. Section 26 28 16 - Enclosed Switches and Circuit Breakers

1.4 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 1 and Division 26, Section 26 00 90 requirements.

B. Product Data: Submit product data for time switches.

C. Samples: Provide a non-returnable sample when requested.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Water Heater Time Clocks & Batteries:
1. Tork Model EH10/20 Digital Control Clock
2. Intermatic ET2725C
3. Battery Backup - 9V lithium or super capacitor good for at least 100hrs.

B. All other manufacturers shall require pre-approval in accordance with specification section 26 00 90 - Electrical Submittal Procedures.

2.2 MATERIALS

A. Case:
1. Indoor/outdoor Nema 3R enclosure made of self-extinguishing high impact plastic or steel with corrosion resistant paint.

B. Type:
1. Seven day, 24 hour, with skip a day capability. Solid state electronic type. Fully automatic with manual capability.

C. Features:
1. Contacts:
   a. Minimum 20 amps at 120 VAC resistive.
2. Backup System:
   a. Maintain program functions for up to 7 days. Provide a new lithium battery per manufacturer s requirements.
3. Events and Holiday Schedule:

a. Daily Minimum: 8 events (on or off) in any order
b. Weekly minimum: 56 events

D. Photoelectric Control Interface:
1. Heavy duty photo control with zero cross technology
2. Mount on conduit and locate on roof where directed by Engineer.
3. Photo control to bring lights on, timer to turn off.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install near the panelboard supplying service to load per manufacturer s direction.

B. Mount time switch not more than 12 above top of switchgear and so that the time switch is readily accessible.

C. Programming:
1. Program the time switches as directed. Include programming and operating instructions in Records for Owner as outlined in Section 26 00 00.
2. Instruct the Engineer in setting the switches before final inspection.

D. Label Time Clock.

3.2 WATER HEATER TIME CLOCKS

A. Provide a Digital Control Clock for each water heater. Located time clock in electrical room and label Water Heater - (Location) .

B. Provide power to each water heater time clock from the same circuit as the general purpose receptacle in the electrical room or from the same circuit as the circulation pump or from the nearest acceptable 120v circuit using a 20A breaker and 12 wire or greater.

C. Set to Operate:
1. On: 7:00 a.m.
2. Off: 11:00 a.m.
3. On: 2:00 p.m.
4. Off: 6:00 p.m.
5. Off: Saturdays and Sundays

D. Timer to control both the water heater and any circulating pump. Circulating pump to run continuously as long as water heater is operational. When the water heater is intentionally turned off to conserve energy, then turn off the circulating pump.

E. Provide mechanically held contactor for each water heater circulating pump.

F. Provide a non-fused disconnect at each water heater. Refer to Section 26 28 16 for Enclosed Switches and Circuit Breakers.

END OF SECTION

SECTION 26 20 00

LO VOLTAGE ELECTRICAL DISTRI UTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Electrical service including underground primary requirements, transformer and secondary enclosure requirements, overhead and underground service entrance requirements, metering, and final connections.

B. Provide and install all components of the low voltage distribution system(s) including all switchboards, panelboards, transformers, fuses, circuit breakers, disconnects, MCCs, etc. as shown on the Drawings and as required for a complete and working system. All equipment shall be sized to meet the latest adopted version of NEC 220 requirements as a minimum.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems

D. Section 26 05 33 - Raceways and Boxes

E. Section 26 05 53 - Identification of Electrical Systems

F. Section 26 05 73 - Power System Studies

G. Section 26 43 00 - Surge Protection Devices

1.3 REFERENCES AND STANDARDS

A. ANSI C33.4 / C57.96 - Distribution, Power and Specialty Transformers

B. ANSI / UL 98 - Safety Standard for Enclosed Switches

C. IEEE 65 - Transformer Test Procedures

D. NEMA AB1 - Molded Case Circuit Breakers

E. NEMA AB2 - Procedures for Verifying the Performance of Molded Case Circuit Breakers

F. NEMA ICS 2 - IC System Contactors and Overload Relays

G. NEMA ICS 5 - IC System Control Circuits and Pilot Devices

H. NEMA ICS 6 - IC System Enclosures

I. NEMA KS 1 - Enclosed Switches

. NEMA PB1 - Panelboards

K. NEMA ST 1 - Specialty Transformers (Except General Purpose Type)

L. NEMA ST 20 - Dry Type Transformers for General Applications

M. NEMA WD 1 - General Color Requirements for Wiring Devices

N. NEMA WD 6 - Wiring Devices

O. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

P. NFPA 99 - Health Care Facilities Code

Q. Title 10 CFR Part 431 - Energy Efficiency Program for Certain Commercial and Industrial Equipment

R. UL 50 - Cabinets and Boxes

S. UL 67 - Electric Panelboards

T. UL 489 - Molded Case Circuit Breakers

U. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers

V. UL 5085-1 - Low Voltage Transformers, Part 1: General Requirements

W. UL 5085-2 - Low Voltage Transformers, Part 2: General Purpose Transformers

X. UL 60947 - Low Voltage Switchgear and Controlgear

1.4 COORDINATION

A. Prior to ordering disconnects and fuses or fuse holders, coordinate fuse ratings with the Mechanical Contractor to verify that fuses for all mechanical equipment matches the Maximum Over-Current Protection (MOCP) values of the mechanical equipment being provided. This Contractor to adjust upstream breaker sizes, branch circuit conductor sizes, whip sizes and disconnect sizes to accommodate the fuse (Over-Current Protection Device, OCPD) requirements for the supplied equipment.

1.5 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26 requirements.

B. Provide scaled shop drawings for each electrical equipment room showing the placement of all panelboards, transformers, and other equipment such as mechanical equipment, drawn to scale and dimensioned. Such shop drawings will be reviewed for compliance with the intent of the Drawings and the spaces available for all electrical equipment.

