COUNTY PURCHASING AGENT

Fort Bend County, Texas

Jaime Kovar
County Purchasing Agent

(281) 341-8640
Fax (281) 341-8645

December 4, 2024

TO: All Prospective Bidders

RE: Addendum No. 1 – Fort Bend County BID 25-025 – Construction of Barbara Jordan Community Center for Fort Bend County

Addendum 1:

Attached is Addendum 1. Vendors are to utilize Addendum 1 document while preparing their solicitation response. Changes include Q&A #1, Updated Exhibit II Project Manual, and Geotechnical Report. Provided by Architect.

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Immediately upon your receipt of this addendum, please fill out the following information and email this page to Tyler Kendziora at tyler.kendziora@fortbendcountytx.gov

_____

Company Name

_____

Signature of person receiving addendum Date

If you have any questions, please contact this office.

Sincerely,

Tyler Kendziora

Tyler Kendziora
Senior Buyer

BID 25-025 – Construction of Barbara Jordan Community Center for Fort Bend County

Q&A #1

Question 1: We are interested in learning more about this project; however, the Project Manual Summary indicates Bates Allen Park Black Cowboy Museum. Will you please re-issue with the appropriate project.

SECTION 011000 - SUMMARY

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.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work performed by Owner.
4. Owner-furnished products.
5. Contractor's use of site and premises.
6. Specification and Drawing conventions.
7. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: Bates Allen Park Black Cowboy Museum.

1. Project Location: Charlie Roberts Lane, East Bernard, Texas 77451.

Answer: The Exhibit II Project Manual has been updated in this addendum. Any information pertaining to Black Cowboy Museum has been removed.

Question 2: Do you have a geotech report available for this project?

Answer: See Geotechnical report attached with this addendum (starting on page 604).

Question 3: When going through the bid documents for the Construction of Barbara Jordan Community Center - #25-025 project, it seems spec section 09 65 13 and plan sheet M-101 are missing.

Please advise.

Answer: The project manual provides information for 096513 Rubber base. M101 Mechanical site plan is an excluded sheet and is not part of the scope of work. Please disregard this sheet for bid purposes.

Fort Bend County, Texas
Invitation for Bid

Construction of Barbara Jordan Community Center for Fort Bend County
BID 25-025

SUBMIT BIDS TO:

Fort Bend County
Purchasing Department
Travis Annex
301 Jackson, Suite 201
Richmond, TX 77469

Note: All correspondence must include the term "Purchasing Department" in address to assist in proper delivery

SUBMIT NO LATER THAN:

Tuesday, December 17, 2024
2:00 PM (Central)

LABEL ENVELOPE:

BID 25-025
Barbara Jordan Community Center

ALL BIDS MUST BE RECEIVED IN AND TIME/DATE STAMPED BY THE PURCHASING OFFICE OF FORT BEND COUNTY ON OR BEFORE THE SPECIFIED TIME/DATE STATED ABOVE.

BIDS RECEIVED AS REQUIRED WILL THEN BE OPENED AND PUBLICLY READ.

BIDS RECEIVED AFTER THE SPECIFIED TIME, WILL BE RETURNED UNOPENED.

Results will not be given by phone.
Results will be provided to bidder in writing after Commissioners Court award.

Requests for information must be in writing and directed to:
Tyler Kendziora
Senior Buyer
Tyler.Kendziora@fortbendcountytx.gov

Vendor Responsibilities:

- Download and complete any addendums. (Addendums will be posted on the Fort Bend County website no Later than 48 hours prior to bid opening)
- Submit response in accordance with requirements stated on the cover of this document.
- DO NOT submit responses via email or fax.

Prepared: 08/28/24
Issued: 11/24/24

COUNTY PURCHASING AGENT
Fort Bend County, Texas

Vendor Information

Jaime Kovar
Purchasing Agent
Office (281) 341-8640

Legal Company Name (top line of W9)			
Business Name (if different from legal name)			
Type of Business	☐ Corporation/LLC ☐ Partnership ☐ Sole Proprietor/Individual ☐ Tax Exempt		Age in Business?
Federal ID # or S.S. #		SAM.gov Unique Entity ID #	
SAM.gov CAGE / NCAGE			
Publicly Traded Business	___ No ___ Yes Ticker Symbol _____		
Remittance Address			
City/State/Zip			
Physical Address			
City/State/Zip			
Phone Number			
E-mail			
Contact Person			
Check all that apply to the company listed above and provide certification number.	DBE-Disadvantaged Business Enterprise ☐ SBE-Small Business Enterprise ☐ HUB-Texas Historically Underutilized Business ☐ WBE-Women's Business Enterprise ☐	**Certification #** _____ **Certification #** _____ **Certification #** _____ **Certification #** _____	Cert Date / Exp Date _____ _____ _____ _____ _____ _____ _____ _____
Company's gross annual receipts	<$500,000 _____	$500,000-$4,999,999 _____	
	$5,000,000-$16,999,999 ___	$17,000,000-$22,399,999 _____	>$22,400,000 _____
NAICs codes (Please enter all that apply)			
Signature of Authorized Representative			
Printed Name			
Title			
Date			

THIS FORM MUST BE SUBMITTED WITH THE SOLICITATION RESPONSE

1.0 GENERAL REQUIREMENTS:

1.1 Read this entire document carefully. Follow all instructions. You are responsible for fulfilling all requirements and specifications. Be sure you understand them.

1.2 General Requirements apply to all advertised bids; however, these may be superseded, whole or in part, by the scope, special requirements, specifications, special specifications or other data contained herein.

1.3 Governing Law: Bidder is advised that these requirements shall be fully governed by the laws of the State of Texas and that Fort Bend County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the County Attorney concerning any portion of these requirements.

1.4 Bid Form Completion: Fill out, sign, and return to the Fort Bend County Purchasing Department one (1) complete bid form. An authorized representative of the bidder must sign the Contract Sheet. The Contract will be binding only when signed by the County Judge, Fort Bend County and a purchase order authorizing the item(s) desired has been issued. The use of corrective fluid is not acceptable and may result in the disqualification of bid. If an error is made, the bidder must draw a line through error and initial each change.

If a pricing form in Excel is included and/or posted on the County's website amongst this bid document, the Vendor must download, complete and save the Excel (not a PDF of the Excel file) file of the pricing form on a flash drive. The Excel file on the flash drive must be downloadable by the Purchasing Department in order to copy and paste the vendor's pricing to the County's tabulation. The flash drive must be labeled and included in the same sealed envelope with the respondent's completed bid document along with a printed copy of the pricing form completed by the vendor.

1.5 Bid Returns: Bidders must return all completed bids to the Fort Bend County Purchasing Department at 301 Jackson, Suite 201 Richmond Texas no later than 2:00 P.M. on the date specified. Late bids will not be accepted. Bids must be submitted in a sealed envelope, addressed as follows: Fort Bend County Purchasing Agent, Travis Annex, 301 Jackson, Suite 201 Richmond, Texas 77469.

1.6 Addenda: No interpretation of the meaning of the drawings, specifications or other bid documents will be made to any bidder orally. All requests for such interpretations must be made in writing addressed to Tyler Kendziora, Senior Buyer, 301, Jackson, Suite 201, Richmond, Texas, 77469, E-mail: Tyler.Kendziora@fortbendcountytx.gov. Any and all interpretations and any supplemental instructions will be in the form of written addenda to the contract documents which will be posted on Fort Bend County's website. Addenda will **ONLY** be issued by the Fort Bend County Purchasing Agent. It is the sole

Initials of Bidder: _____

responsibility of each bidder to insure receipt of any and all addenda. All addenda issued will become part of the contract documents. Bidders must sign and include it in the returned bid package. Deadline for submission of questions and/or clarification is no later than **Tuesday, December 10, 2024 at 10:30AM (central)** Requests received after the deadline will not be responded to due to the time constraints of this bid process.

1.7 References: All bidders must submit, **WITH BID**, at least three (3) references from clients for whom a project similar to that specified herein has been successfully accomplished. References must include, clients' name, contact person and telephone number.

1.8 Bid Bond: All bidders must submit, **WITH BID**, a cashier's check or certified check for at least five percent (5%) of the total bid price, payable to the order of Fort Bend County, or a Bid Bond in the same amount issued by a surety, acceptable to Fort Bend County, authorized to do business in the State of Texas, as a guarantee that the Bidder will do the work described herein at the rates stated herein. Unsuccessful bidder's Cashier's Check or Certified Check will be returned only after a written request to do so have been received in the Office of the Fort Bend County Purchasing Agent.

1.9 Material Safety Data Sheets: Under the "Hazardous Communication Act", commonly known as the "Texas Right to Know Act", a bidder must provide to Fort Bend County and using departments, with each delivery, material safety data sheets, which are, applicable to hazardous substances defined in the Act. Bidders are obligated to maintain a current, updated file in the Fort Bend County Purchasing Department. Failure of the bidder to maintain such a file will be cause to reject any bid applying thereto.

1.10 Pricing: Prices for all goods and/or services shall be firm for the duration of this Contract and shall be stated on the bid sheet. Prices shall be all inclusive. No price changes, additions, or subsequent qualifications will be honored during the course of the Contract. All prices must be written in ink or typewritten. If there are any additional charges of any kind, other than those mentioned above, specified or unspecified, bidder MUST indicate the items required and attendant costs or forfeit the right to payment for such items.

1.11 Term Contracts: If the Contract is intended to cover a specific time period, said time will be given in the specifications under scope.

1.12 Recycled Materials: Fort Bend County encourages the use of products made of recycled materials and shall give preference in purchasing to products made of recycled materials if the products meet applicable specifications as to quantity and quality. Fort Bend County will be the sole judge in determining product preference application.

1.13 Evaluation: Evaluation shall be used as a determinant as to which bid items or

services are the most efficient and/or most economical for Fort Bend County. It shall be based on all factors which have a bearing on price and performance of the items in the user environment. All bids are subject to tabulation by the Fort Bend County Purchasing Department and recommendation to Fort Bend County Commissioners Court. Compliance with all bid requirements, delivery and needs of the using department are considerations in evaluating bids. Pricing is NOT the only criteria for making a recommendation. The Fort Bend County Purchasing Department reserves the right to contact any bidder, at any time, to clarify, verify or request information with regard to any bid.

1.14 Disqualification of Bidder: Upon signing this bid document, a bidder offering to sell supplies, materials, services, or equipment to Fort Bend County certifies that the bidder has not violated the antitrust laws of this state codified in section 15.01, et seq., Business & Commerce Code, or the federal antitrust laws, and has not communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of business. Any or all bids may be rejected if Fort Bend County believes that collusion exists among the bidders. Bids in which the prices are obviously unbalanced may be rejected. If multiple bids are submitted by a bidder and after the bids are opened, one of the bids is withdrawn, the result will be that all of the bids submitted by that bidder will be withdrawn; however, nothing herein prohibits a vendor from submitting multiple bids for different products or services.

1.15 Awards: Fort Bend County reserves the right to award this Contract on the basis of lowest and best bid in accordance with the laws of the State of Texas, to waive any formality or irregularity, to make awards to more than one bidder, to reject any or all bids. In the event the lowest dollar bidder meeting specifications is not awarded a contract, the bidder may appear before the Commissioners Court and present evidence concerning its responsibility.

1.16 Contract Obligation: Fort Bend County Commissioners Court must award the Contract and the County Judge or other person authorized by the Fort Bend County Commissioners Court must sign the Contract before it becomes binding on Fort Bend County or the bidders. Department heads are not authorized to sign agreements for Fort Bend County. Binding agreements shall remain in effect until all products and/or services covered by this purchase have been satisfactorily delivered and accepted.

2.0 SCOPE:

It is the intent of Fort Bend County to contract with one (1) vendor for all materials, supplies, equipment, tools, services, labor and supervision necessary to complete the construction of Barbara Jordan Community Center located at 8705 Park Street, Needville, Texas 77461, hereinafter referred to as the "Project," as specified herein.

Vendor to construct approximately 4,800 square foot, single-story, steel structure, masonry

Initials of Bidder: _____

and metal panel exterior Community Center for youth programming. Community center to include event space, classrooms, offices, and multi-purpose spaces.

2.1 *Work* means the procurement, delivery and proper construction and/or installation of all materials and facilities and associated appurtenances necessary to fulfill the winning bidder's obligations (hereinafter the "Contractor") under the Contract as awarded for the Project specified herein, including the coordination and administration of all services necessary for Contractor, and/or its agents and/or subcontractors, to fulfill Contractor's obligations under the Contract.

3.0 PRE-BID CONFERENCE:

A pre-bid conference will be conducted on **Tuesday, December 3, 2024 at 10:30 AM** (CST). The pre-bid conference will be held at the Fort Bend County Purchasing Department located in the Travis Annex at 301 Jackson, Suite 201, Richmond, Texas 77469. All bidders are encouraged to attend.

4.0 LIQUIDATED DAMAGES:

The County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the County if the work is not complete on time. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the County $250.00 for each day that expires after the time specified herein for completion until the Work is complete, unless contract time has been adjusted by extension of time approved by Commissioner's Court.

The Contractor will be placed on one (1) year probation if liquidated damages are accrued. During the probation period, if the Contractor accrues liquidated damages on another project, they will be disqualified from being awarded any County work for two (2) years.

5.0 COMPLETION TIME & PAYMENT:

5.1 Fort Bend County shall pay the Contractor in current funds for the Contractor's performance of the Contract the contract sum, as stated herein, after receipt of notice to proceed and a purchase order issued by the Fort Bend County Purchasing Agent.

5.2 Based upon Applications for payment submitted to the County Auditor, Fort Bend County shall make progress payments on account of the contract sum to the Contractor as provided below and elsewhere in the contract documents.

5.2.1 The period covered by each application for payment shall be one calendar month ending on the last day of the month.

5.2.2 Provided a customary, accurate and complete application for payment is received by the County Auditor not later than the 15th day of a month,

Fort Bend County shall make payment of all undisputed amounts to the Contractor not later than the 15th day of the next month. If an application for payment is received by the County Auditor after the application deadline fixed above, payment shall be made by Fort Bend County not later than 30 days after the County Auditor receives the application for payment.

5.2.3 Application for payment shall indicate the percentage of completion of each portion of the Project as of the end of the period covered by the application for payment.

5.2.4 Subject to the provisions of the contract documents, the amount of each progress payment shall be computed as follows:

5.2.4.1 Take that portion of the contract sum properly allocable to completed Project less retainage of ten percent (10%).

5.2.4.2 Add that portion of the contract sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved by Fort Bend County, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%).

5.2.4.3 Subtract the aggregate of previous payments made by Fort Bend County.

5.2.4.4 The progress payment amount as determined in above shall be further modified under the following circumstances:

Upon substantial completion of the Project, add a sum sufficient to increase the total payments to one hundred percent (100%) of the contract sum, less such amounts as Fort Bend County shall determine should be deducted for incomplete work and unsettled claims.

5.2.4.5 Final payment, constituting the entire unpaid undisputed balance of the contract sum, shall be made by Fort Bend County to the Contractor when Fort Bend County and the Contractor agree that the Contract has been fully performed by the Contractor.

5.3 Before the first application for payment, the Contractor shall submit to the Parks Department a schedule of values allocated to various portions of the work, prepared in such form and supported by such data to substantiate its accuracy as the Parks Department may require. This schedule, unless objected to by the Parks Department shall be used as a basis for reviewing the Contractor's application for payment.

Initials of Bidder: _____

5.4 Contractor must provide with each application for payment a contractor's affidavit certifying bills against the Contractor for labor, material and expendable equipment employed in the performance of Contractor have been paid in full prior to acceptance of final payment from Fort Bend County.

5.5 The Contractor will permit Fort Bend County, or any duly authorized agent of Fort Bend County, to inspect and examine the books and records of the Contractor for the purpose of verifying the amount of work performed under the Contract. Fort Bend County's right to inspect survives the termination of the Contract for a period of five years.

6.0 LIMIT OF APPROPRIATION:

Prior to the execution of this Contract, Contractor has been advised by County, and Contractor clearly understands and agrees, such understanding and agreement being of the absolute essence to this Contract, that County shall have available only those funds specifically allocated in this Contract to fully discharge any and all liabilities which may be incurred by County in bringing this Project to an absolute conclusion, resulting in a complete, fully furnished, fully equipped and fully usable facility, and that the total of any and all basic construction costs, costs of providing the required services and materials, all fees and compensation of any sort to the Contractor, and any and all costs for any and all things or purposes coming inuring under or out of this Contract, irrespective of the nature thereof, shall not exceed said specifically allocated sum, notwithstanding any word, statement or thing contained in or inferred from the preceding provision of this Contract which might in any light by any person be interpreted to the contrary.

7.0 RIGHT TO ASSURANCE:

Whenever Fort Bend County in good faith has reason to question the Contractor's intent or ability to perform, Fort Bend County may demand that the Contractor give written assurance of its intent to perform and its plan to properly continue performance, including a reasonably detailed timeline. In the event that a demand is made and no assurance is given within five (5) business days, Fort Bend County may treat this failure as an anticipatory repudiation of the Contract.

8.0 PERFORMANCE & PAYMENT BONDS:

Performance and Payment Bonds: In the event the total accepted bid price exceeds $25,000 the Contractor must provide a payment bond in the amount of 100% of the total contract sum, and in the event the total accepted bid price exceeds $100,000 the contractor must also provide a performance bond in the amount of 100% of the total contract sum. Bonds must be submitted to the Office of the County Purchasing Agent within ten (10) calendar days after receipt of notification of bid award. Such bonds shall be executed by a corporate surety duly authorized and admitted to do business in the State of Texas and licensed in the State of Texas to issue surety bonds with a Best Rating of "A" or better. Fort Bend County reserves the right to accept or reject any surety company proposed by the Contractor. In the event Fort Bend County rejects,

Initials of Bidder: _____

the proposed surety company, the Contractor will be afforded five (5) additional days to submit the required bonds issued by a surety company acceptable to Fort Bend County.

9.0 POWER OF ATTORNEY:

An attorney-in-fact who signs a bid bond, performance bond or payment bond must file with each bond a certified and effectively dated copy of his or her power of attorney.

10.0 INSURANCE:

10.1 All respondents shall submit, with response, a current certificate of insurance indicating coverage in the amounts stated below. In lieu of submitting a certificate of insurance, respondents may submit, with response, a notarized statement from an Insurance company, authorized to conduct business in the State of Texas, and acceptable to Fort Bend County, guaranteeing the issuance of an insurance policy, with the coverage stated below, to the firm named therein, if successful, upon award of this Contract.

10.2 At contract execution, contractor shall furnish County with properly executed certificates of insurance which shall evidence all insurance required and provide that such insurance shall not be canceled, except on 30 days prior written notice to County. Contractor shall provide certified copies of insurance endorsements and/or policies if requested by County. Contractor shall maintain such insurance coverage from the time Services commence until Services are completed and provide replacement certificates, policies and/or endorsements for any such insurance expiring prior to completion of Services. Contractor shall obtain such insurance written on an Occurrence form (or a Claims Made form for Professional Liability insurance) from such companies having Best's rating of A/VII or better, licensed or approved to transact business in the State of Texas, and shall obtain such insurance of the following types and minimum limits:

10.2.1 Workers' Compensation insurance. Substitutes to genuine Workers' Compensation Insurance will not be allowed.

10.2.2 Employers' Liability insurance with limits of not less than $1,000,000 per injury by accident, $1,000,000 per injury by disease, and $1,000,000 per bodily injury by disease.

10.2.3 Commercial general liability insurance with a limit of not less than $1,000,000 each occurrence and $2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policyholder.

10.2.4 Business Automobile Liability coverage with a combined Bodily Injury/Property Damage limit of not less than $1,000,000 each accident.

Initials of Bidder: _____

The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

10.3 County and the members of Commissioners Court shall be named as additional insured to all required coverage except for Workers' Compensation and Professional Liability (if required). All Liability policies including Workers' Compensation written on behalf of contractor, excluding Professional Liability, shall contain a waiver of subrogation in favor of County and members of Commissioners Court.

10.4 If required coverage is written on a claims-made basis, contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of the contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of two (2) years beginning from the time that work under the agreement is completed.

10.5 Contractor shall not commence any portion of the work under this Contract until it has obtained the insurance required herein and certificates of such insurance have been filed with and approved by Fort Bend County.

10.6 No cancellation of or changes to the certificates, or the policies, may be made without sixty (60) days prior, written notification to Fort Bend County.

10.7 Approval of the insurance by Fort Bend County shall not relieve or decrease the liability of the Contractor.

10.8 Builder's Risk Insurance: Contractor is required to provide proof before a Purchase Order is issued for this project and keep in full force and effect until the Transfer Date, Builders Risk Insurance, subject to policy terms and conditions, of direct physical loss or damage to property, materials, equipment and supplies which are to become an integral part of the Project, whether owned by Contractor, or subcontractors of every tier, and in which one or more of same has an insurable interest, while in transit, while at the Construction Site awaiting construction, during construction, and until the Transfer Date. Such insurance shall be maintained to cover, as nearly as practicable, the insurable value of such property, materials, equipment and supplies at risk, and shall contain a waiver of subrogation in favor of Contractor, Architect, subcontractors of any tier and Owner for loss or damage occurring during the Work and shall name Contractor as the named insured and Owner as additional insureds. All Builder's Risk Insurance proceeds shall be paid directly to the Contractor.

11.0 INDEMNIFICATION:

Respondent shall save harmless County from and against all claims, liability, and expenses, including reasonable attorney's fees, arising from activities of respondent, its agents, servants or employees, performed under this agreement that result from the negligent act, error, or omission of respondent or any of respondent's agents, servants or employees.

Initials of Bidder: _____

11.1 Respondent shall timely report all such matters to Fort Bend County and shall, upon the receipt of any such claim, demand, suit, action, proceeding, lien or judgment, not later than the fifteenth day of each month; provide Fort Bend County with a written report on each such matter, setting forth the status of each matter, the schedule or planned proceedings with respect to each matter and the cooperation or assistance, if any, of Fort Bend County required by Respondent in the defense of each matter.

11.2 Respondent's duty to defend, indemnify and hold Fort Bend County harmless shall be absolute. It shall not abate or end by reason of the expiration or termination of any contract unless otherwise agreed by Fort Bend County in writing. The provisions of this section shall survive the termination of the contract and shall remain in full force and effect with respect to all such matters no matter when they arise.

11.3 In the event of any dispute between the parties as to whether a claim, demand, suit, action, proceeding, lien or judgment appears to have been caused by or appears to have arisen out of or in connection with acts or omissions of Respondent, Respondent shall never-the-less fully defend such claim, demand, suit, action, proceeding, lien or judgment until and unless there is a determination by a court of competent jurisdiction that the acts and omissions of Respondent are not at issue in the matter.

11.4 Respondent's indemnification shall cover, and Respondent agrees to indemnify Fort Bend County, in the event Fort Bend County is found to have been negligent for having selected Respondent to perform the work described in this request.

11.5 The provision by Respondent of insurance shall not limit the liability of Respondent under an agreement.

11.6 Respondent shall cause all trade contractors and any other contractor who may have a contract to perform construction or installation work in the area where work will be performed under this request, to agree to indemnify Fort Bend County and to hold it harmless from all claims for bodily injury and property damage that may arise from said Respondent's operations. Such provisions shall be in form satisfactory to Fort Bend County.

11.7 Loss Deduction Clause - Fort Bend County shall be exempt from, and in no way liable for, any sums of money which may represent a deductible in any insurance policy. The payment of deductibles shall be the sole responsibility of Respondent and/or trade contractor providing such insurance.

12.0 PREVAILING WAGES:

This project is subject to the prevailing wage rate requirements of Chapter 2258 of the Government Code. All persons employed by Contractor shall be compensated at not less than

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the rates shown below. Contractor shall keep detailed records of each of its workers and said records shall be made available to County for inspection at all reasonable times. The Contractor shall pay Fort Bend County sixty dollars ($60.00) for each worker employed by the Contractor for the provision of services described herein for each calendar day or part of the day that the worker is paid less than the below stated rates. Contractors may also visit www.wdol.gov/dba.aspx.

General Decision Number: TX20240247 11/08/2024
Superseded General Decision Number: TX20230247

State: Texas

Construction Type: Building

County: Fort Bend County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.

If the contract was awarded on|or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January|30, 2022: Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a
conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

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Modification Number	Publication Date
0	01/05/2024
1	06/14/2024
2	10/18/2024
3	11/08/2024

	Rates	Fringes
ASBE0022-009 07/03/2023		
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation)	$ 28.35	16.02
BOIL0074-003 07/01/2023		
BOILERMAKER	$ 37.00	24.64
CARP0551-008 04/01/2021		
CARPENTER (Excludes Acoustical Ceiling Installation, Drywall Hanging, Form Work and Metal Stud Installation)	$ 25.86	9.08
ELEC0716-005 08/29/2023		
ELECTRICIAN (Excludes Low Voltage Wiring and Installation of Alarms)	$ 34.50	10.41
ELEV0031-003 01/01/2024		
ELEVATOR MECHANIC	$ 51.32	37.885+a+b

FOOTNOTES:

A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

B. Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day; and Veterans Day.

ENGI0450-002 04/01/2014		
POWER EQUIPMENT OPERATOR		
Cranes	$ 39.47	10.39
IRON0084-002 06/01/2023		

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IRONWORKER (ORNAMENTAL AND STRUCTURAL) PLAS0783-001 04/01/2023	$ 27.51	8.13
PLASTERER	$ 31.34	10.30
PLUM0068-002 10/01/2023		
PLUMBER	$ 34.86	11.68
PLUM0211-010 10/01/2024		
PIPEFITTER (Including HVAC Pipe Installation)	$ 41.14	11.86
SHEE0054-003 04/01/2020		
SHEET METAL WORKER (Excludes HVAC Duct and Unit Installation)	$ 29.70	13.85
SUTX2014-023 07/21/2014		
ACOUSTICAL CEILING MECHANIC	$ 16.41 **	3.98
BRICKLAYER	$ 19.86	0.00
CAULKER	$ 15.36 **	0.00
CEMENT MASON/CONCRETE FINISHER	$ 13.82 **	0.00
DRYWALL FINISHER/TAPER	$ 16.30 **	3.71
DRYWALL HANGER AND METAL STUD INSTALLER	$ 17.45	3.96
ELECTRICIAN (Alarm Installation Only)	$ 17.97	3.37
ELECTRICIAN (Low Voltage Wiring Only)	$ 18.00	1.68
FLOOR LAYER: Carpet	$ 20.00	0.00
FORM WORKER	$ 11.87 **	0.00
GLAZIER	$ 19.12	4.41
INSULATOR – BATT	$ 14.87 **	0.73
IRONWORKER, REINFORCING	$ 12.10 **	0.00

Initials of Bidder: _____

LABORER: Common or General	$ 10.79 **	0.00
LABORER: Mason Tender – Brick	$ 13.37 **	0.00
LABORER: Mason Tender - Cement/Concrete	$ 10.50 **	0.00
LABORER: Pipelayer	$ 12.94 **	0.00
LABORER: Roof Tearoff	$ 11.28 **	0.00
LABORER: Landscape and Irrigation	$ 9.49 **	0.00
LATHER	$ 19.73	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 14.10 **	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 13.93 **	0.00
OPERATOR: Bulldozer	$ 20.77	0.00
OPERATOR: Drill	$ 16.22 **	0.34
OPERATOR: Forklift	$ 15.64 **	0.00
OPERATOR: Grader/Blade	$ 13.37 **	0.00
OPERATOR: Loader	$ 13.55 **	0.94
OPERATOR: Mechanic	$ 17.52	3.33
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 16.03 **	0.00
OPERATOR: Roller	$ 16.00 **	0.00
PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping	$ 16.77 **	4.51
ROOFER	$ 15.40 **	0.00
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 17.81	2.64
SHEET METAL WORKER (HVAC Unit Installation Only)	$ 16.00 **	1.61
SPRINKLER FITTER (Fire Sprinklers)	$ 22.17	9.70

Initials of Bidder: _____

TILE FINISHER	$ 12.00 **	0.00
TILE SETTER	$ 16.17 **	0.00
TRUCK DRIVER: 1/Single Axle Truck	$ 14.95 **	5.23
TRUCK DRIVER: Dump Truck	$ 12.39 **	1.18
TRUCK DRIVER: Flatbed Truck	$ 19.65	8.57
TRUCK DRIVER: Semi-Trailer Truck	$ 12.50 **	0.00
TRUCK DRIVER: Water Truck	$ 12.00 **	4.11
WATERPROOFER	$ 14.39 **	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at
https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate

whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.
Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

State Adopted Rate Identifiers

Classifications listed under the ""SA"" identifier indicate that the prevailing wage rate set by a state (or local) government was adopted under 29 C.F.R §1.3(g)-(h). Example: SAME2023-007

01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 01/03/2024 reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:
* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor

Initials of Bidder: _____

200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

13.0 PERMITS:

It shall be the sole responsibility of the successful bidder to obtain all required permits in the name of Fort Bend County.

14.0 CONTRACTOR'S RESPONSIBILITY FOR WORK:

14.1 Preconstruction Work. Contractor shall do (or cause to be done) the following as preconstruction work:

14.1.1 On written demand as requested by Fort Bend County, cause the Contractor's personnel to meet with Fort Bend County and the Engineer to discuss the status of the Project.

14.1.2 On written demand as requested by Fort Bend County, review drawings and specifications with the Engineer to permit the Contractor and the Engineer to determine the compliance of the proposed facility with applicable building codes.

14.2 Construction Work. Contractor shall do (or cause to be done) the following as construction work:

14.2.1 Perform (or cause to be performed) all preparatory work at the construction site required herein, including (without limitation) soil and concrete testing and demolition of improvements existing at the construction site and all actions necessary for compliance with all laws and regulations as to actions to be taken by owners or contractors before construction begins, including without limitation those in regard to archaeological and environmental requirements.

14.2.2 Construct and install (or cause to be constructed and installed) the Project on the construction site in accordance with this Contract and the drawings and specifications approved by Fort Bend County.

14.2.3 Furnish (or cause to be furnished) all materials, supplies, equipment, tools, labor, supervision, utilities, transportation, and other materials and services necessary to complete the Project described herein.

14.2.4 Materials testing necessary for the Project and required by laws and regulations, construction industry standards as approved by Fort Bend County and this Contract; the frequency of testing shall be approved by Fort Bend County. **It is the contractor's responsibility to engage a**

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material testing laboratory to perform testing on the structural concrete to be used for foundation work in this project. The cost of testing shall be incidental to bid item for drill shaft foundation. Testing of concrete shall comply with current TXDOT criteria. Contractor has to submit the name of the testing laboratory, intended to be used by the contractor for this project, for County's approval.

14.3 Standards for Review and Approval. Fort Bend County acknowledges that in order to meet the deadlines for the completion of the Project, and in order to accomplish the efficient completion of the Project, the Contractor may submit matters to Fort Bend County in stages for approval or consent. Upon receipt of any matter submitted by the Contractor for review and approval, Fort Bend County shall review the same and shall diligently and promptly (but in any event within 14 calendar days for any such matter, other than a proposed change order, and within 28 calendar days for a proposed change order) give the Contractor notice of Fort Bend County's approval or disapproval, setting forth in detail all reasons for any disapproval. Fort Bend County's right to disapprove any such matter submitted (other than a proposed change order) shall be limited to the elements thereof (a) which do not conform substantially to matters previously approved, (b) which are new elements not previously presented and approved and the Contractor is unable to demonstrate that such new element is reasonably necessary for completion of the Project, or (c) which depict matters that are violations of this Contract or applicable laws and regulations.

14.3.1 If Fort Bend County disapproves of a particular matter or Proposed Change Order, the Contractor shall have the right to resubmit such matter or Proposed Change Order to Fort Bend County, altered to satisfy Fort Bend County's basis for disapproval. Any resubmission shall be subject to review and approval by Fort Bend County.

14.3.2 Fort Bend County and the Contractor shall attempt in good faith to resolve any disputes concerning the approval of any aspect of the Project expeditiously, so as not to delay the completion of the Project in accordance with this Contract.

14.3.3 Expedited Approvals. Fort Bend County recognizes the importance of expeditious action upon all matters submitted to Fort Bend County for review and approval and of expeditious response to those aspects of the Project requiring approval by governmental authorities having jurisdiction there over. Fort Bend County agrees to exercise its rights of review and approval hereunder with due diligence, reasonableness, and good faith. Fort Bend County shall use its reasonable efforts to expedite any required review of the Project or other matters by any governmental authority.

14.4 Changes.

14.4.1 General. Fort Bend County may make changes to the Project by altering,

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adding to, or deducting from the Project. All changes in the Project which (a) require an adjustment in the contract sum or an adjustment in the final completion date or (b) involve a material change in the overall scope or function of the Project shall be requested and authorized before commencing such changes by use of written change order notices, Proposed Change Orders and Change Orders, which change order procedure shall be the exclusive means to effect such changes in the Project.

14.4.2 Change Order Procedure. If at any time Fort Bend County desires to make any change in the Project requiring the issuance of a Change Order, Fort Bend County shall so advise the Contractor in writing by delivery to the Contractor of a written notice describing the change. Upon receipt of such notice initiated by Fort Bend County, the Contractor shall within a reasonable period of time advise Fort Bend County of the Contractor's proposal for the adjustments, if any, in the contract sum, the schedule of values, and the final completion date attributable to such change by delivering a written notice thereof (the "Proposed Change Order") to Fort Bend County. Such Proposed Change Order shall contain a description of the proposed change and shall set forth the Contractor's estimate of the increase or decrease, if any, in the contract sum and the change, if any, in the schedule of values and the final completion date attributable to such change. If the Contractor desires to make a change in the Project requiring the issuance of a change order, the Contractor shall deliver to Fort Bend County a Proposed Change Order. Upon execution by Fort Bend County, a Proposed Change Order shall constitute (and be defined herein as) a "Change Order" for purposes of this Contract. The Contractor shall forthwith perform the work as changed in accordance with such Change Order. All work performed pursuant to a Change Order shall be performed in accordance with the terms of this Contract. All Proposed Change Orders shall be submitted for approval by Fort Bend County. No action, acquiescence or inaction by Fort Bend County or any representative of Fort Bend County shall be construed to be a waiver of requirements set forth in this Contract in regard to Change Orders or ratification of a violation of such requirements, and all acts in violation of this provision shall be considered void.

14.4.3 Change Order Authorization. Each Change Order shall be signed by Fort Bend County and an authorized representative of the Contractor.

14.4.3 Contract Sum Adjustments. The contract sum and the schedule of values shall be adjusted only as a result of a Change Order requiring such adjustment. Any extra work performed without a proper Change Order shall be considered voluntary and not subject to additional compensation. The Contractor shall not be entitled to an adjustment in the contract sum (or a Change Order permitting such adjustment) or to damages as a result of any delays in the Project caused by the acts or omissions of Fort Bend

County, provided that this sentence is not applicable to delays that constitute more than 90 days in any 365-day period or cause the Project to be interrupted for a continuous period of 45 days through no fault of the Contractor.

14.4.5 When Fort Bend County and the Contractor agree upon the adjustments in the contract sum, the schedule of values, and the final completion date attributable to such adjustment, such agreement will be documented by preparation and if approved by the Fort Bend County Commissioners Court, execution of an appropriate Change Order.

14.5 Site Access. Prior to the transfer date, Fort Bend County and the Contractor shall have uninterrupted access to the construction site. Subsequent to the transfer date, Fort Bend County will permit the Contractor, the Engineer, and their representatives and subcontractors to enter upon the Project at times reasonably necessary to complete the punch list items.

14.6 Applicable Laws and Regulations. Contractor shall in its performance of the Project comply with all applicable laws and regulations. Any delays in the prosecution of the Project caused by any changes in the laws and regulations or the application or enforcement of the laws and regulations may entitle the Contractor to an extension of time.

14.7 Familiarity with Project. The Contractor represents and accepts that it has: (a) visited the property(ies), (b) taken such other steps as may be necessary to ascertain the nature and location of the Project and the general and local conditions which affect the Project or the cost thereof, (c) investigated the labor situation as regards to the Project, (d) examined the property(ies), the obstacles which may be encountered and all other observable conditions having a bearing upon the performance of the Project, the superintendence of the Project, the time of completion and all other relevant matters, and (e) reported to Fort Bend County the results of all of the foregoing. The Contractor represents that it is familiar with all phases of the Project and the matters that may affect the Project or its prosecution under this Contract.

14.8 Standard of Performance. The Contractor shall prosecute (or cause to be prosecuted) the Project in accordance with the best efforts for the construction and development of projects similar to the Project in the State of Texas, using qualified, careful, and efficient contractors and workers and in conformity with the provisions of this Contract. The Contractor shall perform the work in a good and workmanlike manner.

14.9 Warranty of Contractor. The Contractor warrants to Fort Bend County that: (i) the Contractor possesses the skill and knowledge ordinarily possessed by well-informed members of its trade or profession and the Contractor will use its best efforts to ensure that the services provided under this Contract will be performed, delivered, and conducted in accordance with the best professional standards and

in accordance with industry standards, and (ii) the Contractor is fully experienced and properly qualified to perform the class of work provided for herein, and that it is properly equipped, organized and financed to perform such work, and (iii) following the date of acceptance of this Contract, the services provided by the Contractor to Fort Bend County will conform to the representations contained in this Contract, including all attachments, schedules and exhibits. All warranties provided by the Contractor in this Contract shall be cumulative, shall be deemed consistent and not in conflict, are intended to be given full force and effect and to be interpreted expansively to give the broadest warranty protection to Fort Bend County.

14.10 Contractor's Personnel. Contractor shall employ only competent, skilled personnel for the Project. Prior to the final completion date, the Contractor shall maintain a superintendent who shall be authorized to act on behalf of the Contractor and with whom Fort Bend County may consult at all reasonable times. The superintendent shall not be transferred from the Project without Fort Bend County's consent (which shall not be unreasonably withheld or delayed); provided, however, the superintendent shall not be assigned solely to the Project and shall be entitled to spend reasonable time working on matters unrelated to the Project so long as such work on other matters does not render the superintendent unavailable to the Project or unavailable to Fort Bend County. However, such obligation to furnish the superintendent and such staff personnel shall not be construed (a) to preclude the promotion within the Contractor's organization of any person assigned to the Project or (b) to give rise to any liability of the Contractor if any person assigned to the Project (including, without limitation, the superintendent) leaves the Contractor's employment. If the superintendent is transferred from the Project, Fort Bend County shall have the right to approve the replacement superintendent (which approval will not be unreasonably withheld or delayed). The Contractor, the Architect, and the other subcontractors shall comply with all applicable health, safety, and loss prevention rules of applicable governmental authorities. The Contractor shall, at its own expense, remove from the Project any person who fails to comply with such rules and instructions. The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ on the Project any unfit person or anyone not skilled in the work assigned to him. Fort Bend County may, upon written notice to the Contractor, require the Contractor to remove an individual immediately from providing services for the following reasons: violation of the terms and conditions of this Contract; violation of Fort Bend County’s or the Contractor’s work rules and regulations; criminal activity; or violation of state, federal, or municipal statutes. Fort Bend County may, upon thirty (30) days written notice to the Contractor, require the removal of any individual from providing services without cause.

14.11 Inspection. The Project and all parts thereof shall be subject to inspection from time to time by inspectors designated by Fort Bend County. No such inspections shall relieve The Contractor of any of its obligations hereunder. Neither failure to inspect nor failure to discover or reject any of the work as not in accordance with

the drawings and specifications or any provision of this Contract shall be construed to imply an acceptance of such work or to relieve the Contractor of any of its obligations hereunder. Fort Bend County agrees that its right of inspection shall be used reasonably and in a timely manner so as not to delay orderly completion of the Project.

14.12 Protection Against Risks. The Contractor shall take all precautions which are necessary and adequate, against conditions created during the progress of the Project which involve a risk of bodily harm to persons or a risk of damage or loss to any property. The Contractor shall regularly inspect all work, materials and equipment to discover and determine any such conditions and shall be responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with all federal, state, and local occupational hazard and safety standards, codes and regulations applicable in the jurisdiction where the Project is being performed. The Contractor shall include the substance of this clause in its entirety in all subcontracts for any work to be performed at the construction site.

14.13 Equipment. Except as expressly provided herein to the contrary, the Contractor shall furnish (or cause to be furnished) all construction, transportation, installation, tools, and other equipment and facilities required for the performance of the Project within the times specified herein. Such equipment and facilities shall be serviceable and kept fit for the uses intended. Defective items shall be removed from the construction site promptly and at the Contractor's cost. The Contractor shall schedule (or cause to be scheduled) its other operations so as to not interfere with its duty to timely furnish the necessary equipment and facilities and personnel to operate the same at the times necessary for the orderly completion of the Project.

14.14 Materials. Except as may be specifically provided otherwise in the Contract or approved in advance by Fort Bend County, the Contractor shall provide Fort Bend County with copies of material testing reports and to cause all materials, equipment, and fabricated items incorporated in the Project to be new and of a suitable grade of their respective kinds for their intended use.

14.15 Delay, Disruption or Hindrance Damages. Contractor and the County contemplate that Contractor’s performance may be delayed, disrupted or interfered with by unanticipated causes including but not limited to the following:

a) Severe and unavoidable natural disasters such as fires, floods, epidemics and earthquakes;
b) Abnormal weather conditions;
c) Acts or failures to act of the County , third party utility owners or other third – party entities; and
d) Acts of war or terrorism.

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Contractor and the County agree and stipulate that an extension of the Contract Time shall be the sole remedy of Contractor for delays in performance of the Work, whether or not such delays are foreseeable, except for delays caused solely by acts of the County that constitute fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work and then only to the extent such acts continue after Contractor notifies Owner in writing of such conduct. For delays caused by any act(s) other than fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work Contractor shall not be entitled to any compensation or recovery of any damages including, without limitation, those damages prohibited or limited in Sections 14.15.1 – 14.15.8 below. The County's exercise of any of its rights or remedies under the Contract including, without limitation, ordering changes in the Work or directing suspension, rescheduling, or correction of the Work, in response to any breach or failure by the Contractor to comply with the terms of the Contract Documents or the Contractor's obligations arising therefrom, shall not be construed as intentional interference with Contractor's performance of the Work regardless of the extent or frequency of the County's exercise of such rights or remedies.

Without limiting the foregoing, except as otherwise expressly provided in this Agreement in calculating the amount of any claim recoverable by Contractor, the following limitations on the recovery of damages shall apply:

14.15.1 No indirect or consequential damages will be allowed.

14.15.2 No recovery shall be based on a comparison of planned expenditures to total actual expenditures, or on estimated losses of labor efficiency, or on a comparison of planned manloading to actual manloading, or any other analysis that is used to show damages indirectly.

14.15.3 Damages, to the extent recoverable, are limited to the additional, actual costs specifically shown to have been directly incurred by the Contractor and solely caused by the proven wrong.

14.15.4 No damages will be allowed for home office overhead or other home office charges.

14.15.5 No exemplary damages or unjust enrichment damages shall be recoverable.

14.15.6 No recovery of attorney's fees shall be recoverable except as expressly permitted under the Agreement.

14.15.7 No profit will be allowed on any damage claim, except as expressly recoverable under the Agreement as Fee on Cost of the Work incurred.

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14.15.8 Notwithstanding any other damage limitation herein the County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Contractor if the County is found to have intentionally interfered with Contractor's performance of the Work by fraud, misrepresentation, gross negligence, or intentional arbitrary or capricious acts and/or omissions. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages (in lieu of any other remedy or damages) for delay, disruption or hindrance (but not as a penalty) the County shall pay the Contractor $250.00 for each day that a court of competent jurisdiction finds the County's conduct referenced in Section 14.15 (above) is the sole cause of Contractor's delay in completing the Work.

15.0 TERMINATION:

15.1 Fort Bend County may terminate the Contract for cause if the Contractor:

15.1.1 Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials.

15.1.2 Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractor.

15.1.3 Persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction.

15.1.4 Otherwise commits substantial breach of a provision of the Contract Documents.

15.2 When any of the above reasons exists, Fort Bend County may, without prejudice to any other rights or remedies of Fort Bend County and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

15.2.1 Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor.

15.2.2 Finish the Project by whatever reasonable method Fort Bend County may deem expedient.

15.2.3 When Fort Bend County terminates the Contract for one of the reasons stated in this section, the Contractor shall not be entitled to receive further

payment until the Project is finished. Therefore, the Contractor shall be promptly paid for all work actually and satisfactorily completed.

15.3 Termination for Convenience of Fort Bend County

Fort Bend county reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply.

15.3.1 The County will notify Contractor in writing of the county's determination to terminate the contract for convenience and the effective date of the Contract termination. The notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.

15.3.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any dispute in determining or adjusting any amounts due at that point in the Contract:

15.3.2.1 Stop all work.

15.3.2.2 Place no further subcontracts or orders for materials or services.

15.3.2.3 Terminate all subcontracts for convenience.

15.3.2.4 Cancel all materials and equipment orders as applicable.

15.3.2.5 Take appropriate action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

15.3.2.6 When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits or lost business opportunities.

15.4 Settlement on Termination. When the Contract is terminated by the County under 15.3, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to the County based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, the County may unilaterally determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.

16.0 COMPLETION, TRANSFER, & ACCEPTANCE:

Initials of Bidder: _____

16.1 Final Completion. Upon the occurrence of the final completion date, the punch list items shall be promptly commenced and thereafter completed within thirty (30) days after final completion.

16.2 Transfer and Acceptance. Upon the occurrence of final completion, care, custody and control of the Project shall pass to Fort Bend County. As referenced herein, the "Transfer Date" shall mean the date on which the care, custody and control of the Project passes to Fort Bend County. Subsequent to the Transfer Date all risk of loss with respect to the Project shall be by Fort Bend County and the Contractor shall be thereafter obligated to cover the Project with their Insurance.

17.0 SUSPENSION BY FORT BEND COUNTY FOR CONVENIENCE:

17.1 Fort Bend County may, without cause, order the Contractor in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as Fort Bend County may determine.

17.2 An adjustment shall be made for increase in the cost of performance, caused by suspension, delay or interruption. No adjustment shall be made to the extent:

17.2.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible.

17.2.2 That an equitable adjustment is made or denied under another provision of this Contract.

17.3 Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

18.0 INDEPENDENT CONTRACTOR:

The Contractor shall be an independent contractor and any provisions of this Contract that may appear to give Fort Bend County the right to direct the Contractor as to the details of the manner of doing the Project shall be deemed to mean that the Contractor shall follow the desires of Fort Bend County in the results of the Project only and not in the means whereby the Project is to be accomplished. The Contractor shall be responsible as to the details of completing the Project. Neither the agents, representatives, nor employees of the Contractor, shall be deemed to be the agents, representatives, or employees of Fort Bend County. The Contractor further represents that it accepts a fiduciary role and responsibility with respect to Fort Bend County and will, to its best abilities, act in the best interests of Fort Bend County and the timely completion of the Project. The Contractor agrees and understands that neither it nor any of its agents or employees may act in the name of Fort Bend County except and unless specifically authorized in writing by Fort Bend County to do so. The Contractor shall furnish construction administration and management services and use the Contractor's best efforts to complete the Project in an expeditious and economical manner consistent with the interests of Fort Bend County.

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19.0 NOTICE:

19.1 All written notices, demands, and other papers or documents to be delivered to Fort Bend County under this Contract shall be delivered to the Parks Department, 301 Jackson, Richmond, Texas 77469, or at such other place or places as Fort Bend County may from time to time designate by written notice delivered to the Contractor. For purposes of notice under this Contract, a copy of any notice or communication hereunder shall also be forwarded to the following address: Fort Bend County, 301 Jackson Street, Richmond, Texas 77469, Attention: County Judge.

19.2 All written notices, demands, and other papers or documents to be delivered to the Contractor under this Contract shall be delivered to the Authorized Representative identified in the Contract documents or such other place or places as the Contractor may designate by written notice delivered to Fort Bend County.

20.0 RECORDS:

20.1 Fort Bend County shall be the absolute and unqualified owner of all drawings, preliminary layouts, record drawings, sketches and other documents prepared pursuant to the Contract by Contractor.

20.2 The Contractor agrees to maintain and preserve for a period of at least five years after the earlier of the expiration of the defects period or termination of this Contract, accurate and complete records relating to the performance of the Project. The Contractor agrees to, upon request, provide Fort Bend County with such records.

21.0 SUCCESSORS & ASSIGNS:

21.1 Fort Bend County and the Contractor bind themselves and their successors, executors, administrators and assigns to the other party of this Contract and to the successors, executors, administrators and assigns of such other party, in respect to all covenants of this Contract.

21.2 Neither Fort Bend County nor the Contractor shall assign, sublet or transfer its interest in this Contract without the prior written consent of the other.

21.3 Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public and/or governmental body that may be a party hereto.

22.0 PUBLIC CONTACT:

Contact with the news media, citizens of Fort Bend County or governmental agencies shall be the sole responsibility of Fort Bend County. Under no circumstances, whatsoever, shall Contractor release any material or information developed in the performance of its services

Initials of Bidder: _____

hereunder without the express written permission of Fort Bend County, except where required to do so by law.

23.0 MODIFICATIONS:

This instrument contains the entire Contract between the parties relating to the rights herein granted and obligations herein assumed. Any oral or written representations or modifications concerning this instrument shall be of no force and effect excepting a subsequent written modification signed by both parties hereto.

24.0 SILENCE OF SPECIFICATIONS:

The apparent silence of specifications as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of specifications shall be made on the basis of this statement. The items furnished under this contract shall be new, unused of the latest product in production to commercial trade and shall be of the highest quality as to materials used and workmanship. Manufacturer furnishing these items shall be experienced in design and construction of such items and shall be an established supplier of the item bid.

25.0 SEVERABILITY:

In the event one or more of the provisions contained in these requirements or the specifications shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and these requirements or the specifications shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

26.0 GOVERNING FORMS:

In the event of any conflict between the terms and provisions of these requirements and the specifications, the specifications shall govern. In the event of any conflict of interpretation of any part of this overall document, Fort Bend County's interpretation shall govern.

27.0 TAX EXEMPT:

Fort Bend County is exempt from state and local sales and use taxes under Section 151.309 of the Texas Tax Code. This Contract is deemed to be a separate contract for Texas tax purposes, and as such, Fort Bend County hereby issues its Texas Exemption for the purchase of any items qualifying for exemption under this Contract. Contractor is to issue its Texas Resale Certificate to vendors and subcontractors for such items qualifying for this exemption, and further, contractor should state these items at cost.

28.0 ENTIRE AGREEMENT:

The Parties agree that this Contract contains all of the terms and conditions of the understanding of the parties relating to the subject matter hereof. All prior negotiations, discussions, correspondence and preliminary understandings between the parties and others relating hereto are superseded by this Contract. By entering into this Contract, the parties do not intend to create any obligations, express or implied, other than those specifically set out in this Contract.

29.0 APPLICABLE LAW & VENUE

This Contract shall be construed under and in accord with the laws of the State of Texas, and all obligations of the parties created hereunder are performable in Fort Bend County, Texas, and that venue for any litigation arising out of or related to this Contract shall lie solely in the court of appropriate jurisdiction located in Fort Bend County, Texas.

30.0 AWARD:

This contract will be awarded to the overall lowest and best bid.

31.0 TEXAS ETHICS COMMISSION FORM 1295:

31.1 Effective January 1, 2016 all contracts executed by Commissioners Court, regardless of the dollar amount, will require completion of Form 1295 "Certificate of Interested Parties", per the new Government Code Statute §2252.908. All vendors submitting a response to a formal Bid, RFP, SOQ or any contracts, contract amendments, renewals or change orders are required to complete the Form 1295 online through the State of Texas Ethics Commission website. Please visit: https://www.ethics.state.tx.us/filinginfo/1295/

31.2 On-line instructions:

31.2.1 Name of governmental entity is to read: Fort Bend County.

31.2.2 Identification number used by the governmental entity is: B25-025.

31.2.3 Description is the title of the solicitation: Construction of Barbara Jordan Community Center

31.3 Apparent low bidder(s) will be required to provide the Form 1295 within three (3) calendar days from notification; however, if your company is publicly traded you are not required to complete this form.

32.0 STATE LAW REQUIREMENTS FOR CONTRACTS:

The contents of this section are required by Texas Law and are included by County regardless of content.

32.1 Agreement to Not Boycott Israel Chapter 2271 Texas Government Code:

Initials of Bidder: _____

Contractor verifies that if Contractor employs ten (10) or more full-time employees and this Agreement has a value of $100,000 or more, Contractor does not boycott Israel and will not boycott Israel during the term of this Agreement.

32.2 Texas Government Code Section 2251.152 Acknowledgment: By signature on vendor form, Contractor represents pursuant to Section 2252.152 of the Texas Government Code, that Contractor is not listed on the website of the Comptroller of the State of Texas concerning the listing of companies that are identified under Section 806.051, Section 807.051 or Section 2253.153.

33.0 HUMAN TRAFFICKING:

By acceptance of this contract, Contractor acknowledges that Fort Bend County is opposed to human trafficking and that no County funds will be used in support of services or activities that violate human trafficking laws

34.0 INDEMNITY FOR BODILY INJURY OR DEATH CLAIMS

Indemnity for certain bodily injury or death claims. To the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county from and against all claims, losses, expenses, costs, demands, suits, causes of action, and damages, including without limitation, attorneys' fees and expenses, for bodily injury or death of any employee of contractor, its agents, or its subcontractors of every tier, even if the bodily injury or death is caused by or alleged to have been caused by the sole or partial negligence, fault or strict liability of any indemnitee.

Indemnity for all other claims. For all claims not addressed in the preceding section or section 11.0 above , including, without limitation, claims for damage to or loss of use of property and claims for bodily injury to or death of any person other than that addressed in the immediately preceding section, to the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county from and against all claims, losses, expenses, costs, demands, suits, causes of action, and damages, including without limitation, attorneys' fees and expenses, of any nature whatsoever arising out of or related to this contract or the work to be performed under this contract, but only to the extent of the negligence or other fault of the contractor, its agents, representatives, employees or subcontractors of any tier.

35.0 AGREEMENT TO ARBITRATE UNDER THE FEDERAL ARBITRATION ACT

To the maximum extent allowed by law, any controversy or claim arising out of or relating to this contract, or the breach thereof, shall be settled by arbitration under the Federal Arbitration Act, 9 U.S.C. § 1, et seq. administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. For cases in which the amount in controversy is less than $250,000, there shall be no discovery other than an expeditious and complete exchange of documents relative to the dispute. For cases in which the amount in controversy is between $250,000 and $1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information and up to three (3)

Initials of Bidder: _____

depositions per side (including expert depositions, if any). For cases in which the amount in controversy exceeds $1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information up to five (5) depositions per side (including expert depositions, if any). No formal interrogatories, request for admissions or formal request for production of documents shall be allowed in the arbitration process. The hearing on the merits will be completed no later than ninety (90) days after the initial demand for arbitration is made for disputes involving amounts in controversy of up to $250,000; no later than no later than one hundred twenty (120) days after the initial demand for arbitration is made for disputes involving amounts in controversy of between $250,000 and $1,000,000; and, no later than three hundred sixty five (365) days after the initial demand for arbitration is made for disputes involving amounts in controversy of over $1,000,000.

36.0 ADDITIONAL REQUIRED FORMS:

All vendors submitting are required to complete and return with submission

36.1 Required Proof of Insurance

36.2 Vendor Form

36.3 W9 Form

36.4 Tax Form/Debt/Residence Certification

36.5 Contractor Acknowledgement of Stormwater Management Program

36.6 Pricing Sheet, as stated in Exhibit I.

37.0 EXHIBIT:

Exhibit I: Pricing

Exhibit II: Project Manual

Exhibit III: Plans

Initials of Bidder: _____

Contract Sheet
Bid 25-025

THE STATE OF TEXAS
COUNTY OF FORT BEND

This memorandum of agreement made and entered into on the _____ day of _____, 20_____, by and between Fort Bend County in the State of Texas (hereinafter designated County), acting herein by County Judge KP George, by virtue of an order of Fort Bend County Commissioners Court, and _____ (hereinafter designated Contractor).

(company name)

WITNESSETH:

The Contractor and the County agree that the bid and specifications for the **Construction of Barbara Jordan Community Center** which are hereto attached and made a part hereof, together with this instrument and the bond (when required) shall constitute the full agreement and contract between parties and for furnishing the items set out and described; the County agrees to pay the prices stipulated in the accepted bid.

It is further agreed that this contract shall not become binding or effective until signed by the parties hereto and a purchase order authorizing the items desired has been issued.

Executed at Richmond, Texas this _____day of _____20_____.

Fort Bend County, Texas

By:_____
County Judge, KP George

By:_____
Signature of Contractor

By:_____
Printed Name and Title

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

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

Print or type
See **Specific Instructions** on page 2.

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; 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. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member 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.)

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 Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 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 on page 3.

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

General Instructions

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

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

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?* on page 2.

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?* on page 2 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 Publication 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 28% 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 Part II instructions on page 3 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* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

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* on page 3 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, list first, and then circle, the name of the person or entity whose number you entered in Part I of 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 in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

Limited Liability Company (LLC). If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in 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.

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. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), 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 the chart on page 4 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. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

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 items 1, 4, or 5 below indicate 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), 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)	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor[2]
4. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee[1] The actual owner[1]
5. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
6. 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:**
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity[4]
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. 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
14. 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* on page 2.

***Note.** 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 Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system 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 contact them at *www.ftc.gov/idtheft* or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov 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.

Job No.: _____

TAX FORM/DEBT/ RESIDENCE CERTIFICATION
(for Advertised Projects)

Taxpayer Identification Number (T.I.N.): _____

Company Name submitting Bid/Proposal: _____

Mailing Address: _____

Are you registered to do business in the State of Texas? Yes No

If you are an individual, list the names and addresses of any partnership of which you are a general partner or any assumed name(s) under which you operate your business

_____

_____

I. **Property:** List all taxable property in Fort Bend County owned by you or above partnerships as well as any d/b/a names. Include real and personal property as well as mineral interest accounts. (Use a second sheet of paper if necessary.)

Fort Bend County Tax Acct. No.*	Property address or location**
_____	_____
_____	_____
_____	_____
_____	_____

** This is the property account identification number assigned by the Fort Bend County Appraisal District.*

*** For real property, specify the property address or legal description. For business personal property, specify the address where the property is located. For example, office equipment will normally be at your office, but inventory may be stored at a warehouse or other location.*

II. **Fort Bend County Debt** - Do you owe any debts to Fort Bend County (taxes on properties listed in I above, tickets, fines, tolls, court judgments, etc.)?

Yes No If yes, attach a separate page explaining the debt.

III. **Residence Certification** - Pursuant to Texas Government Code §2252.001 *et seq.*, as amended, Fort Bend County requests Residence Certification. §2252.001 *et seq.* of the Government Code provides some restrictions on the awarding of governmental contracts; pertinent provisions of §2252.001 are stated below:

(3) "Nonresident bidder" refers to a person who is not a resident.

(4) "Resident bidder" refers to a person whose principal place of business is in this state, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

I certify that _____ is a Resident Bidder of Texas as defined in Government Code
[Company Name]
§2252.001.

I certify that _____ is a Nonresident Bidder as defined in Government Code
[Company Name]
§2252.001 and our principal place of business is _____.
[City and State]

Mandatory Form

Contractor Acknowledgement of Storm Water Management Program

I hereby acknowledge that I am aware of the stormwater management program and standard operating procedures developed by Fort Bend County in compliance with the TPDES General Permit No. TXR040000. I agree to comply with all applicable best management practices and standard operating procedures while conducting my services for Fort Bend County. I agree to conduct all services in a manner that does not introduce illicit discharges of pollutants to streets, stormwater inlets, drainage ditches or any portion of the drainage system. The following materials and/or pollutant sources must not be discharged to the drainage system as a result of any services provided:

1. Grass clippings, leaves, mulch, rocks, sand, dirt or other waste materials resulting from landscaping activities, (except those materials resulting from ditch mowing or maintenance activities)
2. Herbicides, pesticides and/or fertilizers, (except those intended for aquatic use)
3. Detergents, fuels, solvents, oils and/or lubricants, other equipment and/or vehicle fluids,
4. Other hazardous materials including paints, thinners, chemicals or related waste materials,
5. Uncontrolled dewatering discharges, equipment and/or vehicle wash waters,
6. Sanitary waste, trash, debris, or other waste products
7. Wastewater from wet saw machinery,
8. Other pollutants that degrade water quality or pose a threat to human health or the environment.

Furthermore, I agree to notify Fort Bend County immediately of any issue caused by or identified by:

_____

(Company/Contractor)

that is believed to be an immediate threat to human health or the environment.

_____ _____

Contractor Signature Date

_____

Printed Name

_____

Title

Bid 25-025
Construction of Barbara Jordan Community Center

Exhibit I: Pricing

Total Bid

$_____

Calendar days for completion (Maximum 180 days) _____

Acknowledgement of Receipt of Addendum(s), if issued by Purchasing, to the Request for Proposal Document.

Addendum No 1 dated _____ Received _____

Addendum No 2 dated _____ Received _____

Addendum No 3 dated _____ Received _____

_____
Name of Respondent

_____
Signature of Authorized Representative

_____
Printed Name of Representative

FORT BEND COUNTY
PROJECT MANUAL

Issued For Bid and
Construction

Due Date and Time:
Monday, September 23, 2024

Barbara Jordan Park
Community Center

VCS Architects
19251 Purus Dr. Porter, TX
77365

Dvaughn@VCSArch.com

832.527.1634

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Andre Chachere
2. 10998
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.

B. Civil Engineer:

1. WECS Engineers
2. 98053
3. Responsible for Sections in Divisions 02, 03, 31, 32 and 33.

END OF DOCUMENT 000107

02: TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated, as modified by subsequent Addenda and Contract modifications:

GENERAL

A-000	COVER SHEET
A-001	INDEX, CODE & PROJECT INFORMATION
A-003	OVERALL LIFE SAFETY PLAN

CIVIL

C0.1	CONSTRUCTION NOTES
CO.2	CONSTRUCTION NOTES
C1.0	TOPOGRAPHIC SURVEY
C2.0	DEMOLITON PLAN
C3.0	SITE PLAN
C4.0	DRAINAGE AREA MAP
C4.1	DRAINAGE PLAN
C4.2	DRAINAGE PLAN
C4.3	DRAINAGE PLAN
C4.4	DRAINAGE CALCULATIONS
C5.0	GRADING PLAN
C7.0	STORM WATER POLLUTION PRVENTION PLAN
C8.0	CONSTRUCTION DETAILS
C8.1	CONSTRUCTION DETAILS
C8.2	CONSTRUCTION DETAILS
C8.3	CONSTRUCTION DETAILS
C8.4	CONSTRUCTION DETAILS
C8.5	CONSTRUCTION DETAILS
C8.4	
C8.6	CONSTRUCTION DETAILS
C8.7	CONSTRUCTION DETAILS
C8.8	CONSTRUCTION DETAILS
C8.9	CONSTRUCTION DETAILS
C8.10	CONSTRUCTION DETAILS
C8.11	CONSTRUCTION DETAILS

STRUCTURAL

S0.01	STRUCTURAL GENERAL NOTES
S1.00	FOUNDATION PLAN
S4.00	TYPICAL FOUNDATION DETAILS
S4.01	TYPICAL FOUNDATION DETAILS
S4.02	TYPICAL FOUNDATION DETAILS
S4.03	FOUNDATION DETAILS

ARCHITECTURE

AS-100	OVERALL SITE PLAN
AS-101	OVERALL FLOOR PLAN & RCP'S
AS-102	OVERALL ROOF PLAN
AS-201	EXTERIOR ELEVATIONS
AS-301	BUILDING SECTIONS
AS-311	WALL SECTIONS
AS-312	WALL SECTIONS
AS-401	ENLARGED KITCHEN & PLAN ELEVATIONS
AS-402	ENLARGED RESTROOM PLAN & ELEVATIONS
AS-501	EXTERIOR DETAILS
AS-601	PARTITION SHCEDULE AND DETAILS
AS-602	WALL PARTITION DETAILS
AS-611	DOOR SCHEDULE/FRAME ELEVATIONS & DETAILS
AS-621	WINDOW SCHEDULE
AS-681	FINISH SCHEDULE& DETAILS

MECHANICAL

M.001	MECHANICAL SYMBOLS & LEGENDS
M.002	MECHANICAL SCHEDULES
M.003	MECHANICAL SPECIFICATIONS
M.201	MECHANICAL FLOOR PLAN
M.301	MECHANICAL DETAILS

ELECTRICAL

E.001	ELECTRICAL SYMBOL LIST, NOTES, ABBREVIATIONS, & INDEX
E.002	ELECTRICAL SPECIFICATIONS
E.003	SINGLE LINE DIAGRAM AND PANEL SCHEDULE
E.100	ELECTRICAL SITE PLAN
E.101	ELECTRICAL LIGHTING PLAN
E.102	ELECTRICAL POWER PLAN

PLUMBING

P.001	PLUMBING SYMBOLS & LEGENDS
P.002	PLUMBING SPECIFICATIONS
P.201	PLUMBING SANITARY FLOOR PLAN
P.202	PLUMBING DOMESTIC FLOOR PLAN
P.301	PLUMBING DETAILS
P.401	PLUMBING RISER

END OF DOCUMENT 000115

SECTION 011000 - SUMMARY

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.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work performed by Owner.
4. Owner-furnished products.
5. Contractor's use of site and premises.
6. Specification and Drawing conventions.
7. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: Barbara Jordan Park Community Center.

1. Project Location: 8705 Park St. Needville, TX 77461.

B. Owner: Fort Bend County, 5855 Sienna Way, Missouri City TX, 77459.

C. Architect: VCS Architects, 19251 Purus Dr., Porter, TX 77365.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Civil Engineer: WECS Engineers.

2. MEP Engineer: Breakthrough Engineering, LLC

E. Other Owner Consultants: Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. Project consists of a 2 story, 7,000 square foot composite steel framed museum of Type II-B construction per IBC. Project also consists of other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK PERFORMED BY OWNER

A. General: Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products

1. N/A

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.8 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
1. Early Morning Hours: Refer to Local Municipal Noise Ordinance.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

1. Notify Owner not less than 7 days in advance of proposed utility interruptions.
2. Obtain Owner’s written permission before proceeding with utility interruptions.

D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than 5 days in advance of proposed disruptive operations.
2. Obtain Owner’s written permission before proceeding with disruptive operations.

E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.

F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 ALLOWANCES

A. Advise Architect of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

D. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

E. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include [**taxes,**]freight and delivery to Project site.

F. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.2 UNIT PRICES

A. Unit price is **an amount incorporated in the Agreement, applicable during the duration of the Work as** a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, **applicable taxes,** overhead, and profit.

C. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

1.3 ALTERNATES

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be

completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

B. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

C. Notification: Immediately following award of the Contract, notify each party involved, in writing, whether alternates have been accepted, rejected, or deferred for later consideration.

1.4 PAYMENT PROCEDURES

A. Submit a Schedule of Values at least ten (10) days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the schedule of values with Contractor's construction schedule.

1. Arrange schedule of values consistent with format of **AIA Document G703**
2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
4. Provide separate line items in the schedule of values for initial cost of materials and for total installed value of that part of the Work.
5. Provide a separate line item in the schedule of values for each allowance.