C. Clearly indicate on the submittals whether equipment is fully-rated or series-rated.

D. Arrangement: Arrange panelboard submittals in the order the panelboard schedules appear on the panelboard sheets of the Drawings as read from top to bottom, then left to right.

E. Include the following parameters as applicable in the submittal: equipment name, description, voltage, phase, ampacity, kVA rating, K-rating, control voltage, impedance, etc.

1.6 CLOSEOUT SUBMITTALS

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below:

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. All panelboards, switchboards, disconnects, OCPDs, etc. shall be from the same manufacturer to ensure proper breaker coordination.

B. All equipment on this project shall be new. Refurbished or used equipment will not be acceptable.

C. The following are approved manufacturers.

1. ABB (formerly GE)
2. ACT Communications
3. Bussman
4. Eaton (formerly Cutler-Hammer)
5. Hammond Power Solutions
6. Industrial Electric Manufacturing (IEM)
7. efferson
8. Littlefuse
9. Mersen (Ferraz Shawmut)
10. MGM Transformer
11. Mirus International
12. Powersmith
13. Siemens
14. Square-D (Schneider Electric)

D. All other manufacturers shall require pre-approval in accordance with Section 26 00 00 - Electrical.

2.2 GENERAL REQUIREMENTS

A. Conductor material for switchboards, panelboards, disconnects, etc. shall be copper.

B. Transformer coils shall be continuous wound and conductor material shall be copper.

C. Unless otherwise indicated on the Drawings, provide the following enclosures for all panelboards, switchboards, switchgear, disconnects, transformers, etc.:
1. NEMA 1 - All equipment located in interior dry locations.
2. NEMA 3R - All equipment located in damp, wet or exterior locations.
3. NEMA 4X - All equipment located in corrosive environments.

D. All panelboards, switchboards, disconnects, etc. shall have weatherproof threaded hubs for top / bottom / side conduit entries.

E. Unless specifically noted otherwise on the Drawings, all equipment in these Specifications shall meet the the requirements outlined below.

F. All equipment shall have a factory applied gray finish applied over a rust inhibiting treatment. Any items which have the finish marred shall be touched up or refinished to a new condition before final acceptance. This shall include, but shall not be limited to, sanding and properly removing rust or other contaminants and completely repainting equipment if damage is extensive. Overall acceptance is subject to approval of the Engineer.

G. Provide all labelling / identification per Section 26 05 53 - Identification of Electrical Systems.

2.3 PANELBOARD / SWITCHBOARD COMMON REQUIREMENTS

A. Construction: NEMA PB 1, interiors shall be completely factory assembled. See General Requirements above for NEMA enclosure rating requirements.

B. Enclosure Properties: Door in door construction, standard conduit knockouts in ends and sides of cabinet. Provide flush type combination catch and key door locks on all panelboards and load centers. Key all locks alike, provide two keys with each panelboard.

C. Buss Information:
1. Ground Buss: Full length, 25 phase rated, bonded to each buss, additional isolated buss in computer and communication panels.
2. Neutral Buss: Full length
   a. 200 of phase rated for all computer or isolated ground (IG) panels.
   b. 100 of phase rated for all lighting and power panels.

D. OCPDs: Provide bolt-on circuit breakers unless otherwise indicated on the Drawings.

E. Fault Withstandability: Suitable for operation and able to withstand the symmetrical short circuit current as indicated on the Drawings or available at the location, whichever is larger.

F. Spaces: Install all allotted or indicated spaces so that future OCPDs can be added without additional machining, drilling, tapping or buss extensions.

G. Circuit Identification:
1. Frame-mounted directory with a heat-resistant transparent face for identifying circuits. Mount inside the panelboard door. Use equipment names as reflected by panel schedules on the Drawings. Use room names and numbers selected by the Owner's Representative, which may differ from those shown on Drawings.
2. Provide on all panelboards, revise existing panelboards per Division 26 with new information.
3. See Section 26 05 53 - Identification for Electrical Systems for more information.

H. Features & Accessories:
1. Provide metering and instrumentation per Section 26 09 13 - Electrical Power Monitoring and per Division 23 Energy Management Control System requirements.
2. Provide GFCI protection as indicated here, as shown on the Drawings and where required per NEC.
3. Provide SPDs at the main switchgear per Section 26 43 00 - Surge Protective Devices.

2.4 PANELBOARDS

A. Construction:
1. Flush mounted panelboards: Trims shall fasten to permit both horizontal and vertical adjustment.
2. Surface mounted panelboards: Trims shall fasten to insure no overhang.

2.5 SWITCHBOARDS (> 1200A AMPS)

A. Construction:
1. Provide the required number of sections of the required size to fit in the space provided.
2. Connect sections with bussing. Cabled connections are not allowed.
3. Switchboards rated 2,000 amps or greater shall have a minimum depth of 30 inches.

B. Overcurrent Protection Devices:
1. Circuit breakers: Shall be capable of field-installable shunt trip, all shall be capable of being locked in the OFF position.
2. Fused switches: Provide fused switches and fuses as indicated on the Drawings.
3. Clearly indicate size of breaker or fused switch and ON / OFF positions for all OCPDs.

2.6 TRANSFORMERS

A. Constr:
1. NEMA ST 1, factory-assembled, enclosed, ventilated, air-cooled, dry-type, with lifting brackets, sized as indicated on Drawings.
2. Transformers shall be rated for continuous operation at rated kVA, 24 hours per day, 365 days per year with normal life expectancy as defined in IEEE 65.
3. Minimum transformer efficiency shall meet Title 10 CFR Part 431.
4. K-13 and K-20 rated transformers shall have a 200 neutral bar.
5. See General Requirements above for NEMA enclosure rating requirements.

B. Enclosure Properties:
1. Enclosed, with vent openings (to meet NEC 450.21), UL 1561 listed.
2. Audible sound levels shall be in accordance with NEMA ST-20.
3. Capable of operating at 115 on 115 C rise, with ambient temperature rise not exceeding 40 C.

C. Insulation: Unless otherwise noted on the Drawings, provide the following:
1. Class 155 or higher, no exceptions.
2. 1-15 kVA: Class 185 with 115 C rise.
3. 16-500 kVA: Class 220 with 115 C rise.

D. Tap arrangement: Use in the high voltage winding unless noted otherwise on the Drawings. Provide taps at 2.5 each, at least two (2) above and at least two (2) below nominal voltage.

E. Mounting Options:

1. 1-15 kVA: Suitable for wall mounting.
2. 16-75 kVA: Suitable for wall, floor stand, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor stand or trapeze mounting.
4. Floor mounting shall be bolted to a four (4) inch raised concrete pad.

2.7 SAFET SWITCHES AND ENCLOSED CIRCUIT BREAKERS

A. Product Description:
1. Provide single throw, horsepower rated, 100 load break and make rated, designed for locking in ON or OFF position, in code gauge steel cabinets, as required by the application and required per the NEC.
2. Provide equipment rated for the required voltage and with the number of poles required, dependent on the equipment requirements.
3. Provide SPDs at equipment in accordance with Section 26 43 00 - Surge Protection Devices.

B. Construction:
1. All safety switches and enclosed circuit breakers shall be Heavy Duty (HD) type.
2. See General Requirements above for NEMA enclosure rating requirements.

C. Disconnect / Safety Switches:
1. Safety switches shall be fused, unless indicated as non-fused on the Drawings.
2. All disconnects / safety switches shall be lockable in the OFF position.
3. Use fuse clips which are rejecting type to accept Class RK or L fuses only.
4. Size fused safety switches and upstream conductors serving motor loads at 125 to 175 of motor nameplate or per NEC values, whichever is larger, and round to the next standard size.

D. Enclosed Circuit Breakers: Provide where indicated on Drawings, otherwise provide a disconnect / safety switch.

2.8 CIRCUIT BREAKERS

A. Product Description: Bolt-on, quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489 ratings, configurations, and features as indicated on the Drawings.

B. Interrupting Ratings: Provide size (ampacity) and withstand (AIC) rating as indicated on Drawings. Series rated panels are NOT allowed. All panels shall be FULL RATED.

C. Thermal Magnetic Circuit Breaker: Bimetallic overload elements, magnetic trip, common trip type so that an overload or fault on one pole will trip all poles simultaneously. Handle ties are not acceptable.

D. Electronic Trip Circuit Breaker: Solid state, microprocessor-based, true RMS sensing trip units with the following field-adjustable trip response settings:
1. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
2. Long time delay.
3. Short time pickup and delay.
4. Instantaneous pickup.

E. Features and Accessories: Provide as required, as indicated in the Specifications and as shown on the Drawings.
1. AFCI: Arc fault sensing where arc fault protection is indicated or required.
2. GFCI: Ground fault pickup and delay where ground fault protection is indicated or required by NEC.
3. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
4. Lock-Out Provision: For locking the circuit breaker in the off position.

F. Provide number of poles indicated for the specified equipment or service, with common trip handle for all poles.

G. Independently mount so that a single unit can be removed from the front of the panel without disturbing or removing main buss, other units or other branch circuit connections.

H. All circuit breakers that have an overcurrent trip setting fixed or adjustable at 1200A or higher shall have an Energy-Reducing Maintenance Switch or similar approved method for arc energy reduction and shall meet all requirements of NEC 240.87. No exceptions.

2.9 FUSES

A. Performance Requirements:
1. All fuses shall be from the same manufacturer.
2. Provide ampacity rating as indicated on Drawings or required by NEC.
3. Unless otherwise indicated on the Drawings, size fuses serving all motor loads at 175 of motor nameplate FLA or NEC motor table ampacity, whichever is larger.

B. 600-amp and less: UL Class RK-1 dual element, time delay.

C. 601-amp and larger: UL Class L time delay.

2.10 GFCI PROTECTION

A. Ground Fault Protection System:
1. Ground sensor relay (GSR) system with ground break components, solid state construction, adjustable current pick-up and time delay settings.
2. Coordinate ground sensor (CT) with integral test winding of sufficient size to encircle all phase and neutral conductors, for zero-sequence monitoring and a solid-state relay to operate the trip circuit on the main switches.
3. Provide required transformer to supply power for tripping switches and connect phase to phase.

B. Accessories Included:
1. Ground fault relaying system for main switches to be zero-sequence type.
2. Ground fault current-detection range to be 100 to 1,200 amperes.
3. Time delay range to be instantaneous to 60 cycles.
4. Derive tripping and control power from control power transformers in switchboard.
5. Components shall include static ground fault sensor, current monitor, and test panel.

C. Where GFCI protection is required or indicated in the Specifications or Drawings, coordinate with the equipment manufacturer to provide proper GFCI requirements to determine whether they are intended to be for personnel (5ma) or equipment (30ma).

2.11 FRACTIONAL HORSEPOWER MOTOR-RATED SWITCH

A. Product Description: NEMA WD-1 & WD-6, motor-rated toggle switch. For use when switch-mounted thermal overload relays are not required.

B. Provide quality and features comparable to Leviton MS302 / MS303 series, Hubbell HBL78xx series or P&S 7802 / 7803 series.

2.12 FRACTIONAL-HORSEPOWER MANUAL MOTOR STARTER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually-operated full-voltage controller for induction motors, with toggle control, manual motor starter and thermal overload relay, NEMA WD 1 & WD 6, UL 60947, NEMA ICS 6 enclosure.

B. Control voltage shall be 120v, unless otherwise indicated on the Drawings.

C. Provide quality and features comparable to Cutler-Hammer B100x series, Square-D KG-1/2 series, ABB CR1062Sx series or Siemens Class SMF / MMS series.