B. Application for Payment Forms: Use **AIA Document G702 and AIA Document G703** as form for Applications for Payment.

C. Submit [**4**] four copies of each application for payment according to the schedule established in Owner/Contractor Agreement.

1. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor.
2. With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

3. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

    a. Include insurance certificates, proof that taxes, fees, and similar obligations were paid, and evidence that claims have been settled.
    b. Include affidavit of payment of debts and claims **on AIA Document G706**.
    c. Include affidavit of release of liens **on AIA Document G706A**].
    d. Include consent of surety to final payment **on AIA Document G707**.
    e. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. <**Insert allowance name**>: Allow the sum of <**Insert dollar or quantity amount of allowance**> for <**Insert allowance description**> as specified in Section <**Insert MF04 Section number**> "<**Insert MF04 Section title**>"[**and as shown on Drawings**].

B. Copy and re-edit "(Insert allowance name)" Paragraph below for each quantity allowance required for Project.

3.2 SCHEDULE OF UNIT PRICES

A. **Concrete Sidewalk** As specified in Section 03 30 00 Concrete," including as shown on drawing details.

    1. Quantity Allowance: Coordinate unit price with allowance adjustment requirements.

B. **Chain Link Fence,** As specified in Section 03 31 13 Chain Link Fences and Gates," including as shown on Drawing details.

3.3 LE OF ALTERNATES

A. Alternate No. 01: <**Insert title of alternate**>.

    1. Base Bid: <**Insert brief description of base bid requirement**> [**as indicated on Sheet <Insert title of sheet>**] [**and**] [**as specified in Section <Insert MF04 Section number> "<Insert MF04 Section title>."**]

2. Alternate: **<Insert brief description of alternate requirement>** [**as indicated on Sheet <Insert title of sheet>**] [**and**] [**as specified in Section <Insert MF04 Section number> "<Insert MF04 Section title>."**]

END OF SECTION 012000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUBSTITUTION PROCEDURES

A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use **CSI Form 13.1A**.
2. Submit requests within **14 Calendar**>days after **the Notice to Proceed**.
3. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.

C. Architect will review proposed substitutions and notify Contractor of their acceptance or rejection. If necessary, Architect will request additional information or documentation for evaluation.

1. Architect will notify Contractor of acceptance or rejection of proposed substitution within [**15**] fifeteen days of receipt of request, or **seven** (7) days of receipt of additional information or documentation, whichever is later.

D. Do not submit unapproved substitutions on Shop Drawings or other submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 CONTRACT MODIFICATION PROCEDURES

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time**.**

B. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work.

1. Proposal Requests are not instructions either to stop work in progress or to execute the proposed change.
2. Within **15 calendar days or less, when not otherwise specified,** after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time.

C. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

D. On Owner's approval of a Proposal Request, Architect will issue a CPR Approval for signatures of Owner and Contractor. All changes to the Contract Sum or the Contract Time will be issued at the end of the project **on one AIA Document G701**, for signatures of Architect, Owner and General Contractor.

E. Architect may issue a Construction Change Directive[**on AIA Document G714**]. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

F. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work. **Use CSI Form 1.5A.**

B. Key Personnel Names: Within **15** calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.

C. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.

D. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use **forms acceptable to Architect and Owner**.

E. Project Web Site: Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion.

1. Provide up to **five** Project Web site user licenses for use of the Owner, Architect, and Architect's consultants.
2. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of **AIA Document C106**.

F. Provide bi-weekly project progress photographs, minimum 4 view angle.

G. Schedule and conduct progress meetings at Project site at **regular** intervals. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.

Record minutes and distribute to everyone concerned, including Owner and Architect.

H. Attend public meetings and hearings concerning the project progress and schedule of the Project, if requested by owner.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, for a $250.00 usage fee.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings **and Project record drawings**.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Contractor shall execute a data licensing agreement in the form of **AIA Document C106.**

B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals
2. Architect will **discard submittals** received from sources other than Contractor.
3. Contractor to review and stamp each submittal, with name of reviewer, date and any questions or concerns to be addressed by architect or engineer.

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

D. Identify options requiring selection by Architect.

E. Identify deviations from the Contract Documents on submittals.

F. Contractor's Construction Schedule Submittal Procedure:

1. Submit required submittals in the following format:

    a. Working electronic copy of schedule file, where indicated.
    b. PDF electronic file.

2. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

    a. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

3. Coordinate Contractor's construction schedule with the schedule of values, **submittal schedule,** progress reports, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.2 ACTION SUBMITTALS

A. Product Data: Mark each copy to show applicable products and options. Include the following:

1. Manufacturer's written recommendations, product specifications, and installation instructions.
2. Wiring diagrams showing factory-installed wiring.
3. Printed performance curves and operational range diagrams.
4. Testing by recognized testing agency.
5. Compliance with specified standards and requirements.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (762 by 1067 mm). Include the following:

1. Dimensions and identification of products.
2. Fabrication and installation drawings and roughing-in and setting diagrams.
3. Wiring diagrams showing field-installed wiring.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

C. Samples: Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.

1. If variation is inherent in material or product, submit at least **three** sets of paired units that show variations.

2.3 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Submit **two** paper copies of each submittal unless otherwise indicated. Architect will not return copies.

B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.4 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit **three** copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within **15 calendar** days of date established for **the Notice to Proceed .**

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

D. Recovery Schedule: When periodic update indicates the Work is **14** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and indicate date by which recovery will be accomplished.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Updating: At **monthly** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **one week** before each regularly scheduled progress meeting.

1. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION 013000

SECTION 01 32 23 SURVEY AND LAYOUT DATA

PART 1 - GENERAL

1.1 QUALITY CONTROL

A. Conform to State of Texas laws for Surveyors requiring licensed surveyors. Employ a surveyor acceptable to the Owner's Representative if required by the Contract

1.2 SUBMITTALS

A. Conform to requirements of Division 1

B. Submit name, address, and telephone number of Surveyor to Owner's Representative before starting survey work.

C. Submit documentation verifying accuracy of survey work on request.

D. Submit certificates signed by Surveyor, that elevations and locations of the Work area are in conformance with the Contract Documents.

1.3 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B Prepare a certified survey setting forth dimensions, locations, angles, and elevations of construction and site work upon completion of foundation, walls and major site improvements.

C. Submit record documents under provisions of Division 1.

1.4 EXAMINATION

A. Verify locations of survey control points prior to starting the Work.

B. Notify Owner's Representative immediately if any discrepancies are discovered.

1.5 SURVEY REFERENCE POINTS

A. The Owner will establish survey control datum as indicated on Drawings. Inform Owner's Representative in advance of time and vertical control points will be established so verification deemed necessary by Owner's Representative may be done with minimum inconvenience to the Owner or Contractor.

B. Locate and protect survey control points prior to starting site work; preserve permanent reference points during construction.

C. Notify Owner's Representative a minimum of 48 hours before relocation of reference points is needed due to changes in grades or other reasons.

D. Promptly report loss of destruction of reference points to Owner's Representative.

E. Reimburse the Owner for costs of reestablishment of permanent reference points disturbed by construction operations.

1.6 SURVEY REQUIREMENTS

A. Utilize recognized engineering survey practices.

B. Establish a minimum of two permanent benchmarks on site, referenced to established control points. Record horizontal and vertical location data on Project record documents.

C. Establish elevations, lines and levels to provide quantities required for measurement and payment and for appropriated controls for the Work. Locate and lay out the following with appropriate instruments.

1. Site improvements including grading, fill and topsoil placement, utilities, and footings and slabs.

2. Grid or axis for structures.

3. Building foundations, column locations, ground floor elevations and sports fields.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 01 32 23

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supple mentary Conditions and other Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

A. The types of submittal requirements specified in this section include shop drawings, product data, samples and miscellaneous work-related submittals. Individual submittal requirements are specified in applicable sections for each unit of work.

1.03 DEFINITIONS

A. Work-related submittals of this section are categorized for convenience as follows:

1) Shop Drawings include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects.

2) Product Data includes standard printed information on materials, products, and systems not specifically prepared for this project other than the designation of selections from among available choices printed therein.

3) Samples include both fabricated and un-fabricated physical examples of materials, products and units of work both as complete units and as smaller portions of units of work either for limited visual inspection or (where indicated) for more detailed testing and analysis.

a. Mock-ups are a special form of samples that are too large or otherwise inconvenient for handling in specified manner for transmittal of sample submittals.

4) Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of Specifications.

a. Certifications: Where other Sections of Specifications require certification that a product, material, or installation complies with specified requirements; submit a notarized certification from manufacturer certifying compliance with specified requirements.

b. Signature: an officer of manufacturer or other individual authorized to sign documents on behalf of company shall sign Certification.

5) Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the work and not processed as shop drawings, product data or samples.

1.04 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1. Coordinate submittal schedule with the list of subcontractors, schedule of values and the list of products as well as the Contractor's construction schedule.

2. Prepare the schedule in chronological order, include submittals required during the first 30 days of construction. Provide the following information:

a. Scheduled date for the first submittal.
b. Related section number.
c. Submittal category.
d. Name of subcontractor.
e. Description of the part of the work covered.
f. Scheduled date for resubmittal.
g. Scheduled date of the A/E's final release or approval.

B. Distribution: Following response to initial submittal, print and distribute copies to the A/E, Owner, subcontractors, and other parties required to comply with the submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisionare made, distribute to the same parties and post in same location. Delete parties from the distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updates schedule concurrently with the report of each meeting.

1.05 GENERAL SUBMITTAL REQUIREMENTS

A. Scheduling: Where appropriate in administrative submittals (listing of products, manufacturers, suppliers and subcontractors, and in job progress schedule), show principal work-related submittals and time requirements for coordination of submittal activity with related work in each instance.

1) Listing: Prepare a separate listing, organized by related specification section number sequence, showing principal work-related submittals and their initial submittal dates as required for coordination of the work. Submit listing within 30 days of date of commencement of the work.

B. Coordination and Sequencing: Coordinate preparation and processing of submittals with performance of the work so that work will not be delayed by submittals. Coordinate and sequence different categories of submittals for same work and for interfacing units of work so that one will not be delayed for coordination of A/E's review with another.

C. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, contractor, subcontractor, and consecutively number all submittals using the specification section of the particular item as a prefix, i.e., 08 10 00-1, 08 10 00-2, 10 16 00-3, 10 16 00-4, etc. Note: Also consecutively number each submittal forwarded to the architect. On the top right hand corner of each submittal copy consecutively number each submittal with a ½" high circled number. Do not reuse numbers and do not add prefixes to previously used numbers. Show contractor's executed review and approval marking (contractor's stamp must specifically note contractor's approval of submittal); see sample of contractor's stamp required and provide a 3" x 3" blank area on submittal for Architect/Engineer's marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through contractor's office will be returned by A/E without review.

1.06 USE OF ELECTRONIC FILES FOR CONSTRUCTION OR PREPARATION OF SUBMITTALS

A. Use of Electronic Files: At the request of the successful contractor, the architect and/or consultants may provide electronic files for the convenience of the contractor to be used in construction or the preparation of shop drawings related to the project. Neither VCS Architects, nor their consultants make any representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced software.

B. In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by VCS Architects, or their consultants, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights. The electronic files submitted by VCS Architects, or their consultants to the undersigned are submitted for an acceptance period of 30 days. Any defects the undersigned discovers during this period will be reported to VCS Architects, .

C. Data contained on these electronic files is part of VCS Architects, and their consultants instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the construction layout or preparation of shop drawings for the referenced project. Any other use or reuse by you or by others, will be at your sole risk and without liability or legal exposure to VCS Architects, or their consultants. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against VCS Architects, or their consultants, their officers, directors, employees, agents or sub-consultants which may arise out of or in connection with your use of the electronic files. In addition, the undersigned agrees, to the fullest extent permitted by law, to indemnify and hold VCS Architects, and their consultants harmless from any damage, liability or cost, including reasonable attorney's fees and costs of defense, arising from any changes made by anyone other than VCS Architects, or their consultants or from any reuse of drawings and data without the prior written consent of VCS Architects, Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless VCS Architects, and their consultants from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

D. <u>These electronic files are not contract documents.</u> Significant differences may exist between these electronic files and corresponding hard copy contract documents due to

addenda, change orders or other revisions. Neither VCS Architects, nor their consultants make any representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed contract documents prepared by VCS Architects, or their consultants and electronic files, the signed contract documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, review structural shop drawings, verify field conditions and coordinate your work with that of other contractors for the project.

E. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, VCS Architects, and their consultants reserve the right to remove all indications of its ownership and/or involvement from each electronic display.

F. Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for use by the undersigned be deemed a sale by VCS Architects, or their consultants, and neither VCS Architects, nor their consultants make any warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall VCS Architects, or their consultants be liable for any loss of profit or any consequential damages.

1.07 SUBMITTAL PROCEDURES

A. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through contractor's office will be returned by A/E without review.

B. Transmittal Form: Prepare a draft of special transmittal form for project and submit to architect for acceptance. Provide places to indicate project, date, "to," "from" names of subcontractors, suppliers, manufacturers, required references, category and type of submittal, purpose, description, distribution record (for both transmittal and submittals), and signature of transmitter.

C Provide contractor's certification on form, ready for execution, stating that information submitted complies with requirements of contract documents.

D. By approving and submitting shop drawings, product data, samples and similar submittals, the contractor represents that the contractor has determined and verified materials, field measurements and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of the work and of the contract documents. At the time of submission, Contractor shall inform the Architect and Engineers in writing of any deviation in shop drawings or samples from the requirements of the Contract Documents.

E. The contractor is to maintain a complete copy of all submittals and project data for the owner. Turn this copy over to the owner along with other final closeout documents. Organize these submittals by division of work and present them to the owner in labeled file boxes.

1.08 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS

A. Shop Drawings: Provide newly-prepared information on sheets with graphic information at accurate scale (except as otherwise indicated), with name of preparer indicated (firm name). Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements.

B. Product Data: Collect required data into one submittal for each unit of work or system and mark each copy to show which choices and options are applicable to project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements, which have been checked, and special coordination requirements. Maintain one set of product data (for each submittal) at project site, available for reference by A/E and others.

1) Submittals: Do not submit product data or allow its use on the project until compliance with requirements of contract documents has been confirmed by contractor. Submittal is for information and record unless otherwise indicated. Submit 3 copies, plus number of copies needed for contractor, owner's records, and distribution to others.

2) Installer's Copy: Do not proceed with installation of materials, products, or systems until final copy of applicable product data is in possession of installer.

C. Samples: Provide units identical with final condition of proposed materials or products for the work. Include "range" samples (not less than 3 units) where unavoidable variations must be expected and describe or identify variations between units of each set. Provide full set of optional samples where A/E's selection is required. Prepare samples to match A/E's sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by A/E. Architect/Engineer will not "test" samples for compliance with other requirements, which are, therefore, the exclusive responsibility of the contractor.

D. Quality Control Set: Maintain returned final set of samples at project site in suitable condition and available for quality control comparisons by Architect/Engineer and by others.

1) Reusable Samples: Returned samples, which are intended or permitted to be incorporated in the work, are so indicated in the individual work sections and must be in undamaged condition at time of use.

E. Mock-Ups: Mock-ups and similar samples specified in individual work sections are recognized as a special type of sample. Comply with requirements for "samples" to greatest extent possible and process transmittal forms to provide a record of activity.

F. Inspection and Test Reports: Classify each as either "shop drawing" or "product data," depending upon whether report is uniquely prepared for project or a standard publication of workmanship control testing at point of production; process accordingly.

G. Request for Interpretations or Information (RFI): In the event the Contractor/Contractor feels the Contract Documents are not clear as to the intent of the Requirements for Construction then he shall submit a RFI to the Architect on the form included at the

end of this section of the specifications. Electronic versions of RFI form are available from Architect for Contractors use on this project.

H. Prior to submission of any RFI the Contractor shall:

1) Review the Contract Documents thoroughly for the specific information being requested.

2) Write a brief description of the Contractor's recommended solution to the RFI that will result in meeting the intent of the Contract Documents.

3) RFI's shall be sequentially numbered and dated.

4) Upon submission of this information the Architect will review and accept or give further interpretation of the documents within 7 days whenever possible. An additional 3 days should be anticipated for any RFI requiring Architects/Consultant/Owner review. Answer to RFI by Architect shall in no way give authorization to the Contractor to proceed with work that will increase contract time or construction cost.

I. Warranties: Refer to "products" section for specific general requirements on warranties, product/workmanship bonds, and maintenance agreements. In addition to copies desired for contractor's use, furnish two (2) executed copies, except furnish two (2) additional (confirmed) copies where required for maintenance manuals.

J. Standards: Where copy submittal is indicted and except where specified integrally with "product data" submittal, submit a single copy for Architect/Engineer's use. Where workmanship at project site and elsewhere is governed by standard, furnish additional copies to fabricators, installers, and others involved in performance of the work.

K. Close Out Submittals: Refer to individual work sections and to "close out" sections for specific requirements on submittal of close out information, materials, tools, and similar items.

1) Record Document Copies: Furnish one set.
2) Maintenance/Operating Manuals: Furnish two (2) bound copies.
3) Materials and Tools: Refer to individual work sections for required quantities of spare parts, extra, and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.

L. General Distribution: Provide additional distribution of submittals (not included in foregoing copy submittal requirements) to subcontractors, suppliers, fabricators, installers, governing authorities, and others as necessary for proper performance of the work. Include such additional copies in transmittal to A/E where required to receive "Action" marking before final distribution. Record distributions on transmittal forms.

M. Contractors shall furnish to Owner, Manufacturer Safety Data Sheets (MSDS) for all materials installed on this project. The MSDS sheets must indicate no asbestos containing materials are included in the furnished product. Submit these MSDS sheets with each submittal and provide an additional complete set as part of the final close out documents.

1.09 ARCHITECT/ENGINEERS' REVIEW

A. Architect/Engineer will review submittal after Contractor has reviewed and coordinated with other trades. Architect/Engineer will mark with comments as noted above. When possible, architect will return submittal within two (2) weeks of receipt of submittal and within three (3) weeks for submittals requiring engineer or other consultant review. Where submittal must be held for coordination, architect/engineer will process submittal as soon as possible after all coordination information and material is provided by contractor.

B. NOTE: ALL COLOR SELECTION SUBMITTALS WILL BE HELD UNTIL CONTRACTOR NOTIFIES A/E THAT ALL SELECTIONS FOR WORK ARE SUBMITTED. A COLOR BOARD PRESENTATION WILL THEN BE PREPARED BY ARCHITECT FOR OWNER'S REVIEW AND APPROVAL; ALLOW FIVE (5) WEEKS FOR THIS PROCESS.

C.. Marking "Reviewed. No Exceptions Noted": Work may proceed provided it complies with contract documents.

D. Marking "Reviewed. Exceptions Noted": Work may proceed provided it complies with notations and corrections on submittal and with contract documents.

E. Marking "Rejected. Returned for Resubmittal": Do not proceed with work. Revise submittal in accordance with contract documents and resubmit without delay to obtain a different marking. Do not allow these submittals to be used in connection with performance of the work.

F. NOTE: The contractor shall not be relieved of responsibility for deviations from requirements of the contract documents by the architect's approval of shop drawings, product data, samples, or similar submittals unless the contractor has specifically informed the architect, in writing and on the submittal, of such deviation at the time of submittal and the architect has given written approval to the specific deviation. The contractor shall not be relieved of responsibility for errors or omissions in shop drawings, product data, samples, or similar submittals by the architect's approval thereof.

1.10 REPETITIVE REVIEW

A. Shop drawings, product data and samples submitted for each item, will be reviewed no more than two times at Architect's and Owner's expense. After second submittal shop drawings, product data and samples failing to comply with Contract requirements will be reviewed by Architect at Contractor's expense, based upon a flat rate of **$75.00 per hour** not to exceed $750.00 per each subsequent resubmittal. Contractor shall reimburse the Owner for additional submittal reviews. The Owner reserves the right to deduct said reimbursement from Contractor's monthly application for payment.

B. Need for resubmission of shop drawings, or delay in obtaining Architect's review of submittals, shall not entitle Contractor to an extension of Contract Time nor increase Contract Price, nor shall it become basis for a "Damage for Delay " claim.

End of Section

AGREEMENT WITH REGARD TO RELEASE OF ELECTRONIC (CAD) FILES TO CONTRACTOR

Project for which electronic files are to be used is:

_____

AutoCad Version Compatibility requested: (Default version AutoCad 2018)

Other _____

USE OF DIGITAL DATA FOR CONSTRUCTION OR PREPARATION OF

SUBMITTALS A. GENERAL PROVISIONS

1. The purpose of this Agreement is to grant a license from Pfluger Architects to the Contractor for the Contractor's use of Digital Data on the Project, and to set forth the license terms.

2. This Agreement is the entire and integrated agreement between the parties. Except as specifically set forth herein, this agreement does not create any other contractual relationship between the parties.

3. "Digital Data" is defined as information, communications, drawings, or designs created or stored for the Project in digital form. Digital Data specifically, but not exclusively, includes Autodesk Revit building information models (BIMs), and any and all BIM families, systems, profiles and annotations.

4. "Confidential Information" is defined as Digital Data that Pfluger Architects, or its successors or assigns, has designated as confidential and clearly marked with an indication such as "Confidential" or "Business Proprietary."

5. "The Contractor" means [identify the contractor by name and the extent to which parties associated with the contractor are to be included].

6. "Instruments of Service" means all drawings, specifications and other documents, including Digital Data.

7. "Pfluger Architects" means Pfluger Architects, L.P., its past and present partners, officers, directors, employees, agents, subsidiary and affiliated companies, attorneys, insurers, successors, and assigns.

B. LIMITED LICENSE FOR USE OF DIGITAL DATA

1. At the request of the Contractor, VCS Architects may transmit Digital Data for the convenience of the Contractor to be used in construction or the preparation of shop drawings related to the project.

2. VCS Architects grants the Contractor a nonexclusive, limited license to use the Digital Data solely and exclusively to perform services or construction for the Project in accordance with the conditions set forth herein.

3. By accepting and utilizing any Digital Data generated, provided or transmitted by VCS Architects, the Contractor agrees that VCS Architects retains its rights in the Digital Data, has authored the Digital Data, and maintains a copyright and any other intellectual property right it is entitled to in the Digital Data. By generating, providing or transmitting the Digital Data, VCS Architects does not grant to the Contractor an assignment of those rights, nor does VCS Architects convey to the Contractor any right in the software use to generate the Digital Data.

4. No other license or right shall be deemed granted or implied under this Agreement.

C. LICENSE CONDITIONS

1. The Digital Data are part of VCS Architects' Instruments of Service and shall not be used by the Contractor for any purpose other than as a convenience in the construction layout or preparation of shop drawings for the referenced project. Any other use or reuse of the Digital Data by the Contractor, or by others, will be at the Contractor's sole risk and without liability or legal exposure to VCS Architects.

2. The Contractor agrees to keep Confidential Information strictly confidential and not to disclose it to any other person except to (1) its employees; or (2) those who need to know the content of the Confidential Information in order to perform services or construction solely and exclusively for the Project.

4. The Digital Data submitted by VCS Architects or its consultants to the undersigned is submitted for an acceptance period of 30 days. Any defects the Contractor discovers during this period will be reported to VCS Architects.

5. The Contractor agrees to make no claim and hereby waives, to the fullest extent permitted by law, any claim, cause of action, or defense of any nature against VCS Architects or its consultants or sub-consultants which may arise out of or in connection with the Contractor's use of the Digital Data.

6. In addition, the Contractor agrees, to the fullest extent permitted by law, to indemnify and hold VCS Architects and its consultants harmless from any damage, liability or cost, including reasonable attorney's fees and costs of defense, arising from any changes made by anyone other than VCS Architects or its consultants, from any reuse of the Digital Data without the prior written consent of VCS Architects, or any other unlicensed use the Digital Data Furthermore, the Contractor, to the fullest extent permitted by law, indemnifies and holds harmless VCS Architects and its consultants from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of the Digital Data.

7. The Digital Data are not contract documents. Significant differences may exist between the Digital Data and corresponding hard copy contract documents due to addenda, change orders or other revisions. In the event that a conflict arises between the signed contract documents prepared by VCS Associates or its consultants and the Digital Data, the signed contract documents shall govern. The Contractor is responsible for determining if any conflict exists.

8. By the Contractor's use of the Digital Data, the Contractor is not relieved of its duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, review structural shop drawings, verify field conditions and coordinate your work with that of other contractors for the project.

9. Neither VCS Architects nor its consultants make any representation regarding the accuracy or completeness of the Digital Data the Contractor receives.

10. Because of the potential that the information presented in the Digital Data can be modified, unintentionally or otherwise, VCS Architects and its consultants reserve the right to remove all indications of its ownership and/or involvement from each electronic display.

11. Under no circumstances shall transfer of the drawings or other instruments of service in Digital Data for use by the undersigned be deemed a sale by VCS Architects or its consultants, and neither VCS Architects nor its consultants make any warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Pfluger Architects or its consultants be liable for any loss of profit or any consequential damages.

A service fee of SEVENTYFIVE dollars ($75.00) per sheet is hereby remitted along with this form to VCS Architects, L.L.C.. prior to delivery of the electronic files. All terms and conditions above are hereby agreed to and accepted in their entirety as a condition of receipt of the referenced CAD file.

VCS Architects will furnish you electronic files of the following drawings:

All drawing sheets as listed on Title Page
A0.0

VCS
ARCHITECTS

Signature: _____ Date: _____

Contractor

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, **comply with the most stringent requirement.** Refer uncertainties to Architect for a decision.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in State of Texas where Project is located and who is experienced in providing engineering services of the kind indicated.

F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

G. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

H. Associated Services: Cooperate with testing agencies and provide reasonable auxiliary services as requested. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Security and protection for samples and for testing and inspecting equipment.

I. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

J. Special Tests and Inspections: **(HISD Selected)** a qualified **testing agency** to conduct special tests and inspections required by authorities having jurisdiction and as required by owner. **Testing will be of footing excavations for proper soils, concrete testing, and soil compaction as required by Construction documents.**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PRIVATE tbl1

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AHAM	Association of Home Appliance Manufacturers
AHRI	Air-Conditioning, Heating, and Refrigeration Institute, The
AI	Asphalt Institute
AIA	American Institute of Architects (The)

AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association (Now WCMA)
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association)
AWS	American Welding Society

AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI, Inc.
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CEA	Consumer Electronics Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet and Rug Institute (The)
CRRC	Cool Roof Rating Council
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)

CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association (Electrostatic Discharge Association)
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)
FM Approvals	FM Approvals LLC
FM Global	FM Global (Formerly: FMG - FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydronics Institute
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)

HPVA	Hardwood Plywood & Veneer Association
IAPSC	International Association of Professional Security Consultants
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association, Inc.
ICPA	International Cast Polymer Association
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISA	Instrumentation, Systems, and Automation Society, The
ISO	International Organization for Standardization Available from ANSI
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA (Now ETL SEMCO)
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LGSEA	Light Gauge Steel Engineers Association
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MCA	Metal Construction Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling

	(Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCMA	National Concrete Masonry Association
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)

NOMMA	National Ornamental & Miscellaneous Metals Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SIA	Security Industry Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association

SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
TCNA	Tile Council of North America, Inc.
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)

WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PRIVATE tbl2

DIN	Deutsches Institut fur Normung e.V.
IAPMO	International Association of Plumbing and Mechanical Officials
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.

DIN Deutsches Institut fur Normung e.V.
IAPMO International Association of Plumbing and Mechanical Officials
ICC International Code Council
ICC-ES ICC Evaluation Service, Inc.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Use Charges: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.

B. **Water and Electric Power**: Available from Owner's existing system without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

D. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

2.2 TEMPORARY FACILITIES

A. Provide field office with Conference Room.

B. Dumpster, storage and fabrication sheds, laydown yard and other support facilities for construction operations will be discussed at Pre-Construction meeting with owner and architect.

C. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
   1. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of [**8**] at each return-air grille in system and remove at end of construction.

3.1 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for services.

2. General Contractor to provide utility shut down schedule for review and approval by owner.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will NOT be permitted.

C. Heating[**and Cooling**]: Provide temporary heating[**and cooling**] required for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

D. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

3.2 SUPPORT FACILITIES INSTALLATION

A. Install project identification and other signs in locations **approved by Owner** to inform the public and persons seeking entrance to Project.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. (Dumpsters, waste collection to be discussed during Pre-Construction meeting)

C. Temporary Elevator Use: **Use of elevators is not permitted.**

D. Deliveries: Material Deliveries to the site will occur 9:00 AM – 2:00 PM and after 4:30 PM. Deliveries do NOT need to check in at school office – Only onsite construction personnel

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

C. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior if required for scope of work.

D. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by **Owner and tenants** from fumes and noise.

E. Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

3.4 MOISTURE AND MOLD CONTROL

A. Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

B. After installation of weather barriers but before full enclosure and conditioning of building, protect as follows:

1. Do not load or install drywall or porous materials into partially enclosed building.
2. Discard water-damaged material.
3. Do not install material that is wet.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Operation: No noisy and disruptive work during the school day/ hours of operation. May work within the area of work during school day if not disruptive.

B. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

C. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

D. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

1. Show compliance with requirements for comparable product requests.
2. Architect will review the proposed product and notify Contractor of its acceptance or rejection.

C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.

D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.

E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store materials in a manner that will not endanger Project structure.
5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
2. Where products are accompanied by the term "as selected," Architect will make selection.
3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:

1. Products:

   a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
   b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.

2. Manufacturers:

   a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
   b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.

3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.

C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
3. List of similar installations for completed projects, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

A. Cutting and Patching:

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit Two **copies** of manual.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.

E. Record Drawings: Submit two set(s) of marked-up record prints.

F. Record Digital Data Files: Submit data file and **one** set(s) of plots.

G. Record Product Data: Submit **annotated PDF electronic files and directories** of each submittal.

H. Submit video documentation that systems are operational prior and after construction.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect.
4. Submit test/adjust/balance records.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Remove temporary facilities and controls.
6. Complete final cleaning requirements, including touchup painting.
7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:

1. Submit a final Application for Payment.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Complete owner requirements of documents for closeout.

B. Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.

C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:

1. Manufacturer's operation and maintenance documentation.
2. Maintenance and service schedules.
3. Maintenance service contracts. Include name and telephone number of service agent.
4. Emergency instructions.
5. Spare parts list and local sources of maintenance materials.
6. Wiring diagrams.
7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.

1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.

1. Format: **Same digital data software program, version, and operating system as the original Contract Drawings** & **Annotated PDF electronic file**.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, **mechanical and electrical systems,** and other construction affecting the Work.

1. Video documentation that systems are operational prior and after construction.

B. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates.
2. Examine roughing-in for mechanical and electrical systems.
3. Examine walls, floors, and roofs for suitable conditions.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.2 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Use products, cleaners, and installation materials that are not considered hazardous.

3.3 CUTTING AND PATCHING

A. Provide temporary support of work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **prevent** interruption to occupied areas.

D. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.

1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

E. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
2. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance.
3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.4 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
3. Remove labels that are not permanent.
4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
6. Vacuum carpeted surfaces and wax resilient flooring.
7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
8. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

3.5 OPERATION AND MAINTENANCE MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.6 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:

1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Action Submittals:

1. Waste Management Plan: Submit plan within twenty-one calendar] [**21**] days of date established for commencement of the Work.

B. Informational Submittals:

1. Waste Reduction Progress Reports: Submit concurrent with each Application for Payment. Include total quantity of waste, total quantity of waste salvaged and recycled, and percentage of total waste salvaged and recycled.
2. Records of Donations and Sales: Receipts for salvageable waste donated or sold to individuals and organizations. . Indicate whether organization is tax exempt.
3. Recycling and Processing Facility Records: Manifests, weight tickets, receipts, and invoices.
4. Landfill and Incinerator Disposal Records: Manifests, weight tickets, receipts, and invoices.
5. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations.

C. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013000 "Administrative Requirements." Review methods and procedures related to waste management.

E. Waste Management Plan: Develop a waste management plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

1. Salvaged Materials for Reuse: Identify materials that will be salvaged and reused.
2. Salvaged Materials for Sale: Identify materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: Identify materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Achieve end-of-Project rates for salvage/recycling of **(20)** percent by weight of total nonhazardous solid waste generated by the Work.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Clean salvaged items and install salvaged items to comply with installation requirements for new materials and equipment.

B. Salvaged Items for **Sale and Donation**: **Not permitted**] on Project site.

C. Salvaged Items for Owner's Use: Clean salvaged items and store in a secure area until delivery to Owner.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

3.3 RECYCLING WASTE

A. General: Recycle paper and beverage containers used by on-site workers.

B. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

C. Asphaltic Concrete Paving: Grind asphalt to maximum [**4-inch (100-mm)**] size.

D. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

E. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum [**4-inch (100-mm)**] size.

F. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum [**4-inch (100-mm)**] size.
2. Clean and stack undamaged, whole masonry units on wood pallets.

G. Wood Materials:

1. Sort and stack reusable members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
2. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
3. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

H. Metals: Separate metals by type.

I. Asphalt Shingle Roofing: Remove and dispose of nails, staples, and accessories.

J. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

K. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

L. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

M. Carpet **and Pad**: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet **and pad** in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

N. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

O. Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 DISPOSAL OF WASTE

A. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

B. Do not burn waste materials.

END OF SECTION 017419

SECTION 01 78 36 WARRANTIES AND GUARANTEES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.02 SUMMARY

B. In additions to the requirements of the General Conditions and Supplementary General Conditions of the Contract for Construction, the Contractor and each Subcontractor shall submit to the Owner a written guarantee, prior to release of final payment on a form approved by the Architect, for the work, materials, and equipment for a one (1) year period as specified herein after.

C. All guarantees, including extended guarantees specified hereinafter, shall be addressed to the Owner by name and submitted to the Architect, with other "Records" for Owner", all in binders, properly labeled.

D. Warranties/guarantees shall include parts, labor, and all other costs required to repair and/or replace items that may malfunction during the Warranty/Guarantee period.

1. Initiation of Requests: The Owner will initiate a request for corrective work at the project. This is accomplished by their submission of a request to the contractor with copies sent to the Owner's project manager. The Owner's project manager will review the item and determine if it is a maintenance item or warranty item. If determined to be a warranty item, he/she will address the Warranty Item Letter to the Contractor for action and will retain a copy in a suspense file and forward a copy to the Architect's CA representative. The contractor is to maintain a log of warranty items reported during the first year of Owner occupancy and send a copy of the log each month to the Owner and Architect for their records. At no time should a warranty item go unresolved more than 10 working days.
2. Response to Request: Upon receipt of the Warranty Item Letter, the Contractor should either initiate the repair with his work force or forward a copy to the subcontractor for action. If the Contractor forwards the action to the subcontractor, he will retain a copy in a suspense file. Prior to commencing any repairs the Contractor or subcontractor must contact the Owner prior to visiting the site.
3. Repairs and Acknowledgment of Repairs: Coordination should be made with the Owner's maintenance personnel prior to commencing repairs in case they wish to be present during repairs. In any event, OWNER maintenance personnel must be present to acknowledge completion of the repair and must sign off on a copy and date it. The contractor must then send a copy of the completed item back to the Owner's project manager. The return of the signed copy constitutes completion of the requests and all file copies can so be annotated.

E. All guarantees shall be for a period specified, commencing on date of acceptance of ENTIRE project by the Owner.

F. Additional guarantee requirements are included, but not limited to, the following: (Contractor(s) shall review the documents and provide all extended Guarantees listed.

1.	Air Conditioning and Refrigeration Systems	2 years
2.	HVAC Controls	2 years
3.	Electrical Equipment	2 years
4.	Damproofing and Waterproofing	2 years
5.	Sealants	2 years
6.	Glass, Glazing, Windows	2 years
7.	Aluminum Entrances and Storefronts	2 years
8.	Painting	2 years
9.	Combination locker locks	2 years
10.	Sheet Metal & Flashing	2 years
11.	Carpet Installation	3 years
12.	Resilient Athletic Flooring (manuf. Defects)	3 years
13.	Mirror Glazing	5 years
14.	Chiller Compressors	5 years
15.	Door Closures	5 years
16.	Sport Flooring	10 years
17.	Interlocking Athletic Flooring	10 years
18.	Boilers	10 years
19.	Roofing (weather tightness & finish)	20 years
20.	Metal Siding (finish)	20 years
21.	Wood Doors (interior)	Lifetime
22.	Carpet	Lifetime of Installation

Until receipt of these guarantees, final inspection will not be conducted nor final payment released

PART 2 - PRODUCTS- NOT USED

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall arrange for all required inspections during warranty period. Regardless of the wording of individual warranties, the Owner shall not be responsible for notification for routine inspections during the General Contractor's warranty period.

B. Upon receipt of written or verbal notice by the Owner or Architect of a deficiency, the Contractor shall promptly respond with inspection and repair during the General Contractor's warranty period.

C. The General Contractor shall be responsible for coordinating the activities of subcontractors, suppliers and manufacturers during the General Contractor's warranty period and the subcontractor/ supplier/ manufacturer extended warranty period.

END OF SECTION 01 78 36

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for reinforcing related to concrete pavement and walks.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Zinc repair material.
4. Bar supports.
5. Mechanical splice couplers.
6. Structural thermal break insulated connection system.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

D. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

E. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coating on steel reinforcement.

1. Store reinforcement to avoid contact with earth.
2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Epoxy-Coated Reinforcing Bars:

1. Steel Bars: ASTM A615, Grade 60, deformed bars.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, ASTM A775/A775M epoxy coated.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

    a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
    b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

D. Mechanical Splice Couplers: Mechanical couplers may be sleeve-filler, sleeve-threaded, sleeve-swaged, or sleeve-wedged. Sleeve-wedge type couplers will not be permited on coated reinforcing.

E. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.

2. Stagger splices in accordance with ACI 318 (ACI 318M).
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a testing laboratory to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

END OF SECTION 032000

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Labor, materials, services and equipment required in conjunction with or properly incidental to placing of cast-in-place concrete slabs, building members, and MEP equipment pads as described herein or as shown on the Drawings, including but not limited to:
   1. Concrete mix designs.
   2. Assistance with Owner provided laboratory testing of concrete.
   3. Installation of items to be built-in formwork or embedded in concrete but furnished by other trades, including metal anchors, anchor slots, reglets, hangers, supports, ties, inserts, bolts, corner guards, and sleeves.
   4. Cast-in-place concrete, with formwork, under slab vapor barrier, reinforcing, accessories, appurtenances, finishing and curing required to complete concrete work.
   5. Grouting under structural steel base plates.
   6. Foundation for columns, walls, and slabs on grade.
   7. Super-structure for walls, columns, slabs, curbs, stairs, steps, equipment pads, walks, and pre-moulded expansions joints.

B. Examine the drawings for Plumbing, Mechanical, and Electrical work. These subcontractors will furnish and set sleeves or box forms required for openings. Contractor shall use care in placing reinforcement and pouring concrete so as not to displace such sleeves or boxes.
   1. All slots, chases, recesses, or openings indicated on the drawings, which are not formed by sleeves or boxes shall be provided in locations shown. When the work of other contractors is completed, the excess part of the openings shall be completely closed with concrete.

1.2 RELATED REQUIREMENTS

A. Division 1 Sections applicable to the Work of this Section.

1.3 RELATED SECTIONS

A. Section 01 45 23 - Testing and Inspection Laboratory Services

B. Section 02 32 00 - Geotechnical Report

C. Section 31 00 00 - Earthwork

D. Electrical and Mechanical Drawings and Specifications for sleeves, conduit, and other items embedded in concrete.

1.4 QUALITY ASSURANCE

A. Where standards or requirements of this Section are in conflict with those noted on the Contract Drawings, or the Building Code, the more stringent requirements shall govern. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected. Failure to do so will not relieve the Contractor from performing the Work correctly at no additional expense to the Owner.

B. Testing Laboratory Services:
1. Test results shall meet or exceed established standards. A technician from the Owner's Testing Laboratory must be present during all operations.

C. Evaluation and Acceptance:
1. Codes and Standards: The Work described in this Section, unless otherwise noted on the Drawings, or herein specified, shall be governed by the editions of the following codes or specifications approved by authorities having jurisdiction.
   a. American Association of State Highway and Transportation Officials (AASHTO)
      1) TP 23, "Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying"

   b. American Concrete Institute (ACI)
      1) 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
      2) 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete"
      3) 301, "Specifications for Structural Concrete for Buildings"
      4) 302, "Guide for Concrete Floor and Slab Construction"
      5) 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete"
      6) 305, "Hot Weather Concreting"
      7) 306, "Cold Weather Concreting"
      8) 309, "Standard Practice for Consolidation of Concrete"
      9) 311, "ACI Manual of Concrete Inspection"
      10) 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures"
      11) 318, "Building Code Requirements for Reinforced Concrete"
      12) 347, "Recommended Practice for Concrete Formwork"
      13) 355.2, "Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary"
      14) Keep one copy of "Manual of Concrete Practice" at job site at all times.

   c. American Society for Testing and Materials (ASTM)
      1) A36, Standard Specification for Carbon Structural Steel
      2) A108, Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
      3) A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
      4) A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
      5) A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
      6) A704, Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
      7) C33, Standard Specification for Concrete Aggregate
      8) C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
      9) C94, Standard Specification for Ready-Mix Concrete
      10) C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates
      11) C150, Standard Specification for Portland Cement
      12) C172, Standard Practice for Sampling Freshly Mixed Concrete
      13) C260, Standard Specification for Air-Entraining Admixtures
      14) C330, Standard Specification for Lightweight Aggregates for Structural Concrete

15) C494, Standard Specification for Chemical Admixtures for Concrete
16) C595, Standard Specification for Blended Hydraulic Cements
17) C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
18) C979, Standard Specification for Pigments for Integrally Colored Concrete
19) C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
20) C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
21) E96, Standard Test Methods for Water Vapor Transmission of Materials
22) E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs
23) E1745, Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
24) F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

d. American Welding Society (AWS)
1) D1.4 Structural Welding Code- Reinforcing Steel

e. Federal Specification (FS)
1) FF-S-325
2) QQ-Z-325C

f. Concrete Reinforcing Steel Institute (CRSI)
1) "Reinforced Concrete – A Manual of Standard Practice"
2) "Recommended Practice for Placing Reinforcing Bars"
3) "Recommended Practice for Placing Bar Supports"

D. Source Quality Control:
1. Concrete production facilities shall meet the requirement for certification by the National Ready Mixed Concrete Association. All ready mix concrete trucks proposed for use on the project shall meet the requirements of NRMCA, Certification of Ready Mix Concrete Production Facilities.
2. Concrete batchers shall be completely interlocked semi-automatic or automatic batchers, as defined by the Concrete Plant Manufacturers Bureau.
3. Concrete batchers shall have graphic, digital, or photographic recorders, which shall register both empty balance and total weight (or volume of water or admixture) of each batched material, time to the nearest minute, date, identification of batch, and numerical count of each batch. Copies of the record shall be furnished to the Inspection and Testing Laboratory.
4. The Inspection and Testing Laboratory shall provide concrete batch plant inspection as follows:
a. Provide a qualified inspector with necessary equipment and apparatus to inspect weighing and batching of controlled concrete at batch plant on a random basis, approximately once daily as the concrete is being placed on this project.
b. Make certain that materials and batch equipment used are in accordance with requirements of Specifications.
c. Check for adjustment in batch weights to compensate for variations in moisture content.
d. Submit promptly to Architect, certification of weights used in loads of acceptable concrete which has been batched during plant inspection time.

E. Concrete Mix Design Criteria:
   1. Design concrete mixes in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures.
   2. Submit the proposed mix designs for each concrete mix type proposed.
   3. Determination of required average strength above specified strength shall be in accordance with ACI 318.
   4. If trial mixes are used as the basis for the proposed mix design, mold and cure test cylinders in accordance with ASTM C39. Do not place concrete on project until laboratory reports and results of confirmation cylinder tests have been evaluated by the Inspection and Testing Laboratory and results indicate that proposed mixes will develop required strengths.
   5. Inspection and Testing Laboratory shall furnish the Architect with a written evaluation of each proposed concrete mix design submitted by the Contractor.
   6. Check mix designs and revise if necessary wherever changes are made in aggregates or in surface water content of aggregate or workability of concrete. Water content shall be minimum to produce workable mix. The water content shall be verified in the field by use of the Microwave Test.

1.5 SUBMITTALS

A. Mix Designs: Submit proposed mix designs, including confirmation cylinder test results, in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Submit mix designs to Architect/Engineer and Inspection and Testing Laboratory for evaluation a minimum of 14 days prior to placing concrete. Key requirements:
   1. Combined aggregate gradation.
   2. Proportions of cement, fine and coarse aggregates, and water.
   3. Type, color and dosage of integral coloring compounds, where applicable.
   4. Range of ambient temperature and humidity for which design is valid.
   5. Any special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product.

B. Complete test data for trial mixes or a complete summary of previous project test results for mix design based on standard deviation analysis must be included.

C. Provide duplicate delivery tickets for each load of ready-mix concrete delivered to site, in accordance with ASTM C94. Show batch weights on each ticket.

D. Provide mill test reports on an as-used basis for each type and brand of cementitious material used.

E. Provide certification from independent test laboratory indicating underslab vapor retarder compliance with specification and ASTM 1745 Class A requirements.

F. Provide product data for each accessories item specified but necessarily not listed above which are required for a complete installation, including, but not limited to reinforcing, chairs, admixtures, stains and color pigments, grouts, sealers, vapor retarders and barriers, water stops, epoxy adhesives, curing compounds and anchors.

G. Provide Shop Drawings for all reinforcing steel. Show bending diagrams, splicing and laps of rods, shapes, dimensions and details of bar reinforcement and accessories.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Mix and deliver concrete to project ready-mixed in accordance with ASTM C94. Mix concrete a minimum of 70 revolutions of transit mix drum at mixing speed. A minimum of 40 revolutions shall be at the production plant.

B. Schedule delivery so that continuity of any pour will not be interrupted for over 15 minutes.

C. Place concrete on site within 90 minutes after proportioning materials at batch plant.

D. Store bagged cement on platforms off ground. Protect stored cement against the elements. Handle and store fine and coarse aggregate separately in manner to prevent intrusion of foreign material or segregation of the material. Protect all reinforcement until used. Do not use any hardened cement.

E. Mild steel reinforcement at the time of placement of concrete shall be clean and free of all loose dirt, form oil, and other coatings affecting bond.

1.7 JOB CONDITIONS

A. Hot Weather Concreting:
   1. Follow ACI 301 and ACI 305.
   2. Provide water-reducing retarding admixture conforming to ASTM C494, Type D when necessary to retard initial set. The admixture shall be dispensed in accordance with manufacturer's recommendations.
   3. Maximum concrete temperature shall not exceed 95 degrees F at time of placement.
      a. Concrete with temperatures above 90 degrees F shall be placed only if a high range water reducer (superplasticizer) is added to the mix as directed by the Testing Laboratory to maintain the specified slump during placement.

B. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures.
   1. Follow ACI 301 and ACI 306.
   2. When ambient temperature at site is below 40 degrees F or is expected to fall to that temperature within ensuing 24 hours, heat water and/or aggregate prior to adding to mix so that temperature of concrete will be between 55 degrees F and 85 degrees F at time of placement.
   3. Maintain temperature of deposited concrete between 50 degrees F and 70 degrees F for minimum of seven (7) days after placing.
   4. Add the specified non-corrosive accelerator for all floor concrete placed at air temperatures below 50 degrees F.

C. Temperature Changes: Maintain changes in concrete temperature as uniformly as possible, but in no case exceed change of 5 degrees F per hour or 25 degrees F in any 24 hour period.

D. Combustion heaters shall not be used during the first 48 hours without precautions to prevent exposure of concrete and workmen to exhaust gasses containing carbon dioxide and/or carbon monoxide.

E. Admixtures intended to accelerate hardening of concrete or produce higher than normal strength at early periods will not be permitted unless approved by the Architect. The use of calcium chloride is specifically prohibited.

1.8 PRE-INSTALLATION CONFERENCE

Not Used

1.9 SEQUENCING/SCHEDULING

A. Coordinate Work of this Section with work of other Sections as required to properly execute the Work and as necessary to maintain satisfactory progress of the work of other Sections.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Manufacturers named within this Section are approved for use on the Project for the product for which they are specified. Other manufacturers must have a minimum of five (5) years experience manufacturing the product specified and meet or exceed the specifications for that product. Substitution of products must be in accordance with the General Conditions, Supplementary Conditions, and Section 01 33 00, Submittals to be considered prior to proposal.

2.2 MATERIALS

A. Formwork:
1. General: Contractor may use any of the following formwork materials as long as material meets the following and will not stain, or impart any undesirable texture, i.e. wood grain, where such texture would be objectionable in an exposed location.
   a. Wood Forms:
      1) Plywood: PS 1, Douglas Fir or Spruce species.
      2) Medium Density Overlay (MDO): One (1) side grade; sound undamaged sheets with clean, true edges.
      3) Lumber: Southern Yellow Pine species; No. 2 grade, with grade stamp clearly visible.

   b. Pre-Fabricated Forms:
      1) Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
      2) Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

   c. Form Liner: Any material recommended by manufacturer to impart finish which will exhibit the finish or design characteristics, i.e. smooth, textured, ribbed, etc. detailed by the Architect for exposed locations as shown or required and capable of being stripped from complex designs without damaging the finish or design. Form liner shall be as manufactured by Symons Corporation, Greenstreak, Inc. or Architect approved equal.
   d. Self-expanding corkboard expansion joint fillers should conform to ASTM D1752 for exterior work. Joint fillers shall extend full depth of slab or joint and be of thickness and lengths indicated on drawings.

B. Metal Reinforcement:
1. Bars:
   a. General: Conform to ACI 315, latest edition.
   b. Comply with ASTM A615, Grade 60.
   c. Number 3 bars comply with ASTM A615, Grade 40

2. Welded Steel Wire Fabric (Mesh): Not permitted in structural concrete, unless approved by Structural Engineer

C. Concrete, General:
1. Ready-mixed concrete, ASTM C94
2. Comply with ACI 318.
3. Concrete must be approved by Architect through design mix and cylinder test of testing laboratory.

4. Unless approved otherwise by the Architect, use one (1) brand of cement throughout the work where finished surface will be exposed to view.
5. Strength: Refer to Paragraph 2.3, A.

D. Concrete Materials:
1. Cement:
a. Portland Cement, Type I or III, conforming to the requirements of ASTM C150.
b. Combined aggregate gradation for slabs and other designated concrete shall be 8 percent - 18 percent for large top size aggregates (1-1/2 in.) or 8 percent - 22 percent for smaller top size aggregates (1 in. or 3/4 in.) retained on each sieve below the top size and above the No. 100.

2. Fly ash: Not permitted.

E. Aggregate:
1. Fine Aggregate: ASTM C33; clean, hard, durable, uncoated, natural and manufactured sand, free of silt, loam or clay.
2. Coarse Aggregate: ASTM C33; hard, durable, uncoated, crushed stone; gradation in accordance with Size No. 467 for piers and concrete footings and Size No. 67 for all other concrete. Maximum aggregate size in accordance with ACI 318.
3. Grading shall be in accordance with "Standard Method for Fine Analysis of Sieve and Coarse Aggregates" (ASTM C136).

F. Water: ASTM C94, Paragraph 4.1.3; potable, clean and free from oil, acid and injurious amount of vegetable matter, alkalies, and other impurities.

G. Admixtures:
1. Cement-dispersing, water-reducing types. Admixtures shall conform to ASTM C494, Type A or D, and shall be used strictly in accordance with manufacturer's recommendations and as determined by the Inspection and Testing Laboratory. Admixture shall not discolor concrete or in any way affect the appearance of the concrete.
a. High-range water reducing admixture conforming to ASTM C494, Type F or G shall be used as required and shall be one (1) of the following or Architect approved equal:
1) Eucon 37 (Type F), Eucon 537 (Type G) by The Euclid Chemical Company
2) Rheobuild 1000 (Type F), Rheobuild 716 (Type G) by Master Builders
3) Sikament 300 (Type F), Sikament 86 (Type G) by Sika Chemical Corp.
4) WRDA-19 (Type F), Daracem 100 (Type G) by W.R. Grace

2. An air-entraining admixture conforming to ASTM C260 shall be used as required on the Drawings and shall be one (1) of the following or Architect approved equal:
a. Air-Mix or AEA-92 by The Euclid Chemical Company
b. Sika Aer by Sika Corporation
c. MB-VR or MB-AE by Master Builders

3. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
4. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Architect/Engineer.

H. Non-Shrink Cement Grout:
1. The non-shrink grout shall be a factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory

indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 4 foot x 4 foot base plate. Provide one (1) of the following or Architect approved equal:

a. NS Grout by The Euclid Chemical Company
b. Five Star Grout by U.S. Grout Corp.
c. Horn Non-Corrosive Non-Shrink Grout by Tamms Industries
d. Duragrout by L & M Construction Chemicals, Inc.
e. Masterflow 713 by Master Builders
f. SikaGrout 212 by Sika Corp.
g. Sonogrout 10K by Sonneborn
h. 588 Grout by W. R. Meadows, Inc.
i. US SPEC GP Grout by US Mix Products Company

2. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 18 inch x 36 inch base plate. Provide one (1) of the following or Architect approved equal:
   a. Hi-Flow Grout by The Euclid Chemical Company
   b. Crystex by L & M Construction Chemicals, Inc.
   c. Masterflow 928 by Master Builders
   d. CG-86 Grout by W. R. Meadows, Inc.
   e. US SPEC MP Grout by US Mix Products Company

I. Non-Oxidizing Metallic Hardener: (For use at Loading Dock where shown)
   1. Non-Oxidizing Metallic Floor Hardener: The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected portland cement and necessary plasticizing agents. Product shall be Diamond-Plate by The Euclid Chemical Company or Architect approved equal.

J. Evaporation Retardant:
   1. Evaporation Retardant shall be a thin, continuous film which prevents rapid moisture loss from the concrete surface. For use when concrete operations must be performed in direct sun, wind, high temperatures, or for relative humidity. Products: Subject to compliance with requirements, provide one (1) of the following or Architect approved equal:
      a. Eucobar by The Euclid Chemical Company
      b. Confilm by Master Builders
      c. Evapre by W. R. Meadows, Inc.
      d. US SPEC Monofilm ER by US Mix Products Company.
      e. E-Con by L& M Construction Chemicals

K Sealer/Densifier: Provide "Euco Diamond Hard" by The Euclid Chemical Company, "Sealhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.

L. Chemical Hardener/Dustproofer: Provide "Surfhard" by The Euclid Chemical Company, "Chemhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.

M. Curing Compound: dissipating resin type, which chemically breaks down after approximately eight (8) weeks. Membrane forming compound shall meet ASTM C309, Types 1 and 1D Class B, water based, VOC/AIM Compliant. Provide "Kurez DR VOX" by The Euclid Chemical Company,

"Cure R" by L&M Construction Chemicals, "1100 Clear" by W. R. Meadows, Inc., US SPEC "Maxcure Resin Clear" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.

N. Curing and Sealing Compound: high solids acrylic copolymer emulsion blend. Membrane forming compound shall meet ASTM C1315, Type 1 Class B. Provide "Super Rez-Seal" by The Euclid Chemical Company, "Dress & Seal" by L&M Construction Chemicals, "VOCOMP 25 1315" by W. R. Meadows, Inc., US SPEC "CS-25-1315" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.

O. Epoxy Adhesive for rebar and threaded rod dowelling: Adhesive anchors shall have been tested and qualified for use in accordance with ICC-ES AC308 for cracked and uncracked concrete recognition. Size and location of anchors shall be as indicated on the drawings. Provide one (1) of the following or Structural approved equal:
1. Simpson Strong-Tie SET-XP (ICC-ES ESR-2508)
2. Hilti Corp. RE 500-SD (ICC-ES ESR-2322)
3. Powers Fasteners PE1000+ (ICC-ES ESR-2583)

P. Epoxy Adhesive to bond fresh concrete to hardened concrete and grout base plates: ASTM C881, two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Provide one (1) of the following or Architect approved equal:
1. Euco #452 Epoxy System or Euco #620 Epoxy System by The Euclid Chemical Company
2. Sikadur Hi-Mod by Sika Corp.
3. Rezi-Weld 1000 by W. R. Meadows, Inc.
4. US SPEC Maxibond 2500 by US Mix Products Company.
5. Epobond by L& M Construction Chemicals.

Q. Underslab Vapor Retarders and Barriers:
1. Vapor Retarder Membrane:
   a. Requirements:
      1) Class: ASTM E1745, Class A.
      2) Water Vapor Permeance: ASTM E96, 0.015 perms maximum.
      3) Tensile Strength: ASTM E154 (Section 9, Average), 45.0 pounds per inch, minimum.
      4) Puncture Resistance: ASTM D1709 (Method B), 2400 grams, minimum.

   b. Provide compatible seam taping and pipe boots or sealing mastic in accordance with manufacturer's requirements.
   c. Provide proof of compliance to Architect at time of delivery of materials.
   d. Provide one (1) of the following under entire slab, unless noted otherwise:
      1) Barrier Bac-Inc "VB-350"
      2) Insulation Solutions, Inc. "Viper II 15 mil"
      3) Raven Industries, Inc. "VaporBlock 15"
      4) Reef Industries, Inc. "Griffolyn 15 Mil Green"
      5) Stego Industries, LLC "Stego-Wrap 15-mil"
      6) Tex-Trude, "Xtreme 15 Mil"
      7) W. R. Meadows, Inc. "Perminator 15"

2. Vapor Barrier: Under Wood Floors at Gymnasiums, Stages, and Dance Floors, and at Auditorium Areas Below Finish Floor Level: Premoulded Membrane Vapor Seal with Plasmatic Core manufactured by W.R. Meadows, Inc., Hempshire, IL; or Architect approved equal.
3. Below Grade Waterproofing: Provide below grade waterproofing at vertical walls below grade and beneath elevator pit in accordance with Section 07 16 00.

R. Miscellaneous Structural Metals Associated with Structural Concrete:

1. Structural steel pieces, including miscellaneous structural metals placed in concrete, exposed to weather, in permanent contact with soil, or accessible to salt intrusion shall be hot dipped galvanized in accordance with ASTM A123.
2. Structural steel pieces embedded in concrete shall conform to ASTM A36, unless noted otherwise on the Drawings.
3. Welding of inserts, anchors and other steel pieces used in conjunction with structural concrete shall conform to AWS DI.4.
4. Welding of reinforcing steel used in conjunction with structural concrete shall conform to AWS DI.4.
5. Headed stud anchors shall conform to ASTM A108, minimum tensile strength 60,000 PSI.
6. Mechanical and screw anchors shall have been tested and qualified for use in Accordance with ACI 355.2 and ICC ES AC193 for cracked and uncracked concrete recognition. Size and location shall be as indicated on the Drawings. Provide one (1) of the following or Structural approved equal.
   a. Simpson Strong-Tie Strong-Bolt wedge anchor (ICC-ES ESR-1771)
   b. Simpson Strong-Tie Strong-Bolt 2 wedge anchor (ICC-ES ESR-3037)
   c. Simpson Strong-Tie Titen HD screw anchor (ICC-ES ESR-2713)
   d. Hilti Corp. Kwik-Bolt TZ wedge anchor (ICC-ES ESR-1917)
   e. Hilti Corp. Kwik HUS-EZ screw anchor (ICC-ES ESR-3037)
   f. Hilti Corp. HAD undercut anchor (ICC-ES ESR-1546)
   g. Powers Fasteners Power-Stud+ SD2 wedge anchor (ICC-ES ESR-2502)
   h. Powers Fasteners Wedge-Bolt+ screw anchor (ICC-ES ESR-2526)
   i. Powers Fasteners Atomic+ undercut anchor (ICC-ES ESR-3067)

S. Miscellaneous Materials and Accessories:
1. Form ties: Adjustable length and type which will not leave holes larger than 1 inch in diameter in face of concrete. Ties shall be such that when forms are removed, no metal will be within 1 inch of the finished concrete surface. The holes must be patched.
2. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages, Fasteners: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
3. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture.
4. Chairs and Spacers: Heavy-duty plastic-type sized to support all reinforcing steel to proper height. Use type with sand cushion pads where concrete is on grade. Provide chairs and spacers Series “B” by W.H.C. Products, Inc., E-Z Chair by Aztec Concrete Accessories, Inc., GTI Bar Chair by General Technologies, Inc., or Architect approved equal.

5. Waterstops:
   a. Ribbed flat 3/16 inch by six (6) inch with 1/8 inch ribs, rated for 75 foot of head pressure. Provide factory made corner fittings weld splices with thermostatically controlled heating iron. Style No. 782 by Greenstreak, Inc., or Architect approved equal.
   b. Contractor’s Material Option: Specially formulated preformed joint sealant that provides a lasting,, watertight bond to both fresh and cured concrete surfaces. Synko-Flex Preformed Plastic Adhesive Waterstop and Synko-Flex Primer manufactured by Synko-Flex Products, Division of Henry Company, Houston, Texas; (713) 671-9502 or Architect approved equal.
6. Carton Void Forms: If shown or required, shall be wax coated corrugated paper material, rectangular in shape and same width as the grade beams, with 1/8 inch thick tempered hardboard for top plane. Provide void forms as required (i.e. with curves, radial) that have vertical supported edges adjacent to all drilled piers, in order to prevent damage to the interior supporting network caused by field cutting.
7. Soils retainers: If shown or required, shall be composed of lightweight, plastic material that is not adversely affected by moisture. They must be flexible, impact resistant and must be able to resist lateral loads applied by the soils. Retainers shall extend both 6” above and below the top and bottom of void forms.

8. Corners: Chamfer, wood strip type; one (1) inch x one (1) inch size; maximum possible lengths.
9. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
10. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
11. Bonding Agent: Acrylic latex emulsion type as recommended for bonding new concrete to old concrete.
12. Integral Color Pigment (If shown or required): Mineral oxide, lightfast, lime-proof, water-resistant type conforming to ASTM C979. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide one (1) of the following or Architect approved equal:
    a. ChemSystems, Inc.
    b. Davis Colors
    c. New Riverside Ochre Co., Inc.
    d. L.M. Scofield Company
13. Color Stain (If shown or required): A chemically reactive stain, designed for adding variegated color to new or old concrete. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide Lithochrome Chemstain by L.M. Scofield Company or Architect approved equal.
14. Joint Sealants: Refer to Section 07 92 00, Building Sealants

2.3 CONCRETE MIXES

A. Strength: Concrete is classified and specified by ultimate compressive strength (f c) at the age of 28 days. Unless indicated otherwise on the Drawings, strengths shall be as follows:
    1. All concrete including grade beams, footings, slabs, and pads: 5 sack/3,000 psi/28 days.
    2. Strength recommendations on Structural Drawings supersede when they are greater than specified here.

B. Interior slabs subjected to vehicular traffic: This concrete shall have a maximum W/cm of 0.48 and maximum air content of 3 percent. No air-entraining admixture shall be added to this mix.

C. Concrete permanently exposed to freezing and thawing shall conform to Chapter 4 – Durability Requirements of ACI 318. W/cm and air content ratios shall coincide with its respective Exposure Class.

D. Proportions: Proportions of cement, aggregate, admixture and water to attain required plasticity and compressive strength shall be in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Do not make changes in proportions without submitting proposed changes to Inspection and Testing Laboratory for evaluation.
    1. Trial mixtures having proportions and consistencies suitable for the work shall be made based on ACI 211. 1, using at least three (3) different water-cement ratios which will produce a range of strengths encompassing those required for this project.
    2. Trial mixes shall be designed to produce a slump within 3/4 inch of the maximum permitted, and for air-entrained concrete, within 0.5 percent of maximum allowable air content. The temperature of concrete used in trial batches shall not exceed the maximum temperature specified.
    3. For each water-cement ratio, at least three confirmation compression test cylinders for each test age shall be made and cured in accordance with ASTM C192. Confirmation cylinders shall be tested at seven (7) and 28 days in accordance with ASTM C39.
    4. From the results of the 28 day confirmation tests, a curve shall be plotted showing the relationship between the water-cement ratio and compressive strengths. From this curve,

the water-cement ratio to be used in the concrete shall be selected to produce the average strength required.

5. The cement content and mixture proportions to be used shall be such that this water-cement ratio is not exceeded when slump is the maximum permitted. Control in the field shall be based upon maintenance of proper cement, water content, slump and air content.
6. Mix designs furnished by the concrete supplier, shall be based on the standard deviation analysis of previous test records meeting the requirements of Section 5.3.1 - Standard deviation of ACI 318. These mixes will be accepted in lieu of trial mixtures described in paragraphs above.
   a. Temperature of concrete in test data shall be within 5 degrees F of maximum temperature specified for this project.
   b. Strengths indicated in test data shall be in accordance with ACI 318, Section 5.3.
   c. The specified strength of concrete used in supporting test data shall vary no more than 500 PSI plus or minus from that specified for this project.
   d. The Testing Laboratory shall keep a strength and standard deviation record of all concrete for the duration of the project as specified in this section.

PART 3 - EXECUTION

3.1 GENERAL

A. Inserts: Give the various trades and subcontractors ample notification and opportunity to furnish all anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frame vents, wires, supports, or other items required to be built into the concrete by the provisions of the Drawings or of the Specification governing the work of such trades and subcontractors, or as it may be necessary for the proper execution of their work. Obtain suitable templates or instructions for the installation of such items which are required to be placed in the forms.

B. Install under-slab vapor retarder as instructed by manufacturer in accordance with ASTM E1643. Penetrations shall be sealed to maintain integrity of barrier. Tape around all openings and seal all penetrations as instructed by the barrier manufacturer. Grade stakes shall not be driven through the vapor barrier. Avoid punctures during reinforcement and concrete placement.

C. Slump:
   1. Concrete not containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
      a. Footings: 6 inches maximum, 4 inches minimum
      b. All other Structural Concrete: 5 inches maximum, 3 inches minimum
      c. Pavement: 4 inches maximum. Coordinate slump with requirements in Section 32 13 13, Concrete Paving.
      d. Slump drop not to exceed 2 inches when pumped.
   2. Concrete containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
      a. Prior to addition high range water reducer: 3 inches maximum, 2 inches minimum.
      b. After addition of high range water reducer: 9 inches maximum.

D. Classes of Concrete and Usage: Concrete of the several classes of concrete required shall have the characteristics shown on the Drawings.

E. Mixing:
   1. Transit-mixed concrete conforming to the requirements of ASTM C94 and ACI 304 shall be used in lieu of concrete mixed at the job site. Concrete shall not be transported or

used in any case after a period in excess of 90 minutes has elapsed after the introduction of water into the mixer.

2. Indiscriminate addition of water to increase slump of concrete is prohibited. Add water only at the direction of the Testing Laboratory. No water shall be added which increases the water cement ratio of the concrete in excess of the water cement ratio indicated on the approved mix design. At the direction of the Inspection and Testing Laboratory the addition of a high range water reducing admixture may be used to retemper concrete.
3. The agency supplying transit-mixed concrete shall have a plant of sufficient capacity and adequate transportation facilities, to assure continuous delivery at the rate required. The frequency of deliveries to the site of the work must be such as to provide for placing the concrete continuously throughout any one (1) pour.

F. Conveying Concrete: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of the ingredients. Concrete to be conveyed by pumping shall be submitted to the Inspection and Testing Laboratory for evaluation for each class of concrete specified before being used. Test cylinders for pumped concrete shall be taken at the discharge end of the pumping equipment.

G. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to assure a practically continuous flow of concrete at the delivery end without separation of the materials. The use of gravity-flow or aluminum chutes or conveyors for transporting concrete horizontally will not be permitted.

H. Miscellaneous Materials and Accessories: if not specifically noted, install all materials and accessories per manufacturer's instructions as if noted here in full.

I. Extend underslab vapor barrier continuously under entire slab, slab turn downs, vertical face of grade beams and footings to completely protect concrete adjacent to earth. Overlap joints and install seam tape and pipe boots, and seal penetrations as instructed by manufacturer.

J. Bars shall be supported on chairs or spacers on metal hangers, accurately placed and securely fastened to steel reinforcement in place. No wood or clay brick will be permitted inside forms.

K. All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired at all splices and at all crossing points and intersections.

L. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings. Where not shown, the clear spacing shall be 1-1/2 times the bar diameter but never less than 1-1/2 inches.

M. Lap of splices where shown and noted on the drawings shall be a minimum of 32 bar diameters but never less than 12 inches.

N. Except where shown on the drawings, minimum concrete coverage for reinforcing steel shall be:
1. 3 inches…where concrete is placed against earth
2. 1-1/2 inches…over column ties
3. 1-1/2 inches…for #5 and smaller bars in formed walls
4. 2 inches…for all bars larger than #5 in formed walls
5. 1 inch…for #11 and smaller bars in suspended slabs
6. 1-1/2 inches…for all bars larger than #11 in suspended slabs

3.2 CONCRETE CONTROL AND TESTING

A. Inspection and Testing laboratory services shall be in accordance with Section 01 45 23, Testing and Inspecting Services.

B. Except as noted below, all inspection and testing related to concrete placement, including reinforcing and embedded items, shall be the responsibility of the Owner. The Owner will directly engage the services of a qualified Testing and Inspection Laboratory, however, the Contractor shall provide access to the Owner's consultant, and, if required, the Contractor shall provide patching and repairing of surfaces removed to facilitate testing and inspection.

C. Should the strength of concrete fall below the minimum, then additional tests, including load tests, may be required. These tests, if required, shall be made at the Contractor's expense and shall be in accordance with ASTM C42 and ACI 318. If tests do not meet the applicable requirements, then the structure, or any part of the structure, shall be removed and replaced at the Contractor's expense.

D. Any concrete testing requested by the Contractor for early formwork or shoring removal, etc., shall be at the Contractor's expense.

E. Do not permit placement of concrete having a measured slump outside limits given on Drawings or Specifications, except when approved by Architect/Engineer.

3.3 PLACING CONCRETE

A. Place concrete in reasonably uniform layers, approximately horizontal, and not more than 18 inches deep, exercising care to avoid vertical joints or inclined planes. The piling up of concrete in the forms in such a manner as to cause the separation or loss of any of its ingredients will not be permitted. Concrete which has partially set or hardened shall not, under any circumstances, be deposited in the work. All slabs shall be placed for full thickness in one operation without change in proportions, screeded to proper elevation, and floated. Dusting of surfaces with cement is prohibited.

B. Place concrete in the forms as nearly in its final position as is practical to avoid rehandling. Exercise special care to prevent splashing the forms or reinforcement with concrete. Remove any hardened or partially hardened concrete which has accumulated on the forms or reinforcement before the work proceeds. Do not place concrete on previously deposited concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the respective member of section, except as hereinafter specified.

C. Do not permit concrete to drop freely any distance greater than five (5) feet. Where longer drops are necessary, use a chute, tremie, or other acceptable conveyance to assist the concrete into place without separation. Do not pour directly into any excavations where water is standing.

D. Vibration: As soon as concrete is deposited, thoroughly agitate same by means of mechanical vibrators and suitable hand tools, so manipulated as to work the mixture well into all parts and corners of the forms, and entirely around the reinforcement and inserts. Mechanical vibrators shall maintain frequencies in accordance with the recommendations of ACI 309. Table 5.1.4, and shall be operated by competent workmen. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.

E. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, the surface of the latter shall be thoroughly roughened and cleaned of all foreign matter, scum and laitance. The specified or an Architect approved bonding agent or epoxy adhesive shall be used.

F. Construction Joints: Except as otherwise specifically indicated on the Drawings, each concrete member shall be considered as a single unit of operation, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, same shall be located at or near the midpoints of spans.

Additional construction joints shall not be made under any circumstances without prior review by the Architect.

Protect all freshly placed concrete from washing by rain, flowing water, etc. Do not allow the concrete to dry out from the time it is deposited in the forms until the expiration of the curing period.

Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

G. Cleaning: Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.4 FLOOR AND SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
   1. After placing slabs, surface shall be leveled to an F_F 15 - F_L 13 tolerance. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, or sand-bed terrazzo, and as otherwise indicated.
   1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Surface shall achieve an F_F 20 - F_L 17 tolerance.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
   1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final troweling operation, free of trowel marks, uniform in texture and appearance and to a FF35/ FL30 tolerance (FL17 for elevated slabs). Grind smooth surface defects, which would telegraph through applied floor covering system.

D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, exterior dugout slabs, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application. A sample panel is required.

E. Liquid Densifier/Sealer: Apply liquid densifier/sealer on exposed interior floors subject to vehicular abrasion and as indicated on the Drawings. Compound shall be mechanically scrubbed into the

surface in strict accordance with the directions of the manufacturer and just prior to completion of construction.

F. Non-Oxidizing Metallic Floor Hardener: All slabs, in the loading dock area, or other areas noted on the Drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied in accordance with manufacturer's instructions to produce a smooth dense finish.

3.5 NON-SHRINK GROUT

A. Refer to Structural Drawings for column base plates and other structural grouting requirements.

B. Non-shrink grout shall be mixed only in such quantities as are needed for immediate use. No retempering shall be permitted and materials which have been mixed for a period exceeding 30 minutes shall in no case be used upon any portion of the work.

C. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than ten (10) square feet.

D. For every 1/3 cubic yards of grout placed, grout strength shall be tested with a set of cubes as follows:
   1. A set of cubes shall consist of three cubes to be tested seven (7) days, and three (3) cubes to be tested at 28 days.
   2. Test cubes shall be made and tested in accordance with ASTM C1107, Section 12.5, with the exception that the grout should be restrained from expansion by a top plate.

3.6 CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. All concrete shall be kept continuously moist and above 50 degrees F for seven days. When high early strength concrete is used this temperature requirement may be lowered to three (3) days.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
   1. Provide specified curing compound to exposed interior slabs. This curing compound must be dissipating or easily removed in the cleaning process prior to the application of any liquid densifier/ sealer.

3.7 DEFECTIVE WORK

A. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

3.8 CLEANING

A. Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom, shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.9 REPAIR OF DEFECTIVE AREAS

A. With prior approval of the Architect/Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, using the polymer repair mortars and/or epoxy adhesives furnished by The Euclid Chemical Company, Sika Chemical Corp., or Architect approved equal.

3.10 FIELD QUALITY CONTROL AND TESTING

A. Inspection and Testing Laboratory services shall be in accordance with Section 01 45 23, Testing and Inspecting Services.

END OF SECTION 03 30 00

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: submit data for each type of masonry units, wall ties, anchors and other materials and cleaning solutions.
2. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements.

PART 2 - PRODUCTS

2.1 UNIT MASONRY

A. Comply with ACI 530.1/ASCE 6/TMS 602.

2.2 MASONRY UNITS

A. Concrete Masonry Units: ASTM C 90; Density Classification, Normal Weight.
1. Size: nominal modular size of 16 inches long x 8 inches high x thickness indicated.
2. Furnish special units for bond beams and lintels.
3. Furnish molded bullnose corners at unites exposed to interior of building. Field formed bullnose is not acceptable

4. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
5. **Bullnose** units for outside corners on all interior walls, except at walls with tile, unless otherwise indicated.

B. Concrete Lintels: Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.

2.3 MORTAR AND GROUT

A. Mortar: ASTM C 270, proportion specification.

1. Use **portland cement-lime** mortar, ASTM C 150, Type 1 , gray or white color as required to produce mortar color indicated.
2. Do not use calcium chloride in mortar.
3. Masonry Cement shall not be used.
4. Mortar aggregate: ASTM C 144, Standard masonry type.

5. Hydrated Lime: ASTM C206, Type S
6. Water Clean and potable.
7. Calcium chloride is not permitted.

B. Grout: ASTM C 476 with a slump of 8 to 11 inches (200 to 280 mm).

2.4 REINFORCEMENT, TIES, AND ANCHORS

A. Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Joint Reinforcement: ASTM A 951.

1. Coating: **Mill galvanized at interior walls and hot-dip galvanized at exterior walls**.
2. Wire Size for Side Rods: **0.187-inch (4.76-mm)** diameter.
3. Wire Size for Cross Rods: **0.187-inch (4.76-mm)** diameter.
4. Wire Size for Veneer Ties: **0.187-inch (4.76-mm)** diameter.
5. For single-wythe masonry, provide either ladder design or truss design.
6. For multiwythe masonry, provide **ladder design with three** side rods.
7. Products:
   a. Dayton Superior Corporation, Dur-O-Wal Division.
   b. Heckmann Building Products Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire-Bond.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded strips complying with ASTM D 1056, Grade 2A1.

B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; made from styrene-butadiene rubber or PVC.

1. Products:
   a. Advanced Building Products Inc.
   b. Archovations, Inc.
   c. Dayton Superior Corporation, Dur-O-Wal Division
   d. Mortar Net USA, Ltd.

C. Proprietary Acidic Masonry Cleaner: Product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units.

1. Manufacturers:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.

B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

C. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

D. Stopping and Resuming Work: Rack back units; do not tooth.

E. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

F. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.

G. Fill metal door jamb frames solid with mortar. Build in anchors.

H. Lay CMU in running one-half (1/2) bond pattern, unless otherwise noted.

I. All mortar joints to be of consistent size.

J. Tool exposed joints slightly concave when thumbprint hard unless otherwise indicated.

K. Keep cavities clean of mortar droppings and other materials during construction.

3.2 LINTELS

A. Install lintels where indicated.

B. Minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.3 PARGING

A. Parge masonry walls, where indicated, in two uniform coats with a steel-trowel finish. Form a wash at top of parging and a cove at bottom. Damp cure parging for at least 24 hours.

3.4 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections required by authorities having jurisdiction.

1. Inspections: **Level 1** special inspections according to the IBC.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Do not use chipped or cracked concrete masonry units (CMU).

3.5 CLEANING

A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly cured, clean exposed masonry.

1. Wet wall surfaces with water before applying acidic cleaner, then remove cleaner promptly by rinsing thoroughly with clear water.
2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 042000

SECTION 050510

METAL FINISHES

PART 1 - GENERAL

1.1 SUMMARY
- A. Sections Includes: Metal Finishes (Drawing Designation, MF)
  1. Anodizing.
  2. Baked enamel coating.
  3. Fluorourethane coating
  4. PVDF coating.
  5. Powder coated finish.
  6. Stainless steel finish.
- B. Related Sections:
  1. Sections with Metals: Galvanizing.
  2. Sections with Metals: Factory or shop applied primers for field painting or coating.
  3. Section 087100 – Door Hardware: Hardware finishes.
  4. Division 9 – Finishes: Field-applied paints and coatings.

1.2 REFERENCES
- A. Reference Standards: See Section 014200. In addition to requirements shown or specified, comply with applicable provisions of following:
  1. NAAMM Metal Finishes Manual for finish designations and application recommendations.

1.3 SUBMITTALS
- A. General: Submit in accordance with Section 013300.
  1. Submit submittals of this section simultaneously with submittals of sections with components with finishes specified in this section.
- B. Product Data: Submit following:
  1. Product data for each coating.
  2. Color charts for finish indicating manufacturer's colors available for selection.
  3. Include sample of warranty customized for this Project.
- C. Closeout Submittals: Submit following in accordance with Section 017800.

PART 2 - PRODUCTS

2.1 PREPARATION
- A. Sheet Steel to be Coated:
  1. Mechanical Finishes: Complete mechanical finishes of flat sheet metal surfaces before fabrication. After fabrication, finish joints, bends, abrasions, and other surface blemishes to match sheet finish. Protect mechanical finishes on exposed surfaces from damage by application of adhesive paper or other temporary protective covering, prior to shipment.
  2. Surface Preparation: Solvent-clean surfaces in compliance with SSPC-SP1 to remove dirt, oil, grease and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel in compliance with SSPC-SP5 (White Metal Blast Cleaning) or SSPC-SP8 (Pickling).
  3. Chemical Pretreatment: Apply hot phosphate surface treatment to uncoated steel sheet to comply with SSPC-PT4.
  4. Comply with SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
- B. Protective Coatings: Do not use coatings containing lead.
  1. Primed Carbon Steel: Touch-up with primer.
  2. Galvanized Steel: Touch-up with primer.
- C. Metal Patching Compound:
  1. Two-part epoxy and metal filler, putty grade, composed of metal alloy blended with high molecular weight polymer.
  2. Match base metal of putty to item being repaired.
  3. Use steel based alloy for repairing cast iron.
  4. Machinable after curing.
  5. Paste consistency: Negligible slump at 1 inch thickness or less.
  6. Shrinkage: Show no evidence of measurable shrinkage from plastic state to hardened state.
  7. Acceptable Manufacturers and Products:
     a. Super Metal 1111, Belzona; Miami, FL. Use only on steel or cast iron items.
     b. Bondo, Bondo/Mar-Hide; Medina, OH.

c. Accepted Substitute in accordance with Section 012500.

2.2 SHOP FINISHING
A. General: Apply finishes in factory after products are assembled.
B. Protect finish with factory applied protective covering prior to shipment.
1. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.
2. Finish accessories such as trim, flashing, screens, blank-off panels, and fasteners to match assembly.

2.3 ANODIZING
A. Anodizing: Comply with AAMA 611.
B. Clear Anodized: AA-M12C22A41, Architectural Class I, nonspecular as fabricated mechanical finish, etched medium matte, , minimum 0.7 mil thick.
1. May be architectural Class II anodic coating, AA-M12C22A31.
2. Color: As selected by Architect from manufacturer's full range of standard colors, or as indicated in 009000 Master Schedule.

2.4 BAKED ENAMEL COATING
A. Baked Enamel Finish System: Includes dipped, electrostatic, powder coat, and other forms of baked enamel shop finishing.
1. Galvanized Steel Surfaces: Cleaned and phosphate conversion coated prior to application of 0.2 mil dry film thickness rust-inhibitive prime coat.
2. Aluminum Surfaces: Cleaned, etched and given chromate conversion pre-treatment prior to application 0.2 mil dry film thickness of prime coat.
3. Finish Coat: Manufacturer's standard thermo-cured acrylic, polyester or alkyd enamel, 1.0 mil minimum dry film thickness.
4. Total Coating Dry Film Thickness: 1.5 mils.
5. Acceptable Product: Duracron 900 by PPG.
6. Color: As selected by Architect from manufacturer's full range of standard colors, or as indicated in 009000 Master Schedule.

2.5 FLUOROPOLYMER (PVDF) COATING
A. Acceptable Manufacturers:
1. Akzo Nobel Coatings, Inc., Columbus, OH.
2. BASF Corporation, Decatur, AL.
3. PPG Industries Inc., Delaware, OH and Springdale, PA.
4. Valspar Corporation, Garland, TX.
B. Fluoropolymer (PVDF) Coating: AAMA 2605.
1. Resin: 70 percent polyvinylidene fluoride (PVDF).
2. Substrate, Aluminum: Cleaned and chrome phosphate pre-treated.
3. Primer: Manufacturer's standard epoxy or acrylic coating.
a. Dry Film Thickness: Minimum 0.20 mil.
4. Topcoat: PVDF, Dry Film Thickness:
a. Coil: 0.80 mil.
b. Extrusion: 1.0 mil.
C. [Fluoropolymer (PVDF) Coating with Clear Coat: AAMA 2605.
1. Resin: 70 percent polyvinylidene fluoride (PVDF).
2. Substrate, Aluminum: Cleaned and chrome phosphate pre-treated.
3. Primer: Manufacturer's standard epoxy or acrylic coating.
a. Dry Film Thickness: Minimum 0.20 mil.
4. Topcoat: PVDF, Dry Film Thickness:
a. Coil: 0.80 mil.
b. Extrusion: 1.0 mil.
5. Clear Coat: PVDF, Dry Film Thickness:
a. Coil: 0.50 mil.
b. Extrusion: 0.50 mil.]

2.6 POWDER COATED FINISH
A. Shop-Applied Powder Coated Finish: Fabricator's standard .
1. Clean and phosphatize surfaces prior to application of coating.
2. Apply chrome pretreatment to aluminum surfaces to receive PVDF finish.
3. Apply powder coat finish system for sheet steel immediately following surface preparation and chemical pretreatment.

4. Comply with paint manufacturer's recommendations for application and baking to achieve minimum recommended dry film thickness.

2.7 STAINLESS STEEL FINISH

A. Stainless Steel Finishes: ASTM A480.
   1. Protect finishes with factory applied adhesive backed paper covering.
   2. Unless otherwise Scheduled or Indicated: No. 4 - General Purpose Polished, vertical grain. Refer to 009000 Master schedule for finish descriptions.

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of structural steel work is shown on drawings including schedules, notes and details that show size and location of members, typical connections, and type of steel required. Furnish all labor, materials, services, equipment and appliances required in conjunction with or related to the furnishing, fabrication, delivery, and erection of all structural steel defined below. Include all supplementary parts, members and connections necessary to complete the structural steel work, regardless of whether all such items are specifically shown or specified on the drawings.

B. Structural steel shall be defined as that work prescribed in Section 2.1 of the AISC “Code of Standard Practice for Steel Buildings and Bridges” and all steel supports for elevator guide rails and catwalks (including support members and attached structural steel shapes and plates such as hangers, toeplates, and the grating walking surface).

C. Miscellaneous metal fabrications, architecturally exposed structural steel, metal stairs and ladders, steel joists and joist girders, cold-formed metal framing, and steel deck are specified elsewhere in these Specifications.

1.3 QUALIFICATIONS

A. Fabricator:
1. The structural steel fabricator shall have not less than 5 years of experience in the successful fabrication of structural steel similar to this project.
2. The structural steel fabricator must be registered and approved by the local building official to perform fabrication work without special inspection. Should the fabricator not be so approved, the fabricator shall reimburse the Owner for the cost of the special inspections required by the local building official.

B. Detailer:

1. The structural steel detailer shall have not less than 5 years of experience in the successful detailing of structural steel similar to this project including experience in selecting or completing structural steel connection details using information found in tables in the AISC “Steel Construction Manual.

C. Erector:

1. The structural steel erector shall have not less than 5 years of successful experience in the erection of structural steel of a similar nature to this project.
2. The structural steel erector must participate in the AISC Erector Certification Program and be designated an AISC CERTIFIED STEEL ERECTOR.

D. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material,

1. The Professional Engineer employed by the Fabricator for connection design shall be experienced in the specific area of structural steel connection design with demonstrated experience of not less than three projects of similar scope and complexity.

E. Independent Testing Laboratory: Any testing laboratory retained to perform tests that are required by this specification shall meet the basic requirements of ASTM E 329.

1.4 QUALITY ASSURANCE

A. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

B. Codes and Standards: Comply with provisions of following, except as otherwise indicated. For codes and standards for which no specific version is referenced, the version that is referenced in the applicable building code shall govern, or, if there is no reference in the building code, the latest version of the code or standard shall govern except as otherwise noted in the AISC Steel Construction Manual, 13th edition. Certain sections in this specification contain requirements that are more restrictive and/or different than contained in the standards listed. In such cases, the requirements of this specification shall control.

1. All federal (OSHA), state and local laws that govern safety requirements for steel erection and other requirements if more stringent than the codes and standards enumerated below. OSHA requirements include regulation 29 CFR 1926, Part R, “Safety Standard for Steel Erection”.
2. AISC, "Code of Standard Practice for Steel Buildings and Bridges," except as noted herein.

    a. Certain sections in this specification contain requirements that are more restrictive and/or different than contained in this standard. In such cases, the requirements of this specification shall control.

3. ANSI/AISC 360, "Specification for Structural Steel Buildings."
4. Research Council on Structural Connections (RCSC) "Specification for Structural Joints using High-Strength Bolts.”
5. AISC, “Steel Construction Manual”, Thirteenth Edition.
6. ANSI/AWS D1.1, "Structural Welding Code – Steel.”
7. ANSI/AWS D1.3, "Structural Welding Code – Sheet Steel.”
8. ANSI/AWS D1.4, "Structural Welding Code – Reinforcing Steel.”
9. The Society of Protective Coatings, "SSPC Painting Manual", Volumes 1 and 2.
10. AASHTO, “LRFD Bridge Design Specifications”, U.S. Customary Units.
11. AASHTO, “LRFD Bridge Construction Specifications.”

C. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code - Steel".

D. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in the mill, shop, and field by the Owner's testing laboratory. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. The Contractor shall promptly remove and replace materials or fabricated components which do not comply.

E. Questions about Contract Documents: The Contractor shall promptly notify the Architect/Engineer whenever design of members and connections for any portion of the structure are not clearly indicated or when other questions exist about the Contract Documents. Such questions shall be resolved prior to the submission of shop drawings.

F. Owner’s Testing Laboratory Services: Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents

G. Surveyor: The General Contractor shall employ a qualified land surveyor to perform surveys required by this specification.

1.5 SUBMITTALS

A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products; include laboratory test reports and other data to show compliance with specifications (including the specified standards):

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties. For structural steel for which evidence exists that the steel may not conform to ASTM requirements, the contractor, where permitted by the engineer, shall engage the services of an independent testing laboratory to test the material according to ASTM A 6 and submit certified test reports that verify conformity to ASTM standards. Tests shall be made for each 10 tons of affected material unless otherwise directed by the Engineer.
2. High-strength bolts (each type), including nuts and washers, including certified copies of mill reports covering physical and chemical properties.
3. Shrinkage-resistant grout.
4. Welding electrodes (each type).
5. Structural steel primer paint.
6. Inorganic or other protective paint.
7. Shear studs.
8. Direct tension indicators.

B. Shop Drawing and Erection Drawings:
1. Definitions:

a. Shop Drawings: Drawings of the individual structural steel shipping pieces that are to be produced in the fabrication shop.
b. Erection Drawings: Field-installation or member-placement drawings that are prepared by the Fabricator to show the location and attachment of the individual shipping pieces.
c. Erection-Bracing Drawings: Drawings that are prepared by the Erector to illustrate the sequence of erection, any requirements for temporary supports and the requirements for raising, bolting, and/or welding. These drawings are in addition to and separate from the Erection Drawings.

2. Shop Drawings: Submit for review and approval shop drawings showing complete details and schedules for fabrication and assembly of structural steel members. The licensed professional engineer responsible for the design of any of the connections shown on the shop drawings shall submit a letter that is sealed attesting that the connection design engineer has reviewed the shop drawings and that the connections detailed and shown on the shop drawings conform to the engineer’s design.
3. Structural steel shop drawings shall include the following minimum information:

a. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections). Holes, flange cuts, slots and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

4. Erection Drawings: Submit for review and approval complete erection drawings showing field-installation and member-placing instructions for locating and attaching the individual shipping pieces.
5. Erection-Bracing Drawings: Submit for record purposes only complete erection-bracing drawings to illustrate the sequence of erection, any requirements for temporary supports and the requirements for raising, bolting, and/or welding.
6. Preliminary Connection Review with Steel Fabricator: The fabricator shall submit for review and approval preliminary details of proposed connections for Engineer's review not less than 14 days in advance of the start of preparation of detailed shop drawings. Proposed variations from the details shown on the drawings will be considered and such variations must have preliminary approval from the Engineer prior to the preparation of detailed shop drawings. Failure to adhere to the requirements of this section obligates the Contractor to take responsibility for any and all resulting delays in the detailing and fabrication of structural steel.

7. The fabricator alone shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members.
8. All fabricated material and connections shall fit within architectural constraints.
9. Structural steel members for which shop drawings have not been reviewed and approved shall not be fabricated.
10. The omission from the shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though the shop drawings may have been reviewed and approved.
11. Shear Connector Placement Drawing: Provide shop drawing showing proper placement (longitudinal and transverse spacing) of shear connectors on each composite beam requiring such connectors. The shop drawing shall show the proper relationship of the shear connectors to the flutes in the steel deck and the arrangement of shear connectors along the span of the composite beam. Show the method of attachment of shear connectors and proposed brand and model of equipment to be used.

C. Calculations: The fabricator's engineer shall submit complete signed and sealed design calculations showing all information as specified in the "Connections" section under Part 2. The Engineer reserves the right to reject all shop drawings submitted without complete design calculations.

D. Surveys: Submit the information requested for all surveys required by this specification.

E. Test Reports: Submit certified reports of tests required by this Specification Section. Include data on type(s) of tests conducted and test results.

F. Qualification Data:

1. Submit qualification data, including required certifications, for firms and persons specified in the “Qualifications” section under Part 1, to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
2. Submit a resume from the structural steel detailer showing a minimum of two years of experience selecting or completing structural steel connection details using information found in tables in the AISC “Steel Construction Manual”.
3. Submit Welding Procedure Specifications (WPS) in accordance with ANSI/AWS D1.1 for all welded joints. Submit test reports showing successful passage of qualification tests for all non-prequalified WPSs.
4. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests as specified in the “Qualifications” section under Part 1. If recertification of welders is required, retesting will be at Contractor's responsibility.
5. A fabricator that is registered with the local building official and is approved to perform fabrication without special inspection shall submit a certificate of compliance stating that the work was performed in accordance with the approved construction documents.

G. Substitutions:

1. Substitutions for the member sizes, type(s) of steel connection details or any other modifications proposed by the Contractor will be considered by the Architect/Engineer only under the following conditions:

    a. That the request has been made and accepted prior to the submission of shop drawings. All substitutions shall be clearly marked and indicated on the shop drawings as a substitute.
    b. That there is a substantial cost advantage or time advantage to the Owner; or that the proposed revision is necessary to obtain the required materials or methods at the proper times to accomplish the work in the time scheduled.
    c. That sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by the Architect/Engineer, including cost reductions or savings in time to complete the work.
    d. In no case shall such revisions result in additional cost to the Owner.

H. Longspan Steel Erection Procedure: Submit a written, detailed erection procedure for the longspan steel system that has been reviewed and approved by the General Contractor, Fabricator, Steel Erector and his

registered Engineer. Submit calculations and drawings prepared under the supervision of a licensed professional engineer for the final erection procedure.

1.6 PRE-CONSTRUCTION CONFERENCE

A. At least 14 days prior to beginning structural steel erection, the Contractor shall hold a meeting to review the detailed quality control and construction requirements and to determine the procedures for producing proper structural steel construction. Also review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for materials inspection, testing and certifications.

B. The Contractor shall require responsible representatives of every party who is concerned with the structural steel work to attend the conference, including but not limited to the following:

1. Contractor's Superintendent.
2. Laboratory responsible for field quality control.
3. Special Inspector / Laboratory responsible for shop inspection or testing.
4. Structural Steel Detailer.
5. Structural Steel Fabricator.
6. Structural Steel Erector.
7. Owner's and Architect's/Engineer's Representative.

C. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:

1. Owner's Representative.
2. Architect.
3. Engineer-of-Record.

D. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least 7 days prior to the scheduled date of the conference.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so as not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

D. Furnish all fuel, maintenance, and equipment required for hoisting and placement of materials under this contract.

E. Process, pay for and maintain all permits and certificates of on-site inspection required for derricks, cranes and hoisting equipment. No derrick, crane or hoisting equipment shall be operated without a certificate of operation and a certificate of on-site inspection, as required by governing authorities.

1. In addition to the above, all hoisting equipment shall be installed, operated and maintained in accordance with all applicable regulations of authorities having jurisdiction.
2. The Contractor shall furnish street storage and sidewalk crossing permits.

1.8 JOB CONDITIONS

A. The Contractor shall coordinate the fabrication and erection of all structural steel work with the work of other trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: All hot rolled steel plates, shapes, sheet piling, and bars shall be new steel conforming to ASTM A 6.

B. Structural steel shall comply with the provisions of the following ASTM Specifications as appropriate for the grades and types, and at the locations as specified on the drawings:

1. Structural Steel Wide Flange and WT Shapes: High Strength Steel, ASTM A 992. ASTM A 572, Grade 50 is acceptable as a substitute for A992.
2. ASTM A 913 has special properties for seismic applications and is available from TradeArbed under their Histar trademark. Not all sizes are readily available. Contact your local fabricator or TradeArbed to find out available sizes.
3. M-Shapes, S-Shapes, and Channels: Carbon Steel, ASTM A 36.
4. Angle Shapes: Carbon Steel, ASTM A 36.
5. Structural Steel Plates and Bars: Carbon Steel, ASTM A 36.
6. Structural Steel Plates and Bars: High Strength Steel, ASTM A 572, Grade 50.
7. Steel Pipe: ASTM A 53 (Type E or S) Grade B (Fy = 35 ksi).
8. Round HSS: ASTM A 500 Grade B (Fy = 42 ksi) or ASTM A 501 with written approval from the engineer.
9. Round HSS: ASTM A 500, Grade C (Fy = 46 ksi).
10. Square and Rectangular HSS: ASTM A 500, Grade B (Fy = 46 ksi).
11. Square and Rectangular HSS: ASTM A 500, Grade C (Fy = 50 ksi).

12. Connection Material: Unless noted otherwise on the drawings, column stiffener plates and doubler plates at moment connections shall be the same grade of steel as the beam connecting the column (highest grade if more than one grade is used). All other connection material except as noted otherwise on the drawings including bearing plates, gusset plates, stiffener plates, filler plates, angles, etc. shall be A36 steel unless a higher or matching grade of steel with the members connected is required by strength or stiffness calculations and provided the resulting sizes are compatible with the members connected.

C. Structural Steel Surfaces: For fabrication of work which will be exposed to view in the completed structure, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

D. Structural Bolts and Threaded Fasteners: Structural bolts and threaded fasteners shall comply with the following ASTM Specifications as appropriate for the types and at the locations as specified on the drawings:

1. ASTM A 325 Type 1.
2. ASTM A 490 Type 1.
3. Alternative Design Fasteners: Fasteners that incorporate a design feature intended to indicate a predetermined tension or torque (load indicator bolts or “twist-off” bolts) shall conform to the requirements of section 2.8 of the RCSC “Specification for Structural Joints Using ASTM A 325 or A 490 Bolts”.

a. Bolts that are manufactured to conform to ASTM A 325 shall additionally conform to ASTM F 1852.
b. Bolts that are manufactured to conform to ASTM A 490 shall additionally conform to ASTM F 2280.

c. Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:

1) Nucor Fastener, A Division of Nucor Corporation.
2) Lake Erie Screw Corp.
3) Vermont Fasteners Manufacturing.
4) Lohr Structural Fasteners.

4. Threaded Round Stock:

a. ASTM A 36.
b. ASTM A 572 Grade 50 (to 2 inches in diameter).

5. Bolts and Nuts, High Strength Bolts: Bolts and nuts for all high strength bolts shall be heavy hex head conforming to ANSI Standards B18.2.1 and B18.2.2 respectively. Nuts shall conform to ASTM A 563.
6. Washers: All washers shall be circular, flat and smooth and shall conform to the requirements of Type A washers in ANSI Standard B23.1. Washers for high strength bolts shall be hardened and conform to ASTM F 436. Beveled washers for American Standard Beams and channels shall be square or rectangular, shall taper in thickness (16 2/3% slope) with an average thickness of 5/16". When an outer face of a bolted part has a slope greater than 1:20 with respect to a plane normal to the bolt axis, a beveled washer shall be used. Washers to be used with A490 bolts larger than 1 inch in diameter and installed over oversized or short-slotted holes and other similar situations shall conform to ASTM F 436 except with 5/16 inch minimum thickness.
7. Zinc-Coated Bolts: ASTM A 325 bolts, with their nuts and washers, that are used to connect steel called for on the drawings or in the specifications as hot-dip galvanized after fabrication shall be zinc-coated either by the hot-dip process in accordance with ASTM A 153, Class C or by the mechanical deposition process in accordance with ASTM B 695, Class 50, Type 1. The bolts, nuts, and washers shall all be zinc-coated using the same process and they shall be considered together as an assembly and shall be tested and shipped together as such. Comply with all the requirements of ASTM A 325 and ASTM A 563 as they relate to zinc-coated materials. ASTM F 1852 bolts with their nuts, and washers shall be zinc-coated only by the mechanical deposition process in accordance with ASTM B 695, Class 50, Type 1. Do not zinc-coat ASTM A 490 bolts.
8. Direct Tension Indicators: Compressible washer-type direct-tension indicators conforming to ASTM F 959.

a. Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:

1) Applied Bolting Technology.
2) Turnasure, LLC.

9. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed.
10. New Bolts: All bolts shall be new and shall not be reused.

E. Electrodes for Welding:

1. Provide electrodes that comply with AWS D1.1, "Structural Welding Code - Steel" and that can produce welds that have a minimum Charpy V-notch toughness of 20 ft-lbs at 40° F, unless noted otherwise in these specifications or on the drawings.
2. Electrodes for various welding processes shall be as specified below:

a. SMAW:

1) E70XX low hydrogen
2) E80XX for Grade 60 & 65 Steel with CJP welds or as indicated on the drawings

b. SAW:

1) F7X-EXXX

2) E8X–EXX-XX for Grade 60 & 65 Steel with CJP welds or as indicated on the drawings

c. GMAW:

1) ER70S-X
2) ER80S-X for Grade 60 & 65 Steel with CJP welds or as indicated on the drawings

d. FCAW:

1) E7XT-X
2) E8XT-X for Grade 60 & 65 Steel with CJP welds or as indicated on the drawings

3. Electrodes shall be compatible with parent metal joined.

F. Headed Studs used as Anchors for Structural Steel Members into Concrete: AWS Type A studs manufactured in conformance with ASTM A 108 with a minimum tensile strength of 61,000 psi of sizes as specified on the drawings.

G. Headed Studs used as Shear Connectors: AWS type B studs manufactured in conformance with ASTM A 108 with a minimum tensile strength of 65,000 psi of sizes as specified on the drawings.

H. Deformed Bar Anchors: AWS Type C studs manufactured in conformance with ASTM A 496 with a minimum tensile strength of 80,000 PSI. ASTM A 615 reinforcing bars may not be substituted for deformed bar anchors.

I. Anchor Rods:

1. All anchor rods shall conform to ASTM F 1554. unless noted otherwise on the drawings and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:

a. Grade 55 (1/4 inch to 4 inches in diameter).(Also comply with Supplementary Requirement S1 of ASTM F 1554).

2. Anchor rods used with galvanized baseplates shall be galvanized.
3. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.
4. Washers: Unless indicated otherwise, washers for all base plates shall be in accordance with the AISC “Steel Construction Manual”, Table 14-2 with holes 1/16” larger than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.

J. Structural Steel Primer Paint:

1. Unless noted otherwise, primer paint shall be one of the following types with the indicated surface preparation:

a. SSPC-Paint 25.1, Type II; zinc oxide, raw linseed oil and alkyd primer, surface prepared according to SSPC-SP-2 (Hand Tool Cleaning) unless noted otherwise in this specification.
b. SSPC-Paint 23 acrylic primer, surface prepared according to SSPC-SP-6 (Commercial Blast Cleaning).

2. Refer to Architect's drawings and specifications for final paint finish requirements of structural steel. Primer paint shall be compatible with final paint requirements.

K. Non-Shrink Grout: Provide grout type(s) as specified on the drawings:

1. Non-Metallic Non-Shrink Grout: Premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents, and fluidity improving compounds. Conform to ASTM C 1107. Provide the minimum strength as shown below as determined by grout cube test at 28 days:
a. 8,000 PSI for supporting concrete greater than 3000 psi and less than or equal to 4000 psi.

b. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4000 psi shall be 8000 psi.

Subject to conformance with specified requirements, acceptable non-shrink grouts include:

a. L&M Construction Chemicals, Inc.; Crystex and Duragrout.
b. Dayton-Superior Corporation; Sure Grip High Performance Grout and 1107 Advantage Grout.
c. BASF Construction Chemicals; Masterflow 555, and Set Grout.
d. U.S. Grout Corp.; Five Star Grout.
e. The Euclid Chemical Company; NS Grout.
f. Hilti, Inc.; CG 200 PC.

L. Grating: Welded steel bar grating of the type, depth and finish noted on the drawings capable of carrying not less than the stated live load and deflecting not more than span/360 under that load.

M. Hot Dip Galvanizing:

1. Scope: All structural steel items and their connections permanently exposed to exterior conditions or that are within areas of unconditioned airspace, whether specified on the drawings or not, shall be hot-dipped galvanized after fabrication unless indicated on the drawings or in Specification Section 09900 to receive a primer and/or finish coat. Such items include, but are not limited to:

a. Base plates and anchor rods supporting galvanized members shall also be galvanized.
b. Shelf angles.
c. Parapet wall supporting members.
d. Screen wall supporting members.
e. Window washing support members.
f. Embedded plates in concrete exposed to unconditioned airspace.
g. Garage guardrail steel and connections.
h. Cooling tower support steel.
i. Building skin support steel exposed to moisture outside the exterior waterproofing surface.
j. Examine the architectural and structural drawings for other items required to be hot dipped galvanized.

2. Zinc-coat all ASTM A 325 bolts nuts, and washers used in the connection of such steel. Field welded connections shall have welds protected and the exposed portions of ASTM A 490 bolts, nuts and washers shall be protected with galvanizing repair paint.
3. Surface Preparation: All steel to be hot dip galvanized shall undergo the following surface preparation as specified by the Steel Structures Painting Council (SSPC), Volume 2.

a. Remove all grease, oil, grime and foreign contaminants by thorough cleaning with an alkaline or organic solvent followed by thorough rinsing in cold water.
b. Remove scale by pickling in diluted sulfuric or hydrochloric acid. Pickling shall be followed by a rinse in warm water and a second rinse in cold water. As an alternative to pickling, the steel may be white metal blast cleaned according to SSPC-SP-5.
c. Dip in a flux solution of zinc ammonia chloride followed by drying at room temperature.

4. Zinc Coating: The zinc coating for steel shapes and plates shall conform to ASTM A 123. Weight of zinc coating per square foot of surface for 1/8 inch and 3/16" thick steels shall average not less than 2.0 oz. with no individual thickness less than 1.8 oz. The coating weight shall average not less than 2.3 oz. with no individual thickness less than 2.0 oz. for 1/4" thick and heavier steel.

N. Galvanizing Repair Paint: Galvanizing repair paint shall be "ZRC Cold Galvanizing Compound" as manufactured by ZRC Chemical Products or a paint complying with SSPC-Paint 20.

2.2 FABRICATION

A. Shop Fabrication and Assembly:

1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specification and as indicated on approved final shop drawings. Provide camber in structural members where indicated. Fabricator shall coordinate connection details, joint fit-up procedures, and field adjustment requirements with erector. The General Contractor shall coordinate provision of all erection bolts, lifting lugs or other devices required for erection with the fabricator and the erector and for interference with architectural finishes and constraints.
2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
3. Clearly mark the grade of steel on each piece, distinguishable in the field from floor surfaces, for purpose of field inspection and confirmation of grade of steel.
4. Milled surfaces of built-up sections shall be completely assembled or welded before milling.
5. Fitted stiffeners shall be fabricated neatly between flanges, and the ends of stiffeners shall be milled or ground to secure an even bearing against abutting surfaces. All milled or ground joints shall bear throughout their contact length.

B. Dimensional Tolerances: Dimensional tolerances of fabricated structural steel shall conform to Section 6.4 of the AISC Code of Standard Practice.

C. Camber:

1. Camber of structural steel members is indicated on the drawings. Camber shall be measured in the fabricators shop in the unstressed condition, prior to erection. The fabricator shall provide camber measurements of all beams and a report to the Testing Laboratory confirming this has been done.
2. Where possible, camber of beams shall be applied by a cold bend process.
3. The local application of heat may be used to introduce or correct camber, curvature, or straightness provided the temperature of the heated area, as measured by temperature crayons or other approved means, does not exceed 1200°F.
4. Where indicated on the drawings in a camber diagram, cantilever or double cantilever beams shall be cambered for the main span and cantilever end separately, either by a staged cold bending process or by the application of heat.
5. Beams [and trusses] detailed without specified camber shall be fabricated so that after erection any natural camber due to rolling or shop fabrication is upward.
6. Specified camber for beams shall be in accordance with the AISC “Code of Standard Practice”.

D. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Engineer. Any member having a splice not shown and detailed on approved shop drawings will be rejected.

E. Compression Joints: Ends of columns, except as otherwise noted, and other compression joints at splices and other connections as noted on the drawings which depend on contact bearing as part of the splice strength shall be finished to bear in accordance with AISC Specification M2.6 so as to provide complete true bearing in accordance with AISC Specification M4.4.

F. Cutting: Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provided the cut is not within 1/8 inch of the finished dimension and final removal is completed by means such as chipping or grinding to produce a smooth surface quality free of notches or jagged edges. All corners shall be smooth and rounded to a minimum 1/2" radius.

G. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members as shown on the contract documents, and/or the final shop drawings.

1. Provide specialty items as indicated to receive other work.
2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

H. Lifting and Erection Devices: The fabricator shall be responsible for designing, detailing and furnishing all lifting devices and erection aids required for erection. Such devices shall be removed after erection if they interfere with architectural finish requirements.

I. Drainage Holes: Provide 1 inch diameter drainage (weep) holes in all members (trusses, girders, beams, etc.) exposed to weather where rain water could collect (at low points and/or behind dams caused by connections, stiffener plates, etc.). Show all holes on shop drawings for review by the Engineer.

2.3 WELDING

A. Code: All shop and field welding shall conform to all requirements in the "Structural Welding Code - Steel", ANSI/AWS D1.1, as published by the American Welding Society (AWS).

B. Welder Certification: All shop and field welders shall be certified according to all the applicable AWS procedures for the welding process and welding position used. Each welder shall be assigned an identifying symbol or mark and all shop and field welded connections containing complete or partial joint penetration welds, multi-pass fillet welds, and fillet welds greater than 5/16” shall be identified by the symbol or mark of the welder responsible for the connection.

C. Minimum Size and Strength:

1. Fillet Welds: Minimum size of fillet welds shall be as specified in Table J2.4 in AISC Specification, Chapter J.
2. Partial-Penetration Groove Welds: The minimum effective throat thickness of partial-penetration groove welds shall be as specified in Table J2.1 in AISC Specification, Chapter J.
3. Minimum Strength of Welded Connections: Except as specified below in "Connections" or noted otherwise on the drawings, all shop and field welds shall develop the full tensile strength of the member or element joined. All members with moment connections as indicated on the drawings shall be welded to develop the full flexural capacity of the member, unless noted otherwise on the drawings.

D. Filler Metal Requirements: Weld metal shall be as specified in Table J2.5 in AISC Specification, Chapter J and other requirements of this specification.

E. Welding Procedure Specification:

1. All welding shall be performed in accordance with a Welding Procedure Specification (WPS) as required in AWS D1.1 and approved by the Owner’s Testing Laboratory and the Architect/Engineer. The WPS variables shall be within the parameters established by the filler-metal manufacturer. Engage the services of an independent testing laboratory to provide the qualification testing required by AWS D 1.1, Chapter 4, part B to qualify any non-prequalified WPS needed for the project. The testing laboratory shall prepare Welding Procedure Qualification Records (WPQR) documenting the successful qualification of each Welding Procedure Specification.

F. Welding Procedures:
1. All welding processes shall comply with the requirements of ANSI/AWS D1.1 unless noted otherwise.
2. Built-up sections assembled by welding shall be free of warpage and all axes shall have true alignment.
3. Welds not specified shall, if possible, be continuous fillet welds developing the minimum strength, as specified above, using not less than the minimum fillet welds as specified by AISC.
4. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
5. Before welding is started, the fabricator shall submit for the approval of the Owner's Testing Laboratory in consultation with the Architect/Engineer, written Welding Procedure Specification for all joints to be welded. After approval, the Welding Procedure Specification shall be followed without deviation unless specific approval for change is obtained from the Owner's Testing Laboratory and the Architect/Engineer.
6. Before welding, particular attention shall be paid to surface preparation, fit up and cleanliness of surfaces to be welded.
7. Minimum preheat and interpass temperatures for structural steel welding shall be as specified in ANSI/AWS D1.1, except that no welding shall be performed when the ambient temperature is lower than 0 degrees F. The temperature shall be measured from the side opposite that upon which the preheat is applied.

8. The heat, input, length of weld and sequence of weld shall be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used shall be subject to inspection before any welding is performed.
9. Welds shall be sound throughout. There shall be no crack in any weld or weld pass. Welds shall be considered sound if they conform to AWS requirements, as confirmed by non-destructive testing.
10. Welds shall be free from overlap.
11. Craters shall be filled to the full cross section of the welds.
12. For high-strength low-alloy steels, follow welding procedures as recommended by steel producer for exposed and concealed connections.
13. Fabricator and erector shall coordinate welding responsibility at all welded joints.

G. Stress Relieving: All welding sequences shall be such as to reduce the residual stresses due to welding to a minimum value. If high residual stresses are present, stress relieving of joints shall be required. Welded connections shall be detailed and designed to minimize the accumulation and concentration of through-thickness strains due to weld shrinkage.

2.4 BOLTING

A. Bolt Diameter: Minimum bolt diameter shall be 3/4 inch. The difference in diameter between bolts of differing sizes used on the project shall be not less than ¼”.

B. Connection Type: Unless noted otherwise on the drawings, all bolted connections shall be snug-tightened using high-strength bolts in standard holes (hole diameter nominally 1/16 inch greater than the nominal bolt diameter) with threads included in the shear planes. Notwithstanding, the contractor shall be responsible to adhere to provisions of AISC Specification Section J1.10, which lists circumstances under which certain connections require pretensioned high strength bolts.

C. Oversize, Short Slotted and Long Slotted Holes: The dimensions and washer requirements of oversize, short slotted, and long slotted holes shall conform to the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Fastener Tension:

1. High strength bolts in snug-tightened joints shall be tightened to a snug tight condition only. Do not pretension bolts in snug-tightened joints the same as if they were in slip-critical joints. The snug-tightened condition is defined as the tightness that exists when all plies are in firm contact. This may usually be attained by a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench.
2. High-strength Bolts in Slip-critical and Pretensioned Joints:

    a. High-strength bolts in slip-critical and pretensioned joints shall be tightened to achieve the minimum bolt tension as specified in the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts” when all the fasteners of a joint are tight.
    b. Any of the four methods to tighten bolts specified in the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts” may be used to achieve the minimum bolt tension. The tightening procedure that uses direct tension indicator washers shall conform to the requirements of ASTM F 959. Conform to the requirements of ASTM F 1852 for a Twist-Off-Type Tension-Control bolt pretensioning.
    c. The Contractor shall cooperate with the Owner’s Testing Laboratory when Arbitration Testing and Inspection is called for due to a disagreement regarding the tension in installed bolts that have been inspected according to the Structural Testing Laboratory Services Specification.

E. Washers: Washers under the bolt head and/or nut shall be used as required by the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed.

G. Impact Wrenches: Properly sized and lubricated air impact wrenches with adequate air pressure shall be utilized for all bolt installation.

H. New Bolts: All bolts shall be new and shall not be reused.

2.5 CONNECTIONS

A. Conceptual connection details with the required member design forces are shown on the drawings for bidding purposes and are applicable to all connections not designed and completely detailed on the drawings. The conceptual details are provided only to indicate the connection type required and may not fully represent the complexity of the connection as required by the final connection design for the forces they must resist. Except as noted below, the fabricator is responsible for engaging the services of a connection specialty engineer to prepare a final connection design for submission that meets the requirements of the conceptual connection details and resists the indicated design forces. Refer to the drawings and specifications for complete requirements.

By bidding this project, the fabricator acknowledges that additional connection elements may not be specifically shown in the conceptual details but may be required by the final connection design, such as stiffener plates, doubler plates, supplement/reinforcing plates or other connection material. The fabricator is responsible to include within his bid all material and labor required to conform to the intent of the conceptual details and to carry the design forces indicated, regardless of whether or not all connection elements (such as stiffener plates, doubler plates, supplement/reinforcing plates or any other connection material) required by final connection design are shown in the conceptual detail.

B. Typical Connection details are indicated on the drawings.

C. Design and Detailing Procedure:

1. Unless noted otherwise or specifically detailed on the drawings, end connections of beams, girders, and trusses shall be designed as flexible and the connection shall accommodate end rotations of the unrestrained beams. Restrained end connections, as indicated on the drawings, shall be designed for the combined effect of bending moment and shears induced by the rigidity of the connection. Forces to be used in the design are described below.
2. The fabricator's licensed professional engineer shall design and submit sealed calculations documenting the design and showing details of the assembled joint with the bolts and welds required for the conditions noted below:

    a. For each connection not otherwise completely detailed on the drawings
    b. Where connections are encountered on the project that does not match those assumed in the AISC Manual or other similar publication.
3. Where connections are of the type than can be selected or completed using information found in tables in the AISC “Steel Construction Manual” or related publications, sealed calculations need not be submitted provided the project design conditions precisely match those assumed in the referenced publications. For conditions encountered on the project that do not conform to the AISC Manual or other similar publication, a complete design shall be prepared and submitted for engineer’s review.
4. The fabricator’s licensed professional engineer shall seal all design calculations.
5. The Engineer reserves the right to reject all shop drawings submitted without complete design calculations if required. Failure to adhere to the requirements of this section obligates the Contractor to take responsibility for any and all resulting delays in the detailing and fabrication of structural steel.

D. Design Intent: It is the intention of the plans and specifications that shop connections be welded or bolted and that field connections be bolted, unless detailed otherwise on the drawings.

E. Preliminary Connection Review: The fabricator shall submit preliminary details of proposed typical connections for Engineer review not less than 14 days prior to the start of preparation of detailed shop drawings. Proposed variations from the details shown on the drawings will be considered and such variations must obtain preliminary approval from the Engineer prior to preparation of detailed shop drawings.

F. Flexible (Simple) Beam Connections:

1. All typical beam simple connections shall conform to requirements of the AISC specifications. Refer to the drawings for typical connection types.
2. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with architectural or MEP requirements.
3. Simple Beam Connection Capacity: Support a factored load reaction R equal to the reaction shown on the plans. Contact the Engineer if no reaction for a beam is shown on the plan. Each connection shall contain not less than the minimum number of bolts shown in the AISC connection tables for each beam size.

G. Restrained (Moment) Connections:

1. Refer to the drawings for Moment Connection Details.
2. Design Reactions for Moment Connected Beams: Shear connections for moment-connected beams shall be designed for the factored reaction shown on the drawings.
3. Design and Furnishing of Reinforcement in Moment Connected Joints: As part of the design responsibility outlined above, the fabricator shall design and furnish all additional reinforcement in moment connected joints to resist the specified design forces unless otherwise specifically detailed on the drawings. Column sections shall be investigated for web shear, web yielding, web buckling, and tension. Stiffeners and/or doubler plates shall be furnished as required by the AISC Specification Section K1.

H. Tightening of Bolts in Welded Moment Connections. At moment connections where beams are complete-joint penetration welded directly to columns or girders in the field, welds shall be made after installation of erection bolts to draw the pieces together and before the final shear connection bolts are tightened. Where loose moment plates are used, such plates shall be groove welded to columns prior to connecting these plates to the beams.

I. Column Splices:

1. Compression Splice: Unless indicated otherwise on the drawings all column splices shall be either a bolted compression splice using high strength snug-tightened bolts or a welded compression splice. Splice and filler plate sizes, thicknesses, and number of fasteners or weld information shall be as shown in Table 14-3 of AISC "Steel Construction Manual". It shall be the fabricator’s responsibility to examine the architectural drawings to verify that splice plates and fasteners do not violate architectural finish requirements.
2. Bearing and Fit-Up of Column Compression Joints: All column splices, except those that are direct welded with complete-joint penetration welds, shall be considered as a compression joint as defined herein unless noted otherwise on the drawings.

J. Base Plates and Bearing Plates:

1. Finish: All baseplates and bearing plates shall be finished in accordance with AISC Specification M2.8.
2. Attachment to Column: Unless shown otherwise on the drawings, all baseplates and bearing plates shall be welded all around to the column with minimum fillet welds as specified in AISC Specification Table J2.4.
3. Anchor Rod Holes in Baseplates: Hole sizes in baseplates for anchor rods shall be made oversize as described in the AISC “Steel Construction Manual”, Table 14-2.

K. Hangers and Braces:

1. Connections for all hangers and braces shall have connections designed to develop the factored axial force shown on the drawings. Contact the Engineer if no force for a member is shown on the drawings.
2. Compression members composed of two or more rolled shapes separated from one another by intermittent fillers shall be connected to one another at such fillers at intervals (not to exceed 48”) so that the slenderness ratio l/r of either shape, between the fasteners, does not exceed 75% of the governing slenderness ratio of the built-up member. The least radius of gyration, r, shall be used in computing the slenderness ratio of each component part.

L. Stiffeners: Provide stiffeners finished to bear under load concentrations where shown on the drawings.

M. Steel Shelf Angles: Shelf angles supporting veneer shown on the drawings to be continuous shall be furnished to a maximum length of 20’-0”. Provide a 1/4" gap at each joint. The gap shall not be welded. The distance from the joint to the first supporting bolt shall not exceed 40% of the bolt spacing (12" maximum). Shelf angles shall be continuous around corners with corner joint complete-joint penetration welded. The distance to the first supporting bolt from the corner shall not exceed 12”.

N. Limitations on Use of A307 Bolts: ASTM A 307 bolts shall not be used in any permanent steel-to-steel or concrete–to-steel connection.

O. Bolts in Combination with Welds: Bolts shall not be considered as sharing the load in combination with welds, except as allowed in AISC Specification Section J1.8.

2.6 SURFACE PREPARATION AND SHOP PRIME PAINTING

A. Specification: Surface preparation, paint, and painting practices shall conform to the "SSPC Painting Manual", Volumes 1 and 2.

B. Scope: All steel shall remain unpainted, except the following:

1. Shop paint surfaces that are to remain exposed to view in the final construction.
2. Shop paint any steel other than weathering steel that, in the final construction, will not be in a controlled environment and is therefore subject to moisture or high humidity infiltration and that has not been specified to be galvanized.
3. Shop paint any steel that is shown on the drawings to receive a finished paint system as defined in Specification Section 099000.
4. Coordinate all shop painting of structural steel with Architect's painting requirements as specified on the architectural drawings and in the specifications. The Fabricator shall be responsible for determining all painting requirements (which surfaces are to be painted or left unpainted) on the project prior to fabrication.

C. Additional Painting Requirements

1. Extend shop paint to 2" from location of welds on surfaces that are to be field welded.
2. All unpainted mating surfaces of all elements that are welded together into an assembly that is permanently exposed to the exterior shall be seal welded in addition to structural welding requirements.
3. If individual elements (including the mating surfaces) of an assembly that is required to be painted are painted prior to welding into an assembly, then all painted surfaces affected by welding shall be touched-up and repaired (according to manufacturer’s instructions, if any) to prevent corrosion bleeding.
4. The fabricator shall be responsible to ensure that all elements of all assemblies that are to be painted are fabricated so that no exposed surface shall be subject to stains due to corrosion bleeding during the warranty period of the paint.
5. Structural steel elements that are bolted with slip-critical joints and are required on the drawings to be painted shall have all faying surfaces (including all surfaces of filler plates, member end supplement plates and welds) painted to comply with the specified slip-critical coating requirement.

D. Surface Preparation - Unpainted Steel: All structural steel that is not specified to receive a shop coat of primer paint shall be prepared in accordance with Society for Protective Coatings specifications as follows:

1. SSPC-SP 2, “Hand Tool Cleaning” or SSPC-SP 3, “Power Tool Cleaning” unless otherwise specified.
2. SSPC-SP 6, “Commercial Blast Cleaning” shall be applied to the faying surfaces of connections that are noted on the drawings as slip-critical connections requiring a Class B surface. Apply this surface preparation to the area surrounding all bolt holes including the area up to 2” outside the outer-most holes.

E. Surface Preparation and Primer Paint - Shop Painted Steel:

1. Surface Preparation: Prepare the surface of all structural steel specified to be shop painted as required by the paint manufacturer or the Society for Protective Coatings specifications, but not less than the following:

    a. SSPC-SP 2, “Hand Tool Cleaning” or SSPC-SP 3, “Power Tool Cleaning” unless otherwise specified.
    b. SSPC-SP 6, “Commercial Blast Cleaning” shall be applied to the faying surfaces (including filler and member-end supplement plates, if any) of connections that are noted on the drawings as requiring a slip-critical coating. At a minimum, apply this surface preparation to the area between and surrounding all bolt holes including the area up to 2” outside the outer-most holes.

2. Priming: Immediately after surface preparation, apply primer to all structural steel specified to be shop primed in strict accordance with manufacturer’s instructions and the Society for Protective Coatings specifications. Apply paint at a rate to conform to the manufacturer’s written instructions and to provide a dry film thickness of not less the 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, welds, and all exposed surfaces. Apply two coats to surfaces that are inaccessible after assembly or erection. Change the color of the second coat to distinguish it from the first coat.
3. Finish Coat: Coordinate shop primer paint requirements with architectural drawings and specifications. The primer selected must be compatible with any specified finish coat.

F. Shop Touch-Up Painting: The Fabricator shall provide for cleaning and touch-up painting of welds, bolted connections (including nuts, bolts, washers, filler plates, member end supplement plates and welds, if any), and abraded areas. Prior to shipment, apply paint to exposed areas using same materials and surface preparation as used for shop painting. Paint shall be applied by brush or spray with minimum dry film thickness of 1.5 mils.

PART 3 - EXECUTION

3.1 ERECTION

A. The Erection work shall comply with the requirements of AISC Specification Section M4.

B. Inspection: Erector shall examine areas and conditions under which structural steel work is to be installed and notify the Contractor and the Architect/Engineer in writing of conditions detrimental to proper and timely completion of the work.

C. Surveys: The following surveys shall be performed.

1. Initial Survey: Check elevations of concrete and masonry bearing surfaces and anchor bolt locations prior to erection and submit any discrepancies to the Engineer prior to the start of erection. Corrections or compensating adjustments to the structural steel shall be made and approved prior to the start of erection.
2. Final Survey: Upon completion of erection of the steel frame, and before the start of work by other trades that may be supported, attached, or applied to the frame, a final survey shall be made and a report submitted certifying compliance with specified tolerances.

D. Erection Tolerances: Erection tolerances of anchor rods, embedded items, and all structural steel shall conform to the AISC Code of Standard Practice, Section 7, unless stricter tolerances are specified elsewhere in the contract documents.

E. Temporary Shoring and Bracing:

1. The lateral-load resisting or stability-providing system and connecting diaphragms are identified on the drawings. Comply with the provisions of the Code of Standard Practice regarding stability of the structure during the erection process, except where stricter requirements are noted herein.
2. The Erector shall design and provide all required temporary shoring and bracing to hold structural framing securely in position and to safely withstand all loads as specified in the Code of Standard Practice and ASCE 37 unless larger loads are required by the local building code or specified

herein. Provide all bracing, any additional structural members, and increase member sizes and/or connections shown on the drawings as required to accommodate the erection loads, methods, sequence of erection, and equipment until the lateral-load resisting or stability-providing system is completely installed. Clearly show all temporary supports and modifications to designed members on the Shop Drawings and the Erection-bracing Drawings. A qualified licensed professional engineer, hired by the Erector, shall design the temporary shoring and bracing and shall seal the erection-bracing drawings.

3. Where architectural or MEP requirements do not allow for any temporary supports, members, erection devices, or connections to be left in place permanently or where such items affect the final structural behavior, they shall be removed by the erector. All costs associated therewith shall be included in the bid price.

F. Wherever the erection equipment is supported by the structure, the Contractor shall be responsible for the retention of a licensed professional engineer to determine the adequacy of the member supporting the erection equipment in relation to the loads imposed thereon. The Contractor shall submit to the Architect/Engineer, for review, the loads that will be imposed by the erection equipment on the building structure. Where the imposed load exceeds the allowable strength, the Contractor shall be responsible for any additional materials, supports, bracing, connections and similar measures required to support the imposed load of the equipment while in use, subject to review by the Architect/Engineer.

G. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work. Furnish 1/8" minimum steel templates for presetting bolts and other anchors to accurate locations. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout. Use only steel wedges or shims.

H. Base Plates and Bearing Plates: Remove loose latent material from bearing surfaces and base and bearing plates. Set plates to the elevation indicated on the drawings and level using steel shims (plastic shims will not be allowed) or by three leveling screws with weldments at the plate edges. After all protruding plates have been trimmed, grout plates solidly between bearing surfaces using the specified grout, ensuring no voids are present. Finish exposed surfaces, protect installed materials, and allow to wet cure. For proprietary grout materials, comply with manufacturer's instructions. Tighten anchor bolts after supported members have been positioned and plumbed.

I. Splices: Splices will be permitted only where indicated on the contract drawings and approved shop drawings. Fastenings of splices of compression members shall be done after the abutting surfaces have been brought completely into contact within AISC tolerances. Bearing surfaces and surfaces that will be in permanent contact are to be cleaned before the members are assembled.

J. Field Assembly of Structural Steel:

1. As erection of the steel progresses, the work shall be fastened securely to safely carry all dead load, wind and erection forces. Particular care shall be exercised to ensure straightness and tautness of bracing immediately upon raising a steel column.
2. Provide temporary planking and working platforms as necessary to effectively complete work.
3. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC tolerances. The Contractor shall coordinate with Erector and Fabricator regarding possible discrepancies in member lengths between temperature at time of fabrication and temperatures during erection, and shall make necessary adjustments to ensure plumbness within AISC tolerances at 70°F. Compensate for cumulative welding draw, construction loadings, sequential applications of dead loads, or any other predictable conditions that could cause distortions to exceed tolerance limitations.
4. On welded construction exposed to view or weather, remove erection bolts, fill holes with plug welds or filler and grind smooth at exposed surfaces.
5. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces receiving field welds.
6. Comply with all bolting and welding requirements of Part 2 of this specification section.

K. Field Modifications to Structural Steel: Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and structural fitting of parts shall be reported

immediately to the Architect/Engineer, and approval of the method of correction shall be obtained. Approved corrections shall be made at no additional cost to the Owner. Do not use cutting torches, reamers, or other devices in the field for unauthorized correction of fabrication errors.

L. Miscellaneous Framing: Provide supplemental structural steel support framing for steel deck where columns, or other framing members or floor openings interrupt normal deck bearing whether shown or not on the architectural, mechanical, or structural drawings.

M. Removal of Erection Aids and Devices: The erector shall remove all erection aids and devices that interfere with architectural finish or MEP requirements.

N. Field Touch-Up Painting:

1. Clean field welds, unpainted areas of bolted connections (including all exposed areas of nuts, bolts, washers, filler plates, member end supplement plates, and welds), and any shop painted areas that are abraded. Apply paint to all exposed areas using same material and surface preparation as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.
2. Clean field welds, ungalvanized areas of bolted connections (including all exposed areas of nuts, bolts, washers, filler plates, member end supplement plates, and welds), and any galvanized areas that are abraded. Prepare surfaces and apply specified galvanizing repair paint in accordance with ASTM A 780.
3. The Contractor shall ensure that, at the substantial completion of the project, all structural steel, bolted and/or welded, required to be painted shall have all necessary steel surfaces painted (including touch-up painting as required) to prevent corrosion bleeding.

O. Headed Stud Anchor Installation:

1. Steel Plates Embedded in Concrete:

a. Studs shall be welded using automatically timed stud welding equipment.
b. Plates must be unpainted and free of heavy rust, mill scale, dirt, sand or other foreign material that will interfere with the welding operation.

P. Clean Up: Clean up all debris caused by the Work of this Section, keeping the premises neat and clean at all times.

3.2 QUALITY ASSURANCE TESTING AND INSPECTION DURING CONSTRUCTION

A. Refer to Specification 01 45 29 “Structural Testing and Inspections” for inspection requirements associated with Structural Steel Framing.

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

1.2 SCOPE OF WORK

A. Extent of steel joists is shown on drawings, including basic layout and type of joists required.

B. Quantity of joists required shall be determined from the contract drawings.

C. Purchase products and systems selected by Architect from the designated supplier.

1.3 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Qualifications: The steel joist manufacturer shall be a firm experienced in manufacturing joists similar to those indicated for this Project. The manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.

B. Design and Fabrication: Provide joists designed and fabricated in compliance with the following, and as herein specified.
1. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for K and LH,/ DLH Series Steel Joists and Joist Girders, adopted November 4, 1985, Revised May 1, 2000.
2. Recommended Code of Standard Practice for Steel Joists and Joist Girders, adopted April 7, 1931, Revised May 1, 2001.
3. Local fabrication requirements of governing authorities such as the city, county and state having jurisdiction over the site where the project is located.
4. SJI Technical Digest #8 "Welding of Open Web Steel Joists"
5. Comply with all OSHA requirements.

C. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society (AWS) qualification procedure.

1.4 SUBMITTALS

A. Qualification Data: Submit evidence of compliance with the requirements listed in section 1.03 A.

B. Shop Drawings: Submit detailed drawings showing layout of joist units, connections, jointing and accessories. Include length, camber, mark, number, type, location and spacing of joists and bridging. Submit details for member splices.

C. Provide templates or location drawings for installation of anchorage devices and bearing plates in other construction materials.

D. Mill Certificates: Submit mill reports for the structural steel used in the joists and for the bolts certifying compliance with specified requirements.

1.5 SHOP INSPECTION

A. The manufacturer's quality assurance inspector shall inspect joists before shipment to insure compliance of materials and workmanship with the documents specified in this specification. In addition, an independent testing laboratory, if requested by the Owner, shall inspect the joist fabrication at the shop. Cooperate with the Owner's testing laboratory and inspectors in all tests and inspections. Repair any defects found prior to shipment of the joists.

1.6 PRODUCTS

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI specifications for chord and web members

B. Steel Bearing Plates: ASTM A 36

C. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.

D. High-Strength Threaded Fasteners: ASTM A 325 heavy hexagon structural bolts with nuts and hardened washers.

E. Steel Prime Paint: Comply with SJI specifications.

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with all documents listed in "Quality Assurance", except as noted below.

B. Splices in Chord Members: All splices shall be designed and provided in accordance with SJI Specifications. The splices in each of the two angles or bars of all members shall not be at the same location, but shall be staggered a minimum of 6 inches.

C. Holes in Chord Members: Provide holes in chord members where shown in contract drawings for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

D. Joists shall be cambered for dead loads: Provide all joists with SJI standard camber unless specified otherwise on the drawings. Review the Structural Drawings and Specifications for information concerning dead loads for joists requiring other than standard camber. Joist camber must be shown on shop drawings submitted for review. Not showing camber information on shop drawings shall be cause for rejection of shop drawings.

E. Joist Bearing: Provide minimum end bearing of joists as required by SJI specifications but subject to requirements below: Provide sloped shoes if joist slope exceeds ¼ inch per 12 inches (1:48).
   1. Joists Less than 60-Foot Span:
      a. If two joists do not abut each other at a support, provide required joist bearing centered on the supporting member unless detailed otherwise on the drawings.
      b. If two joists abut each other at a support and sufficient minimum bearing for each joist exists, provide 1/4" space between joist ends centered over the support unless detailed otherwise on the drawings.
      c. If two joists abut each other at a support and sufficient minimum bearing for each joist does not exist at the support, offset the ends of each joist and center joist bearing on the center of the support.
   2. Joists Greater than or Equal to 60-Foot Span: All joists having a span greater than or equal to sixty feet must have required minimum bearing centered over the support. Joists abutting each other at a support must be offset at the bearing end to satisfy this requirement.