2.13 MANUAL MOTOR CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually-operated full-voltage controller for induction motors, with push-button operation, red pilot light, manual motor starter and thermal overload relays, NEMA WD 1 & WD 6, UL 60947, NEMA ICS 6 enclosure.

2.14 AUTOMATIC MOTOR CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, automatic full-voltage controller for induction motors, with push-button override, red pilot light, motor starter and thermal overload relays, NEMA WD 1 & WD 6, UL 60947, NEMA ICS 6 enclosure.

B. Options and Features:
   1. Cover Mounted Pilot devices: NEMA ICS 5, standard duty type.
   2. Pilot Device Contacts: NEMA ICS 5, Form , rated A150.

2.15 MOTOR CONTROL CENTERS

A. Product Description:
   1. Dead front enclosure, vertical sections as required to house buckets for all required starters and spaces as indicated on the Drawings.
   2. Each bucket to house combination starter / fused disconnect switch, relays, swappable overloads and controls transformers as required.
   3. Each bucket shall include HOA (Hand / Off / Auto) switch, reset button and a pilot light.
   4. Provide a gutter along the top, bottom or vertically along each section for feeder, branch circuit and controls wiring.
   5. Each motor control center, as a complete unit, shall have a single withstand short circuit current rating as shown on the Drawings.

B. Labelling: Provide plastic engraved name tags giving motor designation or load controlled.

C. Control: Extended control wiring as indicated on typical wiring diagram from each motor control module to control terminal section.

D. Integral Monitoring Equipment:
   1. Provide monitoring of line-to-line voltages of the 3-phase incoming feeder in each motor control center. De-energize the buss upon phase loss, phase imbalance (>10) and / or phase reversal.
   2. Provide a pilot light to indicate a malfunction.
   3. Provide adjustable time delay to prevent nuisance tripping.

2.16 CONTACTORS AND RELA S

A. General:
   1. NEMA ICS 2, magnetic contactor with poles and contacts to match the circuit function and load. All contactors used for lighting shall be lighting-rated .
   2. Coordinate coil voltage with controls system. 120v preferred. Provide fused control circuit transformers as required.
   3. Provide an enclosure to house all contactors and relays. See General Requirements above for NEMA enclosure rating requirements.

B. Mechanically-Held Contactors:
   1. Mechanism electrically operated by solenoids and mechanically latched.
   2. Coil clearing contacts to de-energized coils when device is held closed.
   3. Required remote control relay and controls for proper latching and unlatching.

C. Electrically-Held contactors:
   1. Mechanism electrically-held by a solenoid.
   2. Required relays and controls for proper operation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify mounting supports are properly sized and located including concealed bracing in walls.

3.2 PREPARATION

A. Coordinate with the power utility company to obtain information regarding the available short circuit current at the service point. Provide this information to the electrical gear manufacturer for use in the

overcurrent protective device coordination study required by Section 26 05 73 - Power System Studies.

B. Coordinate all requirements with the power utility company and include in the base bid, including but not limited to the following:
   1. Whether the service will be overhead or underground.
   2. The extent of any underground primary.
   3. The need for a secondary enclosure. Provide in bid if required.
   4. Any charges from the power utility company for providing service.
   5. The need for a transocket for utility metering.

3.3 APPLICATION

A. Panelboards and Switchboards: Provide a complete isolated ground system including isolated ground panel with 200 neutral, SPD and separate isolated ground buss where indicated on the Drawings.

B. Transformers:
   1. Provide K-1 transformers when serving electrical panels, unless altered by below items.
   2. Provide K-13 transformers when serving isolated ground electrical panels.
   3. Provide K-20 transformers when serving electrical panels in network operations centers (NOC).

C. Circuit Breakers:
   1. Provide ground fault circuit breakers (GFCI) where indicated on the Drawings, panel schedules and / or as required by NEC 210.8(B), 422.5, etc. For example, provide protection at all EWCs, hand dryers, kitchen equipment, concessions equipment, and so on. Pull separate neutrals with each circuit to ensure correct GFCI operation.
   2. Provide combination AFCI / GFCcircuit breakers where AFCI protection is required per NEC and as indicated on the Drawings.

D. GFCI Protection:
   1. Provide ground fault protection at all service entrance equipment in accordance with NEC 230.95.
   2. At health care facilities, provide an additional level of ground fault protection in accordance with NEC 517.17.
   3. Provide ground fault sensing and indication on emergency systems in accordance with NEC 700.27.
   4. Provide ground fault protection at any additional locations indicated on the Drawings.

3.4 INSTALLATION

A. General:
   1. Set all equipment plumb, straight and level.
   2. Provide grounding and bonding in accordance with Section 26 05 26 - Grounding and Bonding.
   3. Provide and install all equipment, including electrical connections, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and the NECA Standard of Installation , and in accordance with recognized industry practices to ensure that products serve the intended function.

B. Electrical Service:
   1. Underground primary: Unless otherwise noted on the Drawings, provide two 4 conduits from the power utility company service point to pad-mounted transformers. Primary conductors will be provided by the power utility company. Coordinate exact location of service point with the power utility company.
   2. Pad-mounted transformer: Construct the transformer pad in accordance with the power utility company specifications. Coordinate with the power utility company before installation of concrete for exact size, location and all requirements. The transformer will be provided by the power utility company, unless otherwise noted.
   3. Secondary enclosure: Coordinate with the power utility company and provide a secondary enclosure where required to transition from the transformer output to the service entrance feeder. Provide the pad for the secondary enclosure. Provide all conduit, wire, and terminations between the transformer and the secondary enclosure.
   4. Underground service entrance: Provide all trenching, conduit, conductors and electrical equipment from the secondary terminals of the transformer/secondary enclosure to the main service disconnects.