F. Top Chord Extensions and Extended Ends: Provide top chord extensions and extended ends on joists where shown in contract drawings complying with the requirements of SJI specification and load tables.

G. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2" of finished wall surface unless otherwise indicated.

H. Bridging: Provide horizontal and/or diagonal type bridging for all joists, complying with SJI specifications at a minimum.
   1. Examine the drawings carefully for special bridging requirements such as may be required to resist net uplift forces as shown on the drawings or to provide special bracing.
   2. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

I. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with SJI specifications, unless otherwise indicated.

J. Header Units: Any situation requiring heading of joists not shown on the structural drawings shall be referred to engineer for framing.

K. Shop Painting: Remove loose scale, heavy rust, grease, oil and other foreign materials from fabricated joists and accessories by rotary wire brushes and/or solvents before application of shop paint.

Apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1 ERECTION

A. Place and secure steel joists strictly in accordance with SJI code of standard practice, SJI specifications, final shop drawings, and as herein specified.

B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
   1. Comply with SJI specifications regarding required bridging, connections, and anchors to ensure lateral stability during construction. Remove as required for architectural, structural, and mechanical clearances after erection.
   2. Where members support joists from both sides and the supporting width does not meet the SJI recommendations for bearing lengths of both joists, the joists shall be offset to provide recommended bearing lengths. Such offsets shall be subject to approval by the Architect/Engineer.

C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

3.2 ANCHORING JOISTS

A. Anchor steel joists to supporting steel framework with welds, bolts, or a combination of the two in accordance with SJI specifications for type of joists used. Joists on column lines shall be field bolted with high-strength threaded fasteners installed snug tight.

B. Joists where shown with bottom chord extensions shall not have the bottom chords connected to the supporting members until the full dead load is applied.

C. Anchor joists resting on masonry or concrete to steel bearing plates embedded therein with welds, bolts, or a combination of the two in accordance with SJI specifications for type of joists used.

D. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, welded areas, and abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

3.3 ATTACHMENTS TO JOISTS

A. The Contractor shall ensure that no cuts or holes are made in the members of the erected joists for attachment of ceiling, ducts, pipes, or any other items not specifically shown in the contract drawings. Use of power driven fasteners in the diagonal and bottom chord members of the joists is prohibited.

B. The Contractor shall not hang any elements from the top or bottom chords of joists except ceiling, ducts, pipes or other items specifically shown on the Contract Documents, without the written authorization of the Engineer.

All pipes, ducts, and other mechanical, electrical, and plumbing equipment suspended from the joists' top or bottom chord and producing hanger loads exceeding 60 pounds shall have the hanger attached at a joist panel point only except if the chord member is stiffened according to the typical detail shown on the drawings.

All ceilings hung from the joists and producing a concentrated load of 60 pounds or less may have the grid hung anywhere along the bottom chord. Hung ceilings producing more than a 60 pound concentrated load shall have the grid hung only at joist panel points except if the chord member is stiffened according to the typical detail shown on the drawings.

Heavy pipes, ducts, or other equipment hung from joists may require additional reinforcement and shall be referred to the Engineer for framing

3.4 FIELD INSPECTION

A. Joists welded in place are also subject to inspection and testing. Remove and replace work found to be defective and provide new acceptable work at no cost to Owner. Expense of removing and replacing any portion of the steel joists for testing purposes will be borne by the Owner if welds are found to be satisfactory.

END OF SECTION - 052100

SECTION 053113 - STEEL FLOOR DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 - Specification sections, apply to work of this section.

1.2 STANDARDS

The following Standards are listed in this specification:

ASTM A611	Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled
ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3 SCOPE OF WORK

A. Supplier: The metal deck supplier shall furnish all metal deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, pour stops, hanger slots or clips, metal deck edge closures, cell closures, and all related accessories.

B. Erector: The Subcontractor responsible for erecting the metal deck shall provide all labor and equipment as required to place all metal deck components and accessories as described above.

1.4 QUALIFICATIONS

The metal deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.5 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:

1. "Design Manual for Composite Decks, Form Decks, and Roof Decks", as published by the Steel Deck Institute (SDI).

2. "Specification for the Design of Cold Formed Steel Structural Members", as published by the American Iron and Steel Institute (AISI).

3. "Structural Welding Code – Sheet Steel", D1.3, as published by the American Welding Society (AWS).

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

C. Underwriters Label: Provide metal deck units which are listed and conform to Underwriters Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

1.6 SUBMITTALS

A. Product Certification: Submit manufacturer's specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.

B. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, pans, deck openings, special jointing, supplementary framing, and all other accessories.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

See the drawings for location of metal deck types and for depth of deck, design deck properties, design deck yield strength, concrete type, total slab thickness, slab reinforcing, and design superimposed loads. The average rib width to depth of deck ratio shall be greater than or equal to 2.0. The deck properties specified are the values used for the design of the deck shown on the drawings. The deck manufacturer shall be responsible for designing the deck if any one of the proposed deck properties other than depth are less than the minimum or design values stated. The design shall include the ability to carry the construction dead loads and design superimposed loads indicated for all the spans shown on the drawings and to meet all performance criteria as specified by the SDI. Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with “SDI Specifications and Commentary for Composite Steel Floor Deck”.

Acceptable manufacturers include the following:

Canam Steel Corp.
Consolidated Systems, Inc.
DACS, Inc.
Marlyn Steel Decks, Inc.
United Steel Deck, Inc.
Valley Joist/Div. Ebsco Industries, Inc.
Verco Manufacturing Co.
Vulcraft/Div. Nucor Corp.
Wheeling Corrugating Co.

Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADE OF STEEL

Composite metal deck shall be cold formed from steel sheets conforming to ASTM A611 Grade C or D or ASTM A653, Structural Steel Grade, with a minimum yield strength of 40 ksi. The delivered thickness of the uncoated steel shall not be less than 95% of design thickness. Sheet metal accessories shall conform to the same material specification as the deck product.

2.3 FINISH

A. Galvanized: Composite metal deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 RELATED PRODUCTS

A. Flexible Closure Strips: Provide manufacturers standard vulcanized closed cell, synthetic rubber.

B. Acoustic Sound Barrier Closures: Provide manufacturers standard mineral fiber closures.

2.5 FABRICATOR

A. Metal Deck Spans: The deck properties shown on the drawings are selected so that the spans do not exceed the maximum clear spans with unshored construction as required by SDI criteria unless indicated otherwise on the drawings. The deck manufacturer shall be responsible for supplying a deck that meets that criterion. Where possible, all metal deck shall extend over three or more spans. Simple span deck will not be permitted unless it is shored at midspan. Any additional concrete topping specified over the composite slab shall be placed after the slab has reached 75% of its design strength.

B. Cell Closure at Ends of Metal Deck Flutes: Fabricate metal closure strips of not less than 0.0358" minimum (20 gage) cold formed sheet steel. Form to provide tight fitting cell closures at open ends of cells or flutes to prevent wet concrete from leaking through open cells.

C. Pour Stop Closures at Slab Edges: Provide sheet metal pour stop closures at all slab edges, columns, walls, and openings unless steel angles or bent plates are specified in details on the drawings. The closures shall be fabricated from light gage steel not less than the thickness shown in the table below when the slab edge is parallel to the deck span. Provide a return lip on the vertical leg in accordance with the SDI Design Manual. The overhang dimension is measured from the edge of the flange to the edge of the slab.

Overhang =	0”-2”	2”-4”	4”-6”	6”-8”	8”-10”
Slab Thickness					
5.25	18	16	14	12	10
6.25	16	14	12	12	10
6.5	16	14	12	12	10
8.0	12	12	10	10	NA

2.6 COMPOSITE SLAB REINFORCEMENT

See drawings for reinforcement in composite slabs. See Section 03 30 00, “Cast-in-Place Concrete”, for minimum reinforcement requirements.

2.7 OPENINGS IN METAL DECK

For unframed openings, provide blockout in slab for opening with deck uncut. Cut deck at opening after concrete has reached 75% of its design strength. See Section 03 20 00, “Concrete Reinforcement”, for reinforcing in the slab around all unframed openings in metal deck that are greater than 10" in width in either direction.

2.8 CHLORIDE ADMIXTURES

The use of admixtures in concrete containing chloride salts shall not be permitted for metal deck concrete.

2.9 EXTRA CONCRETE REQUIRED BY DECK DEFLECTION

The General Contractor shall include in his bid additional concrete required for metal deck slabs to account for deck deflection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install deck units as accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:

1. Place deck units on supporting framework and adjust to final position with ends accurately aligned and bearing 1 1/2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

6. Do not use floor deck units for storage or working platforms until permanently secured.

B. Attachment of Composite Deck:

1. Typical Welding of Deck: Metal deck units shall be welded to the structural support members with 5/8" ϕ puddle welds at each end of sheet and each intermediate support at each low flute, unless more frequent attachment is specified on the drawings. Where two deck units abut each other, each unit shall be so welded.

2. Side Laps: Unless noted otherwise on the drawings, side laps of adjacent units shall be fastened by welding (1-1/2 inch long), sheet metal screws (No. 10 or larger) or button punching at maximum intervals not exceeding the lesser of ½ of the span or 36".

3. Welding to Girder: Metal deck units shall be welded to girders (steel framing that is parallel to span of deck) with 5/8" ø puddle welds at 12" o.c. If the metal deck is not continuous across the girder, the deck on each side of the girder shall each be welded to the girder with 5/8" ø puddle welds at 12" o.c.

4. Welding Washers: Welding washers shall be used when welding steel deck units less than 0.028" thickness.

5. Welding of Composite Deck used on Roof: In addition to the minimum attachment specified above, typical areas of the roof deck shall be welded to resist the net uplift pressures as specified in the General Notes on the drawings

6. Minimum Bearing: Provide a minimum deck bearing of 1 1/2" over all supports with butted end joints.

C. Welding Requirements: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work.

F. Hanger Slab or Clips: Provide UL approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.

1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.

2. Locate slots or clips at not more than 14" o.c. in both directions, not over 9" from walls at ends, and not more than 12" from walls at sides, unless otherwise shown.

3. Provide manufacturer's standard hanger attachment devices.

4. Loads hanging from metal deck slabs shall not exceed 100 pounds unless specifically detailed otherwise on the drawings.

G. Joint Covers and Cell Closures: Weld steel sheet joint covers at abutting ends, except where taped joints are specified. Weld steel sheet column closures, cell closures and Z-closures to deck with 1" long weld at 12" maximum centers to provide tight-fitting closures at open ends of ribs, unless shown otherwise on the drawings.

H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated. Provide minimum 2" bearing over steel support.

3.2 TOUCH-UP PAINTING

After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.3 INSPECTION

Welded decking in place is subject to inspection and testing by the Owner's Testing Laboratory. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work. Cost of such removal and replacement shall be borne by the Contractor.

END OF SECTION 053113

SECTION 053123 - STEEL ROOF DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SCOPE OF WORK

A. Supplier: The steel deck supplier shall furnish all steel deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, steel deck edge closures, cell closures, cant strips, sump pans, and all related accessories.

B. Erector: The Subcontractor responsible for erecting the steel deck shall provide all labor and equipment as required to place all steel deck components and accessories as described above.

1.3 QUALIFICATIONS

A. The steel deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.4 QUALITY ASSURANCE

A. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

B. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:

1. SDI, "Design Manual for Composite Decks, Form Decks, and Roof Decks."
2. AISI, "Specification for the Design of Cold Formed Steel Structural Members."
3. AWS D1.3, "Structural Welding Code – Sheet Steel."

C. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

D. Underwriters Laboratories Classifications:

1. Provide steel deck units which are listed and conform to Underwriters Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific fire-resistant system detailed.
2. Provide units and construction meeting the requirements of Construction No. 157 as listed in the 2000 UL “Roofing Materials & Systems Directory” under Roof Deck Constructions (TGKX) and rated as a Class 90 assembly. and with each deck unit bearing the UL label and marking for specific wind-rated system detailed.

E. Factory Mutual Listing: Provide steel roof deck units which have been evaluated by Factory Mutual Research Corporation and are listed as an approved product in "Factory Mutual Research Approval Guide 2006- Building Materials."

1.5 SUBMITTALS

A. Product Certification: Submit manufacturer's specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.

B. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, supplementary framing, and all other accessories.

C. Insurance Certification: Assist Architect and Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire, windstorm, and extended coverage insurance.

D. Welding Certificates: Submit Copies of certificates for welding procedures and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. See General Notes on the drawings for the location, depth of deck, design thickness, and type of deck required.

B. Acceptable manufacturers include:
1. ASC Steel Deck.
2. Canam Group.
3. Consolidated Systems, Inc.
4. Cordeck.
5. Epic Metals Corp.
6. Loadmasters Systems, Inc.
7. Marylyn Steel Decks, Inc.
8. New Millennium Building Systems, Inc.
9. United Steel Deck, Inc.
10. Valley Joist, Inc.
11. Verco Manufacturing Co.
12. Vulcraft/Div. Nucor Corp.
13. Wheeling Corrugating Co.
14. Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADES OF STEEL

A. Steel deck shall be manufactured from steel conforming to ASTM A1008 Grades C, D, or E for painted deck or A653, Structural Steel Grade for galvanized deck or Engineer approved equal, having a minimum yield strength of 33,000 PSI.

2.3 FINISH

A. Galvanizing: Steel deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G90.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 ROOF DECK ACCESSORIES

A. Provide minimum 20 gauge ridge and valley plates, minimum 20 gauge cant strips, minimum 14 gauge sump pans, minimum 20 gauge inside or outside closure channels angles or plates, minimum 20 gauge butt strips at change of deck directions, and minimum 20 gauge filler sheets.

2.5 MECHANICAL FASTENERS

A. Powder-Actuated or Pneumatically Driven Pins: Provide corrosion-resistant, powder-actuated or pneumatically driven fasteners manufactured from steel conforming to AISI 1060 or 1061 steel, austempered to a core hardness of 52 to 58 Rockwell C. Fasteners shall have a knurled shank and shall be zinc-plated in accordance with ASTM B633, Sc. I, Type III.

1. Subject to compliance with requirements, provide products of one of the following manufacturers:

a. Hilti, Inc.
b. ITWBuildex.
c. Pneutek, Inc.

B. Self-Drilling Screw Fasteners: Provide corrosion-resistant, hexagonal head, steel self drilling screws, austempered to a core hardness of Rockwell C 50.

1. Subject to compliance with requirements, provide products of one of the following manufacturers:

a. ITWBuildex.
b. Grabber Construction Products.
c. SFS Intec Fastening Systems, Inc., Wyomissing.
d. Textron Fastening Systems.

2.6 SIDE-LAP FASTENERS:

A. Provide Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

2.7 FABRICATION

A. General: Fabricate deck panels, without top-flange stiffening grooves, to comply with “SDI Specifications and Commentary for Steel Roof Deck”, in SDI Publication No. 29, and the following.

B. Steel Deck Spans: Where possible, all steel deck shall extend over three or more supports. Single span deck is prohibited.

2.8 ROOF OPENINGS

A. Provide a 20 gage galvanized flat plate to reinforce openings in roof deck that are greater than 6” and less than 10” in any one direction.

B. Refer to drawings for opening that are larger than 10” in any one direction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:

1. Place deck units on supporting framework and adjust to final position with accurately aligned side laps and ends bearing 2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks. Place the end joint over a chord angle for deck bearing on steel bar joists.
2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
6. Do not use roof deck units for storage or working platforms until permanently secured.

B. Attachment of Roof Deck:

1. The method of attachment, attachment pattern, and side lap fastener type and spacing shall be as shown on the drawings and comply with the requirements noted below.
2. Method of Attachment: The attachment method noted in the drawings shall comply with the applicable requirements below.

    a. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting member. Welding washers shall be used only when welding steel deck less than 0.028" thickness. The diameter of the puddle weld on the supporting member shall be, at a minimum, the diameter stated in the drawings but no less than 1/2 inch.
    b. Powder-Actuated or Pneumatically Driven Pins: An operator licensed by the pin manufacturer shall install all pins. Comply with the manufacturer's requirements to install the pins through all layers of the deck material and the manufacturer’s required embedment into the supporting member.
    c. Self-Drilling Fasteners: Comply with the manufacturer's requirements to install the screws through all layers of the deck material and the manufacturer's required embedment into the supporting member.

3. Side Lap Fastening: Unless required otherwise by provisions of this specification, side laps of adjacent units shall be fastened by #10 (min.) TEK screws so that spacing between supports and fasteners does not exceed the value prescribed on the drawings. Button Punching is not allowable as a side-lap fastener.
4. End Bearing: Provide a minimum end bearing of 2" over supports.
5. End Joints: End joints of sheets shall be lapped 2” minimum over supports. Decks that slope 1/4 inch or more in 12 inches in the long direction shall be erected beginning at the low side to insure that end laps are shingle fashion.
6. Underwriters Laboratories Wind Uplift Classification Requirements: Unless a more stringent attachment requirement is specified elsewhere in this specification or on the drawings, roof deck units shall be attached to the supporting structure as required by the Construction Number specified elsewhere in this section.
7. Attachment to Girders: At locations noted in the drawings, attach the deck to steel members that are parallel to the deck flutes in accordance with the requirements noted in the drawings.

C. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

D. Reinforcement at Openings: Roof openings less than 6" square or diameter require no reinforcement. Openings 6" to 10" inclusive shall be reinforced with a 20 gauge galvanized plate welded to the deck at each corner and 6" maximum centers with a 5/8" diameter puddle weld or sheet metal screws. For openings greater than 10" in diameter or width, refer to the drawings and structural steel specifications for additional framing to support the deck around the opening.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld in each corner.

F. Joint Covers: Provide steel joint covers at changes in direction of deck units, except where taped joints are specified.

G. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, and reinforcing channels according to deck manufacturer’s written instructions. Weld to substrate to provide a complete deck installation.

3.2 TOUCH-UP PAINTING

A. After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

3.3 QUALITY ASSURANCE INSPECTION DURING CONSTRUCTION

A. The method of attaching the deck to the frame is subject to inspection by the Owner’s designated Testing Laboratory. The Contractor shall, at its own expense, remove work found to be defective and replace with new acceptable work.

B. The Owner shall engage a qualified testing and inspection agency (The Owner’s Testing Laboratory) to perform the following inspections and prepare reports.

1. Welding or Self-drilling Fasteners

a. Visually inspect 100% of the attachment of the steel deck to the structural frame and at side laps.
b. Periodically monitor the method of attaching the steel deck to the structural frame.

2. Powder-actuated or pneumatically-driven pins

a. Visually inspect 100% of the Powder-Actuated or Compressed-Air fasteners using an inspection gauge supplied by the manufacturer to verify that the stand-off distance from the top of the deck is in accordance with the manufacturer's requirements.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Load-bearing wall framing.
   2. Exterior non-load-bearing wall framing.
   3. Floor joist framing.
   4. Roof rafter framing.
   5. Ceiling joist framing.
   6. Soffit framing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.
B. Shop Drawings:
   1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Sustainable Documentation Submittals:
   1. Recycled Content:
      a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
      b. Include statement indicating costs for each product having recycled content.
   2. Regional Material:
      a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
      b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Member in good standing of the Steel Framing Industry Association (SFIA) or be a part of a similar organization that provides verifiable code compliance program.
   1. Products to be certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.
B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including Base-Steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association (SFIA), or be a part of a similar organization that provides verifiable code compliance program.
D. Comply with AISI Specifications and Standards.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI's "Code of Standard Practice"..

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CEMCO Steel Framing Systems
2. ClarkDietrich Building Systems.
3. MarinoWARE.
4. Steel Network, Inc. (The).

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/360 supporting cement plaster veneer and 1/600 supporting masonry veneer.
b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 supporting EIFS and ACM veneer, 1/360 supporting cement plaster veneer, and 1/600 supporting masonry veneer.
c. Floor Joist Framing: Vertical deflection of 1/360 for live loads and l/240 for total loads of the span.
d. Roof Rafter Framing: Vertical deflection of 1/240 of the horizontally projected span for live loads.
e. Ceiling Joist Framing: Vertical deflection of 1/240 of the span for live loads and 1/240 for total loads of the span.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
a. Upward and downward movement of 3/4 inch or as otherwise indicated on the structural drawings.
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards: Unless more stringent requirements are indicated, the following shall comply with AISI S100 and AISI S240.
1. Floor and Roof Systems .
2. Wall Studs.
3. Headers.
4. Lateral Design.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEELFRAMING, GENERAL

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 30 percent.

B. Framing Members, General: Comply with ASTM C 955 for conditions indicated

C. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: As required by structural performance
2. Coating: Non Coastal Areas: CP 60: G60 (Z180), A60 (ZF180), AZ50 (AZM150), or GF30 (ZGF90)

b. Coastal Areas: CP 90: G90 (Z275), AZ50 (AZM150), or GF45 (ZGF135)Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As required by structural performance.

2. Coating: G60 (Z180) typical and G90 (Z275)

2.4 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch.
   2. Flange Width: 1-5/8 inches
B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch.
   2. Flange Width: 1-1/4 inches.
C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch.
   2. Flange Width: 1-5/8 inches.
D. Headers and Jambs - Heavy-Duty Stud: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
   1. Product: ClarkDietrich Building Systems; Heavy Duty Stud (HDS) and Header Bracket (HDSC), or comparable product.
   2. Minimum Base-Steel Thickness: Matching steel studs.
   3. Web and Flange Widths, Type HDS: 6 by 3 by 2-1/4 by 3/4 inch (152 by 76.2 by 57.2 by 19.1 mm).
   4. Web and Flange Widths, Type HDSC: 5-7/8 by 3-1/16 by 2 inches (149 by 77.8 by 50.8 mm).

2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 1-5/8 inches .
B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 1-1/4 inches .
C. Headers and Jambs - Heavy-Duty Stud: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
   1. Product: ClarkDietrich Building Systems; HDS Heavy Duty Stud and HDSC Header Bracket] [RedHeader PRO, or comparable product.
   2. Minimum Base-Steel Thickness: [0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)] [Matching steel studs].
   3. Web and Flange Widths, Type HDS: [3-5/8 by 3 by 1-1/16 by 3/4 inch (92.1 by 76.2 by 27.0 by 19.1 mm)] [6 by 3 by 2-1/4 by 3/4 inch (152 by 76.2 by 57.2 by 19.1 mm)].
   4. Web and Flange Widths, Type HDSC: [3-1/2 by 3-1/16 by 2 inches (88.9 by 77.8 by 50.8 mm)] [5-7/8 by 3-1/16 by 2 inches (149 by 77.8 by 50.8 mm)].
D. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. CEMCO Steel Framing Systems
      b. ClarkDietrich Building Systems.
      c. MarinoWARE.
      d. Steel Network, Inc. (The).
E. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 1 inch plus twice the design gap for other applications .

2.6 FLOOR JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, punched, with enlarged service holes, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 1-5/8 inches , minimum.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 1-1/2 inches , minimum.

2.7 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 2 inches , minimum.

2.8 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch .
   2. Flange Width: 2 inches , minimum.

2.9 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0538 inch 0.0966 inch.
   2. Flange Width: 2 inches , minimum.

2.10 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
      a. Product: ClarkDietrich Building Systems; Spazzer 5400 Bridging Bar (SPZS), Spazzer Bar Guard (SPBG), or comparable products
   3. Web stiffeners.
      a. Product: ClarkDietrich Building Systems; QTWS, or comparable product
   4. Anchor clips.
      a. Product: ClarkDietrich Building Systems; Moment Clip (MC Series), Holdown (CD Series)], or comparable products
   5. End clips.
   6. Foundation clips.
   7. Gusset plates.
   8. Stud kickers and knee braces.
   9. Joist hangers and end closures.
   10. Hole reinforcing plates.
   11. Backer plates.

2.11 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by mechanically deposition according to ASTM B 695, Class 50.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.12 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.13 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
   4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to ASTM C 1007 and AISI S240 “North American Standard for Cold-Formed Steel Structural Framing,” and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
   1. Anchor Spacing: As shown on Shop Drawings.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
   1. Stud Spacing: As required by design, but not less than 18 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
   1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
   2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
   1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
1. Stud Spacing: As required by design, but not less than 18 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
1. Install single deep-leg deflection tracks and anchor to building structure.
2. Connect vertical deflection clips to studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as follows:
1. Joist Spacing: As indicated.

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.
D. Remove and replace work where test results indicate that it does not comply with specified requirements.
E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Preassembled steel stairs with concrete-filled treads.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

1.4 ACTION SUBMITTALS

A. Product Data: For metal pan stairs and the following:
   1. Paint products.

B. Sustainable Documentation Submittals:
   1. Recycled Content:
      a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
      b. Include statement indicating costs for each product having recycled content.
   2. Regional Material:
      a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
      b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
      c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and its distance from the project site.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Delegated Design: Provide calculations demonstrating that members and fasteners will meet code required loading in the municipality where the project is located.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Uniform Load: 100 lbs. / sq. ft..

2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 30 percent.
C. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
   1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.
D. Post-Installed Anchors: capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces.
B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
E. Form exposed work with accurate angles and surfaces and straight edges.
F. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously unless otherwise indicated.

5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards"
    a. Finish # 1 Welds: No evidence of a welded joint
    b. Finish # 2 Welds: Completely sanded joint, some undercutting and pinholes OK.
    c. Finish # 3 Welds: Partially dressed weld with spatter removed
    d. Finish # 4 Welds: Good quality, uniform undressed weld with minimal spatter.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.6 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:
1. Fabricate stringers of steel channels.
    a. Provide closures for exposed ends of channel stringers.
2. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.
1. Steel Sheet: Uncoated cold -rolled steel sheet unless otherwise indicated.
2. Shape metal pans to include nosing integral with riser.
3. At Contractor's option, provide stair assemblies with metal pan sub-treads filled with reinforced concrete during fabrication.
4. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platform framing.
    a. Smooth Soffit Construction: Construct sub-platforms with flat metal under surfaces to produce smooth soffits.

2.7 STAIR RAILINGS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

2.8 FINISHES

A. Finish metal stairs after assembly.

B. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

3.2 ADJUSTING AND CLEANING
A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055113

SECTION 064113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Architectural wood cabinets.
   2. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
   3. Shop finishing of architectural wood cabinets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products cabinet hardware and accessories and finishing materials and processes.
   1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
   4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
   5. Apply WI Certified Compliance Program label to Shop Drawings.
   6. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection:
   1. Shop-applied transparent finishes.
   2. Shop-applied opaque finishes.
   3. PVC edge material.
   4. Thermoset decorative panels.

D. Samples for Verification:
   1. Lumber for transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
   2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
   3. Lumber and panel products with shop-applied opaque finish, 5 inches wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color, with[one-half of] exposed surface finished.
   4. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish[, with edge banding on one edge].
   5. Corner pieces as follows:
      a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
   6. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For the following:
   1. Composite wood and agrifiber products.
   2. Thermoset decorative panels.
   3. Glass.
   4. Adhesives.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of typical architectural wood cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113.

B. Required Certification: A minimum of 50% of wood, calculated by cost, shall be obtained from forests certified by an FSC accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Required Certification: Composite wood products shall contain No Added Urea-Formaldehyde (NAUF) in the product or laminating adhesives used to fabricate the product.

2.2 ARCHITECTURAL CABINET FABRICATORS

A. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Brochsteins, Inc.
2. Robert Shaw Mfg. Co., Inc.
3. Environment Limited.
4. CRC Mastercraft, LLC, Khoury.

2.3 ARCHITECTURAL WOOD CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork[, including installation,] complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

2.4 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Custom.
B. Type of Construction: Frameless.
C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.
D. Reveal Dimension: As indicated.
E. Panel Product for Exposed Surfaces:
   1. Exposed casework in non-wet areas: Medium-density fiberboard, Type A
   2. Exposed casework in semi-wet areas (restroom and breakrooms with sinks): Medium-density fiberboard, Type B
   3. Exposed casework in wet areas (laboratories, locker rooms, laundry area and cafeteria): Medium-density fiberboard, Type C
F. Wood for Exposed Surfaces: As indicated.
   1. Species: As indicated in drawings or Master Schedule.
   2. Cut: As indicated in drawings or Master Schedule.
   3. Grain Direction: As indicated in drawings or Master Schedule.
   4. Matching of Veneer Leaves: As indicated in drawings or Master Schedule.
   5. Veneer Matching within Panel Face: As indicated in drawings or Master Schedule.
   6. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
   7. Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
G. Semiexposed Surfaces: Provide surface materials indicated below:
   1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
   2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
   3. Drawer Bottoms: Hardwood plywood.
H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
   1. Join subfronts, backs, and sides with glued dovetail joints.

2.5 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
   2. Wood Moisture Content: 8 to 13 percent.
B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Medium-Density Fiberboard: ANSI A208.2, Grade 130 , made with binder containing no urea formaldehyde.
      a. Type A : MDF, MR10 – ANSI A208.2, Grade 130.
      b. Type B: MDF, MR30 – ANSI A208.2, Grade 155.
      c. Type C: MDF, MR50 – ANSI A208.2, Grade 150
   2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
   3. Softwood Plywood: DOC PS 1.
   4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
   5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
      a. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed edges.

2.6 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.
C. 1 inch deep.
D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
E. Shelf Rests: BHMA A156.9, B04013; metal.
F. Drawer Slides: BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted; full-extension type; epoxy-coated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. File Drawer Slides:
a. Integrated drawer slide and side panel, full extension, self-closing feature with 2-5/8 inches (60 mm) self-closing range, built-in drawer front adjustment and bumpers, smooth, quiet travel, white baked-on epoxy finish.
4. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
a. Pencil drawer slides.
1) Basis of Design: Zargen Grass; Unigrass System.
5. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
6. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
7. File Drawer Slides: Full extension member and file railing system.
8. For computer keyboard shelves, provide Grade 1HD-100.
9. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.
G. Door Locks: BHMA A156.11, E07121.
H. Drawer Locks: BHMA A156.11, E07041.
I. Door and Drawer Silencers: BHMA A156.16, L03011.
J. Hanging Rail System for Wall Cabinets:
1. Basis of Design: Hafele; Item No. 290.11.901 Wall and Rail and Suspension Fitting, Item No. 290.00.700 and 701.
K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: BHMA 630.
L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.7 MISCELLANEOUS MATERIALS
A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.8 FABRICATION
A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.9 SHOP FINISHING
A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
   1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

C. Transparent Finish:
   1. Grade: Custom.
   2. Finish: System - 11, catalyzed polyurethane.
   3. Staining: Match approved sample for color.
   4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
   5. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
   6. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
   1. For shop finished items use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   2. Maintain veneer sequence matching of cabinets with transparent finish.
   3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
   1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064113

SCIENCE. SERVICE. SOLUTIONS.

CARLISLE COATINGS & WATERPROOFING

WATERPROOFING

MiraSTOP™ CG-HS

Description

MiraSTOP CG-HS is a **C**hemical **G**rout with **H**igh **S**trength once it is combined with MiraSTOP CG-HS CAT (Catalyst) and then allowed to react with water. This one-component, solvent-free, high-expansion, high-strength polyurethane injection resin is mainly used for wet cracks and water cutoff applications and has a free expansion of +4,000%.

The reaction speed can be adapted easily by varying the catalyst content from 6% to 10%. The more catalyst is added, the faster the reaction time will be. The reaction with water yields a flexible polyurethane foam with closed cells that will neither shrink nor swell. A high compression strength is obtained in very short time.

Installation

Pour the MiraSTOP CG-HS resin into a dry, clean 5-gal pail. Shake the MiraSTOP CG-HS CAT well and add to the resin in a ratio of 6% to 10% in function of the desired reaction speed (refer to Reaction Time Chart). Stir until sufficiently mixed and without streaks.

Use a one-component pump dedicated specifically to MiraSTOP polyurethane chemical grouts. Pumps should be cleaned with MiraSTOP Pump Flush, a cleaning agent specially developed for cleaning of polyurethane injection pumps.

Refer to ASTM D8109 - Standard Guide for Waterproofing Repair of Concrete by Chemical Grout Crack Injection for joint/crack preparation, port spacing, port drilling procedures, packer placement, and grout injection procedures

MiraSTOP CG-HS is very hygroscopic and packed under dry atmosphere. Use opened containers as soon as possible.

Reaction Time*

Catalyst Dosage	Reaction Speed	Polymerization
6%	15 seconds	70 seconds
8%	12 seconds	55 seconds
10%	9 seconds	45 seconds

*Typical times measured at room temperature.

Packaging

MiraSTOP CG-HS is supplied in 5-gal metal pails, 36 pails (180 gal) per pallet.

MiraSTOP CG-HS CAT is supplied in 32 oz. cans, 8 cans per carton, 60 cartons (480 cans) per pallet.

Availability

Available through local CCW and Henry® Representatives or Distribution. Visit www.carlisleccw.com or www.henry.com to contact us, or select "Find a Rep or Distributor."

Limitations

MiraSTOP CG-HS resin must be used with MiraSTOP CG-HS CAT.

Warnings and Hazards

Review Safety Data Sheets before handling; available online at www.carlisleccw.com or www.henry.com.

Do not breathe dust, fumes, mist, vapor, or spray. In case of inadequate ventilation, wear proper respiratory protection.

Wear proper protective gloves, clothing, and eye/face protection.

Carlisle Coatings & Waterproofing
900 Hensley Lane | Wylie, TX 75098 | 800.527.7092 | **www.carlisleccw.com**

WATERPROOFING
MiraSTOP CG-HS

Storage

To avoid problems, it is very important to understand that both the MiraSTOP CG-HS resin and MiraSTOP CG-HS CAT are temperature- and moisture-sensitive. Always store resin and catalyst in a protected and dry location in original, unopened containers. Do not store in direct sunlight or in temperatures below 50°F (10°C) or above 86°F (30°C).

For best results, acclimate both the resin and catalyst at temperatures between 65–75°F (18–24°C) for a minimum of 24 hours prior to application.

When stored at temperatures between 50–86°F (10–30°C) in the original, unopened containers, shelf life for both the resin and catalyst is 12 months.

Disposal

Uncured resin and catalyst are considered hazardous materials and must be handled and disposed as such, in accordance with local, state, and federal regulations.

Physical Properties

Property	Typical Value	Test Method
MiraSTOP CG-HS Resin		
Density	72,29 lb/ft³	EN ISO 2811-2:2002
Viscosity	96 mPa.s	EN ISO 3219:1994
Isocyanate	18,1 M.-%	EN 1242:2006
Flash Point	> 300°F	
Color	Brown	
MiraSTOP CG-HS CAT (Catalyst)		
Density	55,50 lb/ft³	EN ISO 2811-2:2002
Viscosity	21 mPa.s	EN ISO 3219:1994
Flash Point	> 300°F	
Color	Transparent	
MiraSTOP CG-HS Cured Grout		
Density Free Foam	2.2 lbs. PC Ft	ASTM D3574
Density Confined	87.4 lbs. per ft. 1.4 g/cm³	ASTM D3574 EN ISO 2811
Compressive Strength	40 – 4,200 psi	Contingent on confinement

Limited Warranty

Carlisle Coatings & Waterproofing Incorporated (Carlisle) warrants this product to be free of defects in workmanship and materials only at the time of shipment from our factory. If any Carlisle materials prove to contain manufacturing defects that substantially affect their performance, Carlisle will, at its option, replace the materials or refund its purchase price. This limited warranty is the only warranty extended by Carlisle with respect to its materials. There are no other warranties, including the implied warranties of merchantability and fitness for a particular purpose. Carlisle specifically disclaims liability for any incidental, consequential, or other damages, including but not limited to, loss of profits or damages to a structure or its contents, arising under any theory of law whatsoever. The dollar value of Carlisle's liability and buyer's remedy under this limited warranty shall not exceed the purchase price of the Carlisle material in question.

Carlisle Coatings & Waterproofing
900 Hensley Lane | Wylie, TX 75098 | 800.527.7092 | **www.carlisleccw.com**

CCW-12403 - "CCW MiraSTOP CG-HS Technical Data Sheet"

SECTION 07 16 04
CONCRETE FLOOR MOISTURE TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish labor, materials, tools, equipment, and services for Concrete Floor Moisture Testing in accordance with provisions of Contract Documents.

B. Completely coordinate with Section 07 16 05, Water Vapor Emission Control System, and work of other trades.

C. Contractor's Responsibilities:
1. Provide pre-installation coordination with concrete and space acclimatization trades upon building enclosure.
2. Facilitate testing and inspection and furnish labor to assist Owner's testing agency at site.
3. Advise Owner's testing agency sufficiently in advance of operations to allow for completion of routine testing and for assignment of personnel.

1.2 QUALITY ASSURANCE

A. Section includes testing agency administrative and procedural requirements for quality assurance and quality control in performing concrete moisture testing for compliance with floor finishes.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated and do not relieve Contractor's responsibility for compliance with Contract Document requirements.

C. Testing Agency Qualifications:
1. Firm experienced in field of concrete floor moisture testing for projects similar in scope, material, design, and extent indicated for this Project.
2. International Concrete Repair Institute (ICRI) Certified in moisture and pH testing, conducting ASTM tests, and interpretation of results.

D. ASTM International (ASTM):
1. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
2. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in situ Probes

1.3 SUBMITTALS

A. See Section 01 33 00 for requirements.

B. Product Data:
1. For each type of material and accessory.

C. Project Information:
1. Prepare schedule of tests and inspections in tabular form to include following:
   a. Specification Section number and title.
   b. Description of test and inspection method.
   c. Identification of applicable standards.
   d. Identification of test and inspection methods.
   e. Number of tests and inspections required.
   f. Time schedule or time span for tests and inspections.
   g. Entity responsible for performing tests and inspections.
   h. Requirements for obtaining samples.
   i. On elevated slabs on metal deck, test at deepest portion of deck flute.
   j. Each test shall be identified by its own unique number directly on concrete and site map.

k. Digital pictures of testing methods in place.

2. Submit reports of test results and include following:
   a. Date of issue.
   b. Project title and number.
   c. Name, address, and telephone number of testing agency.
   d. Dates and locations of samples and tests or inspections.
   e. Names of individuals making tests and inspections.
   f. Description of Work and test and inspection method.
   g. Record for each test listing interior temperature, interior humidity, concrete internal RH, moisture vapor, and alkalinity results for testing period for both new or existing concrete slabs or both.
   h. Test and inspection results and an interpretation of test results.
   i. Provide electronic copy of Architectural Floor Plans identifying each test by number and location where conducted.
   j. Name and signature of laboratory inspector.
   k. Recommendations on retesting and re-inspection.
3. Testing equipment and devices used to conduct tests:
   a. Product data for components.
   b. Date of most recent calibration as required by manufacturer.

D. Contract Closeout Information:
1. Testing Agency shall include closeout document including testing reports, test location maps, submittal information for installed below grade vapor barrier, concrete mix designs, admixtures, curing methods and moisture control products utilized on project.

1.4 SEQUENCING

A. Owner Responsibilities:
1. Owner shall engage qualified Testing Agency to perform testing specified herein.
2. Payment for testing services will be made by Owner directly to testing agency.
3. Costs for retesting and reinspection construction that replaces or is necessitated by work that failed to comply with the Contract Documents shall be paid by Owner and charged to Contractor by an adjustment to Contract Sum through a Change Order.

B. Testing Agency Responsibilities:
1. Cooperate with Contractor and Architect in performance of duties.
2. Provide qualified personnel to perform required tests and inspections.
   a. Provide documented confirmation of previous projects completed of similar size and scope of proposed project.
   b. Technicians conducting or overseeing performance of moisture testing are required to be International Concrete Repair Institute (ICRI) certified to Grade 1, Moisture Testing Technician level.
3. Notify Contractor and Architect promptly of irregularities or deficiencies observed in Work during performance services.
4. Determine locations from which test samples will be taken.
5. Provide test results marked on finish floor plan drawings showing test results with vapor reduction system recommendations.
6. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
7. Submit a certified written report for each test, inspection, and similar quality assurance service to Owner, Architect, and Contractor.

C. Schedule of Tests and Inspections:
1. Allow adequate time for results of tests, inspections and moisture control system to conclude prior to erection of interior walls, fixtures and equipment.
2. Prepare a schedule of tests, inspections, and similar quality control services required by Contract Documents.

3. Submit schedule within 30 days of date established for Notice to Proceed.
4. Distribute schedule to Owner, Architect, Contractor, testing agencies, and each party involved in performance of portions of Work where tests and inspections are required.
5. Preinstallation Conference:
   a. Testing Agency, Owner, Architect, and Contractor shall meet 90 days prior to flooring installation to discuss testing requirements, specifications, and locations of test sites.

D. Acclimate building to working environment as required by manufacturer requirements of specified flooring materials and in accordance with ASTM F2170 requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Base:
   1. Wagner Electronics.

B. Optional:
   1. American Moisture Test.
   2. Delmhorst Instrument Co.
   3. Tramex.

2.2 MATERIALS

A. Testing equipment shall be from single source, meeting specified requirements:
   1. Alkalinity (pH): ASTM F710.
      a. Wide Range 1-14pH.
   2. Moisture Vapor Emission Rate (MVER): ASTM F1869.
      a. Weight of water evaporation.
   3. Relative humidity (RH): ASTM F2170.
      a. Relative humidity range of 0-100 PCT.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify building weatherproof, exterior doors installed and windows secured.

B. Begin testing process when concrete installation is minimum 90 days of age.

3.2 PREPARATION

A. Prepare test sites per ASTM F710 and ASTM F2170.

B. Conditioning: Minimum 48 HRS prior to testing:
   1. Concrete floor slabs: Service temperature.
   2. Occupied air space above the floor slab: Service temperature.
   3. Occupied air space relative humidity above floor slab: Service humidity.
   4. Continue conditioning required until and during floor installation and adhesive cure.

C. Clearly mark each test location on floor plan and directly on concrete surface with non-removable marker.

3.3 TESTING

A. Test concrete for each area of each non-permeable flooring type.

B. Perform tests at rate of 3 tests for areas up to 1000 SQFT , and 1for each 1000 SQFT thereafter.

C. HVAC system shall be operational during testing period and for a minimum period of 60 days preceding tests.
   1. Record temperature and humidity readings at start and end of testing.

2. Continue conditioning after flooring installation as required by applicable manufacturers.
3. If proper conditions cannot be achieved during construction process and testing is performed results shall be used as preliminary information only.
    a. Re-testing when conditions are achieved or application of Section 07 16 05 scope is required.

D. Perform in-situ probe tests per probe manufacturer's specifications with regard to temperature and humidity of space being tested.
1. Proof of calibration is required for each sensor or testing apparatus prior to use.
2. Test conditions: Service temperature and humidity.

E. Perform digital Alkalinity (pH) tests within water vapor emission test dome.
1. Test in accordance with ASTM F710 and manufacturer's recommendations.
2. Apply manufactures recommended liquid to form 1 IN diameter puddle.
3. Allow liquid to absorb for 60 seconds.
4. Expose probe to liquid and allow meter to calculate pH level for 10 seconds.
5. Document results to nearest hundredth.

F. Perform Relative Humidity (RH) tests.
1. Test in accordance with ASTM F2170 and manufacturer's recommendations.
2. Drill hole to diameter and length required for concrete thickness.
3. Remove concrete debris by compressed air and vacuuming holes.
4. Place RH probe sleeve in opening, secure cap and allow acclimating for minimum 72 HRS.
5. Protect from wet work and trade traffic.

G. Acceptable readings during HVAC operation shall be in accordance with following:
1. Relative Humidity Level per ASTM F2170: Less than 75 PCT.
2. Alkalinity-pH per ASTM F710: Acceptable Range 7.0 pH to 10.0 pH.

H. Section 07 16 05 Water Vapor Emission Control System is required where test results are found unacceptable per flooring manufacturer installation recommendations and requirements.

3.4 POST-INSTALLATION TESTING

A. Coordinate and conduct tests for moisture vapor emissions and alkalinity reductions to comply with specifications prior to placement of self-leveling cementitious surfacing.

B. Repair and re-test locations where system is found to be deficient prior to commencement of topping installation and scheduled floor covering products.

END OF SECTION

SECTION 07 16 05
WATER VAPOR EMISSION CONTROL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish labor, materials, tools, equipment, and services for Water Vapor Emission Control System, as indicated, in accordance with provisions of Contract Documents.

B. Coordinate with Section 07 16 04, Concrete Floor Moisture Testing, and work of other trades.

1.2 SYSTEM DESCRIPTION

A. Water Vapor Emission Control System:
   1. Two component fluid applied epoxy based coating which restricts excessive levels of relative humidity and extreme alkalinity readings at below-grade, on-grade and suspended concrete floor slabs for compliance with subsequent floor coverings or coating materials.
   2. Primer:
      a. One or two component non-porous moisture tolerant primer as recommended by manufacturer of control system.
   3. Cementitious Surfacing:
      a. Self-leveling, calcium aluminate base formula.
      b. Compressive strength: 4,100 PSI minimum.
      c. Nominal thickness of 1/8 IN to1/4 IN over treated floor surface as required by system manufacturer.
      d. Provide smooth porous substrate suitable for application of finish flooring and moisture absorption from adhesive.
   4. Provide 100 percent coverage of interior on grade, below grade, and slab on deck floor areas.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Minimum five (5) years in production of water vapor emission control system products.
   2. Meet source limitations and assume responsibility for performance of materials supplied by or approved by manufacturer.
   3. Product Liability Insurance in amount of not less than five (5) million dollars per occurrence.
   4. Warranty program covering cost associated with correction of system component failure, labor and collateral product failure as result, per section warranty requirements.

B. Installer Qualifications:
   1. Firm with not less than five (5) years of successful installations.
   2. Equipment required to prepare concrete and apply products per manufacturer’s requirements for warranted installation.
   3. Submit minimum of five (5) project references of similar size and scope.
   4. Personnel employed by, trained or certified by, system manufacturer.

C. Single source responsibility for Water Vapor Emission Control System including but not limited to:
   1. Mechanical preparation of concrete surfaces.
   2. Application of system components.
   3. Placement of cementitious surfacing.

D. Install specified, or Manufacturer approved, products from one source to provide compatible products of consistent quality in appearance and physical properties.

E. American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

F. ASTM International (ASTM):
1. ASTM D1308 Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
2. ASTM D7234 Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
3. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM F710 Preparing Concrete Floors to Receive Resilient Flooring
5. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride
6. ASTM F2170 Standard Test Method for Determining Relative Humidity-RH in Concrete Floor Slabs Using in situ Probes.
7. ASTM F3010 Standard Practice for Two-Component Resin Based Membrane Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings

G. Provide products that do not contain, or are classified as:
1. More than 65 g/liter VOC content.

H. Preconstruction Conference:
1. See Section 01 31 19.

1.4 SUBMITTALS

A. Product Data:
1. Manufacturers' product data sheets, details and installation instructions including components and accessories, indicating product used in compliance with specifications.

B. Project Information:
1. Independent ASTM testing reports.
2. Manufacturer's installer certificate.
3. Sample certificate of Warranty.
4. Sample certificate of Product Liability Insurance.
5. Manufacturer certification products comply with 1.3 Quality Assurance requirements.
6. Minutes from Preinstallation Conference.

C. Contract Closeout Information:
1. Warranty:
a. Provide upon completion of Water Vapor Emission Control System installation.
2. Certificate of Product Liability Insurance.
3. Test result documentation of post cure and post seal control application for alkalinity- pH tests.
a. Indicate test locations and results on electronic copy of floor plans.

1.5 SPECIAL WARRANTY

A. Provide manufacturer materials and labor for repair or replacement of damaged finish flooring system and remedial work to replace Water Vapor Emission Control System in event of treatment system failure for a period of fifteen (15) years, including:
1. Deficiencies in system resulting from installation or manufacturing defects.
2. Material and labor to replace damaged finish flooring due individually, or a combination of, concrete moisture, relative humidity, or alkalinity from substrate originated sources, joints, or cracks.
3. Concrete cracks, joints and slab imperfections after application.
4. Mitigation of biological growth, if present.
5. ACI-318, dew point, concrete salts, admixtures, resin, and silicate surface treatments.

B. Provide warranty underwritten by product liability insurance carrier having a minimum Secure "A" rating by A. M. Best, or equivalent rating system, in amount of five million dollars ($5,000,000) per occurrence.

C. Submit warranty as confirmation of compliance with warranty requirements prior to commencement of finished flooring materials.
   1. Include statement that substrate is prepared and ready to accept commercial floor covering products specific to project requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Water Vapor Emission Control System:
   1. Base:
      a. Allied Construction Technologies, AC Tech 2170.
      b. Apac, Apac 70.
      c. Aquafin International, Vaportight Coat SG3.
      d. Ardex Engineered Cements, MC Rapid Moisture Control.
      e. Concrete Curative Systems, LLC. CCS - S2 Fast Cure System
      f. Koster American, VAP I 2000.
      g. Mapei, Planiseal VS or Mapei Planiseal VS Fast.

B. Other Manufacturers desiring approval comply with provisions in Section 01 25 00.

2.2 DESIGN CRITERIA

A. Water Vapor Emission Control System Performance:
   1. Spread rate of water vapor emission control system shall maintain tolerances with following performance requirements after application:
      a. Alkalinity (pH) resistance per ASTM F710: 14pH, 100 percent resistant.
      b. Relative Humidity (RH) per ASTM F2170: 100 percent RH tolerant.
      c. Moisture Vapor Emissions Rate (MVER) per ASTM F1869:
         1) No upper moisture limit:
   2. Adhesion strength per ASTM D7234: 100 percent concrete failure.

2.3 MATERIALS

A. Moisture Control System:
   1. For use over normal and lightweight concrete floor slabs, suspended, on grade and below grade.
   2. Two component fluid applied topical mitigation system.
   3. High density 100 percent solids epoxy resin.

B. Primer:
   1. As required and approved by manufacturer.

C. Cementitious Surfacing:
   1. 4,100 PSI minimum.

D. Testing: See Section 07 16 04.
   1. Concrete alkalinity-pH, and relative humidity-RH testing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review concrete mix designs, admixtures, below slab vapor barrier and curing methods.

B. Install in accordance with control system manufacturer instructions in compliance with independent testing agency test reports for digital alkalinity-pH per ASTM F710 and relative humidity RH per ASTM F2170.

C. Installation constitutes acceptance of substrate and responsibility for system performance.

3.2 PREPARATION

A. Edge grind near wall base, columns, edges and difficult to reach areas prior to shot blasting.

B. Abrade concrete surfaces using No. 390 - 420 shot to create an International Concrete Repair Institute (ICRI) No. 3 -5 profile or as recommended by water vapor emission control system manufacturer.

C. Overlap edge grinding.

D. Clean joints using a crack chasing blade to remove debris.

E. Broom-sweep and vacuum surfaces slab surfaces to remove dust and debris.

F. Do not use clean sweeping agents or chemicals to clean surface.

3.3 INSTALLATION

A. Install system components with manufacturer trained, certified or employed personnel.

B. Saturate cracks and joints with control system material to seal inner walls of crack or joint, then fill with flexible sealant or control system as recommended by manufacturer.

C. Apply control system coating and surface irregularities with manufacturer approved two-component epoxy resin fill and allow to cure and set prior to application of control system coating at rate recommended by manufacturer based upon test data.

D. Allow to cure and set in accordance with manufacturers recommendations.

E. Verify product thickness using a digital mil gauge at minimum of twenty (20) locations.
   1. Report results to manufacture’s technical representative for written approval and warranty registration.

F. Install cementitious surfacing after mil thickness testing verifies proper application rates of control system and testing reveals success in application

G. If required by cementitious surfacing installation, apply primer over control system surfaces at rate and cure as recommended by manufacturer.

H. Place cementitious surfacing a minimum of 1/8 IN to 1/4 IN thickness over substrate to produce smooth flooring compatible surface.

I. Protect finished surfaces from construction damage, contamination of oil, grease, paint, excess water, and sweeping compounds prior to installation of finish flooring materials.

3.4 FIELD QUALITY CONTROL

A. Prior to placement of cementitious surfacing, conduct post-installation testing for moisture vapor emissions and alkalinity at areas receiving Water Vapor Emission Control System.
   1. See Section 07 16 04.

B. Correct deficiencies as recommended by manufacturer of Water Vapor Emission Control System, where tests do not meet specified levels.

C. Final surfaces shall be compatible with floor coverings and require no special floor adhesives or methods and confirm products meet or exceed requirements of flooring covering sections.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data

B. Surface-Burning Characteristics: According to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

A. Glass-Fiber-Blanket Insulation: ASTM C 665, **Type I, unfaced** Sound batt insulation between toilet rooms with flame-spread and smoke-developed indexes of 25 and 450, respectively.

1. Manufacturers:[**One of the following:**]

a. CertainTeed Corporation.
b. Guardian Building Products, Inc.
c. Johns Manville.
d. Knauf Insulation.
e. Owens Corning.
f. <**Approved equal**>.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.

B. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

C. Except for loose-fill insulation and insulation that is friction fitted in stud cavities, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

D. Spray-Applied Insulation: Apply insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs.

END OF SECTION 072100

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

1.2 QUALITY ASSURANCE

A. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air and vapor barrier membranes. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

B. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds for the specific authority having jurisdiction.

C. Field Quality Assurance: Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the owner. Do not cove air and vapor barrier until it has been inspected, tested and accepted.

D. Mock-Ups: Build mock-up of representative of primary exterior wall assemblies and glazing assemblies, including backup wall and typical penetrations. Mock up shall be suitable for testing.

1.3 WARRANTY

A. Material Warranty: Provide manufacturer's standard product warranty, for a minimum of 3 years from date of substantial completion.

B. Installation Warranty: Provide air barrier subcontractor's 2 year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Air-Barrier Assembly Air Leakage: Maximum **0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa)**, when tested according to ASTM E 283, ASTM E 783, or ASTM E 2357, and ASTM E 2178.

2.2 MATERIALS

A. Fluid Applied Air and Vapor Barrier: Fluid applied proprietary materials as specified. Us regular or low-temperature formulation depending on the site conditions, within temperature ranges specified by the manufacturer. Provide related accessories including primer, seam tape, mastic,, fluid and sealant recommended by the manufacturer. Subject to compliance with requirements, provide one of the following:

1. BASF Corporation- Wall Systems:
   a. Fluid Applied Air Barrier Membrane: Enershield-I, Senershield-VB, Finestop-VB.
   b. Fabric Reinforcement: Sheathing Fabric to be saturated with BASF Fluid Applied Membrane for use at sheathing joints, penetrations and window rough openings.
   c. Flashing and Transition Membrane: TF Membrane / WS Flash polyester-faced 30-mil self-adhesive membrane or TF Wrap / WS Wrap polyethylene-faced 20 mil self-adhesive membrane.
   d. Water-based Primer for Slef-Adhesive Membranes: WS Flashing Primer.
   e. Mastics: As recommended by manufacturer.
2. Carlisle Coatings & Waterproofing Inc.
   a. Fluid Applied Air and Vapor Barrier: Fire-Resist Barritech NP, 70 to 80 mils thick (wet).
   b. Detail Flashing: Fire-Resisti 705 FR
   c. Counterflashing for Metal Wall Flashing: Fire-Resist 705 FR
   d. Water based primer for Detail Flashing: CCW-702 WB
   e. Solvent based primer for Detail Flashing: CCW-702 or CCW-702 LV.
   f. Solvent-based Aerosol primer for Detail Flashing: CAV-GRIP.
   g. Reinforcing Fabric: DCH Reinforcing Fabric.
   h. Glass Mat: Liquifiber-W
   i. Termination Mastic: SURE_SEAL Lap Sealant.
   j. Fill Compound: CCW-201 or CCW-703V.
3. Grace Construction Products:
   a. Fluid Applied Air and Vapor Barrier: Perm-A-Barrier Liquid, 60 mils thick (wet).
   b. Water-Based Primer for Flashing, Transition strip and Detail Membrane: Perm-A-Barrier WB Primer.
   c. Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane: Bituthene Primer B-2 and Bituthene Primer B@ LVC.
   d. Through Wall Flashings or Shelf Angle Flashings: Perm-A-Barrier Wall Flashing.
   e. Mastics, Adhesives and Tapes: As recommended by Grace Construction Products.
   f. Transition Strip: Perm-A-Barrier Detail Membrane and Perm-A-Barrier Wall Flashing.
   g. Termination Mastic: Bituthene Liquid Membrane and as recommended by Grace Construction Products.
   h. Window Flashing and Detail Membrane: Perm-A-Barrier Detail Membrane and Perm-A-Barrier Wall Flashing.
4. Henry Company
   a. Fluid Applied Air and Vapor Barrier, Low VOC: Air Bloc 32MR, 75 to 115 mils thick (wet)
   b. Transition Membrane: Blueskin SA and Blueskin SA LT for low-temperature applications.
   c. Water-Based Primer for Transition Membrane: Aquatec Primer.
   d. Solvent-Based Primer for Transition Membrane: Blueskin Adhesive.
   e. Solvent-based Aerosol Primer for Transition Membrane: Blueskin Spray Prep.
   f. Counterflashing for Masonry Through Wall Flashing: Blueskin TWF.

g. Mastics, Adhesives and Tapes: Henry 570-05 Polybitume.

5. Protective Coatings Technology, Inc.
   a. Poly-Wall Air Lik Flex at 8-10 mils thick (dry).
   b. Water Based Primer: As recommended by manufacturer.
   c. Solvent-Based Primer: Poly-Wall AirLok or AirLok Flex as recommended.
   d. Counterflashing for Masonry Through –Wall Flashings. Poly-Wall CrackGuard.
   e. Mastics, Adhesives and Tapes: As recommended by manufactuer.
6. W.R.Meadows, Inc.
   a. Fluid Applied Air and Vapor Barrier: Air-Shield LM and Air-Shield LM All Season (for cold temperature applications), 60 mils (wet), 45 mills (dry).
   b. Detailing Strips: Air-Shield Self-Adhering Air Barrier.
   c. Water-Based Primer: Mel-Prim WB.
   d. Solvent –Based Primer: Mel-Prime VOC and Mel-Prime NE.
   e. Counterflashing for Masonry Through Wall Flashings: Air-Shield Thru-Wall Flashing.
   f. Mastics, Adhesives and Tapes: Pointing Mastic.
   g.

2.3 ACCESSORIES

A. General: Furnish primers, transition and flashing strips, mastics, sealants, glass fabric scrim tape and other accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examination of substrates, areas, and conditions under which air and vapor barrier assemblies will be applied, with installer present, for compliance with requirements.
   1. Ensure that the following conditions are met:
      a. Surfaces are sound, dry, even and free of oil, grease, dirt, excess mortar or other contaminants.
      b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
      c. Masonry are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
   2. Verify substrate is surface dry. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test. Surface dry is an acceptable substrate condition if acceptable to the manufacturer.
   3. Verify Sealants used in the sheathing are compatible with membrane proposed for use, Perform field peel-adhesion test on materials to which sealant are adhered.

B. Joint Treatment: Prepare and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions.

   1. Concrete and Masonry: Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces. Prime substrate and apply a single thickness of

air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches (75 mm) along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

2. Gypsum Sheathing: Apply first layer of fluid air-barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier membrane over joint reinforcing strip.

C. Install transition strips and auxiliary materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier. Install transition strips so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.

D. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier membrane with foam sealant.

E. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier membrane in same day. Re-prime areas exposed for more than 24 hours.

F. Apply air-barrier membrane to form a seal with termination strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions.

G. Apply under normal working conditions above 45 degrees F and rising. Do not apply when rain is imminent.

H. Apply with brush or spray equipment. Soft brushes free from stiff bristles should be used and the material applied in even strokes. When spraying, apply in one coat with a 50% overlap of the spray pattern to obtain a uniform and continuous coating, carrying coating and around joints, grooves, and slots, following reveals and soffits of window’s, and continuing12 inches out on adjoining partitions and soffits as instructed by the manufacturer.

I. Ensure continuous coating free of breaks, voids and pinholes.

J. Thoroughly cover all cracks, joints and corners.

K. Provide fluid applied air and vapor barrier and transition strips in all exterior cavity walls on concrete masonry units, and on all exterior sheathing including, but not limited to, areas above soffits, doors and windows and behind stucco and plaster.

L. Connect air and vapor barrier in exterior wall assembly **continuously** to the air barrier of the roof, to concrete below grade structures, to windows, curtain wall, storefront, louvers, exterior doors and other intersection conditions and perform sealing of penetrations.

M. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make smooth transition from one plane to another.

N. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.

O. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.

P. Cooperate with owner's testing agency and ABAA auditors. If evidence of moisture penetration is discovered, apply an additional coat of approved fluid applied air and vapor barrier and/or transition strips to exterior surface, repeating application and testing (at no additional cost to the Owner) until no evidence of moisture penetration is found.

END OF SECTION 072726

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Installer certificates signed by Installer certifying that products have been installed in compliance with requirements.

PART 2 - PRODUCTS

2.1 PENETRATION FIRESTOPPING

A. Manufacturers: **One of the following:**

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. Passive Fire Protection Partners.
8. RectorSeal Corporation.
9. Specified Technologies Inc.
10. 3M Fire Protection Products.
11. Tremco, Inc.; Tremco Fire Protection Systems Group.
12. USG Corporation.

B. Provide penetration firestopping materials that are compatible with one another, substrates, and penetrating items if any.

C. Penetrations in Fire-Resistance-Rated Walls and Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating at Fire-Resistance-Rated Walls: Not less than that of construction penetrated.
2. F-Rating at Horizontal Assemblies: At least 1 hour, but not less than that of construction penetrated.
3. T-Rating at Horizontal Assemblies: At least 1 hour, but not less than the fire-resistance rating of construction penetrated except for penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Designation of applicable testing and inspecting agency.
3. Manufacturer's name.
4. Installer's name.

C. Owner will engage a qualified testing agency to perform tests and inspections.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and color Samples.

B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Low-Emitting Materials: Sealants shall comply with the following limits for VOC content:

1. Architectural Sealants: 250 g/L.
2. Nonmembrane Roof Sealants: 300 g/L.
3. Single-Ply Roof Membrane Sealants: 450 g/L.
4. Other Sealants: 420 g/L.
5. Sealant Primers for Nonporous Substrates: 250 g/L.
6. Sealant Primers for Porous Substrates: 775 g/L.
7. Modified Bituminous Sealant Primers: 500 g/L.
8. Other Sealant Primers: 750 g/L.

B. Low-Emitting Materials:

1. Exterior reactive sealants shall have a VOC content of not more than 50 g/L or 4 percent by weight, whichever is greater.
2. Other exterior caulks and sealants shall have a VOC content of not more than 30 g/L or 2 percent by weight, whichever is greater.
3. Interior sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.

D. Sealant for General Exterior Use Where Another Type Is Not Specified[**, One of the Following**]:

1. Single-component, nonsag polysulfide sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.

   a. Products: One of the following:

      1) Pacific Polymers International, Inc.; Elastoseal 230 Type I.
      2) **W. R. Meadows, Inc.;** Deck-O-Seal One Step.

2. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.

   a. Products: **One of the following:**

      1) Dow Corning Corporation; 799.
      2) GE Advanced Materials Silicones; [**UltraGlaze SSG4000**] [**UltraGlaze SSG4000AC**].
      3) May National Associates, Inc.; [**Bondaflex Sil 200 GPN**] [**Bondaflex Sil 201 FC**].
      4) Polymeric Systems, Inc.; PSI-631.
      5) Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
      6) Tremco Incorporated; [**Proglaze SSG**] [**Tremsil 600**].

3. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; and for Use NT.

   a. Products: **One of the following:**

      1) BASF Building Systems; [**Sonolastic NP1**] [**Sonalastic TX1**] [**Sonolastic Ultra**].
      2) Bostik, Inc.; Chem-Calk [**900**] [**915**] [**916 Textured**].
      3) May National Associates, Inc.; [**Bondaflex PUR 25**] [**Bondaflex PUR 25 Textured**] [**Bondaflex PUR 40 FC**].
      4) Pacific Polymers International, Inc.; Elasto-Thane 230 Type II.
      5) Pecora Corporation; Dynatrol I-XL.
      6) Polymeric Systems, Inc.; Flexiprene 1000.
      7) Schnee-Morehead, Inc.; [**Permathane SM7100**] [**Permathane SM7108**] [**Permathane SM7110**].
      8) Sika Corporation, Construction Products Division; Sikaflex - 1a.
      9) Tremco Incorporated; [**Dymonic**] [**Vulkem 116**].

E. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and **Toilet Rooms** and **Around Plumbing Fixtures**:

1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.

   a. Products: **One of the following:**

1) BASF Building Systems; Omniplus.
2) Dow Corning Corporation; 786 Mildew Resistant.
3) GE Advanced Materials - Silicones; Sanitary SCS1700.
4) May National Associates, Inc.; Bondaflex Sil 100 WF.
5) Pecora Corporation; 898.
6) Tremco Incorporated; Tremsil 200 Sanitary.

F. Sealant for Interior Use at Perimeters of Door and Window Frames:

1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

a. Products: **One of the following:**

1) BASF Building Systems; Sonolac.
2) Bostik, Inc.; Chem-Calk 600.
3) May National Associates, Inc.; **Bondaflex 600**
4) Pecora Corporation; AC-20+.
5) Schnee-Morehead, Inc.; SM 8200.
6) Tremco Incorporated; Tremflex 834.

G. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

a. Products:[**One of the following:**]

1) Pecora Corporation; **AIS-919**.
2) USG Corporation; SHEETROCK Acoustical Sealant.

2.2 MISCELLANEOUS MATERIALS

A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 1193.

B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers: **One of the following:**

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Deansteel Manufacturing Company, Inc.
6. Firedoor Corporation.
7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.
9. Karpen Steel Custom Doors & Frames.
10. Kewanee Corporation (The).
11. Mesker Door Inc.
12. Pioneer Industries, Inc.
13. Security Metal Products Corp.
14. Steelcraft; an Ingersoll-Rand company.
15. Windsor Republic Doors.

B. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches (44 mm) thick unless otherwise indicated.

1. Interior Doors: **Level 1 and Physical Performance Level C (Standard Duty)** metal face.
2. Exterior Doors: **Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless),** metallic-coated steel sheet faces.

    a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than [**2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W)**] R-13 when tested according to ASTM C 1363.

3. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates from same material as door face sheets.

C. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.

1. Steel Sheet for Interior Frames: **0.042-inch- (1.0-mm-)** minimum thickness.
2. Interior Frame Construction: **Full profile welded**..
3. Steel Sheet for Exterior Frames: **0.067-inch- (1.7-mm-)**] minimum thickness**, metallic coated**.
4. Exterior Frame Construction: **Full profile welded**.
5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
6. Frame Anchors: Not less than 0.042 inch (1.0 mm) thick.

D. Door Louvers: **Sight**, **Light** proof per SDI 111C.

E. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.

F. Grout Guards: Provide where mortar might obstruct hardware operation.

G. Prepare doors and frames to receive mortised and concealed hardware according to SDI A250.6 and BHMA A156.115.

H. Reinforce doors and frames to receive surface-applied hardware.

I. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with SDI A250.10 acceptance criteria.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 (Z180 or)A60 (ZF180).