5. Overhead service entrance: Provide all conduit, conductors, supports, weatherheads, and sleeving from the electric service point to the main service disconnects.
6. Metering: Provide conduits, conductors, cabinets, racks, transocket, and supports as required by the power utility company for service metering. All utility metering equipment will be provided by the power utility company.
7. Final connection: Coordinate final connection with the power utility company.

C. Panelboards and Switchboards:
1. Install in the locations as shown and as recommended in NEMA PB1.1. Mount the panelboards such that the top of the switch or circuit breaker in the highest position will not be more than 6-1/2 feet above the floor or working platform. Space all panelboards and switchboards to meet the requirements of NEC 110 and 408. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secured.
2. Provide required SPD breaker for each panel / switchboard as indicated on the Drawings.
3. Coordinate installation of panelboards and enclosures with other trades, including Mechanical and Plumbing to avoid clearance issues with dedicated equipment space and working clearances.
4. Furnish and install an engraved laminated nameplate for each circuit breaker or fused switch in distribution panelboards. Refer to Section 26 05 53 - Identification for Electrical Systems for more information.
5. Place all free standing or floor mounted equipment on four (4) inch housekeeping pads.
6. Where series rated panels are allowed: Field mark the factory furnished label in accordance with NEC 110.22(C).

D. Transformers:
1. Mount transformers on additional vibration isolators and / or on neoprene and spring isolators at floor or other mounting points to meet sound ratings. Install as per manufacturer's recommendations.
2. Mount floor-mounted transformers on vibration isolating pads suitable for isolating transformer noise from building structure on a four (4) inch thick reinforced concrete pad, unless indicated otherwise.
3. Exterior weatherproof transformers: Mount on six (6) inch thick minimum steel reinforced concrete slab. Extend slab one (1) foot beyond transformer on each side. Provide weather shields from the manufacturer.
4. Use flexible conduit, six (6) feet maximum length, for connections to transformer. Make conduit connections to side panel of enclosure.
5. Check for damage and tight connections prior to energizing transformer. Measure primary and secondary voltages and make appropriate tap adjustments.
6. At all floor-mounted transformers, installation to be level and equipment shall be bolted to a raised four (4) inch concrete pad.
7. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by manufacturer.

E. Fuses:
1. Check fasteners on fuse clips for tightness when installing fuses.
2. Install fuses so label is in an upright, readable position. Fuses without labels are not acceptable.
3. Do not install fuses until equipment is ready to be energized.

F. Safety Switches and Enclosed Circuit Breakers:
1. Mount switches no more than six (6) inches above and within six (6) feet of the equipment served, so that operating handle is easily accessible. Align tops of switches when grouped together.
2. Provide a four (4) inch housekeeping pad for all free standing / floor mounted safety switches whether they are mounted inside or outside.
3. Mount vertically on required separate support system hardware with switch easily accessible (door to open 90 degrees minimum).
4. Permanently mount safety switches from inside with plated or stainless bolts, toggle bolts or anchors. Exposed mounting bolts, screws, etc. are not acceptable.
5. Permanently install fusible switches with Class R fuse kits so that fuses are readable when looking at open switch.
6. Do not mount switches / disconnects to access panels or on nameplate data on equipment per NEC.
7. Installation of Conductors: Switches shall not be used as “junction boxes” between HVAC units (splicing or “pig tailing” is not permitted). The maximum number of conductors allowed per

termination is determined by the manufacturer's approved rating for each terminal or lug.

8. Identification: Provide nameplate identification on all HVAC equipment regardless of equipment location per Section 26 05 53 - Identification for Electrical Systems.

G. Motor Control Centers (MCCs):
   1. Install items in accordance with manufacturer's instructions and recommendations.
   2. Install MCC on four (4) inch thick concrete housekeeping pad.
   3. Select and install overload heater elements in motor controllers to match installed motor characteristics.

H. Contactors and Relays:
   1. Unless otherwise indicated on the Drawings, mount contactors in electrical enclosures in electrical room, mechanical room or designated area on Drawings in accordance with manufacturer's instructions and recommendations.
   2. Provide an override toggle switch, for maintenance and testing, located beside each contactor used for lighting.
      a. Provide relay with integral override switch per Exterior Lighting Controls details.

3.5 ELECTRICAL SERVICE AND METERING PROVISIONS

A. The Contractor shall provide all materials and labor shown on the Drawings and / or required for the complete installation except as specifically indicated to be by the serving power utility company. The Contractor shall meet all requirements as directed by the serving power utility company at the cost to the Contractor.

3.6 GROUNDING

A. Electrical grounding shall conform to NEC 250. See Section 26 05 26 - Grounding and Bonding for more requirements.

3.7 IDENTIFICATION

A. See Section 26 05 53 - Identification for Electrical Systems.

3.8 AD USTING

A. Electrical Load Balancing: Balance panels by checking each phase of all panels under full load and arrange so that all phases carry the same load as near as possible by moving individual branch circuits. After load balancing is complete, correct panel schedule directories to reflect all breakers and loads correctly.

B. Transformer Voltage Adjustments: Measure primary and secondary voltages and make appropriate tap adjustments.

C. GFCI Protection - Initial adjustments at service entrance equipment:
   1. Initial settings: At the time of installation, adjust the settings of the ground fault protection device as follows:
      a. Time delay: Adjust the time delay to 0.3 seconds.
      b. Pick-up: In no case can the setting exceed 1,200 amps. Observing this absolute maximum, adjust the ground fault trip setting to the greater of the following two options:
         1) 15 of the trip rating of the main breaker in the service entrance equipment.
         2) At least as large as the trip rating of the largest downstream overcurrent device that serves a single piece of equipment.

END OF SECTION

SECTION 26 2 26

IRING DEVICES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide factory fabricated wiring devices of the type and electrical rating for the service indicated, provide proper selection to fulfill the wiring requirements. All wiring devices and associated wall plates shall be colored to match each other, unless indicated otherwise on the Drawings or changed by owner requirements, code requirements or these specifications.