D. Frame Anchors: ASTM A 879/A 879M, 4Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hollow metal frames to comply with SDI A250.11.

B. Install doors to provide clearances between doors and frames as indicated in SDI A250.11.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer. **Use galvanizing repair paint for metallic coated surfaces.**

END OF SECTION 081113

SECTION 081416 – PLASTIC LAMINATE FACED WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Samples for **plastic-laminate-faced** doors.

B. Warranty: Provide a written warranty for the work specified for lifetime replacing, including cost of rehanging and refinishing, at no cost to owner, doors exhibiting defects in materials or workmanship including warp in excess of ¼ inch as defined by AWI, warp or twist to a degree that door will not operate properly, delamination of face and telegraphing or show through of stiles, rails, or core greater than 0.01 inch in any 3 inch area.

PART 2 - PRODUCTS

2.1 Manufacturers: One of the following with a minimum of 5 years experience manufacturing products meeting or exceeding the guidelines

A. Algoma Hardwoods, Inc.

B. Ampco, Inc.

C. Buell Door Company Inc.

D. Chappell Door Co.

E. Eagle Plywood & Door Manufacturing, Inc.

F. Eggers Industries.

G. Graham; an Assa Abloy Group company.

H. Haley Brothers, Inc.

I. Ideal Architectural Doors & Plywood.

J. Ipik Door Company.

K. Lambton Doors.

L. Marlite.

M. Marshfield Door Systems, Inc.

N. Mohawk Flush Doors, Inc.; a Masonite company.

O. Oshkosh Architectural Door Company.

P. Poncraft Door Company.

Q. Vancouver Door Company.

R. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Quality Standard: WDMA I.S.1-A.

B. Fire-Rated Wood Doors: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at positive pressure according to NFPA 252 or UL 10C. Reference construction document drawings for locations and rating.

C. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

D. WDMA I.S.1-A Performance Grade:
1. Standard Duty: **Closets (not including janitor's closets) Private toilets**.

E. Particleboard-Core Doors: Provide **blocking in particleboard cores or provide** structural composite lumber cores instead of particleboard cores for doors with [**exit devices**] [**or**] **protection plates**..

F. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated. Provide the following for mineral-core doors:

1. Composite blocking where required to eliminate through-bolting hardware.
2. Laminated-edge construction.
3. Formed-steel edges and astragals for pairs of doors.

2.3 PLASTIC LAMINATE FACED WOOD DOORS (See Door Schedule on Drawings)

A. Materials
1. The 1-3/4 inch flush interior non rated wood door shall be made up of 3-ply AWI PC-HPDL-3 High Pressure Decorative Laminate (HPDL), bonded 32 lb per cubic foot particle core, bonded 1 -3/8 inch stile and 1-1/8 inch min rails abrasively planed as an assembly prior to laminating ,factory machine fit. Structural lumber cores are required at doors with more than 40 percent of door removed due to light or vent cutouts or doors with exit devices.
2. Flush interior fire rated wood doors shall meet the above requirements and shall be scheduled to be fire-rated, receiving the appropriate label, with a 20 minute rated core.
3. Doors indicated to have closures shall contain a 7 inch top rail blocking, 5 inch bottom-rail blocking in doors indicating armor kick plates, and 5 inch mid-rail and corner blocking in doors indicated to have exit devices.

B. Accessories

1. Glazing shall be factory applied and shall be compatible with positive pressure requirements.
2. Glass stops, where needed, shall be metal type painted to match door frame. Stops prepared for countersink require tamper proof screws.
3. Adhesive shall be type 1, hot pressed.
4. The top, bottom and cut surface of openings shall be sealed at the factory with two coats of varnish.
5. Exposed vertical edges – plastic laminate that matches factory face laminate.

2.4 LOUVERS AND LIGHT FRAMES

A. Louvers: **Clear-anodized aluminum louvers**.

2.5 FABRICATION AND FINISHING

A. Factory fit doors to suit frame-opening sizes indicated and to comply with clearances specified.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3., hardware schedules, shop drawings, DHI A115-W series standards, and hardware templates.

C. Cut and trim openings to comply with referenced standards.
   1. Factory install louvers in prepared openings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.

   1. Install fire-rated doors to comply with NFPA 80.

   2. Coordinate work with door opening construction, and door and frame hardware installation.

B. Align **and fit** doors in frames with uniform clearances and bevels. **Machine doors for hardware. Seal cut surfaces after fitting and machining.**

C. Verify that frames comply with indicated requirements for type, size, location and swing characteristics and that the frames are installed plumb, level and parallel.

D. Clearances: As follows unless otherwise indicated:

   1. 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
   2. 1/2inch from bottom to sill, except 1/4 inch clearance from top of carpeting.
   3. 1/4 inch (6.4 mm) from bottom of door to top of threshold.- exterior doors.
   4. Comply with NFPA 80 for fire-rated doors.

E. Repair, refinish, or replace factory-finished doors damaged during installation, as directed by Architect.

F. Do not remove or paint over labels on labeled doors.

G. Protect doors from damage and replace door that are damaged. Verify that tops and bottoms of doors have been sealed prior to installation, as required for warranty.

END OF SECTION 081416

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The Work required under this section is the complete design, fabrication, and installation of a new standard stick built storefront framing system, that shall be conventionally glazed, captured on all four sides, and erected on site.

B. Section Includes:
   1. Exterior storefront framing
   2. Interior storefront framing
   3. Exterior manual-swing entrance doors
   4. Interior manual-swing entrance doors

C. This is a Design/Build performance specification where Contractor assumes complete responsibility for the design, installation, and performance, of the completed exterior wall installation in meeting the performance standards identified herein and the Architect's aesthetic requirements as reflected in the Drawings. The Contractor also is responsible for ensuring that the design of its specific anchorage system for the Glazed Aluminum Storefront System will attach to the building's structural framing system without the anchorage system intruding into interior finished area. The Building Structural Engineer has designed the building structural system to accommodate the loads (dead and live loads) imposed upon it by the Glazed Aluminum Storefront System. Modifications (if any) to the building's structural system, as designed by the Building Structural Engineer, that are required to accommodate anchor locations particular to the Glazed Aluminum Storefront System's specific anchorage design are to be included in the Work for the Glazed Aluminum Storefront System.
   1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
   2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
   3. Provide Storefront and door systems including their components, engineered by registered professional engineers, licensed to practice structural engineering in jurisdiction where Project is located. Coordinate work to provide continuous, exterior skin assembly, complying with specified performance requirements for air and water infiltration, including at intersections and transitions between adjacent systems.
   4. Provide concealed fastening for the storefront wall systems wherever possible.
   5. Coordinate shop drawings and installation of storefront and door systems to resolve conflicts.
   6. Allow for installation tolerances, thermal expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.
   7. Storefront and door systems shall be free from rattles, wind whistles, and noise due to thermal and structural movement and wind pressure.
   8. Attachment considerations shall take into account site peculiarities and expansion and contraction movements to eliminate loosening, weakening, or fracturing of connections between units and building structure or between units themselves.
   9. Exclude glass, sealants, and interior finishes when determining framing member strength, stiffness, and lateral stability.
   10. Storefront systems shall drain to exterior face of wall at the specified performance pressures; water entering system and condensation occurring within system shall be conveyed to the exterior by drain holes and gutters of adequate size to evacuate water without infiltration to interior.
   11. Provide components exposed to view of uniform color and profile appearance.

1.3 DEFINNITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Documentation Submittals:
   1. Recycled Content:
      a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
      b. Include statement indicating costs for each product having recycled content.
   2. Regional Material:
      a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
      b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
      c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and its distance from the project site.
   3. VOC content data. Provide for any adhesives, sealants, paints, or coatings used on the interior of the building.
      a. Product information or statement from manufacturer indicating the VOC content of the product in grams per liter (g/L).

C. Shop Drawings: For aluminum-framed entrances and storefronts. Include project specific plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.
   3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation registered in the State of Texas.

1.6 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Mockup Testing Submittals:
   1. Testing Program: Developed specifically for Project.
   2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
   3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

B. Qualification Data: For Installer.

C. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

D. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

E. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.9 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings or, if not shown on Drawings, as directed by Architect.
2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits set by authorities with jurisdiction.

B. General Performance: Comply with requirements specified herein as determined by testing of glazed aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Aluminum-framed entrances and glazed aluminum storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Water infiltration.
      d. Noise or vibration created by wind and thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Failure of operating units.
      g. Sealant failure.
      h. Damage to or failure of glazing, framing members, and/or structural connections.
      i. Deflection exceeding specified limits.

C. Delegated Design: Design glazed storefronts, including comprehensive engineering analysis by a qualified professional engineer, registered in the State of Texas, using performance requirements and design criteria indicated.

D. Structural Requirements: Provide storefront systems and components engineered by registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located in accordance with the requirements listed below.

E. Structural Loads:
   1. Wind Loads: As indicated on Structural Drawings.

F. Deflection of Framing Members: At design wind pressure, as follows:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.
   3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175:
   4. Main framing members shall have no permanent deformation in excess of 0.1 percent of their clear span
   5. Member support points limited to 1/16” maximum deflection under the most critical loading conditions

G. Structural Test Performance: Test according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not less than **10** seconds.

H. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).
   2. Entrance Doors:
      a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
      b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

I. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

J. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa)
2. Maximum Water Leakage: No visible water beyond the interior-most plane of glazing. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

K. Provision for Movement: Provide for expansion and contraction due to structural deflection, structural movement, and temperature changes. In addition, design the storefront system to meet the requirements provided below without detriment to appearance or performance

L. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
1. Design Displacement: [As indicated on Drawings] <Insert design displacement>.
2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement].

M. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for [Wind Zone 1] [Wind Zone 2] [Wind Zone 3] [Wind Zone 4].
1. Large-Missile Test: For glazed openings located within 30 feet (9.1 m) of grade.

N. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Test Interior Ambient-Ait Temperature: 75 deg F.
3. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

O. Structural-Sealant Joints:
1. Designed to carry gravity loads of glazing.
2. Designed to produce tensile or shear stress of less than 20 psi.

P. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
1. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.46 BTU/hr/ft2/°F per AAMA 507 or NFRC 100.
2. Condensation Resistance (CR): Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 63 as determined according to NFRC 500.

2.2 EXTERIOR STOREFRONT FRAMING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.
2. Kawneer North America; an Alcoa Company.
3. Oldcastle BuildingEnvelope.
4. YKK AP America Inc.
5. EFCO Corporation
6. Tubelite, Inc.

B. Basis of Design:
1. Kawneer, Trifab VersaGlaze 451T framing system

C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

D. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken
2. Glazing System: Retained mechanically with gaskets on four sides, or as indicated on drawings.
3. Glazing: 1 inch insulated glass, or as indicated on door schedule and Master Schedule.
4. Glazing Plane: Front
5. Finish: High-performance organic finish.
6. Fabrication Method: Screw Spline
7. No exposed fasteners
8. Open back head and jamb members to have continuous fillers.

E. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
F. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
G. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 INTERIOR STOREFRONT FRAMING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.
2. Kawneer North America; an Alcoa Company.
3. Oldcastle BuildingEnvelope.
4. YKK AP America Inc.
5. EFCO Corporation
6. Tubelite, Inc.
B. Basis of Design:
1. Kawneer Trifab VersaGlaze 450 framing system
2. Kawneer InFrame Interior framing system
C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.
D. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Glazing Plane: Center
2. Finish: High-performance organic finish.
3. Fabrication Method: Screw Spline
4. No exposed fasteners
5. Open back head and jamb members to have continuous fillers.
E. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
F. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
G. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 EXTERIOR ENTRANCE DOOR SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.

2. Kawneer North America; an Alcoa Company.
3. Oldcastle BuildingEnvelope.
4. YKK AP America Inc.
5. EFCO Corporation
6. Tubelite, Inc.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
1. Standard Entrances:
a. Medium Stile: Kawneer 350 (1 ¾ in. x 3 ½ in)
b. Wide Stile: Kawneer 500 (1 ¾ in. x 5 in)
2. Heavy Wall Entrances:
a. Medium Stile: Kawneer 350 Heavy Wall (2 in. x 3 ½ in)
b. Wide Stile: Kawneer 500 Heavy Wall (2 in. x 5 in)

C. Door Construction: Extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

D. Bottom Rail: ADA Compliant

E. Glazing: 1 inch clear tempered insulated glass, or as indicated on door schedule and Master Schedule.

F. Glazing Stops and Gaskets: Beveled , snap-on, extruded-aluminum stops and preformed gaskets.
1. Provide non-removable glazing stops on outside of door.

G. Finish: High performance organic finish.

2.5 INTERIOR ENTRANCE DOOR SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.
2. Kawneer North America; an Alcoa Company.
3. Oldcastle BuildingEnvelope.
4. YKK AP America Inc.
5. EFCO Corporation
6. Tubelite, Inc.
7. Frameworks

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
1. Standard Entrances: As indicated in the door type / schedule drawings.
a. Medium Stile: Raco Series 400 (1 ¾ in. x 3 ½ in)
b. Wide Stile: Raco Series 550 (1 ¾ in. x 5 in)

C. Door Construction: Extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

D. Bottom Rail: ADA Compliant

E. Glazing: 1/4 inch minimum clear tempered glass, or as indicated on door schedule and Master Schedule.

F. Glazing Stops and Gaskets: Beveled , snap-on, extruded-aluminum stops and preformed gaskets.

G. Finish: High performance organic finish.

2.6 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.
1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:
a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
1. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.7 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."
B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
C. Glazing Sealants: As recommended by manufacturer
D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
    1. Color: Match structural sealant.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.
    1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
    2. Reinforce members as required to receive fastener threads.
    3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
    1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
C. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.
B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
C. Fabricate components that, when assembled, have the following characteristics:
    1. Profiles that are sharp, straight, and free of defects or deformations.
    2. Accurately fitted joints with ends coped or mitered.
    3. Physical and thermal isolation of glazing from framing members.
    4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
    5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
    6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
F. Storefront Framing: Fabricate components for assembly using screw-spline system
G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

    1. At exterior doors, provide compression weather stripping at fixed stops.
    2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
    1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.

2. At exterior doors, provide weather sweeps applied to door bottoms.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected my Architect from manufacturer’s full range of colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.
7. All materials to be installed by experienced craftsmen in accordance with manufacturer’s written specifications.
8. After installation, the Contractor shall protect all exposed aluminum surfaces from damage by grinding and polishing compounds, plaster, lime, acid, cement, or other contaminants. The Contractor shall be responsible for final cleaning

B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
   2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
      c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
   4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts .
   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to [AAMA 501.2][ASTM E 1105] and shall not evidence water penetration.
      a. Perform a minimum of two tests in areas as directed by Architect.
      b. Perform tests in each test area as directed by Architect. Perform tests, prior to 50 percent completion .
C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
D. Prepare test and inspection reports.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:
   1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
   2. Initial Maintenance Service: Beginning at Substantial Completion, provide **six** months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

3.7 ENTRANCE DOOR HARDWARE SETS

A. A. Refer to Section 087100 “Door Hardware”

END OF SECTION 084113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
- A. Section includes aluminum windows for exterior locations.

1.3 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct conference at Project site.
  1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
  3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
  4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS
- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include project specific plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
  1. Include similar Samples of hardware and accessories involving color selection.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Build mockup of typical wall area as shown on Drawings, or otherwise as directed by Architect.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 WARRANTY
- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
     a. Failure to meet performance requirements.

b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:
a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: Five years from date of Substantial Completion.
c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Boyd Aluminum Manufacturing.
2. Custom Window Company.
3. EFCO Corporation; a Pella company.
4. Kawneer North America; an Alcoa company.
5. TRACO.
6. Wausau Window and Wall Systems.
7. YKK AP America Inc.

B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.3 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Window Certification: AMMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
1. Minimum Performance Class: CW.
2. Minimum Performance Grade: 40 .

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.40 Btu/sq. ft. x h x deg F.

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.25.

E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 52.

F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

G. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

H. Structural Loads:
1. Wind Loads: As indicated on Structural Drawings.

2.4 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:
1. Fixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

C. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.
1. Kind: Fully tempered where required by code.

D. Insulating-Glass Units: ASTM E 2190[, certified through IGCC as complying with requirements of IGCC].
1. Glass: ASTM C 1036, Type 1, Class 1, q3.
a. Tint: Clear.

E. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.5 ACCESSORIES
A. Horizontal Louver Blinds: Provide manufacturer's standard, removable, horizontal louver blinds with aluminum slats and polyester fiber cords that are operated by hardware located on inside face of sash.
   1. Operation: Tilt, raising, and lowering.
   2. Color: As selected by Architect from manufacturer's full range.
B. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.
C. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
D. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
E. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.6 FABRICATION
A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
B. Glaze aluminum windows in the factory.
C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
D. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS
A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES
A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
B. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
   1. Color and Gloss: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL
A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed in three locations per ASTM E1105.
2. Air-Infiltration Testing:
a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
3. Water-Resistance Testing:
a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
b. Allowable Water Infiltration: No water penetration.
4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.
C. Remove and replace noncomplying windows and retest as specified above.
D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION
A. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
1. Keep protective films and coverings in place until final cleaning.
B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Blast Resistant Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Twenty five years for manual overhead door closer bodies.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01,

Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

    a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
    b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Restricted Keyway.

D. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.4 MECHANICAL LOCKS AND LATCHING DEVICES

A. Multi-Point Locksets, Blast and Hurricane: ANSI/BHMA A156.37, Certified Products Directory (CPD) listed three-point deadbolt locking devices engineered for use on inswing and outswing door applications. Concealed, fortified steel construction shall secure the door to the frame at top, bottom, and center latching points. All three latching points shall be activated with one single motion when the device is closed for single motion egress. Devices shall come in mechanical and electro-mechanical functions as specified.

1. The locking system device shall be part of an integrated door, frame, and hardware assembly listed to the following standards:

   a. Blast 6.16 psi Category I / Hurricane 150 psf and 50 fps
   b. Blast 9.74 psi Category II / Hurricane 150 psf and 50 fps

2. ANSI-BHMA listed to A156.37 Grade 1 for multi-point locks:

   a. Lever torque to retract all bolts less than 28 in.lb.
   b. Cycle tested to 800,000 cycles.

3. UL10B or UL10C, 3-hour fire rated openings.

4. Latchbolt construction:

   a. Center Bolt: one piece, 3/4" throw anti-friction stainless steel latch and one piece, 1" throw, hardened stainless steel deadbolt; 2-3/4" backset standard.
   b. Top and Bottom Bolt: 3/4" x 3/4" square stainless steel latchbolt with 3/4" projection

5. Independent top and bottom bolt projection shall be field adjustable at the center mortise pocket, while the door is hung which does not require taking the door down to adjust.

6. Bottom strike shall be offset and reversible to accommodate alignment issues due to rough opening tolerances

7. Manufacturers:

a. Corbin Russwin Hardware (RU) - BL6600 Series.
b. Sargent Manufacturing (SA) - BL7300 Series.
c. No Substitution.

2.5 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.6 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC8000 Series.
b. Sargent Manufacturing (SA) - 281 Series.
c. No Substitution.

C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC8000 Series.
b. Norton Door Controls (NO) - 7500 Series.
c. No Substitution.

2.7 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
b. Trimco (TC).

2.8 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
b. Trimco (TC).

2.9 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.10 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.11 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

2. Submit documentation of incomplete items in the following formats:

   a. PDF electronic file.
   b. Electronic formatted file integrated with the Openings Studio™ door opening management software platform.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

   1. Quantities listed are for each pair of doors, or for each single door.

   2. The supplier is responsible for handing and sizing all products.

   3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MR - Markar
2. SA - SARGENT
3. RO - Rockwood
4. PE - Pemko
5. OT - Other

Hardware Sets

Set: 1.0
Doors: A101A, A102, A103, A104, A105, A105B
Description: Single - Blast Resistant - Exterior - Storeroom Lock - Closer

1	Continuous Hinge	HG305 7'0 TB	PC-1	MR	087100
1	Multi-Point Lock	LC FM7324 LL	US32D	SA	087100
1	Cylinder	As Required x Temp Core	US32D	SA	087100
1	Permanent Core	Match facility Standard	US15	SA	087100
1	Surface Closer	281 CPS	EN	SA	087100
1	Kick Plate	K1050 = 34" x 10" LDW CSK BEV	US32D	RO	087100
1	Threshold	2715AK		PE	087100
1	Gasketing	305CN TKSP		PE	087100
1	Rain Guard	346C x Frame Width		PE	087100
1	Sweep	3452APK		PE	087100

Notes: CONTINUOUS HINGE REQUIRES A CONTINUOUS HINGE REINFORCEMENT IN DOOR AND FRAME.

Blast resistant door hardware to be reviewed and confirmed by doot manufacturer. Basis of design is curries blast resistant openings.

Set: 2.0
Doors: A101, A101B, A102A, A103A, A104A
Description: OH Sectional Doors / OH Coiling Doors / Counter Shutters

1	Cylinder	As Required x Temp Core	US32D	SA	087100
1	Permanent Core	Match facility Standard	US15	SA	087100
1	All Hardware	By the door manufacturer		OT	

END OF SECTION 087100

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 METAL FRAMING AND SUPPORTS

A. Steel Framing Members, General: ASTM C 754.

1. Steel Sheet Components: ASTM C 645. Thickness specified is minimum uncoated base-metal thickness.
2. Protective Coating:[**Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120)**] zinc coating.

B. Framing Systems:

1. Studs and Runners: In depth indicated and [**0.027 inch (0.68 mm)**] thick unless otherwise indicated.
2. Flat Strap and Backing: [**0.027 inch (0.68 mm)**] thick.
3. Hat-Shaped, Rigid Furring Channels: In depth indicated and [**0.018 inch (0.45 mm)**] thick.
4. Resilient Furring Channels: 1/2 inch (13 mm) deep, with single- or double-leg configuration.
5. Cold-Rolled Furring Channels: 0.053 inch (1.34 mm) thick, 3/4 inch (19 mm) deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch (32-mm) face flange, 7/8-inch (22-mm) wall-attachment flange, and 0.018 inch (0.45 mm) thick.

C. Suspension Systems:

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch (1.59-mm) diameter, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, and 0.162-inch (4.12-mm) diameter.
3. Carrying Channels: Cold-rolled steel, 0.053 inch (1.34 mm) thick, [**2 inches (51 mm)**] deep.
4. Furring Channels: [**3/4-inch- (19-mm-) deep, cold-rolled channels, 0.053 inch (1.34 mm) thick**] [**Steel studs, 0.027 inch (0.68 mm) thick, in depth indicated**] [**Steel, rigid hat-shaped channels; 7/8 inch (22 mm) deep, 0.018 inch (0.45 mm) thick**] [**Steel,[Resilient furring channels, 1/2 inch (13 mm) deep, with single- or double-leg configuration**].
5. Grid Suspension System for Gypsum Board Ceilings: Interlocking, direct-hung system.

    a. Products:[**One of the following:**]

        1) Armstrong World Industries, Inc.; Drywall Grid Systems.
        2) Chicago Metallic Corporation; Drywall Grid System.
        3) USG Corporation; Drywall Suspension System.

2.3 ACCESSORIES

A. General: Comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: [**Asphalt felt**] [**or**] [**foam gasket**].

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install steel framing to comply with ASTM C 754."

1. Gypsum Plaster Assemblies: Also comply with ASTM C 841.
2. Portland Cement Plaster Assemblies: Also comply with ASTM C 1063.
3. Gypsum Veneer Plaster Assemblies: Also comply with ASTM C 844.
4. Gypsum Board Assemblies: Also comply with ASTM C 840.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.

D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

E. Install suspension systems level to within [**1/8 inch in 12 feet (3 mm in 3.6 m)**] <**Insert dimensions**>.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Warranty: Provide a warranty for the work specified for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.
   1. Tile backer board warranty against manufacturing defects for 20 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

A. Provide in maximum lengths available to minimize end-to-end butt joints.

B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated, Type X where indicated, Sag-resistant type for ceiling surfaces.

   1. Manufacturers: One of the following:

      a. American Gypsum.
      b. CertainTeed Corp.
      c. Georgia-Pacific Gypsum LLC.
      d. Lafarge North America Inc.
      e. National Gypsum Company.
      f. Temple-Inland.
      g. USG Corporation.

C. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated.

1. Manufacturers: One of the following:

   a. American Gypsum.
   b. CertainTeed Corp.
   c. Georgia-Pacific Gypsum LLC.
   d. Lafarge North America Inc.
   e. National Gypsum Company.
   f. Temple-Inland.
   g. USG Corporation.

D. Glass-Mat, Water-Resistant Gypsum Backing Board: ASTM C 1178/C 1178M, of thickness indicated. Regular type unless otherwise indicated.

1. Products: **One of the following:**

   a. CertainTeed Corp.; GlasRoc Tile Backer.
   b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.

2.3 ACCESSORIES

A. Trim Accessories: ASTM C 1047, Corner and J- Beads formed from 28 gauge galvanized steel sheet.

1. Provide cornerbead at outside corners unless otherwise indicated.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. Provide control joints where indicated. Control joints shall be metal with 1/4 inch open joint and perforated flanges for floating in place.

B. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Glass-fiber Mesh Tape shall be a minimum of 2 inch wide self adhering glass-fiber type with 10 x 10 threads per inch.
2. Joint Compounds: Setting-type taping compound and drying-type, ready-mixed, compounds for topping, as recommended by manufacturer. Perlite and other additives not permitted
3. Skim Coat: For final coat of Level 5 finish, use setting-type, sand able topping compound or drying-type, all-purpose compound. Perlite and other additives not permitted.

C. Screws
1. Shall be 1 inch and 1 5/8 inch long self- drilling, self -tapping cadmium plated bugle head type.

D. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Adhesive shall have a VOC content of 50 g/L or less.

E. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.

1. Sealants shall have a VOC content of 250 g/L or less.

F. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws.
4. Apply all ceiling boards first, cut boards so that they slip easily into place, butt all joints loosely, and place tapered or wrapped edges next to one another.
5. Select the maximum practical length to minimize end joints. All joints shall be neatly fitted and staggered. Joints on opposite sides of partition shall be so arranged as to occur on different studs.
6. Wherever possible, apply boards perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur, stagger and locate them as far from the center of walls as possible.
7. Support all ends and edges of gypsum board on framing, except long edges at right angles to framing and where end joints are to be floated between frame members and back-blocked.
8. Install metal corner bead at external corners. Where length of the corner does not exceed standard stock lengths, use a single length.
9. Install gypsum board 1/2 inch above surface of slab to prevent wicking of moisture.
10. Install metal trim where indicated.
11. To insure level surfaces at joints, arrange board application so that the leading edge of each board is attached to the open or unsupported edge of a steel stud flange.
12. The leading edge of gypsum board shall not be attached to the web edge of a flange.
13. Fasten wallboard at 12 inches on center except at the edges/ joints which shall be at 8 inches on center.
14. Position edge-grip clips on the back of the panels and drive prongs into panel edges. Space clips 16 inches on center. Screw-attach clip to framing, furring or wall surface.

15. Apply at least two coats of joint compound over beads, screw heads and trim, and each coat shall be feathered out onto panel faces. Float out and sand joint to bake joints invisible when painted with non-texture paint.
16. Caulk around pipes, ducts, structure or similar items which penetrate drywall systems.
17. Provide acoustical sealant at walls in accordance with the manufacturer's instructions.
18. Control joints shall be located 30 feet-0 inches on center maximum and along building expansion joints, unless noted otherwise. Locations shall be reviewed prior to placement.

B. Moisture Resistant Tile Backer Board Installation
1. Install tile backer on walls vertically or horizontally.
2. Install tile backer on walls in accordance with manufacturer and TCA, method W245.
3. Substrate for tile: Apply glass mesh joint tape over joints. Embed tape in setting material specified for tile finishes. Allow joints to dry prior to installing tile systems.

C. Ceiling Board Installation
1. Apply gypsum ceiling board of maximum length with the long dimension at right angles to the furring channel and fastened with one inch drywall screws spaced 12 inches on center in the field of the board and 8 inches on center at the edges and along butting ends.
2. Align abutting end or edge joints over the web surface of the furring channel. Tie neatly and accurately with end joints staggered.
3. Install gypsum board ceiling panels in drywall suspension system.

D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

E. Finishing Gypsum Board: ASTM C 840.

1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.

F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

G. Workmanship Tolerances
1. Correct any nicks, bumps, out of level or out of plumb areas detectable to the naked eye.
2. Walls: 3/8" maximum deviation from vertical.
3. Bumps in Boards: maxim of 1/8 inch in 24 inches.
4. Corners: Maximum out of square 1/8 inch in 16 inches.
5. Float solid between corner beads less than 36 inches apart. Surfaces that appear concave are not acceptable.
6. Provide "J" mold and continuous 1/4 inch reveal wherever gypsum board directly abuts other material or when end is exposed.
7. Float Control joints flush with the wall surface so that ceiling wall mold specified separately will align with wall surface flat and straight.

8. Interior gypsum wallboard and ceiling installation may not commence until all exterior damp-proofing and roofing are completed and roof top equipment is fully installed and flashed and exterior wall openings are protected.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.
   1. Submit two (2) full size units of each tile products, trim and accessories.
   2. Submit instructions for using grouts and adhesives.

B. Obtain tile of each type and color or finish from same production run for each contiguous area

C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling ceramic tile packages.

D. Warranty: one year warranty for work specified herein.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A108.1 – Installation of Ceramic Tile, A collection.
   2. ANSI A108.5- Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex- Portland Cement Mortar.
   3. ANSI A108.10- Specifications for Installation of Grout in Tilework.
   4. ANSI A118.1- Standard specification for Dry- Set Portland Cement Mortar.
   5. ANSI A118.4 – Latex-Portland Cement Mortar.
   6. ANSI A118.6- Ceramic Tile Grouts.
   7. ANSI A137,1 – Ceramic Tile.

B. Tile Council of America:
   1. TCA- Handbook for Ceramic Tile Installation.

C. Quality Assurance: Perform work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.

PART 2 - PRODUCTS

2.1 Architect may reject the proposed product for technical non-compliance, or at his discretion, on the basis of color match alone.

2.2 CERAMIC TILE

A. Ceramic tile that complies with Standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."

B. Floor Tile: (to match existing floor tile)
1. Tile as Specified on A-681

C. New Floor Tile
1. Tile as Specified on A-681

D. Wall Tile: (to match existing wall tile)
1. Tile as Specified on A-681

E. New Wall Tile
1. Tile as Specified on A-681

F. Manufacturers: One of the following (to match existing tile only)

a. American Olean; Division of Dal-Tile International Inc.
b. Crossville, Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Deutsche Steinzeug America, Inc.
e. Interceramic.
f. Lone Star Ceramics Company.
g. Grupo Porcelanite.
h. Portobello America, Inc.
i. Seneca Tiles, Inc.

5. Module Size: As noted on drawings.
6. Surface: floor tile shall be **Slip resistant, with** abrasive admixture.

7. Color and Pattern: to match existing and as per drawings.
8. Grout Color: to match existing as approved by architect.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile and matching characteristics of adjoining flat tile:

a. Base: Coved.
b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose).
c. Base Cap for Thin-Set Mortar Installations: Surface bullnose.
d. Wainscot Cap for Portland Cement Mortar Installations: Bead (bullnose).
e. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose.
f. External Corners for Portland Cement Mortar Installations: Bead (bullnose).
g. External Corners for Thin-Set Mortar Installations: Surface bullnose.
h. Internal Corners: Cove.
i. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

2.3 PORCELAIN TILE

A. Tile Type: **porcelain** paver tile and wall tile

1. Manufacturers: One of the following**:**

a. American Marazzi Tile, Inc.
b. American Olean; Division of Dal-Tile International Inc.
c. Crossville, Inc.
d. Daltile; Division of Dal-Tile International Inc.
e. Deutsche Steinzeug America, Inc.
f. Florida Tile Industries, Inc.
g. Florim USA.
h. GranitiFiandre; c/o Trans Ceramica, Ltd.
i. Interceramic.
j. Laufen.
k. Lone Star Ceramics Company.
l. Grupo Porcelanite.
m. Portobello America, Inc.
n. Seneca Tiles, Inc.
o. United States Ceramic Tile Company.

2. Face Size: 11-13/16 by 11-13/16 inches (300 by 300 mm)
3. Thickness: **5**/16 inch thick through body tile
4. Face: manufacturer's standard slip resistant with cushion edges for floor tile.
5. Finish: Unpolished and polished as directed.
6. Color and Pattern: to be selected by Architect from manufacturer's FULL color line.
7. Grout Color: As selected by Architect from manufacturer's Full color line.
8. Base: Porcelain tile bas to match porcelain tile.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile and matching characteristics of adjoining flat tile.

2.4 INSTALLATION MATERIALS

10. Thin-Set Mortar Type: LATICRETE 254 Platinum Thin Set Mortar as manufactured by Laticrete International, Flexbond Mortar as manufactured by Custom Building Products or 1300 Universal Bonding Mortar as manufactured Dal-Tile Corp.,Ultraflex 3 as manufactured by Mapei Americas. No Substitutions.

11. Grout Type: Epoxy Grout: (used on all interior tile installations) Use 100 percent solids epoxy grout in accordance with ANSI A118.3. **No Substitutions**. Color shall be as selected by Architect from manufacturer's full line of available colors.

    a. Manufacturers: **One of the following:**

        1) Atlas Minerals & Chemicals, Inc.
        2) Boiardi Products; a QEP company.
        3) Bonsal American; an Oldcastle company.
        4) Bostik, Inc.
        5) C-Cure.
        6) Custom Building Products.
        7) Jamo Inc.
        8) Laticrete International, Inc.
        9) MAPEI Corporation.
        10) Mer-Kote Products, Inc.
        11) Southern Grouts & Mortars, Inc.
        12) Summitville Tiles, Inc.
        13) TEC; a subsidiary of H. B. Fuller Company.

12. Crack Isolation Membrane
    a. Sheet membrane used to eliminate transmission of substrate cracks.
    b. Liquid membrane with fiberglass mesh in accordance with ANSO A118.12

13. Expansion Joints
    a. Expansion Joint Filler: Flexible and compressible, closed-cell type, rounded at surface to contact sealant as instructed by sealant manufacturer to suit intended use.
    b. Silicone compound sealant over filler. ASTM C920, Uses M and A, single component, mildew resistant. Sanded to match grout. Provide at all wall corners, ceilings, control joints and changes in materials, where floor tile abuts perimeter walls, curbs, columns and pipes: and 24 feet to 36 feet elsewhere.
    c. Conditions exposed to chemicals, food processing, etc.: Polysulfide sealant over filler. ASTM C920, Grade P, Class 25, Uses T & M polyspec Thiokol, or Architect approved equal. Self-leveling and flexible sealant over filler of type instructed by manufacturer to suit application. Sealant shall match grout color. Expansion Joints shall conform to TCA E171.

14. Miscellaneous Metals
    a. Transition strips: Of type and size recommended to suit application. Color shall be as selected by Architect from manufacturer's standard colors.

15. Floor leveling
    a. ARDEX K-15 self-Leveling Underlayment Concrete manufactured by ARDEX ENGINEERED CEMENTS. NO substitutions.

16. Edge Protection and Transition Strips:
    a. Porcelain Tile to Gypsum Board: Schluter- QUADEC transition strips in aluminum finish at all porcelain tile wainscot to gypsum board transition locations.
    b. Porcelain Tile to Porcelain Tile: Schluter- QUADEC transition strips in aluminum finish at all porcelain tile wall outside corner locations.

c. Porcelain Tile to Carpet: Schluter- SCHIEN transition strips in aluminum finish at porcelain tile to carpet transition locations.
d. Porcelain Tile to Sealed Concrete: Schluter- RENO-U edged protection in satin aluminum finish at porcelain to sealed concrete.
e. Stair Nosing: Schluter – TREP-S GX 10 S, Aluminum support with thermoplastic rubber insert.
f. Provide all corners and connectors as required for a complete and detailed finished installation.

17. Extra Tile
a. Deliver one unopened box of each type and color of wall tile and floor tile to the Owner in accordance with Section 017700, Closeout procedures.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For installations indicated below, follow procedures in ANSI's "Specifications for the Installation of Ceramic Tile" for providing 95 percent mortar coverage.

a. Tile floors composed of tiles 8 by 8 inches or larger.

B. Examination: Examine substrates for expansion joints and defects which may affect the work, and notify Architect of any imperfections which would affect a satisfactory completion of this tile work. Do not start work until defects have been corrected. Ensure the surfaces are:
1. Dry, Clean, Free of oily or waxy films, free of curing compounds.
2. Firm and level within specified tolerances.
3. Minimum of 40 degrees and rising.
4. Vacuum clean and damp clean existing substrate surfaces.
5. Protect surrounding work from damage or disfiguration.

C. Tile contractor shall examine preparatory work by others and notify architect of any imperfections which would affect a satisfactory completion of this tile work. Verify that slab is free of cracks, waxy or oily films, and is well cured. Absence of such notification shall constitute acceptance of responsibility by tile contractor.

D. Installation
1. Crack Isolation Membrane:
a. Install crack isolation membrane under tile over building control joints and substrate cracks up to 1/8 inch. Apply a 30 inch wide strip centered on control joint or crack. Install in accordance with TCA F125 and manufacturer’s recommendations.
b. Install joint sealant of first tile on both sides of control joint and crack.

c. Install membrane with products or methods approved by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.

2. Install porcelain wall tile and porcelain pavers with Aligned joints (no staggering), 1/8 inch to 3/16 inch joint width.
3. Set interior floor tile and grout in accordance with TCA F113 and shower floor in accordance with TCA B415.
4. Set interior wall tile and grout in accordance with TCA W244 on tile backer cement board in wet areas, showers and restrooms as indicated. TCA W243 on tile backer gypsum board at dry areas not exposed to water or moisture, and TCA W202 on concrete masonry unit (CMU) Substrates.
5. Allow minimum of 24 hours after tile is set before grouting.
6. Lay out tile so that the minimum size tile used is 1/2 size.
7. Form internal angles square.
8. Install expansion joints in accordance with TCA publication EJ171, and TCA F125 and ANSI A108.5 recommendations and manufacturer's instructions.
9. Slope tile within three (3) foot diameter of a floor drain, unless otherwise noted.
10. Damp cure grout in accordance with manufacturer's recommendations.
11. Do not use damaged tile, including those with broken or cracked edges.
12. Lay out all work so that, where possible, no tiles less than half size occur.
13. Install grout in accordance with ANSI A108.10 and manufacturer's instructions.
14. Install edge protection and transition strips in accordance with manufacturer's instructions.
15. Damp cure grout in accordance with manufacturer's recommendations. Clean all tile surfaces upon completion. Protect finish tile work from damage.

16. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Cleaning and Protection

1. Clean work at completion of installation, remove excess grout from tile surfaces. Clean tile and grout surfaces prior to installation of plumbing fixtures.
2. Wipe all tile with a clean damp cloth, and buff lightly, leaving tile surfaces clean and ready to use.
3. Remove grout from adjacent finish surfaces.
4. Protect finished installation until final acceptance.
5. Do not permit traffic over finished floor surface.

END OF SECTION 093000

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS PANELS

A. Basis-of-Design Product:

1. Armstrong World Industries, Inc. **Fissured #756** (to match existing ceiling panels)

B. Classification: As follows, per ASTM E 1264:

1. Type and Form: **Type III, Form 2**
2. Pattern: **D (fissured)**
3. Light Reflectance (LR) Coefficient: Not less than **0.80**
4. Noise Reduction Coefficient (NRC): Not less than 0.55
5. Ceiling Attenuation Class (CAC): Not less than **30**.
6. Anti-microbial
7. Surface-Burning Characteristics: **Class A**

C. Color: **White**

D. Edge Detail: **Square**.

E. Thickness: **5/8 inch (15 mm)**.

F. Modular Size: **24 by 24 inches (610 by 610 mm)**.

2.2 CEILING SUSPENSION SYSTEM

A. Ceiling Suspension System: Pre-lude ML exposed Tee – 15/16”
1. Basis-of-Design Product:

a. Armstrong World Industries, Inc.

2. Face Design: **Flat, flush**
3. Face Finish: **Painted white**

B. Ceiling Suspension System: **Direct hung**; ASTM C 635, **intermediate** duty structural classification.
1. Basis-of-Design Product:

a. Armstrong World Industries, Inc.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Provide yield strength at least 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), but not less than **0.106-inch- (2.69-mm-).** diameter wire.

2. Lights: provide one wire hanger at each corner.

D. Access: Identify **upward** access tile with manufacturer's standard unobtrusive markers for each access unit.

2.3 MISCELLANEOUS MATERIALS

A. Acoustical Tile Adhesive: (if required) Type recommended by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.

1. Adhesive shall have a VOC content of 50 g/L or less.
2. Adhesive shall comply with Green Seal's GS-36 and with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical ceilings to comply with ASTM C 636/C 636M, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

C. Adhesive Installation: (If required) Install acoustical tile by bonding to substrate, using amount of adhesive and procedure recommended in writing by tile manufacturer and as follows:

1. Install splines in joints between tiles; maintain bottom surface of tiles in a level plane.
2. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

D. Arrange directionally patterned acoustical units to match existing ceiling pattern.

END OF SECTION 095100

SECTION 09 68 13
TILE CARPETING (CPT)

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish labor, materials, tools, equipment, and services for Carpet Tile (CPT) in accordance with provisions of the Contract Documents.

B. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Carpet manufacturer shall have no less than ten (10) years of production experience with carpet similar to type specified in this document; and whose published product literature clearly indicates compliance of products with requirements of this section.

B. Contractor Qualifications:
   1. Firm with not less than five (5) years of successful carpeting experience similar to work of this section and recommended and approved by the carpet manufacturer. Upon request, submit letter from carpet manufacturer stating certification qualifications and acceptance.

C. Installer Qualifications:
   1. Mill trained, skilled mechanics supervised by experienced superintendent with 50,000 yards experience.

D. Single Source Responsibility:
   1. Provide product material by a single manufacturer for each carpet type specified.

E. Fire and Smoke Compliance:
   1. Comply with DOC FF-1-70, standard for surface flammability of Carpets and Rugs.
   2. Critical Radiant Flux, per ASTM E648 and NFPA 253:
      a. Class I, not less than 0.45 W/cm2.
   3. Smoke Developed:
      a. 450 or less per ASTM E662 / NFPA 258.

F. Comply with DOC FF-1-70, standard for surface flammability of Carpets and Rugs.

1.3 SUBMITTALS

A. See Section 01 33 00 for requirements.

B. Product Data:
   1. For each type of material and accessory.

C. Samples:
   1. One sample 12 IN square of each material and color specified in I-001 Drawing Interior Finish Legend.

D. Contract Closeout Information:
   1. Warranty.
   2. Maintenance data:
      a. See Section 01 78 23.

1.4 WARRANTY

A. Replace damaged or defective carpet or carpet stained by adhesives for a period of two (2) years.

B. Warrant material will not degrade for fifteen (15) years due to following:

1. Delamination from face structure, shrinkage or stretching affecting performance of face or backing structure or causing tile to curl or dome.
2. Reduction of pile height by more than 15 PCT in any area.
3. Colorfastness to normal light as measured by AATCC 16E.
4. Normal atmospheric contaminates.
5. Pulling out of nap.
6. Edge ravel.

C. Warranty to include removal, replacement carpet tiles, installation, and disposal of defective carpet tiles.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Carpet Tile (CPT):
   1. Base:
      a. As specified on Drawing Sheet A-681, Architectural Finish Schedule and Details.

B. Carpet Edging Strips:
   1. Base:
      a. Roppe
   2. Alternate:
      a. BurkeMercer.
      b. Johnsonite

C. Other manufacturers desiring approval comply with Section 01 25 00.

2.2 MATERIALS

A. Carpet Tile (CPT):
   1. First quality, no seconds or imperfects.
   2. Deliver with mill register numbers attached.
   3. Comply with applicable state and local codes.
   4. Verify flooring products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" Version 1.1-2010 (CA section 01350) & V1.2-2017.
   5. Wet-applied adhesive products must meet applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005 except where local or state requirements for VOCs utilize a different criteria.

B. Carpet Edging Strips:
   1. Base Product: Carpet to Resilient Transition for rolling traffic
   2. Thickness to match carpet.
   3. Color as selected by Architect. Match Carpet

C. Leveling Compound:
   1. Non-crumbling, non-staining, cementitious type.
   2. Mix with latex milk not water.
   3. Leveling compound shall have a VOC content no greater than 200 g/L.
   4. K-15 by Ardex or Ultraplan 1 Plus by Mapei.

D. Patching Compound:
   1. Fill cracks, joints, holes or uneven areas with non-crumbling latex base floor filler.
   2. Acceptable Product: LeveLastic by CMP Specialty Products.
   3. Do not mix with water.

E. Adhesive:
   1. Non-staining, non-bleeding strippable type.

2. As recommended by carpet manufacturer with VOC content no greater than 50 g/L.
3. Comply with Carpet and Rug Institute Green Label Plus Program for emissions standards.
4. Allow removal of carpet without damage or adherence to carpet.

F. Carpet Types:
1. See material and color specified in I-001 Drawing Interior Finish Legend.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify concrete floor surfaces are suitable for Carpet Tile installation.

B. Coordinate installation with requirements of Section 07 16 04 Concrete Floor Moisture Testing, and Section 07 16 05 Water Vapor Emission Control System.

3.2 PREPARATION

A. Clean areas to receive carpet tile.
1. Strip waxes and finishes.
2. Vacuum and wet mop.

B. Layout:
1. Arrange joints symmetrically at centerline of rooms.
2. Lay and match adjacent tiles for pile and pattern directions.

3.3 INSTALLATION

A. Install carpet patterns in accordance to layouts indicated in Drawings.
1. Develop templates as required.

B. Comply with manufacturer's instructions and recommendations for seam locations, and lay of carpet pile.
1. Do not mix dye lots in same area.
2. Install carpet under open bottom items, removable flanges, furnishings, alcoves and closets.
3. Install tight against walls, columns, cabinets and over recessed door closers.
4. Butt edges tight without distortion.
5. Where carpet tiles abut deeper finish flooring materials, feather leveling compound for approximately 12 IN for each 1/8 IN of rise so finished surfaces align.
6. Fill or level floors at uneven areas with leveling compound and feather minimum 4 FT- 0 IN.
7. Expansion joints:
a. Do not bridge building expansion joints with continuous carpeting.
b. Provide for movement.

C. Install carpet edging strips, transition strips and reducer strips at non-carpeted floor surface.
1. Conceal cut edges with protective edge guards or overlapping flanges.
2. Score and trim narrow end of reducer strip to conform to adjacent floor finish.

3.4 CLEAN

A. Remove spots and adhesive from face or seams in accordance with manufacturer recommendations.

B. Vacuum using pile lifter.

C. Advise Owner regarding care and maintenance.

END OF SECTION

SECTION 099000 - PAINTING AND COATING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Samples.

B. Coordination of work specified. Substrate inspection by painting contractor of preceding trades for proper preparation of substrates. Ask for notification for any item to receive paint which may not be covered by a scheduled finish type.

C. Extra Materials: Deliver to Owner **1 gal.** of each color and type of finish coat paint used on Project, in containers, properly labeled and sealed.

D. Warranty: Provide a written warranty for the work specified for two years against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials or workmanship.
   1. Defects may include discoloring noticeably by yellowing, streaking, blooming, changing color or darkening, mildewing, peeling, cracking, blistering, alligatoring or releasing from the substrate, chalking or dusting excessively, changing sheen in irregular fashion, softening or becoming tacky and bubbling. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to owner.

PART 2 - PRODUCTS

2.1 PAINT – All paint materials selected for coating system for each type of surface shall be the product of a single manufacturer and shall, as a system, have flame spread, fuel combination, and smoke density test results less than 25.

A. Paint materials listed as the basis specification herein, unless otherwise designated in the “Painting Schedule”, are the products of The Sherwin Williams Company, Cleveland, Ohio and require no further approval as to manufacturer or catalogue number.

2.2 MATERIALS

A. Paint and coatings should be ready mixed, except for field catalyzed coating; having good flow and brushing properties and consistent drying or curing behavior, free of sags and streaks.

B. For architectural paints, coatings, and primers applied to interior walls and ceiling, do not exceed the VOC content limits established in Green Seal Standard GS-11. Flat paints should have 50 g/L and non-flats 150 g/L.
   1. For anti-corrosive and anti-rust paints applied to interior ferrous metal substrates, do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti- Corrosive Paints.

2. For clear wood finishes, floor coatings, stains, sealers and shellacs applied to interior elements, do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings. Clear wood finish should be varnish 350 g/L or lacquer 550 g/L. Floor coatings shall be 100 g/L and sealers should be 250 g/L for waterproofing and 275 g/L for sanding. Stains shall be 250 g/L.

C. Accessory material include linseed oil, turpentine, and paint thinners as recommended by paint and coatings manufacturer as necessary to achieve finishes as specified.

D. Patching and surface prep are typically latex fillers as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surface**, new and existing,** unless otherwise indicated.

1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint the back side of access panels.
4. Color-code mechanical piping in accessible ceiling spaces.
5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.

C. Apply paints according to manufacturer's written instructions.

1. Use brushes only for exterior painting and where the use of other applicators is not practical.
2. Use rollers for finish coat on interior walls and ceilings.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

E. Apply stains and transparent finishes to produce surface films without color irregularity, cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other imperfections. Use multiple coats to produce a smooth surface film of even luster.

F. Verify that shop applied primers are compatible with specified finish coats.

G. Measure moisture content of surfaces using an electronic moisture meter. Do not begin application of coatings unless moisture content of surfaces is below the maximum values: gypsum soffits, plaster, masonry and vertical concrete (12 percent), wood (15 percent), horizontal concrete (8 percent).

H. Spray equipment shall be the type recommended for the application and shall be maintained clean and in proper working order and shall be operated by person(s) or entity specializing in applications of paints and coatings of types specified with minimum five years experience.

I. Number of coats on each of several finishes shall be in accordance with detailed specifications, which will produce first quality finish when properly applied.

J. Temperature in the storage area shall be between 40 and 110 degrees F. Open and mix all materials in the storage area. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 degrees F., unless otherwise permitted by paint manufacturer's printed instructions.

K. Do not paint in snow, fog, rain or mist, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying method.

L. Surface must be clean to insure adhesion. Remove oil and grease with paint thinner. Wash off dirt with warm soapy water and rinse with clean water. Remove rust by wire brushing or sanding. Wall surfaces must be dry before painting. Verify moisture.

M. Unfinished Surfaces
1. Wood: Sand smooth and apply one coat of Primer Undercoat. After primer has dried overnight, putty nail holes and cracks, then spot-prime putty with primer. Again allow the primer to dry overnight, sand lightly and topcoat.
2. Masonry and Concrete: Remove efflorescence or cement dust on masonry and concrete by etching with a 10 percent solution of muriatic (Hydrochloric) acid. Flush off surface after etching with clean water, and paint while still damp. On surface where muriatic acid cannot be used to neutralize the efflorescence, remove the efflorescence by sanding, scraping or wire brushing ans apply a coat of Masonry Conditioner before painting. If efflorescence is not present, no primer is necessary on concrete and masonry surfaces. Fill voids and pores in concrete and haydite blocks with Latex Block Filler and allow to dry overnight before top-coating. New construction blocks will require two full coats of block filler prior to painting.
3. Iron and steel should be primed with metal primer and allowed to dry overnight.

4. Galvanized metal should be primed with galvanized metal primer and allow to dry overnight before top-coating.

N. Paint Thickness: provide the following minimum dry film thickness per coat unless noted otherwise.
1. Enamels on metal: 1 mil.
2. Latex paints: 1 mil.
3. Metal primers: 1.5 mils.
4. Undercoats 1.5 mils.
5. Oil paints 1.5 mils.
6. Epoxy coating 2.0 mils.
Thickness test: Use observation gauge that measures "V" shaped scratch.

O. Allow exterior paints to dry 72 hours between coats and interior paint to dry 24 hours between coats. Allow all enamels and varnishes to dry 24 hours between coats. If enamel and varnishes are tacky after 24 hours, allow additional time until finish is dry.

P. Leveling: Apply with proper consistency and quality so paint flows out to a level surface free of brush and roller marks, bubbles, dust, runs, sags and holidays. Spread evenly.

Q. First coat shall be white unless otherwise specified.

R. Keep project premises free of painting-related debris. Collect material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

S. Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows and oranges) are specified and/ or when a graffiti resistant coating is required.
1. Galvanized Metal:
   a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least 6 months prior to beginning painting operations.
   b. Primer: one coat Pro-Cryl Pro Industrial Universal Primer (B66W310)
   c. Finish: two coats Sher-Cryl HPA High Performance Acrylic (B66W300)
2. Un-galvanized Metal:
   a. Primer: One coat- Pro-Cryl Pro industrial Universal Primer (B66W310)
   b. Finish: Two coats Sher-Cryl HPA High Performance Acrylic (B66W300)
3. Concrete and CMU:
   a. Primer/ Finish: Two coats Loxon XP Exterior Waterproofing System, 14 -18 mils wet, 6.4-8.3 mils dry per coat.
4. Wood (includes plywood siding and wooden trim)
   a. Primer: One coat A-100 Latex Wood Primer(B42W41)
   b. Finish: Two coats A-100 Acrylic Gloss (A8 Series)
5. Fiber Cement Materials:
   a. Primer: one coat Loxon Masonry Primer (A24W300)
   b. Finish: two coats A-100 Acrylic Gloss (A-8 Series)
6. Parking Line and Driveway Paint: Setfast Waterborne Yellow (TM225) (meets Federal Specifications (FS) TTP-1952-B).
7. All piping in mechanical rooms shall be painted in their entirety, in colors: Gas lines (Orange), domestic cold water (white), domestic hot water (pink), heating hot water

(Red), condenser water (green) and chilled water (blue). Paint only newly installed lines, existing shall not receive new paint.

T. Interior Surfaces
1. Galvanized Metal:
   a. Primer: One coat Pro-Cryl Pro Industrial Universal Primer (B66W310)
   b. Finish: Two coats Pro Industrial 0 VOC Acrylic Semi-Gloss.
2. Gypsum Wall Board:
   a. Primer: One coat Pro Green 200 latex Primer (B28W600)
   b. Finish: Two coats Pro Green 200 Latex Egg-Shell (B31-600 Series)
3. Concrete & CMU (Enamel)
   a. Primer: Two coats Pro Mar Block Filler (B25W25)
   b. Finish: Two coats Pro Green 200 Latex Semi-gloss (B31-600 series)
4. Wood: (painted)
   a. Primer: Pro Mar Classic Latex Primer (B28W8111)
   b. Finish: Pro Classic Waterborne Semi-Gloss (B31 Series)
5. Wood: (Stained)
   a. Primer: Sher Wood BAC Wiping Stain (S64 Series)
   b. Finish: (First Coat) Wood Classics Polyurethane Varnish (A67 Series)
   c. Finish: (Second Coat) Wood Classics Polyurethane Varnish (A67 Series)
6. Gypsum Wallboard: (Epoxy) – Kitchens, bathrooms, laboratories, etc.
   a. Primer: One coat Pro Green 200 Latex Primer (B28W600)
   b. Finish: Two coats Water-Based Catalyzed Epoxy (B70/B60)
7. CMU: (epoxy)
   a. Primer: Two coats Pro Mar Block Filler (B25W25)
   b. Finish: Two coats Water-based Catalyzed Epoxy (B70/ B60)

END OF SECTION 099000

Section 09.65.13
RESILIENT WALL BASE

THIS DOCUMENT IS INTENDED AS A SUGGESTED GUIDE FOR CREATING, MODIFYING, OR EDITING YOUR 3-PART ARCHITECTURAL GUIDE SPECIFICATIONS.

TARKETT WILL NOT BE LIABLE FOR ANY DAMAGES ARISING OUT OF THE USE OF ANY INFORMATION OR SPECIFICATIONS FOUND IN THIS DOCUMENT.

ENSURE THAT YOU HAVE THE LATEST PUBLICATION FOR THIS SPECIFICATION.

THE SPECIFIER OR DESIGNER IS RESPONSIBLE FOR PRODUCT SELECTION AND ACCURACY OF ALL PROJECT SPECIFICATIONS, INCLUDING ANY TARKETT INFORMATION OR SPECIFICATIONS USED.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Resilient Wall Base.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

   1. Product Data for Credit EQ 4.1: For adhesives, include printed statement of VOC content and chemical components.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

E. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the

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various flooring materials specified. An installer is "qualified" if trained by Tarkett or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 - PRODUCTS

2.1 RESILIENT SHEET FLOORING

Manufacturer:
Tarkett North America Phone: (800) 899-8916
30000 Aurora Rd.
Solon, Ohio 44139
Web: www.tarkettna.com
E-mail: info@tarkett.com

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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2.3 RESILIENT **TRADITIONAL RUBBER DURACOVE** WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett Traditional Thermoplastic Rubber Wall Base.

B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Thermoplastic Rubber Wall Base, Type TP, Group 1.

C. For thickness specify, 0.125" (3.17 mm)

D. For type, specify: [Straight] [Coved] <**Insert type**>

E. For height specify: [2.5" (6.35 cm)], [4" (10.16 cm)], [4.5" (11.4 cm)] or [6" (15.24 cm)] <**Insert height**>

F. For 2.5", 4" or 4.5" heights, specify length: [4' (1.22 m)] [120' (36.58 m)] <**Insert length**>

G. For 6" heights, specify length: [4' (1.22 m)] [100' (30.48 m)] <**Insert length**>

H. For corners, specify: [Inside Corners] [Outside Corners]

I. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

J. Test Data:
1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

2.4 RESILIENT **TRADITIONAL VINYL** WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett Traditional Thermoplastic Vinyl Wall Base.

B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Vinyl Wall Base, Type TV, Group 1.

C. For thickness, specify: [0.125" (3.17 mm)] [0.080" (2 mm)] <**Insert thickness**>

D. For type, specify: [Straight] [Coved] <**Insert type**>

E. For height, specify: [2.5" (6.35 cm)], [4" (10.16 cm)] or [6" (15.24 cm)] <**Insert height**>

F. For 2.5", 4" or 4.5" heights, specify length: [4' (1.22 m)] [120' (36.58 m)] <**Insert length**>

G. For 6" heights, specify length: [4' (1.22 m)] [100' (30.48 m)] <**Insert length**>

H. For corners, specify: [Inside Corners] [Outside Corners]

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RESILIENT WALL BASE

I. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

J. Test Data:
1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

2.5 RESILIENT **PERCEPTIONS** RUBBER WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett; Perceptions [**Recess coved**] [**Recess straight**] [**Flex**] [**Contour**] [**Royale**] or comparable product.

B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Thermoplastic Rubber Wall Base, Type TP, Group 1.

C. For thickness, specify: [0.125" (3.17 mm)]

D. For height, specify: [4.25" (10.8 cm)]

E. Specify length: [120' (36.58 m)]

F. For corners, specify: [Inside Corners] [Outside Corners]

G. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

H. Test Data:
1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

2.6 RESILIENT **BASEWORKS** WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett Traditional Rubber Wall Base.

B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Thermoset Rubber Wall Base, Type TS, Group 1.

C. For thickness, specify, 0.125" (3.17 mm)

D. For type, specify: [Straight] [Coved] <**Insert type**>

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E. For height, specify: [2.5" (6.35 cm)], [4" (10.16 cm)], or [6" (15.24 cm)] <**Insert height**>

F. For 2.5" and 4" heights, specify length: [4' (1.22 m)] [120' (36.58 m)] <**Insert length**>

G. For 6" heights, specify length: [4' (1.22 m)] [100' (30.48 m)] <**Insert length**>

H. For corners, specify: [Inside Corners] [Outside Corners] <**Insert Corners**>

I. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

J. Test Data:
1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.
5. ASTM E84, Flame Spread and Smoke Development: Class B, ≤ 450

2.7 RESILIENT **TIGHTLOCK** RUBBER WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett Traditional Rubber Wall Base.

B. Performance requirements meets ASTM F1861 Standard Specification for Resilient Rubber Wall Base, Type TP, Group 1.

C. For type, specify: [TightLock for Carpet] or [TightLock for Resilient] <**Insert type**>

D. TightLock for Carpet height specify: [3.25" (8.26 cm)], [4.5" (11.43 cm)] or [6.5" (16.51 cm)] <**Insert height**>

E. TightLock for Resilient height specify: [3.125" (7.94 cm)], [4.375" (11.11 cm)] or [6.375" (16.2 cm)] <**Insert height**>

F. For length specify: [4' (1.22 m)] [75' (22.86 m)] <**Insert length**>

G. For corners, specify: [Inside Corners] [Outside Corners]

H. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

I. Test Data:
1. Flexibility, ASTM F137: Passes 1/4 inch mandrel
2. Resistance to light, ASTM F1515: Passes
3. Resistance to chemicals, ASTM F925: Passes
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

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2.8 RESILIENT **MILLWORK** CONTOURABLE WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite; A Tarkett Company; Millwork [**Attaché**] [**Ambassador**] [**Diplomat**] [**Delineate**] [**Equinox**] [**Inflection**] [**Mandalay**] [**Monument**] [**Monarch**] [**Oblique**] [**Outline**] [**Reveal**] [**Silhouette**] or comparable product.

B. Product Standard: Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP, Group 1.

C. For **Mandalay** specify height: [2.5" (6.35 cm)], [3" (7.62 cm)], [4.5" (11.43 cm)] or [6" (15.24 cm)] <**Insert height**>

D. For **Reveal** specify height: [4.25" (10.8 cm)] [6" (15.24 cm)] or [8" (20.32 cm)] <**Insert height**>

E. For **Monument** specify height: [4" (10.16 cm)] or [2.5" (6.35 cm)] <**Insert height**>

F. Specify length: 8 feet (2.4 m).

G. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

H. Test Data:
1. Resistance to light, ASTM F1515: Passes
2. Resistance to chemicals, ASTM F925: Passes
3. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

2.9 RESILIENT **MASQUERADE** WALL BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite; A Tarkett Company; Masquerade [**Classic**] [**Oblique**] [**Outline**] [**Reveal**] [**Silhouette**] [**Traditional Wall Base**] or comparable product.

B. Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP, Group 1.

C. Specify length for **Traditional Wall Base**: 4 feet (1.22 m).

D. Specify length for **Classic**, **Oblique**, **Outline**, **Reveal**, or **Silhouette** Wall Base: 8 feet (2.44 m).

E. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <**Insert colors and patterns**>.

F. Test Data:
1. Resistance to light, ASTM F1515: Passes
2. Resistance to chemicals, ASTM F925: Passes
3. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class 1.

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2.10 INSTALLATION MATERIALS

A. Adhesives: as recommended by Tarkett to meet site conditions
   1. Tarkett 960 Cove Base Adhesive (Porous applications)
   2. Tarkett 946 Premium Contact Bond Adhesive (Non-porous applications)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to Tarkett's written instructions to ensure adhesion of resilient wall base.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with Tarkett's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.4 CLEANING AND PROTECTION

A. Comply with Tarkett's written instructions for cleaning and protection of resilient products.

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B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. END OF SECTION 09.65.13

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and Samples.

B. Warranty: Provide a fifteen (15) year warranty for the work specified against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

PART 2 - PRODUCTS

2.1 TOILET COMPARTMENTS AND SCREENS

A. Manufacturers:

1. Scranton Products – "Black" EX

B. Accessibility Requirements: Comply with the latest standards of U.S. Architectural & Transportation Barriers Compliance Board's Accessibility Guidelines, ICC A117.1 and **Texas Department of Licensing and Regulation Standards of Accessible Design** for toilet compartments designated as accessible.

2.2 MATERIALS

A. Solid-Polymer: All toilet partitions shall be floor mounted, overhead braced, with non-corrosive panel doors and pilasters of solid polymer and in the dimensions and arrangements indicated on the drawings. Partitions between urinals and lavatories shall have floor mounted pilasters. Panels, doors and pilasters shall be fabricated from Polymer resins under high pressure forming a single component section which is waterproof, non-absorbent and has a self-lubricating surface that resists marking with pens, pencils or other writing utensils. The panel should have a manufacturer applied texture similar or equal to EX from Scranton Products.

2.3 CONSTRUCTION AND FABRICATION

A. Doors, Panels, and Pilasters shall be one (1) inch thick and all edges machined to a radius of 0.250 inch and all exposed edges to be free of saw marks made of HDPE (High Density Polyethylene), fabricated from polymer resins compounded under high pressure.

B. The panels should be waterproof and non-absorbent, with self- lubricating surface, resistant to marks by pens, pencils, markers and other writing instruments.

C. Dividing Panels and doors shall be 55" high and shall be mounted at 14inches above the finish floor.

D. Pilasters shall be 82 inches high.

E. Urinal Screens are 24 inches deep x 60 inches high and shall be mounted 12 inches above finished floor.

F. Doors, panels, urinal screens, and pilasters shall be equal to "Plasti-Glaze 280" in manufacturer's selected color.

G. Edging Strips are aluminum fastened to the bottom edge of all doors and panels utilizing vandal-proof stainless steel fasteners.

H. Door Hardware shall be as follows:
1. Require full length continuous adjustable helix hinge in brushed finish wurface manufactured from 14 gauge, 304 Stainless Steel, with stainless steel pin welded and ground. Both hinges shall be fastened with 3/4 inch long #14 stainless steel screws.
2. Each door requires one coat hook/ bumper with rubber bumper. No Zamac coated hardware.
3. Handicapped doors also require one door pull and one wall stop with rubber bumper.
4. Door strike and keeper are fabricated from heavy aluminum extrusion (6463-T5 alloy) with clear anodized finish with wrap around flange, surface mounted and thru-bolted to pilaster with one-way sex bolts. Size of strike shall be six (6) inches.
5. Door latch Housing shall be fabricated from heavy aluminum extrusion (6463- T5 Alloy) with clear anodized finish, surface mounted and thru-bolted to door with one-way sex bolts. Slide bolt and button shall be heavy aluminum with similar or equal to "Tuff-Coat Black" finish.

I. Pilaster Shoes shall be 3 inch high, 20 gauge stainless steel shoes with theft proof sex bolts.

J. Provide full length continuous wall brackets (6464 T5 Alloy) with mill finish weighing not less than 1.685 lbs. per linear foot similar or equal to section #58992 shall be used for all panels to pilaster, pilaster to wall, and panel to wall connections. Manufacturer to predrill holes spaced every six (6) inches along full length of brackets. Thru-bolt to panels and pilasters with one-way sex bolts.

K. Headrail to be fabricated from heavy aluminum extrusion (6463 T5 Alloy) with mill finish in anti-grip configuration weighing not less than 1.188 lbs. per linear foot similar or equal to section # 58993. Fasten to tops of pilasters and headrail brackets by thru-bolting with one-way sex bolts.

L. Headrail Brackets are 16 gauge stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units rigid, straight, level, and plumb, with not more than 3/8 inch between pilasters and panels and not more than 3/4 inch between panels and walls and in accordance with manufacturer's instructions. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed fasteners finished to match hardware. Use sleeve nuts for through-bolt applications.

1. Stirrup Brackets: Align brackets at pilasters with brackets at walls. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide blocking/ anchoring devices to secure to wall. Anchoring devices must be compatible to wall type to ensure adequate strength.