B. Provide switch, receptacle, outlet, conduit, and special purpose wall plates for wiring devices, with ganging and cutouts as indicated, provided with metal screws for securing plates to devices, screw heads colored to match finish of plate.

C. Provide a compatible receptacle for the cap or plug and cord of all other equipment installed in this project.

D. Mount all devices per Americans with Disabilities Act.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical Requirements

B. Section 26 05 33 - Raceways and Boxes

1.3 REFERENCES AND STANDARDS

A. ADA - Americans with Disabilities Act

B. ANSI / UL 20 - General Use Snap Switches

C. ANSI / UL 498 - Electrical Attachment Plugs and Receptacles

D. UL 943 - Ground Fault Circuit Interrupters

E. UL 1310 - Safety Class 2 Power Units

F. NEMA WD 1 - General Purpose Wiring Devices

G. NEMA WD 6 - Wiring Devices Dimensional Requirements

H. Federal Specification WC 596F and WS 896E

1.4 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26 requirements.

1.5 CLOSEOUT SUBMITTALS:

A. Submit per Closeout Submittals requirements in 26 00 00 - Electrical and any additional requirements listed below.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following, unless specific manufacturers are listed or restricted elsewhere in this specification section:
1. Arrow Hart / Eaton Corp. / Cooper Industries
2. Bell
3. Bryant
4. GE
5. Gleason
6. Graco
7. Hubbell Inc.
8. KH Industries
9. Leviton
10. Pass & Seymour / Legrand / Wiremold
11. Perfectline
12. ReelCraft
13. Wattstopper

2.2 GENERAL REQUIREMENTS

A. Unless otherwise specified herein or indicated on the drawings, all devices shall be specification grade, heavy duty, 20A rated (at equipment rated voltage with the required number of poles), back and side-wired with grounding terminals. Screw terminals only, no push-in terminals. These devices shall comply with NEMA WD 1 Standards and shall all be listed.

B. All devices in healthcare / patient care and similar areas shall be Hospital Grade, no exceptions.

C. Color:
1. Device color shall be coordinated with Owner's Representative and shall reasonably match across all divisions. Emergency devices and plates shall be red per NFPA.
2. Device plate material shall be as follows: In gang toilets, mechanical spaces, kitchens and gyms, use stainless steel device plates and covers. In other finished spaces use smooth nylon device plates and covers.

D. All devices shall be properly labelled and identified per NEC, NFPA and IECC requirements. Additionally, all emergency device coverplates shall be labelled with the panel name and circuit number.

2.3 AC / TOGGLE SWITCHES

A. Unless otherwise specified herein or indicated on the drawings, all switches to be quiet-type, complying with UL 20 and Federal Specification WC 896.

B. Key-Operated switches shall be single pole, with factory-supplied key in lieu of switch handle. Corbin-style or barrel lock and key. Single-hump key not acceptable.

C. Wall Switches:

	Single Pole	Do□ le Pole	T ee a□	Fo□ a□	Pilot Lig t
Leviton	1221-S	1222-S	1223-S	1224-S	1221-PLR
Hubbell	CS1221	CS1222	CS1223	CS1224	1221-PL
P & S	CS20AC1	CS20AC2	CS20AC3	CS20AC4	CS20AC1-RPL

D. Slotted Key-Operated Switches:

	Single Pole	Do□ le Pole	T ee a□	Fo□ a□
Leviton	1221-L	1222-L	1223-L	1224-L
Hubbell	HBL 1221	HBL 1222	HBL 1223	HBL 1224
P & S	PS20AC1L	PS20AC2L	PS20AC3L	PS20AC4L

E. Captive Twist Key-Operated Switches:

Leviton	1221-2KL w/WS-35 key	1222-2KL w/WS-35 key	1223-2KL w/WS-35 key	1224-2KL w/WS-35 key
Hubbell	HBL 1221-RKL	HBL 1222-RKL	HBL 1223-RKL	HBL 1224-RKL
P & S	PS20AC1KL	PS20AC2KL	PS20AC3KL	PS20AC4KL

F. Motor-Rated Switches:

	20A 2 Pole	**20A 3 Pole**	**30A 3 Pole**
Leviton	MS302-DS	MS303-DS	MS303-DS
Hubbell	HBL7832D	HBL7810D	HBL7810D
P & S	7802MD	7803MD	7803MD

2.4 RECEPTACLES

A. Unless otherwise specified herein or indicated on the drawings, all receptacles to be NEMA 5-20R duplex, complying with NEMA WD 6 Standards, UL 498 and 943, Federal Specification WC 596F and WC 596.

B. Isolated Ground (IG) Receptacles: All IG receptacles to be four wire with self-ground strap. Place these receptacles at all computer and communications / technology locations if IG panels are provided.

C. GFCI Receptacles: GFCI receptacles to be NEMA 5-20R duplex, self-test, auto monitoring, complying with UL 943 and UL 498.

D. SPD Receptacles: NEMA 5-20R duplex, Type 3 SPD, >200 oules, >6kA Surge, 3-mode, with indicator light.

E. Specification Grade, Heavy Duty Receptacles:

	20A D□ le□	**20A GFCI**	**20A IG**	**20A SPD**
Leviton	5362	G5362x	5362-IG	5380x
Hubbell	5362	GFRST20	Equal by Hubbell	5362x
P & S	5362	P2097	Equal by P&S	5362-SP

F. Hospital Grade Receptacles:

	20A D□ le□	**20A GFCI**	**20A IG**
Leviton	8300-H	GFTR2x	8300-IG
Hubbell	8300H	GFRST83	Equal by P & S
P & S	8300-H	2097x	

G. Weatherproof Receptacles:
1. All weatherproof receptacles shall have GFCI protection at the device or at the breaker.
2. Receptacle covers protected from rain shall be zinc die-cast weather-resistant cover with self-closing lid, Leviton 4992, P&S WIUCAST1, or equivalent.
3. Receptacle covers not protected from rain shall be “While-In-Use” cover, Leviton 5977DG , P&S WIUC10DGL, or equivalent.