C. Install all partitions and compartments where indicated on the drawings, and as indicated on the shop drawings, anchoring all components firmly in place for a long life under hard use and incomplete accordance with the manufacturer's recommendations.

D. Pilaster shoes shall be anchored to the floor with No. 5 Plastic anchors and No. 14 stainless steel phillip head screws.

E. Attachment of brackets to adjacent wall construction shall be accomplished by one theft proof mushroom nail in head anchor directly behind the vertical edge of panels and pilasters at every 12 inches along the length of bracket and two No. 5 plastic anchors and No. 14 x 1-1/4 inch stainless steel phillips head screws at each 12 inch interval alternately spaced between anchor connections.

F. No evidence of drilling, cutting patching shall be visible in the finished work. Defaced finish will not be permitted. Damaged, scratched or marred defective materials will be rejected and shall be replaced with new materials.

G. Clearance of vertical edges of doors shall be uniform top to bottom and shall not exceed 3/16 inch.

H. Except for toilet partitions for the handicapped, adjust doors to remain at a uniformly open (not less than 30 degrees) position when unlocked.

END OF SECTION 102113

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Warranty: Provide warranty for the work specified herein for three (3) years, or provide manufacturer's standard warranty for specified products, against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.
   1. Defects shall include, but not limited to: delamination or deterioration of finish, noisy, rough or difficult operation, and failure to meet specified quality assurance requirements.
   2. Mirror Silver spoilage of 15 years.

PART 2 - PRODUCTS

2.1 Where products are named in the specifications, they are considered basis of specification. Other approved manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications to be considered.
   1. Specifications are based on products of Bobrick Washroom Equipment, Inc.

2.2 COMPONENTS

A. Accessories shall be shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation. Grind welded joints smooth and fabricate units made of metl sheet or seamless sheets, with flat surfaces.

B. Stainless Steel sheets shall meet ASTM A666 Type 302 or 304 and stainless steel tubing shall meet ASTM A269. Both shall have a No. 4 satin, unless otherwise specified, finish and a 22 US stainless gauge minimum thickness.

C. Chromium Plating shall be over nickel and comply with ASTM C456, Type SC 2

D. Framed mirrors shall be1/4 inch thick with an electrolytic copper backing and shall be FS DD-G-451-C, silvering quality No. 1 float or plate.
   1. Warranty of fifteen (15) years against silver spoilage.

E. Fasteners, Screws, and Bolts shall be hot dipped galvanized, tamper proof.

F. Expansion shields shall be fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

G. Concealed backing to comply with local codes and as required for substrate conditions; or manufacturer's standard mounting kits.

2.3 WASHROOM EQUIPMENT

A. Soap Dispenser - Shall be surfaced mounted and provided at each lavatory. The **Owner will provide,** contractor to install. Model No. Symmetry B.9010001.

B. Mirrors- 24 inches x 36 inches surface mounted, Model No. B-290. Locations as shown on drawings. Mirrors should be located away from sink (unbreakable with Stainless Steel frames)

C. Toilet Paper Dispensers – shall be surface mounted and located at each water closet. The contractor will provide**,** big roll at student restrooms: double roll in adult areas. Stainless Steel with spindle, contractor to install Model No????

D. Grab Bars – shall be 1 – ½ inch diameter satin finish stainless steel with a 1-1/2 inch clearance between rail and wall. Attach bars with concealed mounting and parallel to the floor at each accessible stall with one 36 inch behind toilet and one 42 inch long bar at side of toilet. Refer to drawings. Model No. B-6806.

E. Sanitary Napkin Dispenser – shall be surface mounted in each women's toilet room with single coin/double coin-(25/50 cents) operation and capacity of 20 Napkins / 30 Tampons. Model No. B2706.

F. Mop and Broom Holder - shall be surface mounted with a capacity of four (4) hooks and three (3) mop holders and be located above mop sinks at each custodial room. Model No. B-239x 34. Refer to drawings for locations if any.

G. Clothes Hooks- shall be surface mounted and one should be located at each single toilet room inside the door and at each shower location if not included in partition package. Model No. B-6717 or equivalent.

H. Paper Towel Dispenser/ Trash Receptacle Combination – Shall be surface mounted. Model No. B-3949.

I. Roll Paper Towel Dispensers- The **Owner will provide,** contractor to install Model No. SCA 5510282.

J. Electric Hand Dryers- RE: electrical specifications. Should be high speed, energy efficient electric hand dryers and internally grounded. Require 5 year warranty. Operational sound shall be less than 80 dB. Motor and blower 5/8 HP, 20,000 RPM. Air flow rate: 19,000 linear feet per minute. The controls should be completely sealed with automatic operations activated by infrared sensors. The unit should be recessed in an ADA compliant 22 GA 304 Stainless steel #4 finish mount. The mounting kit should be all welded construction measuring 16-3/8" wide x 26" high x 3-3/8" deep.

K. Underlavatory Guard

1. Description: Insulating pipe coverings for supply and drain piping assemblies, which prevent direct contact with and burns from piping, and allow service access without removing coverings.

2.4 MATERIALS AND FINISHING

A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, ASTM B 16 (ASTM B 16M), or ASTM B 30.

C. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T6 or 6463-T6.

D. Sheet Steel: ASTM A 1008/A 1008M, 0.0359-inch (0.9-mm) minimum nominal thickness.

E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60 (Z180).

F. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

G. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

H. Tempered Glass: ASTM C 1048, Kind FT (fully tempered).

I. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

J. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

K. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

L. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **six (6)** keys to Owner's representative.

M. FINISHING
1. Baked Enamel Coatings require pretreating to clean condition, application of one coat primer and minimum two coats vitreous enamel.
2. Chrome / Nickel Plating should have a satin finish.
3. Shop Primed Ferrous Metals requires pretreating, spray apply one coat primer and bake.
4. Back paint components where contact is make with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Install grab bars to withstand a downward load of at least 250 lbf , when tested according to method in ASTM F 446.

B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

C. Comply with ADA and TAS requirements for mounting locations. Refer to drawings. When not shown, submit supplier's recommendations for locations and mounting height before proceeding.

D. Contractor shall be responsible for supplying all opening, blocking, and other components necessary for installation of all toilet accessories.

E. Use approved theft-resistant type fasteners.

END OF SECTION 102800

SECTION 123640 - STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes stone countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Sustainable Documentation Submittals:

1. Recycled Content:
   a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
   b. Include statement indicating costs for each product having recycled content.
2. Regional Material:
   a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
   b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and it's distance from the project site.
3. VOC content data. Provide for any adhesives, sealants, paints, or coatings used on the interior of the building.
   a. Product information or statement from manufacturer indicating the VOC content of the product in grams per liter (g/L).

C. Shop Drawings: Include plans, sections, details, and attachments to other work.

1. Show locations and details of joints.
2. Show direction of veining, grain, or other directional pattern.

D. Samples for Verification:

1. For each stone type indicated, in sets of Samples not less than 12 inches (300 mm) square. Include two or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, according to referenced ASTM standards. Base reports on testing done within previous three years.
2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone countertops to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate stone countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of stone countertops.

C. Mockup: Build mockup to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
   1. Build mockup of typical countertop as shown on Drawings.
   2. Subject to compliance with requirements, approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING
A. Preconstruction Sealant Adhesion and Compatibility Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
   1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
   2. Store stone on wood A-frames or pallets with non-staining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

1.9 FIELD CONDITIONS
A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Source Limitations for Stone: Obtain stone, regardless of finish, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.
   1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
   2. Make stone slabs available for examination by Architect.
      a. Mark and photograph aesthetically unacceptable portions of slabs as directed by Architect.

2.2 GRANITE
A. Material Standard: Comply with ASTM C 615.
B. Description: Uniform, fine to medium-grained, stone without veining.
C. Varieties and Sources: Subject to compliance with requirements, provide the following: As scheduled.
D. Cut stone from contiguous, matched slabs in which natural markings occur.
E. Finish: As indicated.
F. Color and Pattern: As scheduled.

2.3 MARBLE
A. Material Standard: Comply with ASTM C 503[, Classification I Calcite] [, Classification II Dolomite] [, Group A] [, Group B] [, Group C] [, Group D].
   1. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241/C 241M or ASTM C 1353.
B. Description: Uniform, fine- to medium-grained, white stone with only slight veining.
C. Varieties and Sources: Subject to compliance with requirements, provide the following: As scheduled.

2.4 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES
A. General: Use only adhesives formulated for stone and ceramic tile and that are recommended by their manufacturer for the application indicated.
B. Water-Cleanable Epoxy Adhesive: ANSI A118.3, with a VOC content in accordance with Section 018113.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Bonsal, W. R. Company.
      b. Custom Building Products.
      c. Laticrete International, Inc.
      d. MAPEI Corporation.

C. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bonsal, W. R. Company.
      b. Bostik, Inc.
      c. Custom Building Products.
      d. Laticrete International, Inc.
      e. MAPEI Corporation.

D. Stone Adhesive: Two-part epoxy adhesive, formulated specifically for bonding stone to stone, with an initial set time of not more than two hours at 70 deg F (21 deg C).
   1. Color: Clear.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Epoxy Adhesive:
         1) Akemi North America; Akepox.
         2) Axson North America, Inc; Akabond Epoxy.
         3) Bonstone Materials Corporation; Touchstone Ratio Pac Clear Gel Epoxy.

E. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that complies with applicable requirements in Section 079200 "Joint Sealants" and will not stain the stone it is applied to.
   1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
   2. Color: As selected by Architect from manufacturer's full range.

F. Stone Cleaner: Specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer and, if a sealer is specified, by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

G. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Bostik, Inc.
      b. Hillyard, Inc.
      c. Miracle Sealants Company.

2.5 STONE FABRICATION, GENERAL

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
   1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.

B. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.

C. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated.
   1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
   2. For marble, comply with recommendations in MIA's "Dimension Stone - Design Manual VI."
   3. Clean sawed backs of stones to remove rust stains and iron particles.
   4. Dress joints straight and at right angle to face unless otherwise indicated.
   5. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
   6. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
   7. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased unless otherwise indicated.
   8. Finish exposed faces of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.

D. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1.1 STONE COUNTERTOPS

E. General: Comply with recommendations in MIA's "Dimension Stone - Design Manual VI."

F. Nominal Thickness: Provide thickness indicated, but not less than 1-1/4 inches (32 mm). Gage backs to provide units of identical thickness.
G. Edge Detail: As indicated.
H. Splashes: Provide 3/4-inch- (20-mm-) thick backsplashes and end splashes unless otherwise indicated.
   1. Height: As indicated.
   2. Top-Edge Detail: As indicated.
I. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated and as follows:
   1. Bonded Joints: 1/32 inch (0.8 mm) or less in width.
   2. Grouted Joints: 1/16 inch (1.5 mm) in width.
   3. Sealant-Filled Joints: 1/16 inch (1.5 mm) in width.
J. Cutouts and Holes:
   1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
      a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch (5 mm) into fixture opening.
   2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
   3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone countertops.
B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.
B. Before installing stone countertops, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES
A. Variation from Level: Do not exceed 1/8 inch in 96 inches (3 mm in 2400 mm), 1/4 inch (6 mm) maximum.
B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.
C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS
A. General: Install countertops over plywood subtops with full spread of water-cleanable epoxy adhesive.
B. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight, true, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
C. Set stone to comply with requirements indicated. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.

D. Space joints with 1/16-inch (1.5-mm) gap for filling with grout or sealant. Use temporary shims to ensure uniform spacing.
   1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

E. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

F. Install backsplashes and end splashes by adhering to wall with water-cleanable epoxy adhesive and to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.

H. Apply sealant to joints; comply with Section 079200 "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Remove and replace stone countertops of the following description:
   1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
   2. Defective countertops.
   3. Defective joints, including misaligned joints.
   4. Interior stone countertops and joints not matching approved Samples and mockups.
   5. Interior stone countertops not complying with other requirements indicated.

C. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

D. Clean stone countertops no fewer than six days after completion of sealant installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 123640

SECTION 31 11 00 - CLEARING AND GRUBBING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Protecting and preserving trees and vegetation designated to remain.

B. Clearing of site, including, but not limited to the removal of trees, shrubs, and vegetation which is not designated to remain, and brush, branches, logs, rock, debris, rubbish and other objectionable material from the entire project area.

C. Grubbing of site, including, but not limited to uprooting and removal of all stumps, roots, other organics, etc. to their full depth from the project area and disking to a depth of nine (9) inches.

D. Removal and legal, satisfactory disposal of all material cleared and grubbed from the site.

1.2 PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CONDITIONS AT SITE

A. Execute all work in an orderly and careful manner with due consideration for any and all surrounding areas, planting or structures which are to remain. Periodically, water as required to allay dust and dirt. Protect any adjacent property and improvements from damage and replace any portions damaged through this operation.

B. Coordinate and comply with the following:
   1. Geotechnical Report.
   2. Local ordinances and requirements of authorities having jurisdiction.

C. The Contractor shall take proper precautions to protect adjacent or adjoining property from damage caused by clearing and grubbing activities. All damage shall be repaired or replaced at Contractor's expense.

D. The Contractor shall be responsible for obtaining all permits required by State and local governing agencies.

3.2 DISPOSAL OF MATERIAL

A. All cleared and grubbed material becomes the property of the Contractor and shall legally and satisfactorily be removed and disposed of off-site. **On-site burning will not be permitted**.

3.3 FINAL SITE PREPARATION

A. Remove all rubbish, debris, etc., resulting from Work of this Section from the site.

B. After clearing, grubbing and discing the project site, rake and pick the entire site to remove all debris material.

END OF SECTION 31 11 00

SECTION 31 13 13.13 - WASTE MATERIAL DISPOSAL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

A. Waste material disposal consists of disposal of trees, brush, vegetation, rubbish and other objectionable matter from operations such as clearing and grubbing, demolition, excavation, concrete placement and grading. Unless otherwise specified, the Contractor is responsible for removal and disposal of waste material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Specific products are not required. Use equipment and materials necessary to properly complete disposal of waste materials.

PART 3 - EXECUTION

3.1 DISPOSAL AREA

A. Items noted on plans to be "removed" or “disposed” will be taken completely off the site.

B. Concrete wash-out will become property of Contractor to be disposed of with other waste materials.

3.2 COMPACTION AND GRADING

A. Level off waste material to an elevation 12 inches below final grade. Place excess topsoil on waste material in a layer not less than 12 inches thick and compact to the density of the surrounding area.

END OF SECTION 31 13 13.13

SECTION 31 20 00 – EARTHWORK (UNDER PAVING AND SITE APPURTENANCES)

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

A. This section includes the furnishing of all plant, labor, equipment, materials and the performance of all operations required to complete the Earthwork indicated on the Drawings and specified herein, including the following: Clearing and Grubbing, Stripping, Excavation, Embankment, Borrow, Subgrade Preparation, Compaction and Finish Grading.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 CLEARING & GRUBBING

A. This item shall consist of clearing the ground of all trees, brush, rubbish, and of grubbing the roadway, pavement areas, roadside ditches and/or outfall ditch right-of-way or other easements as designated within the limits of the project. The designated areas shall be cleared of stumps, brush, logs, rubbish, trees and shrubs, except such trees and shrubs and certain areas designated by the Engineer for preservation shall be carefully protected from abuse, marring or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees designated for preservation will not be permitted. Trees and shrubs designated for preservation, that must be pruned, shall be trimmed as directed by the Engineer and all exposed cuts over two (2) inches in diameter shall be treated with an approved material.

B. On areas required for paving, channel, or structural excavation, all stumps, roots, etc., shall be removed to a depth of approximately 2-feet below the lower elevation of the excavation. On areas required for embankment construction, all stumps, roots, etc., shall be removed to a depth of approximately 2-feet below the existing ground surface. All holes remaining after clearing and grubbing shall be backfilled and compacted to ninety percent of Standard Proctor Density (ASTM Method D698) at a moisture content of between optimum and plus 3 percent of optimum as directed by the Engineer and the entire area bladed to prevent ponding of water and to provide drainage; except in areas to be immediately excavated, the Engineer may direct that the holes not be backfilled. On areas required for borrow sites and material sources, stumps, roots, etc., shall be removed to the complete extent necessary to prevent such objectionable matter becoming mixed with the material to be used in construction.

C. All cleared and grubbed materials shall be disposed of off site. Contractor shall be responsible for obtaining any necessary disposal permits. The Contractor shall not bury any refuse on site. No burning shall be permitted unless specifically noted and permitted by local jurisdictions.

D. No separate measurement or payment will be made for furnishing all labor, materials, permits, supervision, equipment and supplies required to complete all items of work specified for clearing and grubbing.

3.2 STRIPPING

A. Within the limits indicated, or in areas where existing grade is to be altered either by excavation or embankment, the Contractor shall strip existing topsoil to approximately 3-inches in depth, except that areas beneath foundations or structures shall be stripped to a minimum depth of 6-

inches, and may be stockpiled for future use or disposed of at the Contractor's expense. Stripping shall include the removal and disposal of scrap iron, rubbish, logs, abandoned utilities, signs, and any and all other debris, if within the project site or right-of-way, whether above or below existing grade. Stripping and excavation can take place in the same operation, provided the topmost material is suitable for use in future construction and provided it is not to be set aside for backfill or topsoil. The upper topsoil and debris to be stripped as noted above, shall be removed regardless of whether the site is to be excavated or receive embankment. Surface soil, not suitable for use in the future construction and any other unsatisfactory material shall be excavated, removed off the site and placed in designated spoil banks or shall otherwise be disposed of as directed by the Engineer in such a manner as not to create an unsightly or objectionable condition.

B. Stripping will not be paid for directly. Payment for stripping shall be subsidiary to excavation, borrow or embankment.

3.3 EXCAVATION

A. Excavation shall consist of the required excavation within the project limits, the removal and proper utilization or disposal of all excavated materials; and the constructing, shaping and finishing of all earthwork on the entire project site, in conformity with the required lines, grades and typical cross sections, and in accordance with the specification requirements herein outlined. All suitable excavated materials shall be utilized, insofar as practicable, in grading the site, uniformly widening embankment, flattening slopes, etc., or as directed by the Engineer. The Engineer will define suitable materials. Unsuitable excavation in excess of that needed for construction shall be known as waste and shall become the property of the Contractor to be disposed of by the Contractor outside the limits of the site. Unsuitable material encountered below subgrade elevation, shall be replaced with material from the excavation, or with other suitable material.

B. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, including preparing ditches, trimming of slopes, disposal of surplus materials (wastage), preparation and completion of subgrade, shoulders, roadway, any necessary hauling and the furnishing of all labor, tools, equipment and incidentals necessary to complete the work.

3.4 EMBANKMENT

A. This item shall govern for the placement and compaction of all materials obtained from the site, borrow, channels, structural and sewer excavation, including all underground utility excavation, used in the construction of project fill and/or embankment. Prior to placing any embankment, all stripping and/or clearing and grubbing operations shall have been completed on the excavation sources and areas over which the embankment is to be placed. Stump holes or other small excavations in the limits of the embankments shall be backfilled with suitable material and thoroughly compacted by approved methods before commencing embankment construction.

B. Unless otherwise indicated on the plans, the surface of the ground of all unpaved areas, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than 4-inches. The loosened material shall be recompacted with the new embankment as hereinafter specified, and shall not exceed 8-inches in total depth. Where indicated on the plans or as directed by the Engineer, the surface of a hillside to receive embankment shall be loosened by scarifying or plowing to a depth of not less than 4 inches, or cut into steps, benched or notched before embankment materials are placed. The embankment shall then be placed in layers, not to exceed 8-inches, as hereinafter specified, beginning at the low side in part width layers and increasing the widths as the embankment is raised. The material, which has been loosened, shall be recompacted simultaneously with the embankment material placed at the same elevation. Where embankments are to be placed adjacent to or over existing roadbeds, the roadbed slopes

shall be plowed or scarified to a depth of not less than 4-inches and the embankment built up in successive layers, as hereinafter specified to the level of the old roadbed before its height is increased. The top of the old roadbed shall be scarified and recompacted with the next layer of the new embankment. The total depth of the scarified and added material shall not exceed the permissible depth of layer.

C. Trees, stumps, roots, vegetation or other unsuitable materials shall not be placed in the embankment.

D. Except as otherwise required by the plans, all embankment shall be constructed in layers approximately parallel to the finished grade of the site or paving. Embankments shall be constructed to the grade established by the Engineer, and completed embankments shall correspond to the general shape of the typical sections shown on the plans and each section of the embankment shall correspond to the detailed section or slopes established by the Engineer. After completion, the site shall be continuously maintained to its finished section and grade until the project is completed.

E. No material placed in the embankment by dumping in a pile or windrow shall be incorporated in a layer in that position, but all such piles or windrows shall be moved by blading or similar methods. Clods or lumps of material shall be broken and the embankment material mixed by blading, harrowing, discing, or similar methods to the end that a uniform material is secured in each layer. Water required for sprinkling to bring the material to the moisture content necessary for maximum compaction shall be evenly applied and it shall be the responsibility of the Contractor to secure uniform moisture content throughout the layer by such methods as may be necessary.

F. After each layer of embankment or select material is complete, the Engineer will make tests as necessary. If the material fails to meet the density specified, the course shall be reworked, as necessary, to obtain the specified compaction. Should the subgrade, due to any reason or cause, lose the required stability, density or finish before the pavement is placed, it shall be recompacted and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling, sealing or covering with a subsequent layer of asphaltic or other approved material. Embankment shall not be paid for directly, but shall be incidental to site excavation, channel excavation, construction of underground utilities, including all sewers, or borrow.

3.5 BORROW

A. Borrow shall consist of the required excavation, removal and proper utilization of materials secured from sources obtained by the Contractor and approved by the Engineer. Borrow shall be used only when shown on the bid form or directed by the Engineer and then only from approved sources. Borrow material shall come only from sources approved by the Engineer. The Engineer shall provide samples of the fill material for testing and approval. In the event the material is not acceptable, as determined by the Engineer, the Contractor shall find other sources. All fill material shall be free from organic matter and deleterious material.

B. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price. All work performed as required herein shall be full compensation for furnishing all labor, for all materials, for all royalties and freight involved, for all hauling, delivery, spreading and compacting complete and in place and for all tools, equipment and incidentals necessary to complete the work.

3.6 SUBGRADE

A. The subgrade shall be brought to the lines, grades and typical cross section shown on the plans and in accordance with these specifications. Whenever unsuitable natural material is encountered and cannot be handled by the excavation or embankment requirements, then the

following requirements shall apply. The unsuitable material shall be excavated to a depth deemed sufficient by the Engineer and the excavated material shall be disposed of off the jobsite at the expense of the Contractor. The excavated area shall be filled to its original level with suitable material meeting the requirements of borrow. This imported material shall be compacted to 95- percent of standard proctor density, (ASTM Method D698) using a moisture content ranging from optimum to plus 3-percent above optimum. Soils shall not be compacted at less than the optimum moisture content.

B. After all holes and depressions are filled with approved material, the subgrade shall be brought up to the lines and grades required and if it is not to be stabilized, it shall be compacted to 95- percent of standard proctor density, (ASTM Method D698), using a moisture content ranging from optimum to plus 3-percent above optimum. The subgrade, without stabilization, shall be compacted to a depth of 9-inches. The subgrade shall be kept free from all ruts and weak spots. Any ruts and weak spots that develop under traffic shall be repaired with suitable material as they develop.

3.7 COMPACTION

A. All fill material shall be placed in uniform layers, dried or moistened as required to obtain approximate optimum moisture content and rolled to a density of at least 95 percent of maximum density at optimum moisture as determined by ASTM D-698. Compaction equipment shall be as hereinafter specified. The maximum thickness of uniform layers (loose measurements) shall be as follows:
   1. If the Contractor elects to use a pneumatic tired roller, the thickness of each uniform layer shall not exceed six (6) inches.
   2. If the Contractor elects to use sheepsfoot rollers, the thickness of each uniform layer shall not exceed eight (8) inches.
   3. In locations where it is impractical to use the roller equipment, mechanical hand tampers will be used and the thickness of each uniform layer shall not exceed four (4) inches. The method used to secure the optimum moisture content will be the Contractor's responsibility. The compacting equipment and the method of compaction shall be such that a uniform density will be obtained over the entire area and depth of material being compacted. All fill material deposited in place by means of scrapers, dump trucks, draglines or other similar equipment shall be thoroughly broken up before being spread into the uniform layers. Rolling shall start longitudinally at the sides and proceed toward the center of the crowned sections or start longitudinally at the low side and proceed toward the high side of sloped areas, overlapping on successive trips by at least one-half (1/2) the width of the roller unit. Alternate trips of the roller shall be slightly different in length.

B. Excess loss of moisture shall be construed to exist when the soil moisture content is three (3) percent less than optimum moisture.

C. An independent qualified Testing Laboratory either selected by or approved by the Owner or Engineer, for every 500 square yards of the compacted subgrade shall take density tests. The Testing Laboratory will furnish written reports covering results of all tests and inspections made. Reports will be made promptly to the Engineer, Contractor and Owner.

3.8 FINISH GRADING

A. Uniformly smooth grade all areas indicated on the drawings to be graded. The finish surface shall be not more than 0.05 feet above or below the established grade or approved cross section. All ditches and swales shall be properly graded so as to drain readily. Where existing grade is disturbed by the Contractor in areas not marked to be graded, the Contractor will regrade the disturbed area to its original grade at no additional expense to the Owner.

END OF SECTION 31 20 00

SECTION 31 23 00 - CONSTRUCTION OF UNDERGROUND UTILITIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

A. This Section shall govern for all excavation required for the construction of sewers, sewer structures, pipe culverts, appurtenances and connections and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines and grades shown on the plans or as given by the Engineer and in accordance with these specifications. This Section shall also govern for any necessary pumping or bailing and drainage and all sheathing and bracing of trench walls. Also governed by this Section are the cutting and restoration of pavement and base courses, the furnishing and placing of cement stabilized backfill, the hauling and disposing of surplus materials and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.

1.2 QUALITY ASSURANCE

A. The Testing Laboratory's representative will determine the moisture density relationship in accordance with ASTM D698 on material secured from the trench excavation. Samples secured from the cement stabilized sand supplier shall be blended with Portland cement in accordance with Section 31 23 23.16 - Cement Stabilized Sand Bedding and Backfill, and the moisture density relationship will be determined in accordance with ASTM D558.

B. The Testing Laboratory's representative will determine the in place density in accordance with ASTM Methods D2922 or D1556. The minimum level of testing will consist of at least one test for each 200 linear feet of trench per lift of backfill.

C. At the completion of the project, all on site storm and sanitary sewer lines shall be cleaned out using a hydraulic jet machine in the presence of the owner and engineer. After hydro-jetting storm and sanitary sewer lines, all segments shall be video tape recorded and tapes shall be furnished to the owner.

1.3 REQUIRED INSPECTIONS

A. The contractor is solely responsible for meeting with all inspecting authorities having jurisdiction over the project (to include, but not limited to: MUD District, City, County, State and Federal) prior to construction. All required inspections shall be coordinated by the contractor prior to installation of the WORK. All WORK found to be deficient by the inspector(s) and WORK installed prior to notification of inspector(s) shall be removed and replaced at the contractor's sole expense.

PART 2 – PRODUCTS

2.1 CONNECTIONS TO BUILDING GRAVITY SEWERS

A. Connections to building gravity sewers, to include roof drains and sanitary sewer connections shall be made with SCH 40 X SDR adapter couplings.

B. Fernco couplers are not allowed.

PART 3 – EXECUTION

3.1 EXCAVATION & TRENCH PREPARATION

A. Excavate trench to the alignment and depth required. Brace the trench and drain, as required, so that the work may be accomplished safely and efficiently. If necessary, install a dewatering system to provide a dry trench bottom. Pumps shall discharge into natural drainage channels or to drains. Shoring for excavations and trenches shall meet the requirements of the latest edition of OSHA Regulation 1926, Subpart P.

B. For pipes less than 30 inches in diameter, the minimum width of the trench shall be the width of the outside barrel of the pipe plus 24 inches, the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches. For pipe 30 inches and larger, the minimum trench width shall be the width of the outside barrel of the pipe plus 32 inches, and the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches.

C. Side sloping or benching of the trench, where permitted, will begin at one foot above the top of the pipe and will not encroach upon private property or endanger existing or future structures or underground utilities. Depth of trench, without sheathing or bracing shall comply with OSHA Regulation 1926.650.

D. The full width of the trench shall be excavated to a depth below the invert elevation of the pipe so as to permit placing the bedding material specified on the attached drawings below the outside bottom of the pipe. Any additional depth excavated by the Contractor shall be replaced with an equal depth of cement-stabilized sand. The cost of this additional material, in place shall be at the expense of the Contractor.

E. Where necessary, excavations shall have sheathing and bracing to prevent caving. At these locations, increase the trench width as required and leave the sheathing in place until the pipe has been laid and the backfill compacted to a depth of 2 feet over the pipe. All sheathing and bracing shall be designed to the requirements of OSHA Standard 1926, Subpart P (latest edition).

F. Sewers shall not be constructed or sewer pipe laid in the presence of water. All water shall be removed from the excavation sufficiently prior to the sewer placing operation to ensure a dry, firm bed on which to place the sewer and shall be maintained in such unwatered condition until all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping or by a well-point system as conditions warrant. There will be no separate pay for well pointing without the prior approval of the Engineer. Contractor shall include in base proposal all costs associated with de-watering, well pointing, stabilizing, etc. necessary to install all underground utilities.

G. In the event that the excavation cannot be dewatered to the point where the pipe subgrade is free of mud, excessive wet soil, sand silt or clay with water, a seal slab shall be used in the bottom of the excavation. Such seal slab shall consist of a lean concrete mixture. The seal slab shall be a Class “D”, 5 sacks of cement per cubic yard with a minimum compressive strength of 1,750 P.S.I. at 7 days and 2,500 P.S.I. at 28 days. A precast seal slab may be used, provided that the joints of the seal slab do not occur at the joint of the pipe. Contractor shall have an option of using a three- day cylinder break test at no expense to the Owner.

H. For unstable conditions requiring outside forms, seals, sheathing, and bracing, or where groundwater is encountered, any additional excavation in width and backfill required shall be done at the Contractor’s expense. Portable trench boxes may be used in lieu of sheathing upon approval in writing by the Engineer. The trench box must be in accordance with OSHA Regulation 1926.650 (latest edition).

I. Use of the trench box does not relieve the Contractor of any liability for damages to person or property. When a trench box is moved, the jointed pipe or in-place backfill shall not be disturbed.

J. All materials from excavation operations not required for backfilling, if considered suitable shall be placed in embankments or wasted, in accordance with Section 31 20 00 - Earthwork. All material not suitable for use in embankments will be declared surplus by the Engineer and shall become the responsibility of the Contractor to dispose of as he wishes. Such surplus material shall be promptly removed from the work following the completion of the portion of the sewer involved. No separate payment shall be made for disposal of this surplus material.

K. Unless otherwise specifically approved, Contractor shall use ladder or wheel-type trench-digging machinery, except where hand methods must be employed to avoid damage to existing structures above or below ground, or where hand excavation is indicated.

L. Engineer may limit the amount of trench opened or partially opened at any time in advance of the completed pipe laying operation and the amount of trench left unfilled. Open no more than 500 feet of trench at any one time.

3.2 PIPE LAYING

A. No pipe shall be laid in water or when the trench conditions or weather is unsuitable for such work, unless specifically approved by the Engineer.

B. Non-pressure concrete pipe shall be laid with the ends abutting and true to line and grade. Fit and lay the pipe to form a smooth and uniform invert. Laying of pipe shall commence at the lowest point, so that the spigot ends point in the direction of flow. Lay cast iron pipe on firm earthen foundation with bell ends facing the direction of laying.

C. All other types of pipe shall be laid in accordance with the applicable provisions of this specification, in accordance with the Special Provisions preceding this Subsection, or with the manufacturer's recommendations.

D. Cut cast iron pipe with wheel-type cutters or cold chisel. Flame cutting of cast iron pipe is not allowed. Make cuts in a neat and workmanlike manner without damage to pipe and so as to leave a smooth end at right angles to axis of pipe. Field cutting of Polyvinyl Chloride shall be in accordance with the pipe manufacturer's recommendations.

E. Minor deflections may be obtained in pipe joints. Contractor must obtain approval when the degree of deflection is necessary to deflect from a straight line. Where necessary to make major deflections in concrete pipe, use sections of pipe with beveled ends for deflections not greater than five degrees. For deflections greater than five degrees, use fabricated fittings for concrete pressure pipe and use cast iron fittings for cast iron pipe.

F. When the pipe laying operation is halted, seal the open end of the pipe with a temporary plug. Plug is to remain in place until the pipe laying operation re-commences. Standard plugs shall be inserted into bells of all dead end pipe.

G. All underground pipe shall have a 12 gauge metallic tracer wire running the full length of the pipe. Tracer wire shall be taped to the pipe at intervals not to exceed 15-feet using duct tape and terminate at each end above ground in a 2" PVC riser.

H. Pipe shall be installed with the labels facing upward.

I. At the completion of the project, all on site storm and sanitary sewer lines shall be cleaned out using a hydraulic jet machine in the presence of the owner and engineer. After hydro-jetting storm and sanitary sewer lines, contractor shall run video-camera through pipes and video-record each line segment in order to document proper installation.

3.3 BACKFILLING

A. As soon as practicable after completion of laying and jointing of pipe, backfill the trench. Not more than 200 feet of the trench shall be left open after laying the pipe.

B. Trenches shall be backfilled in accordance with drawing details and notes. Backfill material selected from sewer trench excavation, or obtained from other sources, shall be free from stones, which will interfere with compaction and free of large lumps, which will not break down readily under compaction. Do not use material excavated in large lumps which will not break down or which cannot be spread in loose layers. Material excavated by trenching machine will generally be suitable for use as backfill. Cement stabilized sand shall be in accordance with Section 31 23
23.16 - Cement Stabilized Sand Bedding and Backfill.

C. When placing backfill in the trench simultaneously on both sides of the pipe for the full width of the trench, moisten if necessary and tamp in approximately 6-inch layers, thoroughly compacting under and on each side of the pipe to provide solid backing against the external surface of the pipe. Walking or working on the completed pipeline, except as necessary in tamping or backfilling shall not be permitted until the trench has been backfilled to at least 12-inches over the top of the pipe.

3.4 RESTORATION OF SURFACES

A. Replace or repair sidewalks, driveway culverts, inlets, curbing, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed, to the condition equivalent to that existing prior to commencement of this work. Use concrete having a compressive strength of not less than 3,000 psi in 28 days for the replacement of curbing, gutters, inlets and sidewalks.

B. Use reasonable care in the removal and replacement of shrubbery and trees designated to be replaced at original locations. Where at all possible, ditch alignment will be such as to minimize this work. The restoration of asphalt-topped flexible base and concrete streets shall be as specified under other items of the specifications.

3.5 CLEAN-UP

A. The Contractor shall remove from the site of the work and from public and private property temporary structures, rubbish, and waste materials, including excess excavated materials. The Contractor is responsible for disposing of all surplus earth. The pipe laying operation shall be temporarily suspended if the clean-up is falling behind as determined by the Engineer or Owner.

3.6 MEASUREMENT & PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

END OF SECTION 31 23 00

SECTION 31 23 16.16 - STRUCTURAL EXCAVATION AND BACKFILL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SCOPE

A. This section describes the excavation for all structures except pipe sewers, the backfilling around completed structures and the disposal of all excess excavated material. All operations required for the proper completion of the excavation work, including sheeting, shoring and bracing, dewatering of excavations and compaction of backfill are included under this section.

1.2 PROTECTION

A. Before the start of earthwork operations, adequately protect existing structures, utilities, trees and shrubs and other permanent objects. Costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be charged to the Contractor. The Contractor will also be charged for damage to facilities scheduled for later removal or demolition if the damage sufficiently impairs proper operation to the extent that temporary replacement or repair is required.

1.3 PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the bid form and specified in other sections of this work.

1.4 BLASTING

A. Blasting will not be permitted.

PART 2 - PRODUCTS

2.1 REGULAR BACKFILL

A. Where no other backfill is specified, use suitable soils from the excavation as backfill material.

2.2 SAND BACKFILL

A. Where sand backfill is specified, use reasonably clean bank sand from an approved source. The sand must be free from large lumps of clay, rubbish, organic matter or other deleterious substances. Not more than 12 percent by weight shall pass the 200 mesh sieve and the plasticity index shall not exceed 4.0. This backfill shall be placed a minimum of 18 inches wide around all below-grade structures.

2.3 FILTER MATERIAL BACKFILL

A. Where shown, use a mixture of concrete gravel and concrete sand. Proportion the mixture with two parts gravel to one part sand by volume. Gravel and sand shall meet requirements of ASTM C 33. The maximum size of acceptable gravel is 1-1/2 inches.

2.4 CEMENT STABILIZED BACKFILL

A. Prepare a mixture of sand, cement and water.

B. Use washed river sand free from large clay lumps or unacceptable amounts of other foreign

materials. The sand must not be darker than the standard color when subjected to a color test in accordance with ASTM C 40.

C. Required gradation of sand:

Screen Size	Percent Retained
3/8-inch screen	0 percent
1/4-inch screen	0 percent - 5 percent
20 mesh screen	15 percent - 50 percent
100 mesh screen	80 percent - 100 percent

D. Use Type I cement conforming to ASTM C 150.

E. Mix in a pug mill using not less than 1-1/2 sacks of cement per cubic yard (unless otherwise specified) of mixture with sufficient water to hydrate the cement.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation work shall be unclassified and includes removal of all types of materials encountered without exception. Make excavations to lines and grades indicated on drawings. Complete excavations within the tolerances specified. Perform all work in conformity with the rules and regulations of the Federal Occupational Safety and Health Act.

1. **Shoring, Bracing, Dewatering**: Provide shoring, bracing and dewatering of excavations required to properly and safely complete the work as shown. Construct shoring and bracing to prevent the excavation from extending beyond specified or indicated limits and to protect workmen. Keep excavations dewatered by drainage, pumps or well points as necessary while work is in progress. Dewatering methods are subject to approval. Remove shoring, bracing and sheathing as excavations are backfilled in a manner to prevent injurious caving.
2. **Pipe Trenches**: Excavate by open cut methods. Make and maintain the sides of the trench as nearly vertical as practical. Provide shoring to maintain the sides of the trench in a vertical position and to protect workmen. Complete and shape the trench to provide free working space and to permit thorough tamping of backfill around the pipe. Grade trench bottoms accurately to provide uniform bearing on firm soil along the entire length of each pipe section. Remove rubbish, rock or debris encountered at grade to at least 6 inches below the bottom of the pipe. Reshape and compact the trench bottom. Working space measured from the outside of the pipe to the side of the trench must be at least 6 inches but not more that 24 inches. Provide bell holes where required for making proper connections at joints.

B. Structures Other than Pipes:

1. Wherever practicable cut all footing excavations to neat lines with a tolerance of minus 1 inch or plus 3 inches and place concrete to bear against earth sides. Cut all excavations a sufficient distance from walls, shafts or similar elements of structures to allow for placing and removing forms and for inspection. Make all excavations at a minimum slope of 1:1 with a 3 feet cut outside of footing lines or wall lines except as shown or specifically authorized.
2. Carry all excavations to the elevations shown and to deeper levels as directed when suitable foundation soils are not encountered at plan depth. Remove all pockets of soft or otherwise unstable soils and replace with concrete or with suitable well compacted soil as directed.
3. Fill all unauthorized excessive excavation with concrete at no change in the contract sum.
4. Protect all open excavations from rainfall or excessive drying. Provide pumps and other equipment as required to keep excavations reasonably free of water at all times and completely free of water during placement of concrete.
5. Do not remove the last 4 inch depth of excavation for slabs or footing until reinforcing steel and concrete are ready to be placed.
6. For footings founded on rock, hard shale or similar material, remove all loose material. Clean

and cut to a firm surface either level, stepped or serrated as directed. Clean out seams and fill with concrete at the time footing concrete is placed.

3.2 BACKFILL

A. Complete backfill to the surface of natural ground or to the lines and grade shown on drawings. Except where special materials are requested, use suitable soils from the excavation as backfill material. Do not use peat or other organic matter, silt, muck, debris or similar materials. Deposit backfill in uniform layers and compact each layer as specified.

1. Backfill at Structures: Place backfill as promptly as practicable after completion of each structure or portion of a structure. Do not, however, place backfill against concrete walls or similar structures until concrete has been cured at least seven days. Remove concrete forms before starting backfill and remove shoring and bracing as the work progresses. Take care to prevent any wedging action of backfill against the structure. Step cut or serrate the slopes bounding the excavation as required to prevent wedging.
2. Backfilling of Pipe Trenches:
   a. Refer to appropriate paragraphs of SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES.
3. Compaction of Backfill:
   a. Refer to appropriate paragraphs of SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES.

3.3 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess or unsuitable material from the excavation off the job site.

END OF SECTION 31 23 16.16

SECTION 31 23 23.16 - CEMENT STABILIZED SAND BEDDING AND BACKFILL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies cement stabilized sand to be used for backfill and bedding as called for on the drawings, in other parts of the specifications, or as directed by the Engineer.

1.2 PERFORMANCE

A. The sand cement mixtures shall produce a minimum unconfined compressive strength of one hundred pounds per square inch (100 psi) in forty eight hours, when compacted to ninety five percent (95%) of Standard Proctor density (ASTM Method D558), without additional moisture control and when cured in plastic bags at a temperature of 73.4º F at plus or minus 3º F and tested in accordance with ASTM D1633.

B. Random samples of the delivered product will be taken in the field at the direction of the Engineer and tested at the Owners expense.

1.3 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement shall be Type I Portland cement conforming to ASTM C150. Sand shall be clean durable sand containing not more than the following:
   1. Deleterious Materials:
      a. Clay lumps, when tested in accordance with ASTM C142 shall be less than 0.5 percent. Lightweight pieces, when tested in accordance with ASTM C123 shall be less than 5.0 percent. Organic impurities when tested in accordance with ASTM C40 shall not show a color darker than the standard color.
   2. The plasticity index shall be six (6) or less when tested in accordance with ASTM D4318.
   3. Sand shall be free of organic matter and deleterious substances and shall meet the following gradation requirement.

Square Sieve Size	% Passing, By Weight
3/8"	100%
No. 200	5 - 30%

   4. Water shall be clean and clear, free of oils, acids, alkalis, organic matter or other deleterious substances and shall conform to the requirements of ASTM C94.

2.2 SAND-CEMENT MIXTURE PRODUCT

A. The mixture shall consist of not less than 1.5 sacks of Portland cement per cubic yard (1.1 sacks per ton) of material mixture as placed. The mixture shall contain sufficient water to hydrate the cement.

B. The cement, sand and water shall be mixed in a pug mill type mixer, which meets the approval of the Engineer. It shall be mixed for a minimum period of two minutes per batch.

PART 3 – EXECUTION

3.1 APPLICATION

A. The sand cement mixture shall be placed in maximum eight (8) inch thick lifts, loose measure, and thoroughly rodded and tamped around the pipe, boxes, structures, and paving sections. Placement and compaction shall be performed in a manner that will thoroughly fill all voids without placing undue strain on or displacement of the structure.

B. Cement stabilized sand backfill below the top of sewers, manholes, inlets or other structures shall be placed equally along all sides of the structure. Cement stabilized sand backfill/bedding shall be placed in a manner that will completely fill all voids in the trench. Should compaction be required to fill all voids in the areas described, hand operated tampers may be used.

C. Materials not placed and compacted within four (4) hours after mixing shall be rejected. Do not place or compact sand-cement mixtures in standing or free water.

D. Cement stabilized sand backfill/bedding that is placed in trench bottoms or all other locations between the tops of sewer lines to the bottom of the subgrade, shall be compacted to a minimum of ninety five percent (95%) of Standard Proctor Density (ASTM Method D558), and shall apply to all areas of construction within the limits of the project.

E. In-place density tests shall be taken at each location, each day, to test the placement of bedding/backfill material as directed by the Engineer. In-place densities shall be determined in accordance with ASTM D2922 or ASTM D1556.

END OF SECTION 31 23 23.16

SECTION 31 32 13.19 - LIME STABILIZED SUBGRADE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

A. This item shall consist of treating the subgrade, by the pulverizing, addition of lime, mixing and compacting the mixed material to the required depth and density, and in the amounts shown on the plans.

B. This item applies to natural ground, embankment, base or sub-base and shall be constructed to the sections, lines and grades shown on the plans. The subgrade shall be stabilized with lime to a depth of at least 6-inches in the amount recommended by a materials engineering laboratory. The P.I. shall be determined by ASTM Method D4318.

1.2 QUALITY ASSURANCE

A. The Testing Laboratory's representative will determine the Moisture-Density Relationships in accordance with ASTM Method D698 on material secured from the roadway after stabilization with lime, for each type of material encountered.

B. The Testing Laboratory's representative will determine the in-place density in accordance with ASTM Method D2922 or D1556. The minimum level of testing will consist of at least three tests for each 1,000 feet per lane of roadway or 4,000 square feet (500 square yards) of embankment.

1.3 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Lime for stabilization shall be classified as Type A- Hydrated Lime, or Type B- Commercial Lime Slurry, conforming to the requirements of Section 31 32 13.20 - Hydrated Lime and Lime Slurry.

2.2 EQUIPMENT

A. The machinery, tools and equipment necessary for proper execution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. It is the primary requirement of this specification to secure a completed course of treated material containing a uniform lime soil mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his

work, to use the proper amount of lime, maintain the work and rework the courses as necessary to meet the above requirements.

B. The subgrade shall be constructed and shaped to conform to the typical sections, lines and grades as shown on the plans or as established by the Engineer. The subgrade shall be firm and able to support, without displacement, the construction equipment at the density herein specified. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the Engineer, by scarifying, adding lime, and compacting, or other methods until satisfactory stability is obtained. The cost of the repair of the secondary subgrade and any materials below the secondary subgrade is incidental to this Section.

C. The Contractor shall be required to proof-roll the subgrade, as directed by the Engineer, before using the pulverizing machine and correct any soft areas that this rolling may reveal.

D. Lime shall be spread only on that area where the first mixing operations can be completed during the same working day. The application and mixing of lime with the material shall be accomplished by the methods hereinafter described as "Dry Placing" or "Slurry Placing". When Type A, Hydrated Lime, is specified, the Contractor may use either method, unless otherwise noted on the plans.

E. When dry placing, the lime shall be spread by an approved spreader or by bag distribution at the rates shown on the Bid Sheet, or as directed by the Engineer.

F. The lime shall be distributed at a uniform rate and in such a manner as to reduce the scattering of lime by wind to a minimum. Lime shall not be applied when wind conditions, in the opinion of the Engineer, are such that blowing lime becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread the lime.

G. The material shall be sprinkled as directed by the Engineer, until the proper moisture content has been secured. Where Type A, hydrated lime is specified and slurry placement is used, the Type A hydrate shall be mixed with water to form a slurry of the solids content designated by the Engineer. A minimum of two mixing passes will be required.

H. Where Type B, commercial lime slurry is to be used, it shall be of the minimum solids and purity for the applicable grade being used. The distribution of lime shall be at the rates shown on the proposal form, or as directed by the Engineer. Proper application shall be attained by successive passes over a measured section of the roadway, until the proper moisture and lime content has been secured. The distributor truck shall be equipped with an agitator, which will keep the lime and water in a uniform mixture.

I. The material and lime shall be thoroughly mixed by approved road mixers or other approved equipment, and the mixing continued until, in the opinion of the Engineer, a homogenous friable mixture of material and lime is obtained, such that when all non-slaking aggregates retained on the 3/4-inch sieve are removed, the remainder of the material shall meet the following requirements when tested in accordance with ASTM Method C136, from samples procured from the roadway.

TABLE I

Minimum Passing 1 3/4" sieve	100 Percent
Minimum Passing 3/4" sieve	85 Percent

J. If gradation is achieved on the first mixing, no additional mixing is required.

K. The soil lime mixture shall be sprinkled during the mixing operation as directed by the Engineer to provide optimum moisture in the mixing. The subgrade shall be stabilized to a minimum depth of

6-inches and compacted to a minimum of 95-percent of standard proctor density (ASTM D698) at a moisture content of optimum to 3-percent above optimum.

L. During the interval of time between application and mixing, hydrated lime that has been exposed to the open air for a period of 6-hours, or more, or has had excessive loss due to washing or blowing will not be accepted for payment.

M. Compaction of the mixture shall begin immediately after final mixing unless approval has been obtained from the Engineer not to do so. The material shall be aerated and/or sprinkled as necessary, to provide the optimum moisture content. Compaction shall begin at the bottom and shall continue until the entire depth of mixture is uniformly compacted.

N. The material and lime shall be thoroughly mixed by approved road mixers or other approved equipment and the mixing continued until, in the opinion of the Engineer, a homogenous, friable mixture of material and lime is obtained, free from all clods or lumps. Materials containing plastic clays or other materials which will not readily mix with lime shall be mixed as thoroughly as possible at the time of lime application, brought up to the proper moisture content and left to cure 48 to 96, hours as directed by the Engineer. During the curing period the material shall be kept moist as directed.

O. If a second mixing is required, the material shall be given a final mixing, using approved methods. If the soil binder-lime mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying, or the use of other approved pulverization methods, so that all non- slaking material retained on the 3/4-inch sieve is removed and the remainder of the material shall meet the gradation requirements outlined by Table I. After the second mixing has been completed, the material shall be allowed to cure for a minimum of 3 days, unless otherwise directed by the Engineer.

P. The material shall be sprinkled and rolled, as directed by the Engineer. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and reshaping and re-compacting by sprinkling and rolling. The surface of the course shall be maintained and cured for a minimum of 3 days, prior to placing a base or surface course or until traffic is allowed to travel thereon.

Q. In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests as necessary will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation, the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical section shown on the plans and to the established lines and grades. Should the material, due to any reason or cause, lose the required stability, density and finish before the next course is placed or the work is accepted, it shall be reprocessed and refinished at the expense of the Contractor.

3.2 FINISHING

A. After the final course of the lime treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling as directed with a pneumatic tire or other suitable roller sufficiently light to prevent hair cracking. The completed section shall be moist or emulsion cured until covered by base material, unless otherwise directed by the Engineer. If the plans provide for the treated material to be sealed or covered by other courses of material, such seal or course shall be applied within 14 days after final mixing and compaction is completed, unless otherwise directed by the Engineer.

END OF SECTION 31 32 13.19

SECTION 31 32 13.20 - HYDRATED LIME AND LIME SLURRY

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section establishes the requirements for hydrated lime and commercial lime slurry of the type and grade considered suitable for use in the treatment of natural or processed materials or mixtures for subgrade, sub-base and base construction.

1.2 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The various types and grades are defined and identified as follows:

1. Type A, Hydrated Lime: Shall consist of a dry powder obtained by treating quicklime with enough water to satisfy its chemical affinity for water under the conditions of its hydration. This material is to consist essentially of calcium hydroxide or a mixture of calcium hydroxide and a small allowable percentage of calcium oxide, magnesium oxide and magnesium hydroxide. Hydrated lime shall meet the requirements of ASTM Designation.
   a. When sampled and tested according to prescribed Texas Highway Department procedures, hydrated lime shall conform to the following requirements as to chemical composition:
      1) Hydrate alkalinity, percent by weight CA (OH)2 Min. 90.0%
      2) Unhydrated lime content, percent by weight CaO Max. 5.0%
      3) "Free Water" content, percent by weight H 2 0 Max. 4.0%

   b. The percent by weight of residue retained shall conform to the following requirements:
      1) Residue retained on a No. 6 sieve Max. 0.0%
      2) Residue retained on a No. 10 sieve Max. 1.0%
      3) Residue retained on a No. 30 sieve Max. 2.5%

   c. Specifications for Type "A" applies specifically to the normal hydrate of lime made from "high-calcium" type limestone. Hydrated Lime for stabilization purposes shall be applied, as provided in the governing specifications, as a dry powder or mixed with water to form a slurry.

2. Type B, Commercial Lime Slurry: Shall be pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity and/or nature injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content", shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition, residue and delivered in trucks which shall be equipped with an agitator which will keep the lime and water in a uniform mixture.
   a. Chemical Composition: The "solids content" of the lime slurry shall have a hydrate alkalinity Ca (OH)2 of not less than 90% by weight.

b. Residue: The percent by weight of residue retained in the "solids content" of lime slurry shall conform to the following requirements:

1)	Residue retained on a No. 6	sieve	Max. 0.0%
2)	Residue retained on a No. 10	sieve	Max. 1.0%
3)	Residue retained on a No. 30	sieve	Max. 2.5%

c. Type B: Commercial Lime Slurry shall conform to one of the following grades:
   1) Grade 1: The "Dry Solids Contents", shall be at least 31 percent by weight of the slurry.
   2) Grade 2: The "Dry Solids Contents", shall be at least 35 percent by weight of the slurry.
   3) Grade 3: The "Dry Solids Contents", shall be at least 46 percent by weight.

PART 3 – EXECUTION

3.1 SAMPLING AND TESTING

A. The sampling and testing of lime slurry shall be as determined by Test Method Tex-600-J, "Lime Testing Procedure".
   1. When Type A: Hydrated Lime is used, the quantity of lime will be measured by the ton of 2000 pounds, dry weight.
   2. When Type B: Commercial Lime slurry, is used, the quantity of lime shall be calculated from the required minimum percent solids based upon the use of Grade 1, Grade 2, or Grade 3 as follows:
      a. Grade 1: The "Dry Solids Content" shall be at least 31 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2000 pounds based on the 31 percent dry weight solids.
      b. Grade 2: The "Dry Solids Content" shall be at least 35 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2000 pounds based on the 35 percent dry weight solids.
      c. Grade 3: The "Dry Solids Content" shall be at least 46 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2,000 pounds based on the 46 percent dry weight solids.

END OF SECTION 31 32 13.20

SECTION 31 32 13.21 - LIME-FLYASH STABILIZED SUBGRADE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

A. This item shall consist of treating the subgrade by the pulverizing, addition of lime flyash and/or flyash, mixing and compacting the mixed material to the required density. This item applies to natural ground and embankment and shall be constructed as specified herein and in conformity with the typical sections, lines and grades shown on the Plans.

1.2 QUALITY ASSURANCE

A. The Materials Engineer will determine the Moisture-Density Relationship in accordance with ASTM Method D698, on material secured from the roadway. Samples shall be blended with Lime-Flyash in the laboratory for each type of material encountered.

B. The Materials Engineer will determine the in-place density in accordance with ASTM Method D2922 or D1556. The minimum level of testing will consist of at least three tests of 4,000 square feet (500 square yards) of subgrade.

1.3 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Hydrated lime shall meet the requirements of ASTM C977 and SECTION 31 32 13.20 – HYDRATED LIME AND LIME SLURRY of these Specifications. When Type B, commercial lime slurry, is specified, the Contractor shall select, prior to construction, the grade to be used and shall notify the Engineer in writing before changing from one grade to another.

B. Flyash shall meet the requirements of ASTM C618, Class C. Flyash shall also have a minimum CaO content of 20 percent.

C. Water shall meet the requirements of ASTM Designation C94.

2.2 EQUIPMENT

A. Machinery, tools and equipment for proper performance of the work shall be on the Project and approved by the Engineer prior to the beginning of construction operations.

B. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

C. Hydrated lime and flyash shall be stored and handled in closed, weatherproof containers until immediately before distribution on the subgrade. If storage bins are used, they shall be completely enclosed. Materials in bags shall be stored in weatherproof buildings with adequate protection from ground dampness.

D. If lime and/or flyash are furnished in trucks, each truck shall have a weight ticket from a certified

scale.

E. If lime and/or flyash are furnished in bags, each bag shall bear the manufacturer's certified weight. Bags varying more than five percent from that weight may be rejected and the average weight of the bags in any shipment, as shown by weighing 50 bags taken at random, shall not be less than the manufacturer's certified weight.

PART 3 – PRODUCTS

3.1 CONSTRUCTION METHODS

A. It is the primary requirement of this Specification to secure a complete course of treated material containing a uniform lime-flyash or flyash mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth, and with a smooth surface and suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his work, to use the proper amount of lime and flyash, maintain the work and rework the courses as necessary to meet the above requirements.

B. Before other operations are begun, the subgrade shall be graded, shaped, and compacted as required to construct the lime-flyash or flyash treatment for materials in-place in conformance with the lines, grades, thickness and typical cross sections shown on the Plans. Unsuitable soil or material shall be removed and replaced with acceptable material.

C. The subgrade shall be firm and able to support, without displacement, the construction equipment at the compaction hereinafter specified. Soft or yielding subgrade shall be corrected and made stable by scarifying and aeration or adding lime and/or flyash and compacting until it is of uniform stability.

D. The Contractor shall be required to use a cutting and pulverizing machine that will remove the subgrade material accurately to the secondary subgrade; and pulverize the material at the same time. He will not be required to expose the secondary grade nor windrow the material. However, the Contractor shall be required to roll the subgrade, before using the pulverizing machine and correct any soft areas that this rolling may reveal. This method will be permitted only where a machine is provided which will insure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut.

E. The cost of the repair of the secondary subgrade and any materials below the secondary subgrade is incidental to this item.

F. When lime-flyash stabilization is required it shall be a two-phase operation, with the lime placed and allowed to cure, before the flyash stabilization begins.

G. Application of the lime and the subsequent curing shall be in accordance with SECTION 31 32 13.19 - LIME STABILIZED SUBGRADE. After the subgrade has cured for the time required by that Specification, then flyash stabilization may begin. Flyash stabilization shall be in accordance with this Specification. Unless otherwise noted, the thickness of stabilization shall be 6-inches.

H. The machine will be of such design that a visible indication is given at all times that the machine is cutting to the proper depth.

I. Lime shall be spread only on that area where the first mixing operation can be completed during the same working day.

J. The sequence of application of lime and flyash, with the material, shall be accomplished by the methods hereinafter described as "Dry Placing", or "Slurry Placing". When Type A, hydrated lime is specified, the Contractor may use either method.

K. The lime or flyash shall be spread by a spreader or by bag distribution at the rate directed by the Engineer.

L. For dry placing, the lime or flyash shall be distributed at a uniform rate and in such a manner as to reduce the scattering of lime or flyash by wind to a minimum. Lime or flyash shall not be applied when wind conditions are such that blowing lime or flyash becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread the lime or flyash.

M. The materials shall be sprinkled until the proper moisture content has been secured. However, initial mixing after the addition of lime or flyash will be accomplished dry or with a minimum of water to prevent lime and/or flyash balls.

N. For slurry placing, the lime or flyash shall be mixed with water in vehicles with approved distributors and applied as a thin water suspension or slurry.

O. Type B, commercial lime slurry, shall be applied with a lime percentage not less than that applicable for the grade used. The distribution of lime and flyash shall be attained by successive passes over a measured section of roadway until the proper moisture and lime or flyash content has been secured. The distributor vehicle shall be equipped with an agitator, which will keep the lime or flyash and water in a uniform mixture.

P. The mixing procedure shall be the same for "Dry Placing or "Slurry Placing", as hereinafter described.

Q. The material shall be uniformly mixed by approved methods. If the soil binder lime mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying or the use of other approved pulverization methods so that when all non-slaking aggregates retained on the 3/4" sieve are removed, the remainder of the material shall meet the following requirements when tested at the field moisture condition, or dry by laboratory sieves in accordance with ASTM Method C136.

Minimum Passing	1-3/4 sieve	100 percent
Minimum Passing	3/4 sieve	85 percent

R. It is the intent of this Specification that lime and flyash shall be spread as directed by the Engineer.

S. The amount of lime and flyash used shall be as directed by the Engineer.

T. During the interval of time between application and mixing, hydrated lime or flyash that has been exposed to excessive loss due to washing or blowing will not be accepted for payment. Spreading, mixing, compaction and finishing for lime-flyash stabilized subgrade should be completed during daylight hours of the same day.

U. If flyash only is to be used without lime, the following mixing procedures shall apply.

V. The raw material shall be thoroughly mixed by approved road mixers or other approved equipment, and the mixing continued until a homogeneous, friable mixture is obtained, free from all clods or lumps.

W. The flyash shall be distributed at a uniform rate and in such manner as to reduce the scattering of flyash by the wind to a minimum. Flyash shall not be applied when wind conditions, are such that blowing flyash becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread flyash.

X. The material and flyash shall be thoroughly mixed by approved road mixers or other approved equipment and the mixing continued until a homogeneous, friable mixture of materials is obtained, free from all clods or lumps. If the soil binder-flyash mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying or the use of other approved pulverization

methods so that when all nonslaking aggregates, retained on the 3/4" sieve are removed, the remainder of the material shall meet the following requirements when tested at the field moisture condition or dry by laboratory sieves using ASTM Method C136:

Minimum Passing	1-3/4 sieve	100 percent
Minimum Passing	3/4 sieve	85 percent

Y. Flyash shall be applied only to such an area that all the operations can be continuous and completed in daylight.

Z. During the interval of time between application and mixing, flyash that has been exposed to the open air for a period of 6 hours or more, or to excessive loss due to washing or blowing will not be accepted for payment. It is recommended that the mixing and compaction of flyash stabilized subgrade by completed within 2 hours in order to take advantage of rapid initial set characteristics.

AA. Mixing after the addition of flyash will be accomplished dry or with a minimum of water to prevent flyash balls.

BB. Compaction of the mixture shall begin immediately after adding and mixing of the last stabilizing agent and be completed within 6 hours. The material shall be aerated or sprinkled as necessary to provide the optimum moisture. Compaction shall begin at the bottom and shall continue until the entire depth of the mixture is uniformly compacted to 95 percent of standard proctor density (ASTM D698), to a minimum depth of 6 inches. In addition to the requirements it shall be compacted to the extent necessary to remain firm and stable under the construction equipment. Throughout the entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown of the Plans and to the established lines and grades.

CC. After the final layer of the lime-flyash or flyash treated subgrade has been compacted, it shall be brought up to the required lines and grades, and in accordance with the typical sections.

DD. The resulting surface shall be thoroughly rolled with a pneumatic tire roller and skinned by a power grader to achieve final grade, removing all loosened stabilized material from the section. The surface shall be thoroughly compacted with the pneumatic roller, adding small increments of moisture as needed during rolling. If aggregate larger than a 3/4" screen is present in the mixture, one complete coverage of the section with the flat wheel roller shall be made immediately after the skinning operation. Surface finishing methods may be varied from this procedure to provide a dense, uniform surface, free of surface compaction planes. The moisture content of the surface material must be maintained at optimum during all finishing operations. Surface compaction and finishing shall proceed in such a manner as to produce, in not more than 2 hours, a smooth, closely knit surface, free of cracks, ridges or loose material conformity to the crown, grade and line shown on the Plans.

EE. After the lime-flyash or flyash treated course has been finished as specified herein, the surface shall be protected against rapid drying by either of the following curing methods for a period of not less than 3 days or as directed by the Engineer.

1. Maintain in a thorough and continuously moist condition by sprinkling.
2. Apply an asphalt membrane to the treated course, immediately after same is completed. The asphalt material for the membrane shall be MC-30. Asphaltic material shall meet the requirements of Item 300, Oils, Asphalts and Emulsions, of the TxDOT "Standard Specifications for Construction of Highways, Streets and Bridges". The asphalt shall completely cover and seal the total surface of the base and fill all voids. If the Contractor elects to use this method, it shall be his responsibility to protect the asphalt membrane from being picked up by traffic.

FF. The asphalt membrane may remain in place when the proposed surface or other base courses are applied.

GG. Completed sections of lime-flyash or flyash treated material in-place may be opened immediately to local traffic and to construction equipment and to all traffic after the curing period, provided the lime- flyash or flyash treated course has hardened sufficiently to prevent marring or distorting the surface by equipment or traffic, and after the minimum 3 day curing period. If the Plans provide for the treated material to be sealed or covered by other courses of material such seal or course shall be applied within 14 days after compaction unless otherwise directed by the Engineer. Should the material, due to any reason or cause, lose the required stability, density and finish before the next course is placed, it shall be reprocessed and refinished at the expense of the Contractor.

END OF SECTION 31 32 13.21

SECTION 321313 - CONCRETE PAVING

1.1 GENERAL

1.2 Scope

A. This Section specifies the requirements for forming and placing reinforced concrete pavement and sidewalks to the lines and grades shown on the drawings and constructed as specified herein.

1.3 Applicable Publications

A. The following specifications and standards of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges (TXDOT):

a. Item 360 concrete pavement (water cement ratio.)

b. Item 526 membrane curing.

2. American Society for Testing and Materials Standards (ASTM):

a. D 1751 preformed expansion joint filler for concrete paving and structural construction.

b. A 525 steel sheet, zinc-coated (galvanized).

c. C 309 liquid membrane forming compounds for curing concrete.

d. A 615 standard specification for deformed billet-steel bars for concrete reinforcement.

e. C 94 ready mixed concrete

f. C 31 method of making and curing concrete compression on flexure test specimens in the field

g. C 39 method of test for compress strength of molded concrete cylinders

h. A 186 welded steel wire, fabric, plain, for concrete reinforcement

1.4 Related Sections

A. Site Preparation: Section 311100

B. Fine Grading: Section 312216

2.1 MATERIAL

2.2 Concrete

A. Cement, aggregates, admixtures, and water shall conform to the specifications of TXDOT, Item 421. Preparation of concrete mix shall be in accordance with article 360.3 of TXDOT, Item 360, plus the following:

1. Concrete strength shall be designed to produce a 2,000 psi minimum compressive strength at 7 days and a 3,500 psi minimum compressive strength at 28 days.

B. Maximum size of aggregate 1-1/2 inches.

C. Slump shall range from 1 to 3 inches.

D. Air entrainment concrete mixture shall have an air content by volume of 4.5 percent plus or minus 1.5%.

E. Concrete shall be mixed in accordance with TXDOT, Item 522.

F. Ready mixed concrete conforming to ASTM C 94 may be used.

G. The concrete mix shall be designed by a commercial testing laboratory, and submitted for approval.

2.3 Reinforcement

A. Reinforcing steel shall meet the specifications of ASTM A615, Grade 60. Bars shall be deformed billet steel free of defects.

2.4 Board Filler

A. Timber Boards shall meet the specifications of TXDOT Item 433.2(5)(a).

B. Impregnated asphalt board shall conform to TXDOT Item 433.2(5)(b).

C. Board filler shall be free of defects which will impair their usefulness as expansion joint filler.

2.5 Preformed Bituminous Expansion Board

A. Preformed bituminous expansion boards shall meet the specifications for ASTM D 1751.

2.6 Joint Sealing Material

A. Curbs and Pavement joint sealing material shall meet the requirements and specifications of TXDOT Items 360.3(F).

B. Sidewalk joint sealing materials shall be “Sonolastic Sealant Two-part”, as manufactured by Sonneborn-Contech, Building product division, Contech, Inc. or approved equal. Color shall match adjacent concrete work.

2.7 Deformed Contraction Joint Metal Strips

A. Deformed contraction joint metal strips shall be 28 ga. steel, galvanized 1.25 oz. per square foot or heavier and meet the specifications of ASTM A 525.

2.8 Curing Compound

A. Curing compound shall conform to the specifications of ASTM C 309, Type 1 or Type 2, white pigmented.

2.9 Load Transmission Devices For Expansion And Contraction Joints

A. Load Transmission devices shall be as detailed on plans and conform to the properties specified in ASTM A615, Grade 60 steel.

2.10 Steel Dowel Bars

A. Steel dowel bars and steel reinforcement shall be deformed or smooth bars conform in properties to ASTM A615 Grade 40. Unless otherwise shown on the plans all reinforcing steel shall be deformed bars, all dowel bars at joints shall be smooth bars, and all curb dowels shall be deformed bars.

3.1 EXECUTION

3.2 General

A. The curb and sidewalk pavement shall be constructed to the lines and grades shown on the drawings.

3.3 Pavement

A. Preparation of subgrade

1. The subgrade shall be a previously prepared subgrade, stabilized if required, compacted to a minimum of 95% standard density ASTM D-698, and graded to the required section and grades shown on the drawings and as specified.

2. Rolling and sprinkling shall be performed to maintain the specified moisture content of the subgrade as necessary prior to placing the concrete curbs. Refer to section 31 2216, Fine Grading for applicable specifications for materials and placement.

B. Placing and removing Forms

1. Forms shall be of wood or metal, properly treated to insure concrete does not adhere to the forms, straight, clean, free from warp or defect, and of sufficient depth. The forms shall be so placed that when placed each form section will be firmly in contact for its whole length and base width and exactly at the established grade. Any subgrade under the forms below established grade shall be corrected using suitable material, placed, sprinkled, and rolled.

2. Forms shall be securely staked and tightly jointed and keyed to prevent displacement.

3. Sufficient stability of forms to support equipment operated thereon and to withstand its vibration without springing shall be required.

4. Forms shall remain in place not less than 24 hours after concrete is placed.

C. Joints in Concrete Pavement

1. Shall be constructed in the pavement slab at locations and according to details as shown on the drawings. Stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position.

2. When prefabricated plastic strips are used to form joints, they shall be placed after the concrete surface has been leveled and before the finishing is completed. The strips shall be of a type specifically manufactured for the purpose of forming joints in concrete pavement and to the dimensions as required to form the specified joints. The strips shall be removed after the concrete has set per the manufacturer's recommendations. Any blemishes caused by the removal of the strips shall be repaired immediately using approved methods.

D. Tie Bars And Load Transmission Devices

1. Shall be accurately placed and held securely (parallel to pavement surface and perpendicular to joint) during placing and finishing of pavement.

E. Expansion Joints

1. Shall be constructed with board filler and sealed at top. Board filler must be perpendicular to plane of concrete slab. Alignment of joint shall not vary more than 1/4 inch in 10 feet.

F. Reinforcing Steel

1. Shall be accurately placed as shown on drawings and secured in place. Each bar intersection shall be tied. All bars shall be supported on steel or plastic bar chairs. Laps

shall be a minimum of ten (10) inches and tied. Wire fabric may not be used in vehicular pavement.

G. Concrete Placing And Finishing

1. Concrete not placed as herein prescribed within 90 minutes after mixing shall be rejected.

2. Concrete shall not be placed when temperature is below 40o F and falling, but may be placed when the temperature is above 35o F and rising, the temperature being taken in the shade and away from artificial heat.

3. Concrete shall not be placed before the time of sunrise, and shall not be placed later than will permit the finishing of the pavement during sufficient natural light.

4. Concrete shall be consolidated by a mechanical vibrator to remove all voids. Special care shall be exercised in placing and spading concrete against forms and at all joints to prevent the forming of honeycombs and voids and to prevent displacement of steel reinforcement and load transmission devices.

5. The concrete shall be struck off with an approved strike-off screed to such elevation that when consolidated and finished, the surface of pavement shall conform to the required section and grade. In no case shall the maximum ordinate from a 10 foot straight edge to the pavement be greater than 1/8 inch.

6. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction the work is progressing, maintaining the template in contact with the forms, and maintaining a slight excess of material in front of the cutting edge.

7. After completion of a strike-off, consolidation and transverse screeding, a hand-operated longitudinal float shall be operated to test and level the surface to the required grade.

8. Workmen shall operate the float from approved bridges riding on the forms and spanning the pavement. The longitudinal float shall be held in contact with the surface and parallel to the center line, and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete shall be placed if required, and screeded, and the float shall be used to produce a satisfactory surface. After a section has been smoothed so that the float maintains contact with the surface at all points in being passed from one side to the other, the bridges may be moved forward half the length of the float, and the operations repeated.

9. After completion of the straightedge testing, a pass with a burlap drag shall be made as soon as construction operations permit and before the water sheen has disappeared from the surface. This shall be followed by as many passes of the drag as required to produce the desired surface texture.

10. After completion of dragging and about the time the concrete becomes hard, the edge of the slab and joints shall be left smooth and true to line.

H. Curing

1. Concrete pavement shall be cured by protecting it against excessive loss of moisture for a period of not less than 72 hours from the beginning of curing operation.

2. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured in accordance with the requirements of "Membrane Curing", TXDOT Item 360.4(6) and Item 360.11(3).

3. Special care should be exercised to keep spraying curing compound out of pavement joints.

3.4 Application Of Joint Sealing Compound

A. Joints shall be thoroughly cleaned of loose scale, dirt, dusts and curing compound. When necessary, existing joint material shall be removed to the depth as shown on the plans.

B. Joints shall be filled to the full depth of the joint opening. Pouring shall be done in a neat and workman like manner to give satisfactory results. Sufficient joint sealer shall be poured into the joints so that upon the completion of the work the surface of sealer within the joint shall be 1/4" above top of the pavement surface.

4.1 TESTS

A. Test cylinders for compressive strength shall be taken and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. At least 4 cylinders shall be made for each day for each 100 c.y. of concrete or fraction thereof, placed. A testing laboratory for the tests shall be selected and paid for by the owner.

B. Testing Of Concrete Surface

1. After finishing is complete and while the concrete is still workable, the surface shall be tested for trueness with an approved 10' steel straightedge.

2. The straightedge shall be operated from the side of the pavement placed parallel to the pavement center line and passed across the slab to reveal any high spots or depressions.

3. The straightedge shall be advanced along the pavement in successive stages of not more than 1/2 its length. A tolerance of 1/8" in 10' must be met.

4. Any correction of the surface required shall be accomplished by adding concrete if required and by operating the longitudinal float over the area.

5. The surface test with the straightedge shall then be repeated.

4.2 Opening Pavement To Traffic

A. The pavement shall be closed to all traffic, including vehicles of the contractor, until the concrete is at least 7 days old or has attained a minimum average of 2000 psi compressive strength.

B. Any damage to the pavement prior to acceptance by the owner shall be repaired by the contractor at no extra cost to the owner.

C. This does not relieve the contractor from the normal liabilities and maintenance responsibilities, implied or otherwise, for the pavement or other items.

END OF SECTION 321313

SECTION 32 91 19.1 3 -

TOPSOIL PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work shall include all materials, labor, equipment, transportation, and services necessary to furnish and place topsoil for finish grading, seeding, sodding, and planting as shown on the drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. Contractor to attend a pre-installation meeting and participate in an installation meeting with Owners Representative.

PART 2 – MATERIALS

2.1 TOPSOIL

A. Provide topsoil which is fertile, friable, natural loam, surface soil, free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 inches in any dimension and other extraneous or toxic matter harmful to plant growth.

B. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches. Topsoil shall not be collected from sites that are infected with growth of, or the reproductive parts of noxious weeds, especially nut grass. Topsoil shall not be stripped, collected or deposited while wet. Topsoil shall not be excessively acid or alkaline or contain toxic substances which may be harmful to plant growth. Topsoil shall be without admixture of subsoil.

PART 3- EXECUTION

3.1 EXAMINATION

A. Excavation and subgrade shall be checked and verified that they have been completed to correct lines and grades.

3.2 INSTALLATION

A. Topsoil installment is to be coordinated to coincide with irrigation placement, and is to be spread according to plan grades.

3.3 CLEAN UP

A. Spilled topsoil shall be removed from paved areas, curbs, gutters, etc. As operations proceed all excess soil and debris shall not be allowed to accumulate, but shall be removed daily and the site kept as clean as possible.

3.4 PROTECTION

A. Topsoil shall be protected from wind and water erosion until planting is completed.

END OF SECTION 32 91 19.13

SECTION 32 92 13 - HYDRO-MULCH

SEEDING PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all plant, labor, materials, equipment, supplies, supervision and tools and performing all work necessary to top soiling, smoothing, seeding, fertilizing, watering maintenance and cleanups of side slopes, all in accordance with these specifications.

B. The hydro-mulch seeding operations, together with all necessary related work, shall conform to the requirements specified in this section. The area(s) to be hydro-mulch seeded shall be noted in the construction documents.

1.2 MEASUREMENT & PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All seed must meet the requirements of the U.S. Department of Agriculture Rules & Regulations as set forth in the Federal Seed Act and the Texas Seed Law.

B. Type of seed, purity and germination requirements, rate of application and planting dates are as follows:

TABLE I

Type	Application Rate Pounds per Acre	Planting Date
Hulled Common Bermuda Grass 98/88	40	Jan. 1 to Apr. 15
Unhulled Common Bermuda Grass 98/88	40	Jan. 1 to Apr. 15
Annual Rye Grass, including Gulf	50	Jan. 1 to Apr. 15
Hulled Common Bermuda Grass 98/88	40	Apr. 15 to Oct. 1
Hulled Common Bermuda Grass 98/88	40	Oct. 1 to Jan. 1
Unhulled Common Bermuda Grass 98/88	40	Oct. 1 to Jan. 1

C. Fertilizer shall be water soluble with an analysis of 10 percent nitrogen, 20 percent phosphoric acid and 10 percent potash. Rate of application shall be 500 pounds per acre, except during the period of April 15 through September 1, when the rate shall be reduced to 400 pounds per acre. The fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable State Fertilizer Laws and bearing the name and warranty of the producer.

D. Mulch shall be virgin wood cellulose fiber made from whole wood chips. Within the fiber mulch material, at least 20 percent of the fibers will be 10.7mm in length and 0.27mm in diameter. Rate of application shall be 2000 pounds per acre. Soil Stabilizers such as Terra Type III (or approved equal) shall be applied at a rate of 40 pounds per acre on side slopes and Terra Tack I (or approved equal) shall be applied at a rate of 40 pounds per acre on flatter portions.

E. Wood cellulose fiber mulch, for use in the grass seed and fertilizer, shall be processed in such a manner that it will not contain germination or growth inhibiting factors. It shall be dyed an appropriate color to allow visual metering of its application. The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like ground cover, which readily absorbs water and allows infiltration to the underlying soil. Weight specifications from suppliers for all applications shall refer only to the underlying soil. Weight specifications from suppliers, shall refer only to the air-dry weight of the fiber. The mulch material shall be supplied in packages having a gross weight not in excess of 100 pounds and must be marked by the manufacturer to show the dry weight content. Suppliers shall be prepared to certify that laboratory and field testing of their product has been accomplished and that it meets all of the foregoing requirements.

F. Water shall be free from oil, acid, alkali, salt and other substances harmful to the growth of grass. The water source shall be subject to approval, prior to use.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Immediately after the finished grade has been approved, begin hydro-mulching operations to reduce erosion and excessive weed growth.

B. Hydraulic equipment used for the application of fertilizer, seed and slurry of prepared wood fiber mulch shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing up to forty (40) pounds of fiber plus a combined total of 70 pounds of fertilizer solids for each 100 gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles, which provide even distribution of the slurry on the area to be seeded. The slurry tank shall have a minimum capacity of 800 gallons and shall be mounted on a traveling unit, which may either be self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded, so as to provide uniform distribution without waste. The Engineer may authorize equipment with a smaller tank capacity, provided the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

C. Care shall be taken that the slurry preparation take place on the site of the work. The slurry preparation should begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, good re-circulation shall be established and seed shall be added. Fertilizer shall then be added, followed by wood pulp mulch. The wood pulp mulch shall only be added to the mixture after the seed and when the tank is at least one-third filled with water. The engine throttle shall be opened to full speed when the tank is half filled with water. All the wood pulp mulch shall be added by the time the tank is

two-third to three-fourths full. Spraying shall commence immediately when the tank is full. The operator shall spray the area with a uniform visible coat, by using the green color of the wood pulp as a guide.

3.2 APPLICATION

A. The Contractor shall obtain approval of hydro-mulch area preparation from the Engineer prior to application.

B. Operators of hydro-mulching equipment shall be thoroughly experienced in this type of application. Apply the specified slurry mix in a motion to form a uniform mat at the specified rate. Operators shall keep the hydro-mulch within the areas designated and keep from contact with other plant material. Immediately after application, thoroughly wash off any plant material, planting areas or paved areas not intended to receive slurry mix.

C. Keep all paved and planting areas clean during maintenance operations. Contractor shall keep hydro-mulching within the areas designated and keep from contact with other plant material.

D. If in the opinion of the Engineer, unplanted skips and areas are noted after hydro-mulching, the Contractor shall be required to seed the unplanted areas with the grasses that were to have been planted at no additional cost to the Owner.

3.3 CONTRACTOR'S MAINTENANCE AND GUARANTEE PERIOD

A. The hydro-mulch seeding shall be adequately watered until established. Any areas damaged by erosion or areas that do not have any acceptable turfing shall be redone to the satisfaction of the Engineer. Maintenance of grass areas shall be for 60 days after the completion of the project and shall consist of watering, weeding, repair of all erosion and reseeding, as necessary to establish a uniform stand of the specified grasses. The Contractor shall guarantee growth and coverage of hydro-mulch planting under this contract to the effect that a minimum of 95% of the area planted will be covered with the specified planting after 60 days.

B. Prior to final acceptance, the Contractor shall be responsible for one (1) mowing per month between the months of April to September and shall mow every thirty (30) days plus or minus five (5) after the initial mowing. The Contractor shall also be responsible for one (1) mowing every six (6) weeks between the months of October to March. In addition, the Contractor shall water the entire sodded and hydro-mulched areas to a saturated depth of one (1) inch at least once a week between the months of April to September and at least once a month between the months of October to March.

C. The Contractor shall make a second application of specified hydro-mulch planting to those bare areas not meeting specified coverage as determined by the Engineer. Such replanting is to be performed within 60 days of initial application and upon notification by the Engineer to replant.

D. The Contractor shall apply top dress fertilizer (delayed action), at the rate of 10 pounds per 1000 square feet at 25 days after hydro-mulching of all new lawn areas.

E. Top dress fertilizer shall be 16-6-8.

END OF SECTION 32 92 13

SECTION 32 92 23 - FERTILIZER

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

A. Fertilizing shall consist of providing and distributing fertilizer over such areas as are designated for block sodding or seeding, for erosion control, and in accordance with these specifications.

1.2 MEASUREMENT

A. Acceptable material for "Fertilizer" will be measured by the C-WT (100 lbs) as determined by approved scales or guaranteed weight of sacks shown by manufacturer.

1.3 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All fertilizer used shall be delivered in bags or containers clearly labeled showing analysis. A pelleted or granulated fertilizer shall be used with an analysis of 10-10-5, unless otherwise specified. The figures in the analysis represent the nitrogen, phosphoric acid and potash nutrients respectively as determined by the methods of the Association of Official Agricultural Chemists. The sources of nitrogen in the fertilizer shall be roughly balanced between ammonical (quick release) and nitrate nitrogen (slow release).

B. With permission of the Engineer, fertilizer of a different analysis may be substituted. It shall be pelleted or granulated fertilizer with a lower concentration. The total amounts of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. When fertilizer is included in the specifications, pelleted or granulated fertilizer shall be applied uniformly over the area specified to be fertilized and in the manner directed for the particular item of work. Fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer for the particular item of work shall meet the approval of the Engineer.

B. Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of 480 pounds per acre when "Sodding for Erosion Control", and 400 pounds per acre when "Seeding for Erosion Control".

END OF SECTION 32 92 23

SECTION 32 92 23.16 - SOLID SODDING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

A. Solid Sodding for erosion control shall consist of providing and planting Bermuda grass, or other acceptable sod along or across such areas as are designated on the plans and in accordance with the specification requirements herein outlined.

1.2 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The sod shall consist of live, growing Bermuda grass (ninety-five percent pure), secured from sources where the soil is fertile and has been fumigated. Bermuda sod shall have a healthy virile root system of dense, thickly matted roots throughout and grown in a sandy loam soil consisting of a minimum of 60% sand. Sod grown in fat clayey materials are not acceptable. The sod shall be cut from the field so that there is a minimum of one-half inch of soil on the roots of the sod, and so that no roots show on the bottom of the soil. Sod shall be dense, with the grass having been mowed to 1-inch height before lifting from the field. Sod shall be in a vigorous condition, dark green in color, free of disease and harmful insects. The contractor shall not use sod from areas where the grass is thinned out, nor where the grass roots have been dried out by exposure to the air and sun to such an extent as to damage it stability to grow when transplanted. The sod shall be free from obnoxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Unless the area has been closely pastured, it shall be closely mowed and raked to remove all weeds and long-standing stems.

B. Care shall be taken at all times to retain the native soils on the roots of the sod during the process of excavation, hauling and planting. Sod material shall be kept moist from the time it is dug, until planted. When so directed by the Engineer, the sod existing at the source shall be watered to the extent required, prior to excavating. Do not stack sod for more than 36 hours between the time of cutting and the time of installation. The Engineer reserves the right to reject any sod deemed unacceptable for installation.

C. All planting shall be done between the average date of the last freeze in the spring and six weeks prior to the average date for the first freeze in the fall, according to the U.S. Weather Bureau.

D. Fertilizer shall conform to the requirements of SECTION 32 92 23 - FERTILIZER and shall be applied at the rate of 480-pounds per acre.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. Immediately after the finished grade has been approved, begin sodding operations to reduce excessive weed growth. If the sod bed is dry immediately prior to sod installation, dampen the surface with a fine mist of water.

B. Grass shall be turf sod, cut into approximately 18 inch wide by 24-inch long pieces, or 18 inch wide by continuous length rolls.

C. All areas to be sodded shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots or other objectionable material, which might interfere with the formation of a finely pulverized seedbed, shall be removed from the soil.

D. Lay sod so that adjacent strips butt tightly, with no spaces between strips. Lay sod on mounds and slopes, with strips parallel to contours. Stagger joints. Tamp and roll the sod thoroughly to make contact with the sod bed, or as directed by the Engineer.

E. Peg sod on slopes three to one or steeper with pegs driven through sod into soil, until pegs are flush with the turf. Space pegs 18 inches on center. Pegs to be 1 inch square, 6 inches long or, 6-inch lengths of lath. Commercial fertilizer as outlined in SECTION 32 92 23 - FERTILIZER shall be applied to the entire sodded area at the prescribed rates, immediately following laying of the sod. Immediately after fertilizing, water the entire area to a saturated depth of 2-inches.

F. Immediately after installation of the sod, remove sod clumps on soil, wash off any plant materials and pavements not to have sod. Edges along curbs and drives, walkways, etc., shall be carefully trimmed and maintained until accepted.

3.2 CONTRACTOR'S MAINTENANCE AND GUARANTEE PERIOD

A. Maintenance of sodded areas shall be for 60 days after completion of the project and shall consist of watering, weeding, repair of all erosion and resodding as necessary to establish a uniform growth of the specified grass. The Contractor shall guarantee growth and coverage of the sod planted under this contract to the effect that a minimum of 95% of the area planted will be covered with the specified planting after 60 days. Sod panels that are dead or dying shall be replaced.

B. The Contractor shall be responsible for one mowing, in the event that the time between sodding and final acceptance exceeds thirty days.

C. The Contractor shall make a second planting to those bare areas not meeting specified planting as determined by the Engineer. Such replanting is to be performed within 90 days of initial application and upon notification by the Engineer to replant.

END OF SECTION 32 92 23.16

SECTION 32 80 00 – IRRIGATION

PART 1 - GENERAL

1.1 SCOPE

Work under this section consists of furnishing and installing a complete automatic water sprinkler system as shown on the Contract Drawings and Specified herein. Quick coupling valves and associated distribution lines are included in the scope of this work.

1.2 INTENT

The drawings and specifications indicate and specify a complete and efficient landscape irrigation system which will operate in accordance with the manufacturer's recommendations. Items not specifically noted, but found to be necessary for a complete system, shall be furnished under this contract. The contractor shall verify existing system pressure and location/size of existing lines and control valves. The contractor shall submit shop drawings based on existing pressures and prepared by a licensed irrigator.

1.3 RELATED WORK

A. Division 32, Exterior Improvements

1. 32 92 23 Sodding
2. 32 92 00 Planting
3. 32 92 13 Hydomulching

1.4 QUALIFICATION OF INSTALLER

The Contractor shall have at least one person who is a Licensed Irrigator with the State of Texas supervise the installation of the irrigation system. He shall be present at all times during the execution of this sections work and shall be thoroughly familiar with the type of material being installed and the manufacturer's recommended methods of installation and shall direct the work being performed under this section. The supervisor shall have supervised a minimum of 5 comparable irrigation systems as detailed on the irrigation drawings within the past 5 years.

1.5 JOB REQUIREMENTS AND CONDITIONS

A. Do not willfully install the sprinkler system as indicated on the drawings when it is obvious in the field that unknown obstructions or grade differences exist that might not have been considered in the design. Such obstructions or differences shall be brought to the attention of the Architect.

B. Project records will be kept as provided in Division 1. As a condition for final payment, provide owner with a copy of the project record documents after the work is complete.

1.6 QUALITY ASSURANCE

A. Underground work shall be inspected and approved by Owner's authorized representative for correctness and completeness before backfilling.

B. All materials and equipment shall be warranted in writing for a period of 1 year against defects in materials and workmanship from their respective manufacturers. All installation work shall be warranted for a period of 2 year against defective workmanship and handling by the installer. Warranties shall become effective on the day the system is accepted by the owner.

C. Verification of Finish Grades. Verify all finish grades within the work area in order to ensure proper soil coverage (as specified) of the sprinkler system pipes.

D. Provide to the Owner a copy of the manufacturer's guarantee of equipment, as appropriate. Provide 4 copies each of installation and service manuals to the Owner.

E. Provide complete written operation and maintenance instructions including winterizing procedures ,complete with a schedule showing the length of time each valve is to be open to produce a given amount of precipitation.

F. Provide sample assembly for each type of irrigation head to the Architect and Owner for approval prior to installation.

1.7 DAMAGE TO PROPERTY

A. Repair or replace any property damage inflicted in the course of the irrigation installation, without additional cost and before final payment. Included are damage to buildings, equipement, piping, pipe coverings, sewers, sidewalks and landscaping.

B. Be responsible for damage caused by leaks in the piping systems and make repairs without charge.

C. The irrigation installer is not responsible for any damage to the system caused by others.

1.8 EQUIPEMENT TO BE INSTALLED

A. All materials and sprinkler equipment shall be new and unused except as indicated on the drawings.

1.9 PERMITS, TAXES AND REGULATIONS

A. Contractor shall secure and pay for as necessary for exemption and completion of the project any applicable permits, licenses or taxes.

B. Since the Owner is a governmental entity or organization is exempt from such taxes under the Contract Documents.

1. Determining whether such governmental entity or organization is exempt from such taxes under the Contract Documents.

2. Determining whether your purchase of any tangible personal property for use in the use in the performance of this Contract is exempt.

3. Obtaining any sales tax exemption from the Owner.

4. Properly issuing any sales tax exemption certificate to a seller or supplier that the sale of any item of tangible personal property qualifies for an exemption.

5. Maintaining any records required by the laws of the State of Texas or by any valid rules and or regulations of the Comptroller of Public Accounts of the State of Texas.

6. Properly submitting any monthly pay requests.

7. Payment of any legally assessed penalties or fines for improper use of any exemption Certificate.

C. The Contractor shall comply with all applicable codes, ordinances, rule, regulations, orders and or other requirements of public authorities in connection with performance of the work.

1.10 SHOP DRAWING AND RECORD DOCUMENTS

A. Shop drawings, product data, samples and record drawings and documents shall be maintained and submitted to Architect.

1.11 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall check the materials upon delivery to assure that proper materials has been received.

B. The Contractor shall protect all materials from damage. Sprinkler heads, valves and fitting shall remain in manufacturers boxes until installed. Pipe shall remain bundled until used, Damaged material shall not be used on the project.

1.12 INSPECTIONS, ACCEPTANCE AND APPROVAL

A. Final Inspection

1. A final inspection of the work shall be made by the Architect and Owner, in the presence of the Contractor, at the time when all work is completed and tested. Notification shall be made in writing or by telephone, by the Contractor 48 hours in advance of such inspection.

2. In the event the Contractor requests inspection of work and said work is incomplete, the Contractor shall be responsible for inspections costs of Architect and Owner.

3. When the sprinkler system is completed, the Contractor, in the presence of the Owner's representative shall perform a test of water coverage in all the areas designated for irrigation.

PART 2 - PRODUCTS

2.1 UNAUTHORIZED MATERIALS

A. Materials and products required for work on this section shall not contain asbestos or polychlorinated biphenyls (PCB).

2.2 DISTRIBUTION PIPING

A. Mains: Pressure side of irrigation electric control valves. Polyvinyl chloride (PVC) pipe 11120-1220 SDR 21 Class 200 conforming to ASTM D-2241 in accordance with D-1784 N.S.F. (National Sanitation Foundation) approved and conforming to Standards 14 and 61.

B. Laterals: Non-pressure side of irrigation electric control valves. Polyvinyl chloride (PVC) 11120-1220 SDR 21 Class 200 conforming to ASTM D-2241. N.S.F. approved.

C. Where 3 inch and larger pipe is used, use bell and spigot type pipe.

D. All polyvinyl chloride (PVC) pipe shall be continuously and permanently marked with the following information: manufacturer's name, pie size, class or schedule, type of pipe, working pressure at 73 degrees F and N.S. F. approved.

2.3 PIPE FITTINGS

A. Mains: Pipe fittings on water mains shall be ductile iron push on joints with Mechanical Restraints as manufactured by Harco (The Harrington Corp., Lynchburg, VA.) or Leemco, Inc. (Corora, CA.) or approved equal.

B. Laterals: Use molded Schedule 40 PVC fittings. Use fitting suitable for solvent weld, slip joint ring connections, or screwed connections, as required, to properly join PVC pipe.

1. Use PVC solvent primer (color treated) on all PVC joints and pipe 1 inch in diameter and larger in preparation of the solvent weld.

2. Use solvent cement of a type of approved by the manufacturer on all PVC connections.

3. Do not use threaded connections on Schedule 40 PVC pipe.

2.4 RUBBER GASKETS

A. Rubber gaskets shall conform to ASTM-D1869 and F477. Contractor shall use only pipe joint lubricants recommended by the manufacturer. Lubricants shall be non-toxic and non-detrimental to the rubber gasket or pipe.

2.5 SWING JOINTS

A. All quick-coupling valves and irrigation heads shall be mounted on double swing joint riser assemblies. All swing joint fittings, threaded fittings and nipples shall be schedule 80. Horizontal nipple connection attached to the main line side-outlet shall be a minimum of 4 inches in length. Irrigation heads with ½ inch inlet shall be mounted on swing joints of polyethylene type material as manufactured by Toro or Hunter.

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2.6 VALVES

A. Gate Valves: All gate valves 3 inches and larger will be iron body, bronze mounted, double disc, non-rising stem, parallel seat type. Gate valves will have a maximum working pressure of 200 pounds per square inch (psi) and be tested at 400 pounds per square inch (psi). Non-geared valves shall be furnished with “O” ring packing (two “O” rings). The thrust collar and other bearing surfaces will be permanently lubricated with oil. Valves will have bronze disc with two-piece bronze wedging mechanism. All manual valves located above ground will have 2 inch square operating nuts and the end connections shall be determined by the type pipe connection being used. All gate valves will comply with the American Water Works Association (AWWA) Specification C-500 and will be Mueller A-2380-8, Matco 10RT or approved alternate. All 2 inch gate valves and smaller will be Mueller H-10915 or approved alternate.

B. Ball Valves: Teflon coated ball valves may be used in-lieu of gate valves provided ball valve meets the same working pressure requirements of gate valves.

C. Quick Couple Valves: Provide valve with heavy cast bronze body and metal/vinyl cover. Provide valve with locking top and key.

1. Provide 4 single lug bronze coupler keys to fit quick coupler valves.

2. Provide r (1” NPT x 1” MHT) all brass hose swivels with permits 360 degree rotation to fit quick valves.

D. Remote Conrol Valves

1. Automatic Remote Control Valves, Electric Soleold Type. Provide electric remote control valves (RVC) in the locations and sizes shown in the drawings.

a. Use 24 volt globe-type, diaphragm valves with glass filled nylon bodies, 200 psi CSP rating, and suitable for underground burial without protection.

b. Valves shall be of "normally closed" type and incorporate water hammer attenuators in their design.

c. Valves shall have a manually operated flow adjustment device.

d. Valves shall be Toro Control Valve Model P220.

2. Valve Wiring:

a. Wire

(1) 120 volt power supply from existing power source shall be code approved gauge wire for primary controller wiring.

(2) Valve wire- 2 conductor 14 gauge copper wire (1 black & 1 red) insulated with PVC and high density polyethylene coating jacket.

b. Connections and Splices

(1) Make all Two Wire Path wiring connections and splices by joining with 3M DBR type mechanical connections. Insulate and waterproof all splices and connections.

(2) Splices shall only occur at electric valve connections and where wire runs exceed 500 linear feet. All wire splices that are not at valves must be made in 10" round valve box and location must be noted on the as built drawings.

c. Grounding / Surge Protection:

(1) All Toro CDEC_SSP decoders require surge protection devices using one 5/8" x 8' copper clad ground rod and clamp at locations shown on the drawings. Ground rod must be in valve box 10" round or larger.

(2) Decoders must be manufactured by Toro and installed following Toro installation guidelines.

E. Irrigation Heads

1. Irrigation Heads shall be Toro Rotor Model 17P-SS with Rubber cover, or approved Hunter equal.

2. The sprinkler shall be of pop-up design with an overall height of 7", a body diameter of 2-3/8", and a pop-up stroke of 3 inches. The sprinkler shall have a standard locking cap to provide vandal resistance. It shall be supplied with a standard check valve which shall hold 10' of elevation change. The rise assembly shall be encased in stainless steel for increased vandal

resistance and durability. The sprinkler shall be capable of installation at grade level and shall have a 1" NPT female inlet.

3. Heads to be used on playing field areas requiring sand top dressing as shown on pl an.

F. Automatic Controller:

1. Controller shall be Hunter ICC-1200M

2. Controller shall be installed in a heavy gauge lockable steel cabinet.

3. The controller will be installed as directed by the Owner. Owner will designate the location where the controller is to be installed.

G. Valve Boxes: Gate and quick Couple Valves and Electric Valves shall be in rectangular plastic box with green locking lid. Lids shall be identified with 1" tall white enamel painted letters "GV" for gate valves, "QC" for quick couple valves, and "RC" for remote control valves.

H. Concrete: Concrete associated with the irrigation system shall be Class "A" concrete with Fc= 3000 psi at 28 days minimum.

PART 3 - EXECUTION

3.1 GENERAL

A. Cooperate with other sections so that all phases of the project may be properly coordinated without delays or damage to any part of the work.

B. Products and materials shall be kept covered and protected from weather and damaging conditions at all times while in transit and after receipt at the site.

C. The Contractor shall review drawings for irrigation of lawn (football field) and planting areas and shall visit job site to familiarize himself with topographical conditions and to ascertain the location of structures, streets, water features, walks, site furnishings, and landscaping: as Contractor shall guarantee complete coverage to Owner. Any changes or additions needed to water the indicated planting areas shall be included as part of the contract without additional charge.

D. The Contractor is responsible for locating sprinkler heads, valves, piping and fittings. Locate these items as shown on the drawings, making any minor adjustments necessary due to on site conditions without additional cost to the Owner and without impairing the efficiency of the irrigation system.

3.2 EXCAVATION

A. Trenches:

1. Dig trenches no wider than is necessary to lay pipe, provide free working space around the work installed, and provide ample room for backfilling and tamping. Compact trench bottom to provide a uniform bearing surface the full length of the line.

2. Provide trenches of sufficient depth to provide a minimum cover above the top of the pipe as follows

a. Over main lines: 18 inches

b. Over lateral lines: 12 inches min.

3. Backfill and hand tamp any over-excavation prior to installing piping.

4. Keep trenches free of debris that would damage pipe.

B. Sleeves: Provide sleeves in the locations shown on the drawings. Sleeves shall extend a minimum of 12 inches on each side of the edge of paving.

3.3 PIPE FITTING AND ASSEMBLY

A. Clearances, Maintain following minimum clearances between lines:

1. Pipe 2 inches and smaller 4 inches

2. Pipe 2-1/2 inches and larger: 12 inches

3. Other services: 12 inches

4. Maintain minimum 1 inch vertical clearance between lines crossing at an angle greater than 45 degrees.

B. Pipe Laying; Lay pipe with full bearing on the trench bottom: do not lay pipe on soft fill or other unstable material.

C. Piping Erection

1. General: The installer is responsible for being familiar with any and all methods of assembling, joining, and installation of various types of pipe to be used. Adhere in strict accordance with the manufacturer's recommendations. This shall include thrust blocking of poured concrete, cathodic protection, coating, expansion allowance and testing.

2. Soldered Copper Tubing

a. Thoroughly ream pipe and remove all burrs prior to installation.

b. Thoroughly clean and polish contact surfaces of joint.

c. Flux both male and female ends

d. Insert end of the tube into the fittings the full depth of the socket.

e. After soldering, make sure a solder bead shows continuously around entire joint circumference.

3. Polyvinyl Chloride (PVC) Pipe.

a. Exercise care in handling, loading, unloading and storing plastic pipe and fittings.

b. Snake pipe in trench from side to side to allow for expansion and contraction. Do not lay pipe when there is water in the trench or when temperature is 32 degrees F or below.

c. Make all changes in direction of pipe with fittings, not by bending.

d. Make solvent joints in the following sequences:

(1) Make sure pipe is cut square and all connecting surfaces are properly cleaned and dry.

(2) Apply an even coat of solvent to the inside of the fitting.

(3) Insert the pipe quickly into the fitting and turn pipe approximately one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately 15 seconds so the fitting does not push off the pipe.

(4) Using a clean rag, wipe off the excess solvent to prevent weakening at joint.

(5) Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.

(6) Allow at least 15 minutes set up time for each welded joint before moving.

D. Thrust Blocks; Provide concrete thrust blocks for 3Inch or larger pipe at all turns and other strategic points along the irrigation system to eliminate potential water hammer damage. See drawings for thrust block details.

3.4 CONTROL WIRING

A. Lay control wiring from the remote control valves to the controller along the supply mains where practical.

B. Install wire under walks, roads or pavement inside a PVC schedule 40 sleeve.

C. Splice wire with mechanical connection waterproof wire nuts. Waterproof all splices & connections.

3.5 VALVES

A. Install valves in a plumb position with sufficient clearance for service and operation. Install remote control valves plumb to within 1/16 of an inch. Remote controlled valves shall be installed using Schedule 80 threaded pipe nipples with union connections.

B. Install manual and electric valves in valve boxes. Place gravel below the valves for drainage. Neatly group valve boxes together where 2 or more valves occur in close proximity to each other. Provide a minimum 12 inches spacing between valve boxes and 6 inches space from adjacent walks or structures.

C. Adjust valves for proper operation as required by the manufacturer.

3.6 SPRINKLERS AND QUICK COUPLING VALVES

A. Install heads plumb to within 1/16 inch.

B. In turf areas where grass has not yet been established, initially install heads on risers above grade level.

C. Clean all sprinkler heads before placing system in operation.

D. Adjust direction of throw where necessary to provide coverage required.

E. Extra Parts:

1. Provide 2 extra heads of each size and type used.

2. Provide 2 wrenches for each type of head core and 2 wrenches for removing and installing each type of head.

3.7 BACKFILLING

A. Do not place backfill until system has been inspected by the Architect and Owner.

B. Do not use soil with debris of any sort, including pipe remnants, clods or rock.

C. For first 3 inches over pipe, backfill with bank sand and compact by water method.

D. Fill remainder of trench with excavated soil to within 3 inches of finished grade.

E. Fill top 3 inches with top soil and wheel roll until compaction of backfill is sam as surrounding soil.

F. Carefully pack backfill around heads to provide rigid support for them.

G. Excess excavation not used for backfill shall be legally disposed of off-site at no expense to Owner.

3.8 INSPECTION, TESTING AND APPROVAL

A. Do not enclose or cover any work unit it has been inspected, tested and approved.

B. Hydrostatic Piping Test:

1. In the presence of the Architect & Owner, hydrostatically test the piping system in place before backfilling.

2. Contractor shall provide all equipment to perform hydrostatic test on the piping system.

3. Testing shall include pressure and leakage test of all piping and fittings, including swing joints.

4. After installing adequate sand fill to anchor all irrigation piping, flush and expel all air from water lines.

5. Test pressure shall be 120 psi.

6. All tests shall be in accordance with pipe and fitting manufacturer's recommendations.

7. Main lines under pressure shall maintain a constant pressure without deviation for a minimum of one (1) hour.

8. All leaks and or defective pipe shall be repaired or replaced and the test repeated until the repaired or replaced sections meets the "no loss" requirements stated above.

C. Operation Test

1. After sprinkler heads and quick-coupling valves are installed, test the system for coverage and operating under normal operating pressure in the presence of the Architect and Owner.

2. Test is acceptable if system operates satisfactorily, with uniform coverage in all areas to be irrigated.

3.9 CLEAN UP

A. Maintain a clean work area during the progress of the work within reasonable limits of the installation area. Periodically remove all rubbish, debris, etc. from work site and dispose of them legally at no cost to Owner.

B. Upon completion of the work, remove all construction and installation equipment from the premises; make ground surfaces level where it has been affected by irrigation system installation; and remove excess materials, rubbish and debris.

3.10 MAINTENANCE

A. It shall be the responsibility of the Contractor to maintain the system in top functioning condition, including repair and replacement work, for a period of ninety (90) calendar days from the date of substantial completion of the entire project. Maintenance shall be on a once a week basis and shall include, but not necessarily be limited to:

1. Adjustments of head height and plumbing to compensate for settling and sod growth.

2. Unstopping of clogged heads, adjustment of head coverage arcs and nozzle types as necessary.

3. Adjustment of the controller as necessary including running the system through all stations.

4. Repair or replacement of broken lines or faulty equipment.

B. Plant material loss or damage due to the Contractor's failure to maintain a properly functioning irrigation system during the maintenance period shall be the responsibility of the Contractor.

C. At the end of the maintenance period, instruct the Owner's designated representative in the proper use of the controller and working of the system, including running the system through an entire site irrigation cycle.

3.11 GAURANTEE AND REPLACEMENT

A. The entire irrigation system shall be guaranteed by the Contractor as to materials and workmanship, including settling of backfilled areas below grade for a period of one (1) year following the date of substantial completion of the entire project.

B. Damage as a result of fire, theft, vandalism, construction operations other than the Contractor's forces, occupancy of the site, or the Owner's neglect are not covered by the guarantee. If the Contractor sees any such damage, he/she shall list the item, location, and send a written report within 3 calendar days ho his/her damage observations to the Owner's designated representative.

1. Damage from causes listed in 3.11 B shall be replaced by change order and obtaining approval for same.

C. The Contractor shall promptly service the system, at the Owner's designated representative request, during the guarantee period.

D. If, within one (1) year from the date of substantial completion of entire project for the project settlement occurs and adjustment in pipes, valves and heads, sod, planting or paving is necessary to bring the system, sod, planting or paving to the proper level of the permanent grades, the Contractor as part of the work under this contract, shall make adjustment(s) without extra cost to the Owner, including complete restoration of the damaged sod, planting, pavement or other improvements of any kind.

E. Should any operational difficulties in connection with the system develop within th spedified guarantee period, which in the opinion of the Architect, may be due to inferior material or workmanship, said difficulties shall be immediately repaired or replaced at no additional cost to the Owner, including other damage caused by such defects.

END OF SECTION 32 80 00

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 8

ITEM 102

CLEARING AND GRUBBING

102.1 Description. This Item shall govern for conducting clearing and grubbing operations within the project limits from right-of-way line to right-of-way line. For the purpose of this Item, the project limits shall include roadways, roadside ditches, channels, outfall ditches, detention ponds, and other drainage facilities, temporary and permanent easements and other areas as shown on the drawings. Clearing shall consist of removing all trees, brush, overhangs, logs, tires, appliances, trash, rubbish and other debris, including any deleterious materials, that exist within the limits of the project. Grubbing shall comply with the requirements of the third paragraph of Section 102.2 below.

It shall be the responsibility of the Contractor to visit the project site and ascertain the clearing and grubbing requirements as included in the bid documents prior to submitting a bid on the project. Any necessary trimming of overhangs that encroach into the right-of-way and interfere with the facilitation of construction or the operation or maintenance of the executed project shall be required and will not be paid for separately.

102.2 Construction Methods. The project limits shall be cleared of all trees, brush, stumps, overhangs, logs, rubbish, shrubs, and other trash. Items and certain areas designated by the Engineer for preservation shall be carefully protected from abuse, marring or damage during construction operations and preserved in accordance with the bid documents.

Parking and/or servicing of equipment, or stockpiling of construction materials within 3 feet of the drip line of trees designated for preservation, will not be permitted.

On areas required for roadway, detention pond, channel, or structural excavation, grubbing shall be conducted to remove all stumps, roots, etc., to a depth of approximately 2 feet below the lower elevation of the excavation. On areas required for embankment construction, grubbing shall be conducted to remove all stumps, roots, etc., to a depth of approximately 2 feet below the existing ground surface. All holes remaining after clearing and grubbing shall be backfilled with suitable onsite material and compacted to 95 percent of Standard Proctor Density (ASTM D698 “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)”) at a moisture content of between optimum and +/- 3 percent of optimum as directed by the Engineer and the entire area bladed to prevent ponding of water and to provide drainage; except in areas to be immediately excavated, the Engineer may direct that the holes not be backfilled. On

areas required for borrow sites and material sources, stumps, roots, etc., shall be removed to the complete extent necessary to prevent such objectionable matter becoming mixed with the material to be used in construction.

102.3 Disposal of Materials. All cleared and grubbed materials shall be disposed of offsite. The Contractor shall be responsible for obtaining any necessary disposal permits. The Contractor shall not bury any refuse on Harris County property. The disposal site shall not be an environmentally sensitive area, “Waters of the United States”, wetland, or floodway. It is the responsibility of the contractor to contact the proper authorities to determine land use classification and to obtain any necessary permits. If the disposal site is defined in the plans, then the County shall be responsible for ensuring that the appropriate Department of the Army permit has been obtained for the activity, as necessary. No burning shall be allowed unless otherwise noted.

The Contractor shall refer to Item 560 “Maintenance and Cleanup of the Project Site” for schedule and frequency of cleanup of materials for disposal.

102.4 Limit of Operation. No clearing or grubbing shall be done outside the Project limits or the right-of-way. Any work done outside the Project limits or the right-of-way limits, for any purpose, shall be done at the Contractor's expense and it shall be the Contractor's responsibility to negotiate and secure the permission of the property owner for such operation. The Contractor shall provide sufficient evidence to Harris County that such permission has been obtained.

102.5 Schedule of Clearing. The Contractor shall schedule his clearing operations so that clearing has been completed for a distance of 2,000 feet ahead of any point where excavation is to be started. After starting excavation, the Contractor shall keep a minimum of 1,000 feet of cleared right-of-way ahead of the excavation operation.

102.6 Measurement & Payment. Clearing and grubbing will be paid for at the unit price bid per lump sum, acre, or station (100 foot), as designated in the proposal and/or drawings, and shall be full compensation for furnishing all labor, materials, permits, supervision, equipment and supplies required to complete all items of work specified herein.

Removal of concrete structures shall be measured and paid for in accordance with Item 104 “Removing Old Concrete” and Item 495 “Removing Old Structures”.

Tree protection and tree trimming shall be measured and paid for in accordance with Item 501 “Tree Protection and Trimming”.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 104 “Removing Old Concrete”
Item 200 “Stripping”
Item 495 “Removing Old Structures”
Item 501 “Tree Protection and Trimming”
Item 560 “Maintenance and Cleanup of the Project Site”

END OF ITEM 102

FOR PROJECTS INITIATED
AFTER JUNE 1, 2015
REVISION 5

ITEM 104

REMOVING OLD CONCRETE

104.1 Description. This Item shall govern for breaking up and satisfactorily disposing of concrete pavement, slope paving, riprap, median strips, driveways, sidewalks, combined curb and gutter, or curb.

104.2 Construction Methods. Existing concrete to be disposed of, consisting of pavement, slope paving, riprap, median strips, driveways, sidewalks, combined curb and gutter or curb, shall be removed and legally disposed of offsite. The use of explosives for breaking up old concrete will not be permitted, unless authorized by the Engineer, and when so authorized, adequate precautions shall be given to prevent damage to adjacent property. Reinforcing steel shall be cut as necessary for satisfactory disposal.

Where only a portion of the existing concrete is to be removed, special care shall be exercised to avoid damage to that portion of the concrete to remain in place. The existing concrete shall be cut to the neat lines shown on the plans or established by the Engineer and any existing concrete, beyond the neat lines so established, which is damaged or destroyed by these operations shall be replaced at the Contractor's entire expense. Saw-cutting, full depth or as shown on the drawings, will be required and shall be incidental to the removal of old concrete.

Where indicated on the plans, old concrete which is removed shall be loaded, hauled and disposed of at permitted locations outside the project limits, or used as needed for riprap onsite. Broken concrete reused as riprap onsite will be incidental to this Item. The Contractor shall provide the disposal locations and the total quantity of all excavated material, and the total quantity of disposed material. The disposal site shall not be an environmentally sensitive area, “Water of the United States”, wetland, or floodway. It is the responsibility of the Contractor to contact the proper authorities to determine land use classification and to obtain any necessary permits. If the disposal site is defined in the plans, then the County shall be responsible for ensuring that the appropriate Department of the Army permit has been obtained for the activity, as necessary.

Work performed under this Item shall be initiated at such time and prosecuted in such a manner as to cause a minimum of inconvenience to traffic or adjacent property owners.

104.3 Measurement. Existing concrete pavements with or without curbs, slope paving, driveways, sidewalks, median strips, and riprap, removed as

prescribed above, will be measured by the square yard in its original position, regardless of its thickness or the depth of covering.

Existing combined concrete curb and gutter and concrete curb, not on concrete pavement, removed as prescribed above will be measured by the linear foot in its original position, regardless of the dimensions of same. Monolithic concrete curb or doweled-on concrete curb will be considered as part of the concrete pavement to be removed and will not be measured separately.

104.4 Payment. The work performed as prescribed by this Item, measured as provided under "Measurement" will be paid for at the unit price bid for "Removing Old Concrete" (of the type specified), which price shall be full compensation for:

A. Full depth saw-cutting or

B. Partial depth saw-cutting and breaking up the concrete,

cutting reinforcing steel when required, loading, hauling and disposing of the material offsite and for all labor, tools, equipment, manipulations and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 205 “Subgrade”

END OF ITEM 104

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 7

ITEM 130

BORROW

130.1 Description. This Item shall govern proper utilization of fill materials secured from offsite sources obtained by the Contractor and approved by the Engineer. Compaction of borrow shall conform to the density control method as outlined in the Item 132 “Embankment”.

Borrow shall be used only when there is an insufficient quantity of suitable onsite material available as outlined by Item 132 “Embankment”. Borrow shall be used only as authorized by the Engineer, and shall be supplied from approved sources only.

130.2 Materials. Borrow material used for embankment shall consist of soil having a plasticity index not less than 12, nor more than 20 when tested in accordance with ASTM D4318 “Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils” or as directed by the Engineer. The maximum liquid limit allowed is 45, unless otherwise approved by the Engineer. The Contractor is required to inform the Engineer of the location of the pit or pits from which the fill material is to be taken and shall provide samples of the material for approval by the Engineer. In the event the material is not acceptable, as determined by the Engineer, the Contractor shall find other pit locations. All fill material shall be free from organic matter and deleterious material.

The use of a blend of cohesive and granular soils to achieve the required plasticity index will not be permitted.

130.3 Construction Methods. All suitable material obtained onsite and/or from borrow sources shall be used in the formation of embankments as required by the Item 132 "Embankment", or shall otherwise be utilized as indicated on the plans or as directed, and the completed work shall conform to the established alignment, grades and cross-section.

The Engineer shall be notified sufficiently in advance of opening any approved borrow source to permit necessary testing, prior to the use of the material as borrow.

The borrow site shall not be located within a “Water of the United States” or environmentally sensitive area. It is the Contractor’s responsibility to obtain any and all Federal, State or Local permits associated with operation of the borrow site; if it is not an approved commercial borrow site.

County Borrow Source.

During construction, the borrow source shall be kept drained, insofar as practicable, to permit final cross-sections to be taken when required.

The borrow source shall be left in a suitable condition, so as to provide proper drainage where practicable.

130.4 Measurement and Payment. Borrow is a plan quantity pay item that represents the excess embankment needed over the total excavated material from all onsite sources. These sources include, but may not be limited to:

A. roadway excavation (Item 110),

B. detention pond and/or channel excavation (Item 120),

C. storm sewer excavation,

D. and/or structural excavation (Item 400).

Roadway excavation and detention pond and/or channel excavation are calculated by cross sections using the average end area method, whereas storm sewer excavation and structural excavation are volumetrically calculated.

After project award, if the Contractor feels there is an error in the estimated quantities for excavation, as shown on the bid sheet, the plan quantity may be protested as delineated in Item 110.4 “Contesting Earthwork Quantities”.

All work performed as required herein and measured as provided above, will be paid for at the unit price bid for “Borrow”, which price shall be full compensation for furnishing all labor, for all materials, for all royalties and freight involved, for all hauling, delivery and spreading on the road and compacting complete and in place and for all tools, equipment and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 110 “Roadway Excavation”
Item 120 “Excavation for Channels and Other Drainage Facilities”

Item 132 “Embankment”
Item 205 “Subgrade”
Item 400 “Structural Excavation and Backfill”

END OF ITEM 130

ITEM 160

TOPSOIL

160.1 Description. This Item shall govern furnishing and placing topsoil to the lines, grades and depth shown on the drawings or as directed by the Engineer. Topsoil is defined as the surface layer of material containing decaying vegetable matter and roots. It is not necessary to strip the section of topsoil containing fine, hairline roots, only soil containing moderate to severe root mat.

160.2 References.

A. AASHTO T194 “Standard Method of Test for Determination of Organic Matter in Soils by Wet Combustion”

B. ASTM D422 “Standard Test Method for Particle-Size Analysis of Soils”

C. ASTM D1140 “Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing”

D. ASTM D2974 “Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils”

E. ASTM D4972 “Standard Test Method for pH of Soils”

160.3 Materials.

A. Topsoil shall be:

1. capable of sustaining native plant growth,

2. easily cultivated,

3. highly resistant to erosion,

4. free from objectionable material including gravel, large roots, stumps, wood, brush, debris, hard clods, clay balls, hardpan, refuse or other deleterious materials, and

5. of reasonably uniform quality.

B. If topsoil is required for the project, it shall be provided from an onsite source, or imported as directed by the Engineer.

C. Imported Topsoil shall conform to the following requirements:

TABLE 1

SPECIFICATION	UNIT	VALUE	APPLICABLE STANDARD
Soil Reaction	pH	5.5-8.5[1]	ASTM D4972
Passing No. 4 Sieve	%	95-100	ASTM D422
Sand Size, 2.0-0.05 mm	%	10-70	ASTM D422
Silt Size, 0.05-0.005 mm	%	0-40	ASTM D1140
Clay Size, <0.005 mm	%	20-50	ASTM D1140
Easily Oxidizable Organic Matter	%	2.5-10[2]	ASTM D2974 AASHTO T194

1. Determine pH by Method A for an onsite source and Methods A and B for imported topsoil. If the onsite source topsoil does not satisfy the specified pH range, achieve the desired pH by amending the soil as recommended by the certified agronomist's report of soil sample analysis.
2. Soil testing company shall identify test method used if different from the specified. The Engineer must approve alternate test methods.

D. Topsoil shall have Liquid Limit <50 and Plasticity Index <20.

160.4 Topsoil Delivery, Storage and Handling. Deliver, stockpile and handle topsoil in such a way as to not contaminate the material with other soils or objectionable materials.

The stockpile or disposal site shall not be located within an environmentally sensitive area, floodway, wetland, or in "Waters of the United States". If the stockpile or disposal site must be located in wetland as defined in the plans, then the County shall be responsible for ensuring that the appropriate Department of the Army permit has been obtained for the activity.

160.5 Construction Methods.

A. Strip topsoil as specified on the plans or as directed by the Engineer from area to be excavated or filled and stockpiled for use on the final grades and ditch slopes. Install and maintain proper Storm Water Pollution Prevention Plan Best Management Practices

(SWPPP BMPs) to stockpiled topsoil at no additional cost to Harris County.

B. Prior to placing topsoil, scarify or plow the subgrade to a minimum depth of 4 inches until it is loose and uncompacted to provide bonding of topsoil layer to subgrade. Remove vegetation and foreign inorganic material. Place topsoil on loosened material and roll lightly with appropriate lawn roller to consolidate topsoil.

C. The Contractor shall place the topsoil to the lines and grades and to the depths shown on the drawings.

D. Remove spilled topsoil from curbs, gutters, and paved areas and dispose of excess topsoil offsite.

E. Place topsoil to promote drainage and compact with light roller. Water topsoil after placement until saturated for minimum specified depth. Fill in and recompact any areas of settlement.

F. Do not place topsoil when it is excessively wet or dry.

G. If the topsoil excavated from the site will be utilized for the construction of wetlands, then the Contractor shall store the material in piles less than 5 feet in height to ensure the survivability of the existing seed bank.

H. Topsoil may be used as approved by the Engineer to meet the requirements of Item 132 “Embankment” for the top 4 inches of fill for unpaved areas of the project. When so utilized, it will be included as part of the embankment, volume and its placement will be incidental to the Item 110 “Roadway Excavation”, as is the embankment itself. Compaction of topsoil shall comply with the compaction requirements of this Item, and not Item 132.

160.6 Submittals Required. Contractor shall submit certification from their supplier that their topsoil meets the material requirements of Section 160.3.

The Contractor is required to submit the location of the pit(s) and a sample from which the material is to be taken, for the Engineer’s approval. The Contractor shall submit the vendor’s technical description of the topsoil.

160.7 Quality Control. The Engineer may question the quality of material at any stage of work or location if changes in characteristics are apparent.

160.8 Measurement. When topsoil has to be imported from sources other than the job site, topsoil shall be measured per square yard of specified depth furnished, delivered and placed, in accordance with these Standard Specifications. Topsoil placed in accordance with Section 160.5 above is considered as Embankment.

160.9 Payment. Payment for imported topsoil when shown in the plans shall be made at the contract unit price per square yard of specified depth of topsoil, which price shall be full compensation for all labor, materials, equipment and incidentals necessary to furnish, haul and place the topsoil.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 132 “Embankment”

END OF ITEM 160

ITEM 162

SODDING FOR EROSION CONTROL AND STABILIZATION

162.1 Description. This Item shall govern for providing and planting Bermuda grass, St. Augustine grass, or other acceptable sod along or across such areas as are designated on the drawings and in accordance with the specification requirements herein outlined.

162.2 Materials. The sod shall consist of living, growing Bermuda grass, St. Augustine grass, or other acceptable sod, (ninety-five percent pure), secured from sources where the soil is fertile and has been fumigated. The sod shall have a healthy virile root system of dense, thickly matted roots throughout. The sod shall be cut from the field so that there is a minimum of 1/2 inch of soil on the roots of the sod, and so that no roots show on the bottom of the soil. Sod shall be dense, with the grass having been mowed to 1 inch height before lifting from field. Sod shall be in a vigorous condition, dark green in color, free of disease and harmful insects. The Contractor shall not use sod from areas where the grass is thinned out, nor where the grass roots have been dried out by exposure to the air and sun to such an extent as to damage its ability to grow when transplanted. The sod shall be free from obnoxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Unless the area has been closely pastured, it shall be closely mowed and raked to remove all weeds and long-standing stems.

Care shall be taken at all times to retain the native soil on the roots of the sod during the process of excavation, hauling and planting. Sod material shall be kept moist from the time it is dug, until planted. When so directed by the Engineer, the sod existing at the source shall be watered to the extent required, prior to excavating. Do not stack sod for more than 36 hours between the time of cutting and the time of installation. The Engineer reserves the right to reject any sod deemed unacceptable for installation.

All planting shall be done between the average date of the last freeze in the spring and six weeks prior to the average date for the first freeze in the fall, according to the U.S. Weather Bureau.

Fertilizer shall conform to the requirements of the Item 166 "Fertilizer" and shall be applied at the rate of 480 pounds per acre.

162.3 Construction Methods. Immediately after the finished grade has been approved, begin sodding operations to reduce excessive weed growth. If

the sod bed is dry, immediately prior to sod installation, dampen the surface with a fine mist of water.

Grass shall be turf sod, cut into 16 inch strip widths for those areas behind a curb. All other areas can receive various cut widths and lengths.

All areas to be sodded shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots or other objectionable material which might interfere with the formation of a finely pulverized sod bed, shall be removed from the soil.

Lay sod so that adjacent strips butt tightly, with no spaces between strips. Lay sod on mounds and slopes, with strips parallel to contours. Stagger joints. Sodded areas shall be flush with adjoining seeded areas. All sod shall, of course, be laid green side up. Tamp and roll the sod thoroughly to make contact with the sod bed, or as directed by the Engineer.

Peg sod on slopes three-to-one or steeper with pegs driven through sod into soil, until pegs are flush with the turf. Space pegs 18 inches on center. Pegs to be 1 inch square, 6 inches long or, 6 inch lengths of lath.

Commercial fertilizer as outlined in the Item 166 "Fertilizer" shall be applied to the entire sodded area at the prescribed rates, immediately following laying the sod. Immediately after fertilizing, water the entire area until a saturated depth of 2 inches has been reached. If rain is imminent, then the application of fertilizer shall be postponed until weather conditions exist such that the potential for the runoff of fertilizer from the site is minimized.

Immediately after installation of the sod, remove sod clumps, soil, and any plant material from roadways and pavements. Edges along curbs and drives, walkways, etc., shall be carefully trimmed and maintained until accepted.

In areas where sod is dead, satisfactory growth may be accomplished with application of seeding or hydromulch seeding in lieu of replacing the dead sod, only as approved by the Engineer. Costs for labor, materials, tools and equipment for the application of seeding or hydromulch seeding over dead sod shall be incidental to this pay item.

162.4 Contractor's Maintenance & Guarantee Period. It shall be the responsibility of the Contractor to maintain all sodded areas until satisfactory growth has occurred as determined by the Engineer and for a period of 60 days after the successful completion of all punch list items. Maintenance shall consist of watering, weeding, repairing of all erosion, and resodding as necessary to establish a uniform growth of the specified

grass. A minimum of 95 percent of the area planted shall be covered with the specified grass with no bare or dead spots greater than 10 square feet.

The Contractor shall be responsible for 1 mowing per month between the months of April to October. The Contractor shall also be responsible for 1 mowing every 6 weeks between the months of November to March.

In addition, the Contractor shall water all sodded areas as often as necessary to establish satisfactory growth and to maintain its growth throughout the duration of the project; including in the 60 day period described above.

Contractor shall make as many repeat plantings as necessary to achieve a minimum of 95 percent of the area planted covered with the specified grass with no bare or dead spots greater than 10 square feet. Such replanting is to be performed within 14 calendar days of notification by the Engineer.

162.5 Submittal Required. The Contractor shall submit a statement from the supplier attesting that the sod meets the requirements stated herein.

162.6 Measurement. Work and acceptable material for Sodding for Erosion Control and Stabilization shall be measured by linear feet (with standard width of 16 inches behind curb), or by the square yard (for various widths), complete in place.

162.7 Payment. Work performed and material furnished under "Measurement" shall be paid for at the unit price bid for “Sodding for Erosion Control and Stabilization”, which price shall be full compensation for furnishing materials, preparation of ground for planting, planting of sod, pegging of sod, raking, fertilizing, watering, sprinkling, maintenance, mowing, and for labor, tools, equipment and incidentals necessary to complete the work. Additional payment shall not be made for those areas that are replanted.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications.

Item 166 “Fertilizer”
Item 725 “General Source Controls (SWPPP)”

END OF ITEM 162

FOR PROJECTS INITIATED
AFTER JUNE 1, 2015
REVISION 3

ITEM 166

FERTILIZER

166.1 Description. This Item shall govern for providing and distributing fertilizer over such areas as are designated for sodding for erosion control and stabilization, hydro-mulch seeding, or seeding and erosion control blanket and in accordance with these Standard Specifications.

166.2 Materials. All fertilizer used shall be delivered in bags or containers clearly labeled showing analysis. A pelleted or granulated fertilizer shall be used with an analysis of 10-10-5 (nitrogen – phosphoric acid – potash), unless otherwise approved by the Engineer. The figures in the analysis represent the nitrogen, phosphoric acid and potash nutrients respectively as determined by the methods of the Association of Official Agricultural Chemists. The sources of nitrogen in the fertilizer shall be roughly balanced between ammonical (quick release) and nitrate nitrogen (slow release). Fertilizer shall be readily water-soluble.

Fertilizer of a different analysis may be substituted as approved by the Engineer. It shall be pelleted or granulated fertilizer with a lower concentration. The total amounts of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

166.3 Construction Methods. When fertilizer is included in the specifications, pelleted or granulated fertilizer shall be applied uniformly over the area specified to be fertilized and in the manner directed for the particular item of work. Fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer for the particular item of work shall meet the approval of the Engineer.

Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of 480 pounds per acre for the Item 162 "Sodding for Erosion Control and Stabilization", 400 pounds per acre for the Item 164 "Seeding and Erosion Control Blanket" and for the Item 165 “Hydro-Mulch Seeding for Erosion Control and Stabilization”.

166.4 Delivery, Storage and Handling. Deliver fertilizer in bags or containers clearly labeled with name and address of the manufacturer, weight and guaranteed analysis. Bulk fertilizer, if approved by the Engineer, must be accompanied by either an invoice or label showing the name and address of the manufacturer, guaranteed analysis, and appropriate means to accurately measure and record weight of fertilizer used.

Deliver fertilizer in clean, unopened and undamaged bags.

166.5 Measurement. Acceptable material for "Fertilizer" will be measured by pounds of guaranteed weight of sacks shown by manufacturer.

166.6 Payment. If the fertilizer is being utilized as part of construction project, no separate payment shall be made for materials furnished or work performed under this Item. Include the cost of the same in the contract price bid for work of which this is a component part.

If this Item is being utilized for material procurement, in which fertilizer is not already a requirement of another bid item, payment shall be made by the pound of guaranteed sack weight shown by manufacturer.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications.

Item 162 “Sodding for Erosion Control and Stabilization“
Item 164 “Seeding and Erosion Control Blanket”
Item 165 “Hydro-Mulch Seeding (for Erosion Control and Stabilization)”
Item 725 “General Source Controls (SWPPP)”

END OF ITEM 166

FOR PROJECTS INITIATED
AFTER MARCH 1, 2012
REVISION 7

ITEM 200

STRIPPING

200.1 Description. This Item shall govern stripping of existing topsoil to approximately 3 inches depth or as shown on the drawings and disposing of the stripped material off-site. Within the limits indicated, or in areas where existing grade is to be altered either by excavation or embankment, the Contractor shall strip existing topsoil to approximately 3 inches depth or as shown on the drawings and dispose of it at the Contractor's expense. Stripping shall include the removal and disposal of scrap iron, rubbish, logs, abandoned utilities, abandoned signs, and any and all other debris, if within the right-of-way or designated easements, whether above or below existing grade. Field cross-sections will no longer be obtained.

200.2 Construction Methods. The stripped material shall be removed as designated below regardless of the project area to be excavated or receive embankment. Strippings are unsuitable material and shall not be considered for use in the future construction. The strippings and any other unsatisfactory material shall be removed and disposed of outside the right-of-way, by the Contractor. No strippings shall be used in median or in areas from back-of-curb to R.O.W. *Proper Storm Water Pollution Prevention Best Management Practices shall be applied to stripped areas*.

When disposing of strippings and waste, off site, the Contractor shall not place the material in an "*environmentally sensitive area, floodway or* '*Water of the United States', including adjacent wetland*", as defined in the Clean Water Act and the Rivers and Harbors Act, unless he has previously obtained the appropriate Department of the Army Permit authorizing the activity. If the stockpile or disposal site is defined in the plans, then the County shall be responsible for ensuring that the appropriate Department of the Army permit has been obtained for the activity.

200.3 Measurement & Payment. Stripping and any associated stockpiling, or disposal will not be paid for directly. Payment for stripping shall be incidental to excavation, borrow or embankment.

There are no line codes for this Item.

NOTE: This Item requires other Standard Specifications

Item 110 "Roadway Excavation"
Item 130 "Borrow"

Item 132 “Embankment”

END OF ITEM 200

ITEM 205

SUBGRADE

205.1 Description. This Item shall govern the proof rolling and compaction of the subgrade for pavements. When the road is to be surfaced or paved and after the earthwork has been substantially completed and after all storm sewer and drains have been laid, the subgrade shall be brought to the lines, grades and typical cross-section shown on the plans and in accordance with these Standard Specifications.

205.2 Construction Methods. After stripping, the Contractor shall proof roll the subgrade, i.e. verify that the subgrade is firm and able to support construction equipment and correct any soft or yielding areas by:

A. scarifying and aerating,

B. replacing unsuitable material with suitable material from the project site, or borrow as per Item 130 “Borrow” and authorized by the Engineer,

C. stabilization, etc.

Proof rolling equipment shall meet the requirements of Item 216 “Proof Rolling” of the Texas Department of Transportation’s “Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges”, Latest Edition.

Whenever unsuitable natural material is encountered below the top of subgrade elevation and cannot be economically amended to make it suitable, then the following requirements shall apply:

A. The unsuitable material shall be excavated to a depth deemed sufficient by the Engineer and the excavated material shall be disposed of legally outside the project limits as per Item 110.

B. The excavated area shall be filled to its original level with suitable material from the project site; or borrow as per Item 130 as directed by the Engineer. The fill material shall be compacted to 95 percent of standard proctor density in accordance with ASTM D698 “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))”, using a moisture content between optimum and plus/minus 3 percent of optimum.

All holes and depressions shall be filled with approved material.

Stabilized Subgrade. If the subgrade is to be stabilized, refer to the appropriate Standard Specification Item for additional construction requirements.

Unstabilized Subgrade. If the subgrade is not to be stabilized, it shall be compacted to 95 percent of standard proctor density in accordance with ASTM D698, using a moisture content between optimum and plus/minus 3 percent of optimum. Any subgrade, without stabilization, shall be compacted to a minimum depth of 9 inches. The subgrade shall be brought to the lines and grades required.

The subgrade shall be kept free from all ruts and weak spots. Any ruts and weak spots that develop under construction traffic shall be repaired with suitable material as they develop.

205.3 Quality Assurance. The Testing Laboratory's representative shall determine the Moisture-Density Relationship in accordance with ASTM D698, on material secured from the roadway or borrow source, for each type of material encountered or used.

The Testing Laboratory's representative shall determine the in-place density in accordance with ASTM D6938, "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)" or ASTM D1556, "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method." The minimum level of testing shall consist of the following:

A. at least one test per station per lane of roadway.

B. a lane is defined as 12' wide section of pavement regardless of its use.

205.4 Measurement and Payment. The work prescribed under this Item, shall not be paid for directly, but shall be considered as subsidiary work of the Item 110 "Roadway Excavation" and/or Item 130 "Borrow".