H. Controlled Receptacles:
1. Provide Leviton 5362 series or equivalent.
2. All controlled receptacles required to meet IECC shall be duplex receptacles with the top receptacle controlled and the bottom receptacle non-controlled, unless otherwise noted on the Drawings.
3. All controlled receptacles shall meet NEC 406.3(E) marking requirements.

I. USB Charger Receptacles: 125V, 20A comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, UL 498, UL 1310, and Federal Specification WC 596.
1. Single-piece, rivetless, nickel-plated, all-brass grounding.
2. USB Receptacles: Dual, Type A and C.
3. Line Voltage Receptacles: Dual, two-pole, three-wire, self-grounding.
4. Provide Leviton 5362 series or equivalent.

2.5 VOICE / DATA OUTLETS

A. Refer to Division 27 for device and device plate requirements.

2.6 DEVICE PLATES

A. Both standard and oversized (jumbo) device plates are allowed. However, where oversized device plates are used, the entire room shall use oversized device plates.

B. Weatherproof Cover Plates: Provide cast aluminum weatherproof device plates with hinged cover for each outlet for exterior receptacles as indicated. When any outdoor receptacle is permanently in use (heat tape, etc.) provide a cover listed as While In Use .

PART 3 EXECUTION

3.1 PREPARATION

A. Clean debris from outlet boxes before installing devices.

3.2 APPLICATION

A. All devices shall have GFCI and AFCI protection per NEC 210.

B. All receptacles shall meet tamper-resistant requirements of NEC 406 for the location installed.

3.3 INSTALLATION

A. All Devices:
1. Install devices plumb and level.
2. Install switches with OFF position down.
3. The Owner's Representative can move any device, before installation, up to six (6) feet in any direction at no additional cost to the Owner.
4. Install stainless steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
5. Connect wiring devices by wrapping solid conductor around screw terminal. For other options, see Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
6. Do not install behind markerboards, millwork, permanent mounted equipment, etc. Verify on Architectural drawings before installation. Where installed in unsuitable location, the Contractor will move as directed at no cost to the Owner.

B. GFCI Receptacles:
1. Install separate GFCI device at each location. Do not use feed through feature for any GFCI receptacle unless specifically noted on the Drawings.

C. Device Plates:
1. Use a single one-piece device plate for ganged devices (switches & receptacle).
2. Provide oversize plates where required to completely cover wall opening. Where oversize plates are used, all plates in room shall be oversize style.

D. Cord Reels:
1. Install cord reels per notes on Drawings and cord reel detail.
2. Where a cord reel is required to be installed above a ceiling, mount cord reel such that roller assembly protrudes slightly through the ceiling. Provide trim plate at ceiling cutout.

3.4 QUALIT CONTROL

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Operate each wall switch with circuit energized and verify proper operation.

E. Verify each receptacle device is energized and test each for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.5 AD USTING

A. Adjust devices and wall plates to be flush and level.

END OF SECTION

SECTION 26 43 00

SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide surge protective devices (SPDs) as indicated on the Drawings, as required in NEC 242 and as indicated in Part 3.1 Application below.

B. Provide SPDs for phone, data, security, and other systems.

1.2 RELATED REQUIREMENTS

A. Section 26 00 00 - Electrical

1.3 REFERENCES AND STANDARDS

A. ANSI / IEEE C62 - Guides and Standards for Surge Protection

B. Military Standard 220B - Method of Insertion Loss Measurement

C. UL 497 - Paired Conductor Communications Circuits

D. UL 1449 - Standard for Safety, Surge Protection Devices Type 1-3 Protectors

1.4 ABBREVIATIONS

A. I_n - Nominal Discharge Current

B. MCOV - Maximum Continuous Operating Voltage

C. SCCR - Short Circuit Current Rating

D. VPR - Voltage Protection Rating (clamping voltage)

1.5 SUBMITTALS

A. Submittals required in this section shall conform to and be submitted in accordance with the General Conditions, Division 01, and Division 26 requirements.

B. Product Data: Submit product data for all SPD used on this project. Provide evidence that SPD are listed to the most current edition of UL 1449 by an OSHA approved safety testing agency (i.e. UL, ETL, or CSA). Provide a submittal package that includes specifications, third party testing and listing letters.
   1. Product data to be issued in submittal:
      a. Maximum Single Impulse Surge Current Rating
      b. Surge Life (Repetitive Surge) Rating
      c. Clamping Voltage (VPR)
      d. Nominal Discharge Current (I_n)

1.6 CLOSEOUT SUBMITTALS

A. Provide cut sheets and warranty information on all devices and equipment used on this project that are referenced in this Division and used on this project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. ABB (formerly GE)
   2. ACT Communications
   3. Eaton Corporation (formerly Cutler Hammer)
   4. Mersen (formerly Ferraz Shawmut)
   5. nVent Erico
   6. Southern Tier Technologies (formerly Emerson / Liebert)
   7. Square-D (Schneider Electric)
   8. Surge Suppression Inc (SSI, ILSCO)

2.2 EQUIPMENT

A. General:
   1. Technology: Construction shall be Metal Oxide Varister (MOV) componentry with bidirectional operation.
   2. Protection Modes: Provide at least seven (7) mode protection (L-N, L-G, N-G) with discrete protection elements on each mode.
   3. Protection: Each SPD shall be protected upstream by a dedicated UL rated fuse or disconnecting means.
   4. Provide surge protection plus filtering of disruptive noises, EMI / RFI interference to >-40dB from 3kHz to 1 MHz according to Military Standard 220B.
   5. Listing and Ratings: SPDs shall be tested and performance rated per UL 1449. Clamping voltage shall be clearly stated on both submittals and equipment installed.
   6. Voltage Ratings (per UL 1449):

Rated Line Voltage	MCOV	VPR
120 / 240v 120 / 208v	150v	800v (L-N, L-G), 1200v (L-L)
240 / 480v 277 / 480v	320v	1200v (L-N, L-G), 1800v (L-L)
480v (2 ph. Delta)	600v	1800v (L-G), 3000v (L-L)

   7. Alarms and Monitoring: Provide all SPDs with the following:
      a. LED indicator lights for power and protection status.
      b. Audible alarm, with silencing switch, to indicate when protection has failed.
      c. One set of dry contacts (1-NO and 1-NC) rated at 5A and 240v for remote monitoring of protection.
   8. Mounting: All SPDs may be internally-mounted or externally-mounted if mounted directly beside the panel it serves.
   9. Digital Surge Event Counter with battery backup.

B. Service Entrance: SPDs at the electrical service entrance (main distribution panel or main service disconnecting means) shall meet the following additional criteria:
   1. Modular construction, field replaceable, internal or external mount, NEMA rated for the environment.
   2. UL 1449 location rated as Type 1 and Type 2 SPD device.
   3. UL 1449 Nominal Discharge Current (I_n): 20kA (8 x 20 µs waveform).
   4. Maximum Single Impulse Current Rating: 135kA / mode (8 x 20 µs waveform).
   5. Life Cycle Test (IEEE C62.41.2 C3): 10kA / phase at greater than 20,000 impulses.
   6. SCCR: 200kAIC or no less than specified rating at the service entrance.

C. Panelboards: SPDs at all other electrical panels shall meet the following additional criteria:
   1. Modular construction, field replaceable, internal or external mount, NEMA rated for the environment.
   2. UL 1449 location rated as Type 2 device.
   3. UL 1449 Nominal Discharge Current (I_n): 20kA (8 x 20 µs waveform).
   4. Maximum Single Impulse Current Rating: 65kA / mode (8 x 20 µs waveform).
   5. Life Cycle Test (IEEE C62.41.2 C3): 10kA / phase at greater than 5,000 impulses.
   6. SCCR: 100kAIC or no less than specified rating of the electrical subpanel.

D. Outdoor Mechanical Equipment: SPDs at RTUs, condensers, fans, etc. shall meet the following additional criteria:
   1. Outdoor rated NEMA 4X enclosure, nipple-mounted (preferred).
   2. UL 1449 location rated as Type 2 SPD device.
   3. UL 1449 Nominal Discharge Current (I_n): 20kA (8 x 20 µs waveform).
   4. Maximum Single Impulse Current Rating: 25kA / mode (8 x 20 µs waveform).
   5. Life Cycle Test (IEEE C62.41.2 C3): 10kA / phase at greater than 2,500 impulses.
   6. SCCR: 65kAIC or no less than specified rating of the equipment.

E. Receptacles with Type 3 SPD installed: See Section 26 27 26 - Wiring Devices for more information.

F. SPD for telephone, video, data and alarm lines shall meet the following criteria:
   1. Comply with appropriate UL 497, 497A, 497B and 497C standards for secondary protectors.
   2. Technology can be Gas Tube, Silicon Avalanche Diode or hybrid.
   3. Rate Line Voltage (RMS): 150v for phone, 24v for data and control.
   4. MCOV: 180vac tip (or ring) to ground.
   5. Clamp Voltage (Pair): Tip to ground and ring to ground to be 300v.
   6. Maximum Single Impuse Current Rating: 10kA (8 x 20 µs waveform).
   7. Life cycle test 3kA at greater than 1,000 impulses.

PART 3 EXECUTION

3.1 APPLICATION

A. For new construction, provide SPDs at each location listed below. For renovations and additions, provide SPDs at the locations listed below which are affected / replaced / added to by the project but do not already have SPD.
   1. Each electrical service entrance equipment.
   2. Each computer panelboard and at each isolated ground / nonlinear panelboard.
   3. All emergency systems switchboards and panelboards.
   4. Each panelboard noted on the Drawings in addition to above requirements.
   5. Provide SPD protection on all outdoor HVAC equipment unless requirement is removed or altered by Section 26 20 00 - Low Voltage Distribution, Part 2.8 Enclosed Switches and Circuit Breakers. Mount SPDs to bottom of safety switch or as recommended by the manufacturer.
   6. One SPD power outlet at each Energy Management Control Panel located by project controls contractor.
   7. Each new telephone and data incoming line.
   8. All new video or alarm system wire entering from the outside of the facility.
   9. In or on each fire pump controller in accordance with NEC 695.15.

3.2 INSTALLATION

A. Install all SPDs per manufacturer's installation instructions.

B. Where externally-mounted SPDs are provided, install the SPDs next to the panel they protect. Do NOT extend the lead length beyond the manufacturer's requirements.

C. SPDs installed in distribution or branch panel locations shall be either direct connected to the main bus or via a dedicated branch breaker sized per manufacturer recommendations, unless otherwise noted on the Drawings.

END OF SECTION

EVALUATION POINTS-CHILD NUTRITION

The CSPs shall be evaluated based on the following scales:

	Description	Points
1	Purchase price of products and/or services	50
2	Quality of the Bidder's goods or services	15
3	Extent to which the goods or services meet the needs	15
4	Reputation of the Bidder or the Bidder's goods or serv	10
5	Warranty & Service of bidder	5
6	Bidder has its princial place of business in Texas; or employs at least 500 persons in Texas	5
	TOTAL	100

The District reserves the right to include additional evaluation criteria beyond the initial review. The District reserves t he right to add additional evaluation steps, such as interviews, demonstrations, sample products, etc., to determine which reponse best meets the needs of the District. The District reserves the right to negotiate prices, final terms and conditions, and/or any relevant factors prior to award.

☐ **I Agree**

(Required: Check if applicable)