There are no line codes for this Item.

NOTE: This Item requires other Standard Specifications

Item 110 "Roadway Excavation"
Item 130 "Borrow"

END OF ITEM 205

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 4

ITEM 222

PORTLAND CEMENT STABILIZED SUBGRADE

222.1 Description. This Item shall govern for treating the subgrade by the pulverizing, adding portland cement, mixing, wetting and compacting the mixed material to the required density. This Item applies to natural ground, embankment or existing pavement structure and shall be constructed as specified herein and in conformity to the typical sections, lines and grades as shown, on the plans or as established by the Engineer.

Cement treatment shall not be mixed or placed when the air temperature is below 40° F and falling, but may be mixed or placed when the air temperature is above 35° F and is rising, the temperature being taken in the shade and away from artificial heat and with the further provision that cement treatment shall be mixed or placed only when weather conditions, in the opinion of the Engineer, are suitable.

222.2 Materials

A. Soil shall consist of approved material free from vegetation or other objectionable matter encountered in the existing roadbed and other acceptable material used in the preparation of the roadbed in accordance with this Item.

B. Portland cement shall be Type I of a standard brand of cement and shall conform to the requirements of ASTM C150 “Standard Specification for Portland Cement” and DMS-4600.6 A. (as applicable).

The Contractor, at his option, may use bulk cement, provided the apparatus for handling, weighing and spreading the cement is approved by the Engineer. Cement weighing equipment shall meet the requirements of the Item 520 "Weighing and Measuring Equipment".

C. Water shall be free from substances deleterious to the hardening of the cement treatment and shall meet the requirements of the Item 360 “Concrete Pavement”.

The ratio of cement to soil shall be based on dry weight of the soil/cement mixture and shall be established by the Engineer in the field to provide the desired stability. The cement content in the dry material normally ranges between 6 percent to 10 percent by weight. The percentage of moisture in

the soil, at the time of the cement application shall not exceed the quantity that will permit the uniform and intimate mixture of soil and cement during the dry mixing operations and shall not exceed the specified optimum moisture content for the soil cement mixture, as determined by ASTM D558 “Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures.”

222.3 Equipment. Equipment necessary for proper construction of the work shall be on the project, in first-class working condition and be approved by the Engineer, both as to type and condition, prior to the start of construction operations. The Contractor shall at all times provide sufficient equipment to enable continuous prosecution of the work.

Portland cement treatment for materials in-place may be constructed with any machine or combination of machines and auxiliary equipment that will produce the results as outlined in this Item.

Mixing may be accomplished by a multiple-pass traveling mixing plant or a single-pass traveling mixing plant.

The equipment provided by the Contractor shall be operated by experienced and capable workmen and shall be that necessary to provide a cement treatment meeting the requirements herein specified.

222.4 Construction Methods. It is the primary requirement of this Item to secure a completed course of treated material containing a uniform portland cement mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his work, to process a sufficient quantity of material to provide full depth as shown on the plans, to use the proper amount of portland cement, maintain the work and rework the courses as necessary to meet the above requirements.

The portland cement shall be mixed to the full depth shown on the plans and in no case, shall it be less than six (6) inches.

The subgrade shall be firm and able to support, without displacement, the construction equipment at the density hereinafter specified. Soft or yielding subgrade shall be corrected and made stable by scarifying and aeration or adding cement and compacting until it is of uniform stability.

Before other construction operations are begun, the subgrade shall be graded, shaped and compacted, as required, to construct the portland cement treatment for materials in-place in conformance with the lines, grades, thickness and typical cross-section shown on the plans.

Unsuitable material encountered below the top of subgrade elevation, shall be replaced with suitable material from the roadway excavation, or from other suitable material sources per Item 110 “Roadway Excavation”.

The soil shall be so pulverized that, at the completion of moist-mixing 100 percent by dry weight passes a 1 inch sieve, and a minimum of 80 percent passes a No. 4 sieve, exclusive of gravel or stone retained on these sieves. Old bituminous wearing surfaces shall be pulverized so that 100 percent will pass a 1-3/4 inch sieve as per Table 1 below:

TABLE 1

GRADATION REQUIREMENTS MINIMUM % PASSING

SIEVE SIZE	BASE	SUBGRADE
1-3/4 Inch	100	100
3/4 Inch	85	85
No. 4	-	60

Portland cement shall be spread uniformly on the soil at the rate specified or as approved by the Engineer. If a bulk cement spread is used, it shall be positioned by string lines or other approved methods during spreading to insure a uniform distribution of cement.

Cement shall be applied only to such an area that all operations can be continuous and completed in daylight and within 5 hours of such application.

The percentage of moisture in the soil at the time of cement application, shall not exceed the quantity that will permit uniform and intimate mixture of the soil and cement during dry mixing operations, and it shall not exceed the specified optimum moisture content for the soil cement mixture.

No equipment, except that used in spreading and mixing, will be allowed to pass over the freshly spread cement, until it is mixed with the soil.

After the cement has been applied, it shall be dry mixed with the soil. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied. Any mixture of soil and cement that has not been compacted and finished shall not remain undisturbed for more than 30 minutes.

Immediately after dry mixing of soil and cement is complete, water as necessary shall be uniformly applied and incorporated into the mixture.

Pressurized equipment shall provide an adequate supply to insure continuous application of the required amount of water to the sections being processed within 3 hours of the application of the cement. Proper care shall be exercised to insure proper moisture distribution at all times. After the last increment of water has been added, mixing shall continue until a thorough and uniform mix has been obtained.

The material shall be compacted to not less than 95 percent of standard proctor density (ASTM D698 " Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))"). At the start of compaction, the percentage of moisture in the mixture and in the un-pulverized soil lumps, based on dry weights, shall be between optimum and 2 percent above optimum. When the uncompacted soil cement mixture is wetted by rain so that the average moisture content exceeds the tolerance given at the time of final compaction, the entire section shall be reconstructed in accordance with this Item at the sole expense of the Contractor.

The specified optimum moisture content and field density shall be determined from representative samples of the soil, taken in the fields and blended cement in a materials laboratory setting in accordance with ASTM D698.

Prior to the beginning of compaction, the mixture shall be in a loose condition for its full depth. The loose mixture shall then be uniformly compacted to the specified density lines and grades.

After the soil and cement mixture is compacted, water shall be uniformly applied, as needed, and thoroughly mixed. The surface shall then be reshaped to the required lines, grades and cross-section and then lightly scarified to loosen any imprint left by compacting or shaping equipment.

The resulting surface shall be thoroughly rolled with a pneumatic tire roller and "skinned" by a power grader to achieve final grade, removing all loosened soil and cement from the section. The surface shall then be thoroughly compacted with the pneumatic roller, adding small increments of moisture as needed during rolling. If aggregate too large to pass a No. 4 screen is present in the mixture, one complete coverage of the section with the flat wheel roller shall be made immediately after the skinning operation. When directed by the Engineer, surface finishing methods may be varied from this procedure, provided a dense uniform surface, free of surface compaction planes, is produced. The moisture content of the surface material must be maintained at its specified optimum during all finishing operations. Surface compaction and finishing shall proceed in such a manner as to produce, in not more than 2 hours, a smooth, closely

knit surface, free of cracks, ridges or loose material conforming to the crown, grade and line shown on the plans.

222.5 Curing. After the cement treated course has been finished as specified herein, the surface shall be protected against rapid drying by either of the following curing methods for a minimum period of 3 days, or as directed by the Engineer. These methods of curing are:

A. Maintain in a thorough and continuously moist condition by sprinkling.

B. Apply an asphalt membrane to the treated course, immediately after its completion. The asphaltic material shall meet the requirements of Item 300 "Asphalts, Oils, and Emulsions" contained in TxDOT's " Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges," Latest Edition. The quantity and type of asphalt approved for use by the Engineer shall be sufficient to completely cover and seal the total surface of the base and fill all voids. The Contractor shall be responsible for protecting the asphalt membrane from being picked up by the traffic. The asphalt membrane may remain in-place when the proposed surface or base courses are placed. The surface or other base courses may be applied on the finished base as soon after completion as operations will permit.

222.6 Construction Joints. At the end of each day's construction a straight transverse construction joint shall be formed by cutting back into the total width of completed work to form a true two inch depth vertical face free of loose and shattered material.

Construct vertical joints between new cement-treated base and cement-treated base that has been in place 4 hr. or longer. The vertical face may be created by using a header or by cutting back the face to approximately vertical. Place successive base courses using the same methods as the first course. Offset construction joints by at least 6 in.

Cement treatment for large wide areas shall be built in a series of parallel lanes of convenient length and width meeting the approval of the Engineer.

222.7 Traffic. After the 3 day curing period, or as directed by the Engineer, completed sections of cement treated material in-place, may be opened immediately to local traffic and to construction equipment and to all traffic after the curing period, provided the cement treated course has hardened sufficiently to prevent marring or distorting the surface by equipment or traffic.

222.8 Maintenance. The Contractor shall be required to maintain the cement treated course in good condition until the overlying course has been constructed. Maintenance shall include immediate repairs to any defects that may occur. This work shall be done by the Contractor at his own expense and repeated as often as may be necessary to keep the area continuously intact. Faulty work shall be replaced for the full depth of treatment. It is the intent of this Item that the Contractor shall construct the plan depth of cement treatment in one homogeneous mass. The addition of thin stabilized layers will not be permitted in order to provide the minimum specified depth.

222.9 Quality Assurance. The Testing Laboratory's representative will determine the Moisture-Density Relationships in accordance with ASTM D698 on material secured from the roadway. Samples will be blended with portland cement for each type of material encountered.

The Testing Laboratory' representative will determine the in-place density in accordance with ASTM D6938 "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)" or ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method." The minimum level of testing shall consist of the following:

A. at least one test per station per lane of roadway.

B. a lane is defined as 12' wide section of pavement regardless of its use.

222.10 Measurement. The work performed and the material furnished as prescribed by this Item will be measured as follows:

A. Manipulation of cement during stabilization of the subgrade will be measured by the square yard of surface area of the completed and accepted work in place.

B. Portland cement will be measured by the ton of 2,000 pounds.

222.11 Payment. The work performed and material furnished as prescribed by this Item and measured in accordance with the method indicated in the proposal and in accordance with the applicable provisions of measurement above, will be paid for as follows:

A. "Manipulation of Cement for Stabilized Subgrade" shall be paid for at the contract unit price per square yard.

The unit price bids shall each be full compensation for preparing the subgrade, for furnishing all material, for all freight involved, for weighing the material, for pulverizing, applying cement, water, asphalt membrane, all processing, mixing, spreading, sprinkling, compacting, finishing and curing cement treated soil; and for all manipulations, labor, equipment, fuel, tools, and all incidentals necessary to complete the work.

B. Cement used in stabilized subgrade shall be paid for at the contract unit price per ton for "Cement for Subgrade Stabilization".

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 110 “Roadway Excavation”
Item 360 “Concrete Pavement”
Item 520 “Weighing and Measuring Equipment”

END OF ITEM 222

FOR PROJECTS INITIATED
AFTER SEPTEMBER 1, 2017
REVISION 11

ITEM 250

HOT MIX ASPHALTIC CONCRETE BASE COURSE (BLACK BASE)

250.1 Description. This Item shall consist of a base course mixture of compacted mineral aggregate and asphaltic material, constructed on an approved subgrade, in accordance with the plans and specifications and in conformity with the lines and grades.

It is the intent of these specifications that the asphaltic mixtures produced and placed shall meet the requirements of these specifications, for one hundred percent payment. The Contractor shall have the responsibility for the design, production, transportation and laydown of asphaltic concrete mixtures. All phases of this work shall meet the requirements of this Item and be subject to inspection and acceptance by the Engineer.

The Contractor shall exercise quality control over materials and their assembly, design, processing production, hauling, laydown, compaction and all associated equipment. Quality control is defined as the constant monitoring of equipment, materials and processes to ensure that asphaltic concrete mixtures produced and laid are uniform, and are within control limits, and meet all acceptance requirements of this Item and other specification requirements. If these specifications are not being met, and satisfactory control adjustments are not being made, operations shall be discontinued until proper adjustments and uniform operations are established. Control shall be accomplished by a program independent of, but correlated with, the Engineer's quality assurance testing program and shall verify that all requirements of the job mix are being achieved and that necessary adjustments provide specification results.

At all times, when the plant is in operation, the Contractor shall require his supplier to have a level II specialist certified by TxDOT’s approved hot mix asphalt certification program and will be available to the plant operator who is capable of designing asphaltic concrete mixes, performing tests and analyses to put the plant into operation and producing a mixture meeting the specifications. The daily operations at the plant will not begin without the presence of the qualified technician, as stated above.

The tests made by the Engineer in his quality assurance testing program shall not relieve the Contractor of his responsibility of quality control.

250.2 Materials. Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications.

A. Mineral Aggregate: The mineral aggregate shall be composed of a coarse aggregate and a fine aggregate and, if required, mineral filler and may include reclaimed asphalt pavement (RAP) that meets the requirements of this Item. The use of RAP may be required on the plans. Samples of coarse aggregate, fine aggregate and mineral filler shall be submitted in minimum 10 pound bags when requested by the Engineer. Unless otherwise required, one or more mineral aggregates containing both coarse and fine aggregate may be used to produce the specified mixture. The documented aggregate test results shall be submitted with the asphalt mix design.

1. Coarse Aggregate: Coarse aggregate stockpiles shall have no more than 20% material passing the No. 8 sieve and shall consist of clean, tough, durable fragments of aggregate and/or mechanically crushed aggregate, reclaimed asphalt pavement (RAP) or a combination thereof, as hereinafter specified, of uniform quality throughout and shall be free from dirt, organic or other injurious matter occurring either freely in the material or as a coating on the aggregate. Samples of each aggregate shall be tested for approval by the Engineer. The coarse aggregate shall have an abrasion of not more than 40% when subjected to the Los Angeles Abrasion Test, test method ASTM C131 “Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.”

PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE[1]

TEST	REQUIREMENT
Abrasion Loss	Not more than 40%
Deleterious Material	Less than 1.5%
Decantation	Less than 1.5%

1. Aggregate contained in RAP will not be required to meet these requirements except as shown on the plans.

2. Reclaimed Asphalt Pavement (RAP). RAP is defined as a salvaged, milled, pulverized, broken or crushed asphaltic pavement. The RAP to be used in the mix shall be crushed or broken to the extent that 100 percent will pass the 2 inch sieve.

The stockpiled RAP shall not be contaminated by dirt or other objectionable materials. Do not use RAP if the decantation value exceeds 5% and the plasticity index is greater than 8. Test the stockpiled RAP for decantation in accordance with Tex-406-A, Part I. Determine the plasticity index in accordance with Tex-106-E if the decantation value exceeds 5%. This requirement applies to stockpiled RAP from which the asphalt has not been removed by extraction.

Only RAP from designated sources will be allowed in mixes using more than 25 percent RAP, unless otherwise shown on the plans.

3. Fine Aggregate: Fine aggregates consist of manufactured sands, screenings, and field sands. At most 15 percent of the total aggregate may be field sand or other uncrushed fine aggregate. The fine aggregate shall be that part of the aggregate passing the No. 8 sieve and shall consist of sand and fine aggregate particles from the coarse aggregate material sources or a combination thereof. Sand shall be composed of durable particles free from injurious foreign matter. Screening shall be of the same or similar materials as specified for coarse aggregates. Fine aggregate from each source shall be non-plastic.

PHYSICAL REQUIREMENTS FOR FINE AGGREGATE

TEST	REQUIREMENT
Plasticity Index	Not more than 6%
Sand Equivalent Value	Not less than 45

4. Mineral Filler: Mineral filler, when required, shall consist of thoroughly dried stone dust, slate dust, portland cement, lime, fly ash or other mineral dust approved by the Engineer. The mineral filler shall be free from foreign matter. Fines collected by bag house or other air cleaning or dust collecting equipment may be permitted as mineral filler in amounts up to two percent of the asphaltic mixture, provided that the portion passing the No. 200 master gradation limit is not exceeded. When these fines are permitted in the asphaltic mixture, they shall be introduced in the same manner prescribed for other mineral fillers.

When mineral filler is permitted by the Engineer, it shall be controlled by a measuring device acceptable to the Engineer.

A hopper or other acceptable storage system shall be required to maintain a constant supply of mineral filler to the measuring device.

Mineral filler shall meet the following gradations, when tested in accordance with TxDOT's Test Procedure Tex-200-F.

SIEVE SIZE	% PASSING, BY WIEGHT OR VOLUME
No. 8	100
No. 200, not less than	55

B. Bituminous Material:

Asphalt Binder: Unless otherwise shown on the plans, the asphalt binder shall be PG 64-22, Performance Grade, asphalt binder in accordance with TxDOT's Item 300, Section 300.2.10, "Performance Graded Binders", of the Texas Department of Transportation's, "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", Latest Edition.

C. Tack Coat. Furnish CSS-1H, SS-1H, or a PG binder with a minimum high-temperature grade of PG 58 for tack coat binder in accordance with TxDOT's Item 300, "Asphalts, Oils, and Emulsions." Specialized or preferred tack coat materials may be allowed or required when shown on the plans. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

The Engineer will obtain at least one sample of the tack coat binder per project in accordance with Tex-500-C, Part III, and test it to verify compliance with Item 300, "Asphalts, Oils, and Emulsions." The Engineer will obtain the sample from the asphalt distributor immediately before use.

D. Additives: Additives to facilitate mixing and/or improving the quality of the asphaltic mixture shall be used when noted on the plans or in the specifications. It may be used with written permission of the Engineer. If lime or a liquid antistripping agent is used, then add in accordance with, Item 301 "Asphalt Antistripping Agent", in the

Texas Department of Transportation's "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", Latest Edition.

250.3 Mixtures.

A. General: The paving mixture shall consist of a uniform mixture of:

1. coarse aggregate,

2. fine aggregate,

3. asphaltic material binder.

If required, the paving mixture may also include any or all of the following:

1. RAP,

2. mineral fillers,

3. additives.

B. The supplier of the black base shall submit a proposed mixture design report, which conforms to all the requirements of this Item, for verification by the Engineer. Include the following items in the mixture design report:

1. The combined aggregate gradation, source, specific gravity, and percent of each material used.

2. Plotted job-mix gradation on a gradation chart with sieve sizes raised from 0.45 power. This plot must show that the proposed gradation of the job-mix formula is within the limits of master gradation.

3. Results of all applicable tests.

4. Signature of the Level II person or persons who performed the design.

5. Date the mixture design was performed, and a unique identification number for the mixture design.

Approval of the proposed design, by the County, will require that the supplier maintain the source and quality of aggregates

proposed throughout production and changes which require modification of the proposed mix design shall require the written approval of the Engineer. The supplier of the black base shall follow the established job mix formula both as to asphalt content and gradation.

The grading of each constituent shall be such as to produce, when properly proportioned, a mixture conforming to the following limitations for grading for the type specified. The exact proportions of each constituent producing the total aggregate within these limits shall meet the following requirements:

TABLE 1

GRADATION OF COMPOSITE AGGREGATE

SIEVE SIZE	% PASSING, BY WEIGHT
1-1/2 Inch	100
1 Inch	90 – 100
3/8 Inch	45 – 70
No. 4	30 – 55
No. 40	15 – 30

TABLE 2

GRADATION OF COMPOSITE AGGREGATE
(Hot In-Place Recycled Asphalt)

SIEVE SIZE	% PASSING, BY WEIGHT
1-1/2 Inch	100[1]
1 Inch	98 – 100
3/4 Inch	84 – 98
3/8 Inch	60 – 80
No.4	40 – 60
No. 8	29 – 43
No. 30	13 – 28
No. 50	6 – 20
No. 200	2 – 7

1. Defined as maximum sieve size. No tolerance allowed.

Testing for gradation shall be in accordance with TxDOT's Test Procedure Tex-200-F, Latest Edition.

The gradation of the material produced shall not vary from the designated grading limits for any sieve size by more than plus/minus 5 percent by weight, based on total mixture, for sieve sizes greater than or equal to the No. 8 and plus/minus 3 percent for sieve sizes less than the No. 8. The average asphalt content shall not vary from the optimum asphalt content tolerance determined from the approved job mix design, by more than plus/minus 0.3 percent.

Laboratory density and stability of the mixture when designed and tested, during production, in accordance with these Standard Specifications and the test procedures outlined in the Latest Edition of Texas Department of Transportation's "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges" shall meet the following physical properties:

LAB DENSITY, PERCENT			HVEEM STABILITY
Minimum	Maximum	Optimum	Not less than
94%	98%	96.5%	35 %

Stability and density tests are intended for control tests. If the laboratory stability and/or density of the mixture produced has a value lower than that specified and in the opinion of the Engineer is not due to a change in source or quality of materials, production may proceed with consequent changes in the mix until the laboratory stability and density equals or exceeds the specified values. If, in the opinion of the Engineer, there is a change in the source, types, or quality of material from that used in the design mixture, production will be discontinued until a new design mixture is determined by trial mixes and the Contractor shall pay all costs of redesigning the mix. The Contractor may submit a new mixture-design at any time during the project. The compacted thickness of the mixture or mixtures used shall be as specified by the plans or specifications. The specific test method to be used in this specification is listed in Section 250.4. The supplier's daily QA/QC test results shall be forwarded to Harris County's Material Engineer, on a daily basis.

C. Extraction or Ignition Test: The percentage of asphalt binder in any mixture shall not vary from the proportion established by the job mix formula.

When required by the Engineer, samples of the hot mixture may be taken at the plant or from the trucks or from the finished pavement. The location of sampling of the mixture shall be in accordance with ASTM D979 “Standard Practice for Sampling Bituminous Paving Maxtures.” When tested in accordance with ASTM D2172 “Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures,” or TxDOT’s: Tex-236-F and Tex-200-F, the average of the results of the aggregate gradations and asphalt content shall not vary from the values established in the job mix formula. Provide the Engineer with split samples of the mixtures and blank sample used to determine the ignition oven correction factors. TxDOT’s Test Procedure, Tex-236-F should be used to determine the aggregate and asphalt correction factors from ignition oven.

The mix shall be designed in accordance with Texas Department of Transportation’s Test Procedure Tex-204-F "Design of Bituminous Mixtures" to conform with the requirements of this Item, with the exception that the laboratory density will be determined as a percentage of the mixture theoretical maximum density. The theoretical maximum specific gravity shall be determined in accordance with Texas Department of Transportation’s Test Procedure Tex-227-F "Theoretical Maximum Specific Gravity of Bituminous Mixtures" on trial samples at each asphalt content. The optimum asphalt binder content will correspond to 96 percent laboratory density provided the mixture satisfies the minimum Hveem stability of 35 percent.

D. Stock Pile Gradations: Once a job mix design has been established in accordance with the Latest Edition of Texas Department of Transportation’s Test Procedure Tex-204-F "Design of Bituminous Mixtures", the coarse aggregate delivered to the stockpiles shall not vary on any grading size fraction by more than plus or minus 8 percentage points from the percentage found in the samples submitted by the Contractor and upon which the job mix design was based. The intent of this requirement is to insure consistency and uniformity of the asphaltic mixture produced in the drum mix plant. Should the gradation of coarse aggregates in the stockpiles vary by more than the allowed tolerance, the Engineer may stop the production and may require that new aggregate be furnished to the stockpiles that meet the gradations of the aggregates submitted for the design mix formula.

E. Tolerances: If the paving mixture produced varies from the job-mix formula gradation and/or asphaltic material content by more than the tolerances and restrictions, proper changes shall be made until the mixture meets the requirements, as directed by the Engineer.

250.4 Test Methods.

Testing of Materials: The Engineer will perform random tests to determine if the materials and construction procedures produce a product which meets the contract documents. The specific test methods for material analysis are outlined in the following Tables.

A. Testing of mineral aggregates shall be in accordance with the following ASTM standard laboratory test procedures:

PROPERTY	TEST METHOD
Sampling Aggregates	ASTM D75 "Standard Practice for Sampling Aggregates"
Sieve Analysis	TxDOT's Test Procedure Tex-200-F "Sieve Analysis of Fine and Coarse Aggregates"
Abrasion Resistance	ASTM C131 "Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine"
Specific Gravity	ASTM C127 "Standard Test Method for Relative Density (Specific Gravity), and Absorption of Coarse Aggregate" ASTM C128 "Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate"

PROPERTY	TEST METHOD
Sand Equivalent	ASTM D2419 “Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate” or TxDOT’s Test Procedure Tex-203-F “Sand Equivalent Test”
Atterberg Limit	ASTM D4318 “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils”
Deleterious Materials	TxDOT’s Test Procedure Tex-217-F “Determining Deleterious Material and Decantation Test for Coarse Aggregates” Part I
Decantation	TxDOT’s Test Procedure Tex-217-F “Determining Deleterious Material and Decantation Test for Coarse Aggregates” Part II

B. Performance Graded Binders, PG binders must be smooth and homogeneous material which will not foam when heated to 350˚F and meet the requirements of Section 300.2.10 “Performance Graded Binders” of TxDOT Specification Item 300, Latest Edition.

Testing of bituminous mixtures shall be in accordance with the following standard laboratory test procedures:

PROPERTY	TEST METHOD
Sampling Bituminous Mixtures	TxDOT’s Test Procedure Tex-222-F "Sampling Bituminous Mixtures" or ASTM D979 “Standard Practice for Sampling Bituminous Paving Mixtures”

PROPERTY	TEST METHOD
Molding of Specimens	TxDOT's Test Procedure Tex-206-F "Compacting Specimens Using the Texas Gyratory Compactor (TGC)"
Height of Specimens	ASTM D3549 "Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens"
Bulk Density of Specimens	TxDOT's Test Procedure Tex-207-F "Determining Density of Compacted Bituminous Mixtures"
HVEEM Stability	TxDOT's Test Procedure Tex-208-F "Test for Stabilometer Value of Bituminous Mixtures"
Maximum Theoretical Density	TxDOT's Test Procedure Tex-227-F "Theoretical Maximum Specific Gravity of Bituminous Mixtures"
Method of Mix Design	TxDOT's Test Procedure Tex-204-F "Design of Bituminous Mixtures"
Extraction	TxDOT's Test Procedure Tex-210-F, "Determining Asphalt Content of Bituminous Mixtures" or TxDOT's Test Procedure Tex-236-F "Determining Asphalt Content from Asphalt Paving Mixtures by the Ignition Method"

PROPERTY	TEST METHOD
Gradation	TxDOT's Test Procedure Tex-200-F,"Sieve Analysis of Fine and Coarse Aggregates" or TxDOT's Test Procedure Tex-236-F "Determining Asphalt Content from Asphalt Paving Mixtures by the Ignition Method"

250.5 Equipment. Provide equipment to produce, haul, place, and compact asphalt pavement, that complies with requirements of the Latest Edition of Item 320 "Equipment for Asphalt Concrete Pavement" and in the Texas Department of Transportation's "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges" (hereinafter referred to simply as "TxDOT's Specifications").

The Engineer, or his authorized representative, shall have access at any time to all parts of the paving plant.

250.6 Heating and Discharge of Materials.

A. Heating of Materials: Do not heat the asphalt binder above the temperatures specified in Item 300 "Asphalts, Oils, and Emulsions", of TxDOT's Specifications, Latest Edition; or outside the manufacturer's recommended values. On a daily basis, provide the engineer with records of asphalt binder and hot-mix asphalt discharge temperatures in accordance with Item 320, "Equipment for Asphalt Concrete Pavement", of TxDOT's Specifications, Latest Edition.

B. Mixing and Discharge of Materials: Notify the Engineer of the target discharge temperature and produce the mixture within 25˚F of the target. Monitor the temperature of the material in the truck before shipping to ensure that it does not exceed 350˚F. Harris County will not pay for or allow placement of any mixture produced at more than 350˚F.

Control the mixing time and temperature so that substantially all moisture is removed from the mixture before discharging from the plant. If requested, determine the moisture content by oven drying in accordance with TxDOT's Test Procedure, Tex-212-F, Part II, and verify that the mixture contains no more than 0.2 percent of moisture by weight. Obtain the sample immediately after

discharging the mixture into the truck, and perform the test promptly.

250.7 Asphalt Mixing Plants. Mixing plants may be either the weigh batch type, or the drum mix type. Both types of plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, bins and dust collectors, etc. and comply with the requirements of the Latest Edition of TxDOT's, Specification Item 320 "Equipment for Asphalt Concrete Pavement".

250.8 Spreading and Finishing Machine. The spreading and finishing machine shall conform to the requirements of the Latest Edition of TxDOT's Specification, Item 320 "Equipment for Asphalt Concrete Pavement", and as specified herein:

The spreading and finishing machine shall be of a type approved by the Engineer and shall be capable of producing a surface that will meet the requirements of the typical cross-section and the surface test, when required by the Engineer, and when the mixture is dumped directly into the finishing machine shall have adequate power to propel the delivery vehicles in a satisfactory manner. The finishing machine shall be equipped with a flexible spring and/or hydraulic type hitch sufficient in design and capacity to maintain contact between the rear wheel of the hauling equipment and the pusher rollers of the finishing machine while the mixture is being unloaded. The paver shall have a receiving hopper of sufficient capacity for a uniform spreading operation.

The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed. The screed or strike-off assembly shall produce a surface of the required evenness and texture without tearing, shoving, gouging or displacing the mixture.

The use of any vehicle which requires dumping directly into the finishing machine and which the finishing machine cannot push or propel in such a manner as to obtain the desired lines and grades without resorting to hand finishing will not be allowed. Unless waived by the Engineer, automatic screed controls will be required for asphaltic concrete spreading and finishing machines.

Asphaltic-concrete spreading and finishing machines shall be equipped with an approved automatic dual longitudinal screed control system and a transverse screed control system. The longitudinal controls shall be capable of operating from any longitudinal grade reference including a stringline, 40 foot ski, mobile stringline or matching shoe. The asphaltic concrete spreading and finishing machine shall be equipped with a screed heater and vibrator.

The Contractor shall furnish all equipment required for grade reference. It shall be maintained in good operating condition by personnel trained in the use of this type of equipment. The equipment shall be capable of constructing a finished surface within specified tolerances.

The automatic grade control device shall produce a finished surface meeting the requirements of the surface test on the items of work for which a spreading and finishing machine is required. Skin-patching will not be permitted unless approved by the Engineer and any section of pavement not meeting the minimum tolerance shall be corrected at the Contractor's expense.

The spreader shall be capable of spreading and finishing courses of bituminous plant mix material in lanes not less than 10 feet in width and shall be capable of operating at forward speeds consistent with the satisfactory laying of the mixture.

The asphaltic mixture, when placed with a spreading and finishing machine, shall not be placed unless the air temperature is at least 40° F. and rising. The air temperature shall be taken in the shade away from artificial heat. Asphalt shall not be placed when the temperature of the surface on which the mat is to be placed is below 60° F.

It is further provided that the asphaltic mixture shall be placed only when the humidity, general weather conditions and temperature and moisture condition of the base, in the opinion of the Engineer, are suitable.

250.9 Transporting Asphaltic Concrete. The asphaltic concrete mixture, heated and prepared as specified, shall be hauled to the work site in tight vehicles previously cleaned of all foreign material.

The dispatching of the vehicles shall be arranged so that all material delivered may be placed and all rolling shall be completed during daylight hours. Cover each truck load of mixture with waterproof tarpaulins. The inside of the trucks body may be given a light coating of, lime slurry or other approved release agent to prevent the mixture from adhering to the body. A hole for inserting a thermometer shall be installed in the truck body. Truck beds shall be clean before they are loaded with asphalt. If, in the opinion of the Engineer, the truck bed is damaged, it shall be removed from the project.

250.10 Lay-Down Operations.

A. Minimum Mixture Placement Temperatures. Use Table below for suggested minimum mixture placement temperatures.

SUGGESTED MINIMUM MIXTURE PLACEMENT TEMPERATURE

HIGH-TEMPERATURE BINDER GRADE	MINIMUM PLACEMENT TEMPERATURE (Before Entering Paver)
PG 64 or lower	260˚F
PG 70	270˚F
PG 76	280˚F
PG 82 0r higher	290˚F

B. Windrow Operations. When hot mix is placed in windrows, operate windrow pickup equipment so that substantially all the mixture deposited on the roadbed is picked up and loaded into the paver.

C. Placing. The Contractor shall have the option of placing material in either one or more lifts, in order to maintain uniform compaction. Lifts shall not exceed 4 inches in thickness. Tack Coat shall be required between lifts. Tack Coat shall conform to Item 340 “Hot Mix-Hot Laid Asphaltic Concrete”, Section 340.10.

The asphaltic mixture shall be placed and spread on the approved prepared surface with the specified spreading and finishing machine, in such a manner that when properly compacted the finished pavement will be smooth, of the required density and will meet the requirements of the typical cross-sections and the surface tests. During the application of asphaltic material, care shall be taken to prevent splattering of adjacent pavement, curb and gutter and structures.

When the asphaltic mixture is placed in a narrow strip along the edge of an existing pavement, or used to level up small areas of an existing pavement, or placed in small irregular areas where the use of a finishing machine is not practical, the finishing machine may be eliminated, provided a satisfactory surface can be obtained by other approved methods.

Adjacent to flush curbs, gutters, liners and structures, the surfaces shall be finished uniformly high so that when compacted it will be slightly above the edge of the gutter and flush to the structure.

250.11 Compaction. The pavement shall be compacted thoroughly and uniformly with the necessary rollers to obtain the density, stability and cross-section

of the finished paving mixture meeting the requirements of the plans and specifications.

Rolling equipment shall consist of pneumatic tire and steel wheel rollers. Breakdown rolling shall be accomplished immediately after placing, using steel wheel rollers. Vibratory rollers will not be permitted unless prior approval is obtained from the Engineer and unless the equipment is operated by personnel who are properly certified to operate this equipment.

All equipment shall be in good mechanical condition, properly adjusted and free from wear that would impair the quality of the work. Necessary precautions shall be taken to prevent the dropping of gasoline, oil, grease or other foreign matter on the pavement, by the compaction, or any equipment.

Pneumatic tired rollers shall have tires of equal size and diameter capable of exerting an average contact pressure varying from 40 to 90 psi, by adjusting ballast and/or tire pressure. All tires shall have equal pressure. The wheels will be placed so that one pass will accomplish one complete coverage equal to the width of the roller with a minimum of 1/4 inch overlap. The wheels shall not wobble. The operating weight and tire pressure shall be as such as to provide the required density. The rollers shall be in the best mechanical condition. Pneumatic tire rollers shall be equipped with water systems and fiber mats.

Steel wheel rollers shall be a three wheel two-axle tandem (bull wheel) or three-axle tandem roller weighing not less than 8 tons and developing compression in the rear wheels of not less than 250 pounds per inch of roller width. The rollers shall have power units and be equipped with scrapers to keep the wheels clean and with the means of keeping the wheels wet, to prevent mixes from sticking to the rollers.

Vibratory rollers shall have a minimum of one vibratory drum weighing no less than 8 tons. The vibratory roller shall be capable of obtaining frequency and amplitude combinations that will produce an impact spacing smaller than the thickness of the mat, or a minimum of 8 to 10 blows per foot.

All rolling with any type of roller shall be done as directed by the Engineer. Breakdown (initial pass) rolling shall be conducted with a steel wheel roller or vibratory roller, intermediate rolling shall be conducted with a steel-wheel roller or pneumatic-tired roller and finished rolling shall be conducted with a steel wheel roller or pneumatic-tired roller unless directed otherwise by the Engineer. When rolling with vibratory steel

wheel rollers, the manufacturer's recommendation shall be followed, unless otherwise directed by the Engineer.

The specific rollers used in sequence to obtain the required compaction shall be approved by the Engineer. The ambient temperature, humidity, wind velocity, temperature of existing surface, mat thickness, and temperature of paving mixture shall be considered by the Engineer in determining the type and amount of rollers needed to achieve the required compaction. Approval of the Engineer will not relieve the Contractor of his responsibility to produce the required density.

Rolling pattern shall be established daily and verified as outlined in Test Procedure Tex-207-F, Part IV and III respectively, to achieve the required air void content. The daily established rolling pattern used is subject to approval by the Engineer. The daily established rolling pattern shall be followed unless changes in the mixture or placement conditions occur which affect compaction. A new rolling pattern will be established at this time. If required, test strips approximately 300-500 feet in length shall be established to determine proper rolling patterns. A maximum of two strips will be allowed. If the required rolling patterns cannot be determined that will give the required density with two strips, the first two strips will be removed, before the third strip is constructed.

The mixture shall be placed at a temperature of between 260°F and 325°F. Rolling shall begin as soon as the paving mixture will not be displaced laterally by the weight of the roller. When rolling with the steel-wheel, pneumatic-tired roller or vibratory roller, longitudinal joints shall be rolled initially, however rolling shall begin at the low side of the pavement and proceed toward the higher side of the pavement, overlapping on successive trips by at least half the width of the rear wheel unless otherwise directed by the Engineer. Alternate trips of the roller shall be a minimum of six inches difference in length. The motion of the roller shall be slow enough at all times to avoid displacement of the mixture. To prevent adhesion of the surface mixture to the roller, the rollers shall be kept thoroughly moistened with water, but an excess of water will not be permitted. The roller shall not be allowed to stand on pavement which has not been fully compacted. If any displacement occurs, it shall be repaired at once by the use of rakes, and fresh mixture where required, any repair is subject to the Engineer's approval.

The maximum roller speed for any compaction equipment shall comply with the following table unless directed otherwise by the Engineer. The speed of the roller shall, at all times, be slow enough to avoid displacement of the hot mixture and shall not be greater than the speed indicated below.

MAXIMUM ROLLING SPEEDS
TYPE OF ROLLING

COMPACTOR	BREAKDOWN (miles/hr)	INTERMEDIATE (miles/hr)	FINISH (miles/hr)
Steel Wheel Roller	2	3	3
Pneumatic-tire Roller	-	3	5
Vibratory Roller	3	3	3

Rolling shall be continued until required compaction can be obtained and all roller marks are eliminated. Complete all compaction operations before the pavement temperature drops below 160°F unless otherwise allowed. The Engineer may allow compaction with a light finish roller operated in static mode for pavement temperatures below 160°F.

Rolling with a trench type roller will be required on widening areas in trenches and other limited areas where satisfactory compaction cannot be obtained with the rollers specified or approved.

The roller must not stand on the compacted pavement which has not cooled to normal atmospheric temperature. To prevent adhesion of the paving mixtures to the rollers, the wheels shall be kept properly moistened with water; however, excess water will not be permitted.

If, in the opinion of the Engineer, the asphaltic concrete surface course is not being properly compacted, specimens shall be taken to determine the density of the asphaltic concrete at various locations.

Density of the completed asphaltic concrete shall be uniform over the entire roadway area. The Engineer may have the material (part or all) removed and replaced on areas where density is found not to be that specified, when tested. The entire cost of removing and replacing material from areas because of unacceptable density variations shall be borne by the Contractor and at no cost to the County.

Hand Tamping: The edges of the pavement along curbs, headers and similar structures, and all places not accessible to the roller, or in such positions as will not allow thorough compaction with the rollers, shall be thoroughly compacted with lightly oiled tamps.

250.12 Compaction Criteria. In place compaction methods used to obtain the required density necessary to gain the Engineer’s approval shall be divided into Type A or Type B construction.

Type A construction shall represent asphalt being laid over New Construction, that is, all phases of construction beginning at the sub-base level and ending with the asphalt surface mix shall be New Construction.

Type B construction shall represent asphalt being laid over in-situ material or base repair, that is, all asphalt overlay, level-up, base repair, cold in-placed recycled asphalt or hot in-placed recycled asphalt. For all base repair used to construct an asphalt overlay and level-up the gradation of composite aggregate shall be as shown in Table 1. However, all base repairs used to construct hot in-placed recycled asphalt, the gradation of the composite aggregate shall be as shown in Table 2.

Type A:

In place compaction control is required of all paving mixtures. Asphaltic concrete shall be placed and compacted to obtain from 3 to 8 percent air voids. Do not increase the asphalt content of the mixture to reduce pavement air voids. In no case shall the compacted roadway specimen have air voids in excess of 8 percent. The Contractor shall establish a rolling pattern as outlined in Test Procedure Tex-207-F, Part IV, to achieve the required air void content. The Contractor shall confirm compaction as outlined in Test Procedure Tex-207-F, Part III, through nuclear density testing supplied by the laboratory retained by Harris County. The target density can be established daily and verified with a nuclear density gauge as outlined in Tex-207-F, Part IV and III, respectively. It is recommended that the Thin Lift Asphalt Gauge be used, however other nuclear equipment may be used with prior approval of the Engineer as long as proper correlation is performed and correlation proof is maintained and kept with the gauge at all times. The Contractor shall understand that all nuclear density testing is performed only as an aid to construction, and the Engineer's approval will not relieve the Contractor of his responsibility to produce the required density. Acceptance of the asphalt by Harris County shall be by the acceptable core density and other methods of determining in-place density, which correlate satisfactory with results obtained from roadway specimens, may also be used when approved by the Engineer. Correlation of average nuclear gauge readings to core density results shall be performed after each day's production, as outlined herein after. The Laboratory Technician shall continue to check and verify the rolling pattern by use of nuclear equipment every 100 feet, at a minimum and mark core locations every 500 feet, at center of alternate lane. For Parking Lots, every 1,100 square yards, take 4 nuclear gauge readings at each marked core location. Cores shall be taken the same day, or no later than the beginning of the next day. Core locations must be back filled and compacted with similar pavement material. The in-place density and air void shall be measured in accordance with Test

Procedures Tex-207-F and Tex-227-F. Correlation of average nuclear gauge density reading to core density results shall be established for the cores taken daily and forwarded to Harris County on a daily basis. This process will continue for each day's placement, until the Engineer determines that a good bias has been established for that nuclear gauge. Then the same nuclear gauge should be utilized to establish and verify the in-place densities afterward. The specific rolling pattern used is subject to approval by the Engineer. The daily established rolling pattern shall be followed unless changes in the mixture or placement conditions occur which affect compaction. A new rolling pattern will be established at this time. If required, test strips approximately 300-500 feet in length shall be established to determine proper rolling patterns. A maximum of two strips will be allowed. If the required rolling patterns cannot be determined that will give the required density, with two strips, then the first two strips will be removed, before the third strip is constructed.

Type B:

The Contractor shall establish a rolling pattern as outlined in Test Procedure Tex-207-F, Part IV, to achieve an acceptable density. The Contractor shall confirm compaction as outlined in Test Procedure Tex-207-F, Part III, through nuclear density testing supplied by the Laboratory retained by Harris County. The target density shall be established and controlled with a nuclear gauge as outlined in Tex-207-F, Part IV and III respectively. It is recommended that the Thin Lift Asphalt Gauge be used, however other nuclear equipment may be used with prior approval of the Engineer. The Laboratory Technician shall continue to check and verify the rolling pattern by use of nuclear equipment, at a minimum of every 100 feet per lane. Acceptance of the asphalt by Harris County shall be upon receiving final reports from the Material Engineer verifying Mix Design and Conformance to the Rolling Pattern. Cores shall not be taken for densities unless otherwise directed by the Engineer. Cores will be used to verify depth as required. The daily established rolling pattern used is subject to approval by the Engineer. The daily established rolling pattern shall be followed unless changes in the mixture or placement conditions occur which affect compaction. A new rolling pattern will be established at this time.

250.13 Construction Joints. Placing of the surface course shall be as nearly continuous as possible, and the roller shall pass over the unprotected end of the freshly laid mixture only when the laying of the course is discontinued for such length of time as to permit the mixture to become chilled. In all such cases, when the work is resumed, the material laid shall be cut back so as to produce a slightly beveled edge for the full thickness of the course.

The old material which has been cut away shall be removed from the work site, and the new mix laid against the fresh cut.

When the work is resumed, the materials laid shall be cut back to a point where material is full depth, which will be removed altogether with the surplus material, and the fresh mix laid against the joint thus formed.

Hot smoothing irons may be used for sealing joints, but in such cases extreme care shall be exercised to avoid burning the surface. Any unevenness indicated by a 10 foot straight edge laid perpendicular to the joint, immediately after final rolling, shall be corrected at that time.

250.14 Irregularities. Immediately take corrective action if surface irregularities, including but not limited to segregation, rutting, raveling, flushing, fat spots, mat slippage, color, texture, roller marks, tears, gouges, streaks, or uncoated aggregate particles, are detected. The Engineer may suspend production or placement operations until the problem is corrected. At the expense of the Contractor and to the satisfaction of Engineer, remove and replace any mixture that does not bond to the existing pavement or that has other surface irregularities identified above.

250.15 Surface Requirements. The final surface of the pavement after compaction shall be smooth and true to the established line and grade and typical cross-sections shown on the plans and, when tested with a standard 10 foot or 16 foot straightedge laid parallel to the centerline of the roadway, shall have no deviation in excess of 1/8 inch per foot for a 16 foot straightedge or 1/16 inch per foot for a 10 foot straightedge from the nearest point of contact and the maximum ordinate measured from the face of the straightedge shall not exceed 1/4 inch at any point. Any areas of the surface not meeting these requirements shall be immediately corrected as directed. Tests shall be made at transverse construction joints out at randomly selected locations.

250.16 Opening to Traffic. Allow the compacted pavement to cool before opening to traffic unless directed by the Engineer. If the surface ravels or deteriorates in any manner, it will be the Contractor's responsibility to correct this condition at his expense.

250.17 Measuring Devices. All templates, straight edges, and measuring devices necessary for the proper construction and checking of the work shall be furnished, operated and maintained by the Contractor at his entire expense.

250.18 Quality Assurance. The County will engage a Testing Firm to provide quality assurance services for Hot Mix Asphaltic Concrete (Black Base).

The Testing Firm will sample and test stockpiles for gradation, in accordance with TxDOT's Test Procedure Tex-200-F and deleterious materials and decantation in accordance with TxDOT's Test Procedure Tex-217-F (Parts I and II) for each 3,000 tons production. The abrasion loss of the material shall be determined in accordance with ASTM C131, for each 4,000 tons of production.

Asphalt binder will not be sampled and tested, provided that the supplier will provide copies of test results for PG-grade binder used for the project. Undocumented asphalt binder will require sampling and testing in accordance with ASTM D3381 "Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction" and AASHTO Method T-102 or Tex-540-C and shall meet the requirements of, "Performance Graded Binder", Item 300 of TxDOT's Specifications, Latest Edition. The Contractor will be responsible for the cost of these tests. The Engineer may verify the quality of the asphalt binder at any time, by sampling and testing, in accordance with the aforementioned methods.

The mixture shall be sampled, for each 400 (cumulative) tons of production and the following tests will be made for each sample of the mixture.

TEST	DESIGNATION
Laboratory Density	Tex-207-F
Maximum Theoretical Density	Tex-227-F
Hveem Stability	Tex-227-F
Extraction and Gradation	Tex-210-F or Tex-236-F

Based on daily and total production, Harris County may waive the sampling and laboratory testing.

Type A:

Following compaction of the mixture in the pavement, the Laboratory representative shall sample the pavement by cutting cores and determining the in-place density in accordance with TxDOT's Procedure Tex-207-F, and air voids as outlined in Section 250.12 of this Item. Additional samples and/or tests will be taken to provide quality assurance only when approved by the Engineer.

Type B:

Construction shall be acceptable by Harris County upon receiving final reports from the Materials Engineer verifying Mix Design and conformance to the rolling pattern.

250.19 Truck Scales. A set of standard platform truck scales will be placed at the plant and shall be provided with a suitable weigh office adjacent to the scales for the use of the trucks weigher. Scales which are not accurate to within 4 pounds per 1,000 pounds total load shall not be used. Scales shall meet the requirements of the Item 520 “Weighing and Measuring Equipment”.

250.20 Measurement. Hot mix asphaltic concrete base course, as specified by this Item, shall be measured by the ton of 2,000 pounds. Measurement by weight shall be made on truck scales as previously specified. Records shall be kept on the tare weight, total weight and net weight of asphaltic concrete for each load of same. A day ticket shall accompany each load to the job site, indicating the net weight, gross weight, tare weight, and road name. The asphaltic material for tack coat will be measured at the point of delivery on the road in gallons at the applied temperature. The quantity to be paid for shall be the number of gallons used, as directed, for the tack coat.

250.21 Payment shall be made as follows:

A. Where the bid sheet specifies FOB the job site, the asphaltic concrete shall be transported to the job site in Harris County specified on the bid sheet, and unloaded at the location indicated.

B. Where the bid sheet specifies FOB the plant, the material shall be loaded on Harris County vehicles.

C. The "Hot Mix Asphaltic Concrete Base Course" furnished and placed as prescribed by this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Hot Mix Asphaltic Concrete Base Course", which price shall be full compensation for furnishing all materials, for all freight involved, for all heating, mixing, hauling, cleaning the subgrade, placing asphaltic concrete mixture, rolling and finishing; for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

D. The work performed and materials furnished for "Tack Coat" and measured as provided for under measurement will be paid for at the contract unit price bid for "Tack Coat" as provided in Item 340 “Hot Mix-Hot Laid Asphaltic Concrete”, of the type specified, which price shall be full compensation for cleaning the area or subgrade; for furnishing, heating, hauling and distributing the asphaltic material as specified; for all freight involved; for all manipulation,

labor, tools, equipment and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 340 “Hot Mix-Hot Laid Asphaltic Concrete”
Item 520 “Weighing and Measuring Equipment”

END OF ITEM 250

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 4

ITEM 324

SEAL COAT

324.1 Description. This Item shall govern for a surface treatment composed of a single application of asphalt, covered with aggregate, for the sealing of existing pavements.

324.2 Materials. The asphaltic material used shall be AC-10 or as recommended by the design engineer, and shall meet the requirements of Item 300 "Asphalts, Oils, and Emulsions", of the Texas Department of Transportation's "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges", Latest Edition. The material shall be applied at an approximate rate of 0.35 gallons per square yard.

Aggregate shall meet the requirements of the Item 320 “Single Course Surface Treatment”.

324.3 Construction Methods. The area to be treated shall be cleaned of dirt, dust or other deleterious matter by sweeping or other approved methods. If found necessary by the Engineer, the surface shall be lightly sprinkled, just prior to the application of asphaltic material. Asphaltic material shall be applied on the cleaned surface by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified evenly and smoothly, under a pressure necessary for proper distribution.

Seal coats shall not be applied when the air temperature is below 50° F. and is falling, but may be applied when the air temperature is above 40° F. and is rising; the air temperature being taken in the shade and away from artificial heat. Seal coats shall not be applied when the temperature of the roadway surface is below 60° F. Asphaltic material shall not be placed when general weather conditions in the opinion of the Engineer, are not suitable.

The Contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two distributor loads. The distributor shall have been recently calibrated and the Engineer shall be furnished an accurate and satisfactory record of such calibration.

After beginning the work, should the yield on asphaltic material appear to be in error, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding with the work.

Asphaltic material may be applied for the full width of the seal coat in one application. Asphaltic material shall not be applied until immediate covering with the aggregate is assured.

Aggregate shall be immediately and uniformly applied and spread by an approved self-propelled continuous feed aggregate spreader, unless otherwise shown on the plans or authorized by the Engineer in writing. The aggregate shall be applied at the rate directed by the Engineer.

The entire surface shall be broomed, bladed, or raked, as required by the Engineer and shall be thoroughly rolled with the type or types of rollers specified.

Brooming and Rolling shall be repeated on two successive work days.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer. All holes or failures in the seal coat surface shall be repaired by use of additional asphalt and aggregate and all fat or bleeding surfaces shall be covered with approved cover material in such a manner that the asphaltic material will not adhere to or be picked up on the wheels of vehicles.

Temporary stockpiling of aggregates on roadway will be permitted provided the stockpiles are spaced not less than 1,000 feet apart and are so placed that they neither obstruct traffic nor interfere with roadway drainage. The Contractor shall be responsible for the proper preparation of all stockpile areas before aggregates are placed thereon, including leveling and cleaning of debris necessary for protection of the aggregate to prevent any contamination thereof.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operation condition at all times and they shall be operated in such manner that there will be no contamination of the asphalt with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The Contractor shall load, haul, distribute and apply the stockpiled aggregate and clean up all stockpiles.

324.4 Measurement. Asphaltic material will be measured at the point of application on the road, in gallons at the applied temperature. The quantity to be paid for shall be the number of gallons used, as directed, in the accepted seal coat.

Aggregate shall be measured by the ton of 2,000 pounds, dry weight.

324.5 Payment. The work performed and the materials furnished as prescribed by this Item and measured as provided for under measurement will be paid for at the unit price bid for asphalt and the unit price bid for aggregate, of the type and grade specified, which price shall be full compensation for cleaning and sprinkling the existing surface; for furnishing, preparing, hauling and placing all materials; for all freight involved and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, including rolling.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 320 “Single Course Surface Treatment”

END OF ITEM 324

ITEM 360

CONCRETE PAVEMENT

360.1 Description. This Item shall govern for a pavement of portland cement concrete with reinforcement. The pavement shall be as shown on the drawings, and may or may not include monolithic curbs. The pavement includes any driveways that are included in the project bid.

The pavement shall be constructed as herein specified on the prepared subgrade or other base course in conformity with the thickness and typical cross-sections shown on the drawings, and to the lines and grades established by the Engineer. All materials shall be provided from an approved Texas Department of Transportation (TxDOT) supplier and it shall be the responsibility of the Contractor to provide certification that such approval has been met. In addition, other tests or approvals may be required at the discretion of the Engineer.

360.2 Materials. Harris County's standard mix design shall contain minimum 5-1/2 sacks (94 pounds per sack) of cementitious material (including fly ash as necessary) per cubic yard and achieve a minimum compressive strength of 3,000 psi at 28 days.

The use of fly ash is acceptable and when used, the mix design shall contain 5-1/2 sacks of cementitious material per cubic yard with a fly ash content of not more than 25 percent by weight, and will achieve a minimum compressive strength of 3,000 psi at 28 days. It is recommended that the percent of fly ash by weight be reduced to a maximum of 20 percent during cold weather concreting (average ambient temperature, over a 24 hour period after placement, less than 50° F). Fly ash shall be Class C or Class F, conforming to the requirements of ASTM C618 "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete." Fly ash shall have a minimum combined Oxide content of 50 percent for Class C or 70 percent for Class F. Do not use Class C fly ash in sulfate-resistant (Type II cement) concrete.

"High Early Strength Concrete" shall contain 7 sacks of portland cement (only) per cubic yard and may be produced from either Type I, Type II, or Type III portland cement with other chemical admixtures.

Concrete Components:

Concrete shall be composed of portland cement, fly ash (if required), water, chemical admixtures and coarse and fine aggregates, as outlined below:

A. Portland cement shall meet the requirements of ASTM C150 "Standard Specification for Portland Cement." Unless otherwise permitted or required, cement shall be Type I, Type II, or Type III.

B. Fly Ash for concrete pavement (if applicable) shall meet the requirements of TxDOT's DMS-4610, "Fly Ash." Fly ash is not allowed for use in High Early Strength Concrete.

C. Mixing water for concrete shall conform to the requirements of ASTM C1602 "Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete."

D. Chemical admixtures shall conform to the following specifications:

1. Air-entraining admixtures shall conform to the requirements of ASTM C260 "Standard Specification for Air-Entraining Admixtures for Concrete"

2. Chemical admixtures shall conform to the requirements of ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."

E. Aggregates shall conform to ASTM C33 "Standard Specification for Concrete Aggregates."

Coarse aggregate shall consist of durable particles of gravel, crushed stone, or combinations thereof, free from frozen material or injurious amounts of salt, alkali, vegetative matter, or other objectionable material either free or as an adherent coating, and its quality shall be reasonably uniform throughout. It shall contain no more than 0.25 percent by weight of clay lumps and not more than 1.0 percent by weight of laminated and/or friable particles. When tested by ASTM C136 "Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates" and C117 "Standard Test Method for Minerals Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing", it shall meet the following grading requirements:

TABLE 1

COARSE AGGREGATE GRADATION

SIEVE SIZE	% RETAINED, BY WEIGHT
1-3/4 Inch	0
1-1/2 Inch	0 – 5

SIEVE SIZE	% RETAINED, BY WEIGHT
3/4 Inch	30 – 65
3/8 Inch	70 – 90
No. 4	95 – 100

The loss by decantation shall be a maximum of 1 percent

F. Fine aggregate shall consist of clean, hard, durable and uncoated particles of natural or manufactured sand or a combination thereof, with or without mineral filler. It shall be free from frozen material, or injurious amounts of salt, alkali, vegetative matter or other objectionable material and it shall not contain more than 0.5 percent, by weight, of clay lumps. When subjected to the color test for organic impurities, ASTM C40 “Standard Test Method for Organic Impurities in Fine Aggregates for Concrete”, the fine aggregate shall show a color not darker than the standard.

Unless otherwise specified, fine aggregate shall meet the following grading requirements:

TABLE 2

FINE AGGREGATE GRADATION

SIEVE SIZE	% RETAINED BY WEIGHT
3/8 Inch	0
No. 4	0 – 5
No. 8	0 – 20
No. 16	15 – 50
No. 30	35 – 75
No. 50	65 – 90
No. 100	90 – 100
No. 200	97 – 100

Fine aggregate shall be subjected to ASTM D2419 “Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate”. The sand equivalent shall be not less than 80.

Mineral filler shall consist of stone dust, clean crushed sand or other approved inert material.

Reinforcing Steel:

Unless otherwise designated on the drawings, or herein, all bar reinforcement shall be deformed and shall conform to ASTM A615 “Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement”, Grade 60, open hearth, basic oxygen or electric furnace new billet steel. The use of Grade 40 is permissible for bars that must be bent. The use of prefabricated deformed steel bar mats, conforming to ASTM A184 “Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement”, is not permitted.

Tie bars (including L-bars) shall be the same spacing and diameter as the transverse or longitudinal bars (as the case may be), and shall be tied to the transverse or longitudinal reinforcing steel being used in the pavement. Tie bars shall be a minimum of 30 inches in length. Type III adhesives meeting the requirements of TxDOT Material Specification DMS-6100 “Epoxies and Adhesives” shall be used for installing drilled-in reinforcing steel and dowels, into the existing concrete pavements.

Expansion Joints:

Boards for expansion joint filler shall be 3/4 inch finished thickness. The material for the boards shall consist of “All Heart Merchantable Redwood” or composite material as approved by the Engineer. The joint filler shall meet the testing requirements of ASTM D545 “Standard Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Non-extruding and Resilient Types).”

If the joint filler used is a bituminous composite, it shall meet the requirements of ASTM D1751 “Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).”

Joint sealant shall meet the requirements of ASTM D6690 “Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements", Type II or III. Joint sealant for expansion joints shall be installed 1/4 inch below the top of pavement elevation. Prefabricated expansion joints may be used with approval by the Engineer.

Load transmission devices shall consist of an 18 inch smooth dowel placed as shown on the Standard Civil Drawing. The dowel size varies with pavement thickness as shown on the Concrete Pavement Details of the Harris County Standard Civil Drawings. Dowels may be sheared or saw cut to the desired length.

360.3 Storage of Materials. Cement shall be stored in well ventilated weathertight buildings, bins, or silos which shall exclude moisture and contaminants.

Aggregate stockpiles shall be arranged and used in such a manner as to avoid contamination, with other materials or with other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured in accordance with ASTM D75 “Standard Practice for Sampling Aggregates.” Frozen or partially frozen aggregates shall not be used. Unless otherwise authorized by the Engineer, all aggregate shall be stockpiled at least 24 hours prior to use, to reduce free moisture content.

Chemical admixtures shall be stored in such a manner as to avoid contamination, evaporation, or damage. For those used in the form of suspensions or non-stable solutions, agitating equipment shall be provided to assure thorough distribution of the ingredients. Liquid admixtures shall be protected from freezing and from temperature changes which would adversely affect their characteristics.

360.4 Proportioning of Concrete. Concrete for all parts of the work shall be of the specified quality, capable of being placed without excessive segregation and, when hardened, shall develop all characteristics required by this Item and the contract documents.

The specified compressive strength of the concrete, for each portion of the structure, shall be as designated in the contract documents. Strength requirements shall be based on the 28 day and 7 day compressive strength, respectively.

360.5 Concrete Classification. Concrete shall be classified as shown in Table 3 of Item 421 “Structural Concrete”.

360.6 Selection of Proportions. Proportions of materials for concrete shall be established to provide:

A. Workability and consistency to permit concrete to be worked readily into forms and around reinforcement under conditions of placement to be employed without segregation or excessive bleeding.

B. Strength requirements in accordance with Table 3 of Item 421.

C. Resistance to special exposure as required by the Engineer and as specified in the contract documents or in Special Provisions.

Unless otherwise permitted, the concrete mix design shall be proportioned to provide a slump between 1 and 6 inches. A slump range of 1 to 3-1/2 inches shall be used for concrete placed with a slip form paver, while

vibrated concrete shall have a slump range of 2-1/2 to 6 inches**,** when tested in accordance with ASTM C143 "Standard Test Method for Slump of Hydraulic-Cement Concrete." A slump test will be made for each sample of concrete obtained, or when slumps appear to be outside specification requirements. The allowable air content for moderate exposure is:

AGGREGATE SIZE	% AIR CONTENT
1-1/2 Inch	2.5 - 4.5
3/4 Inch	3.5 – 5.0

The Engineer may reject any concrete shown to be outside of these requirements.

All concrete pavement shall have a minimum design compressive strength of 3,000 psi at 28 days. A minimum of 4 test cylinders shall be made for each 150 cubic yards, or portion thereof, placed each day. Samples shall be taken in accordance with ASTM C172 "Standard Practice for Sampling Freshly Mixed Concrete" and molded and cured in accordance with ASTM C31 "Standard Practice for Making and Curing Concrete Test Specimens in the Field."

All test specimens shall be prepared in accordance with ASTM C617 "Standard Practice for Capping Cylindrical Concrete Specimens" and tested in accordance with ASTM C39 "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens." Two specimens shall be tested at 7 days and two specimens shall be tested at 28 days. The acceptance test results shall be the average of the two specimens tested for each age interval. If one specimen in a test age indicates evidence of improper sampling, handling, molding or testing, it shall be discarded and the strength of the remaining specimen shall be considered the test result. Should both specimens in a test interval show any of the aforementioned defects, the Engineer may request that cores be taken in the affected area.

Additional test specimens may be required due to concrete placing conditions and due to use of high early strength concrete. No extra compensation shall be allowed for materials and work involved in fulfilling these requirements.

360.7 Equipment. All equipment necessary for the construction of concrete pavement shall be on the job and shall have been approved by the Engineer as to condition, before the Contractor will be permitted to begin construction operations on which the equipment is to be used.

Side forms shall be of metal of approved cross-section. The preferred depth of the form shall be equal to the required edge thickness of the pavement. Forms with depths less than the required edge thickness of the pavement will be permitted, provided the difference between the form depth and the edge thickness is not greater than 1 inch, and further provided that forms of a depth, less than the pavement edge are brought to the required edge thickness by securely attaching wood or metal strips, of approved section, to the bottom of the form, or by grouting under the form.

The length of form sections shall be not less than 10 feet and each section shall provide for staking in position with not less than 3 pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of 100 foot radius or less. Forms shall be of ample strength and shall be provided with adequate devices for secure setting so that when in-place they will withstand without visible springing or settlement, the impact and vibration of the finishing machine. The forms shall be free from warp, bends or kinks and shall be sufficiently true to provide a reasonably straight edge on the concrete. The top of each form section, when tested with a straight edge, shall conform to the requirements specified for the surface of the completed pavement. Sufficient forms shall be provided for satisfactory prosecution of the work.

A minimum of two hand vibrators is required at the jobsite when placing concrete. A hand vibrator shall be used around all load transfer devices and intersections where screeds or slip form pavers cannot be operated.

Pavement shall be finished by machine, except as hereinafter provided. Placement shall be the Contractor’s responsibility and shall be based upon equipment sequences utilized in accordance with the recommendations and practices of ACI 304R “Guide for Measuring, Mixing, Transporting, and Placing Concrete”, and with the approval of the Engineer.

The Contractor shall furnish and maintain at least two standard 10 foot steel or aluminum straight edges.

Where applicable, the Contractor shall furnish a sufficient number of bridges equipped to ride on the forms and span the pavement for finishing operations and for the installation and finishing of joints and center strips. All necessary finishing and edging tools shall be furnished as may be required to complete the pavement in accordance with the drawings.

360.8 Slip Form Paver. Slip form pavers are allowed by Harris County.

360.9 Subgrade and Forms. The subgrade shall be prepared as required by the applicable subgrade specification items. Rolling and sprinkling shall be performed as necessary, or as directed. The roadbed shall be completed to the elevation as required on the typical sections shown on construction drawings. Drainage of the roadbed shall be maintained at all times.

The subgrade shall be finished to the exact section of the bottom of the pavement as shown on plans. The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the pavement is placed, and shall be kept thoroughly wetted down sufficiently in advance of placing any pavement to insure its being in a firm and moist condition for at least 2 inches below the prepared surface. No equipment or hauling shall be permitted on the prepared subgrade, except on special permission of the Engineer, which will be granted only in exceptional cases and only where a suitable protection in the form of two-ply timber mats or other approved material is provided.

The subgrade under the forms shall be firm and cut true to grade so that each form section when placed will be firmly in contact for its whole length and base width, and exactly at the established grade. Any subgrade under the forms below established grade shall be corrected, using suitable material, placed, sprinkled and rolled as directed. Forms shall be staked with at least 3 pins for each 10 foot section. A pin shall be placed at each side of every joint. Form sections shall be tightly joined and keyed to prevent relative displacement. Forms shall be cleaned and oiled each time they are used.

Sufficient subgrade shall be prepared far enough in advance of concrete placement to allow a minimum of 300 feet of forms to be set in place in advance of concrete placement at all times (with exception of intersections, etc.) or as approved by the Engineer. Conformity of the grade and alignment of forms shall be checked immediately prior to placing concrete and all necessary corrections made by the Contractor. Where any form has been disturbed or any subgrade has become unstable, the form shall be reset and rechecked. In exceptional cases, the Engineer may require suitable stakes driven to the grade of the bottom of the forms to afford additional support. Sufficient stability of forms to support the equipment operated thereon and to withstand its vibration without springing or settlement shall be required. If forms settle over 1/8 inch under finishing operation, paving operations shall be stopped and the forms shall be reset to line and grade.

Forms shall remain in place for a minimum of 8 hours after the concrete has been placed. They shall be carefully removed so that there is little or no damage done to the edge of the pavement. Any damage resulting

from this operation shall be immediately repaired. After the forms have been removed, the ends of all joints shall be cleaned, and any honeycombed areas pointed up with an approved mortar.

Immediately after pointing is complete, the form trench shall be filled with earth from the shoulders in such manner as to shed water from rainfall or curing away from the edge of the pavement. On completion of the required curing, the subgrade or shoulders adjacent to the pavement shall be placed in condition to maintain drainage.

360.10 Reinforcing Steel and Joint Assemblies. All reinforcing steel, tie bars, load transmission units and splices used in accordance with plan provisions meeting the requirements of Item 440 “Reinforcing Steel”, shall be accurately placed and secured in position in accordance with the details shown on drawings.

Reinforcing bars shall be secured at all splices and at alternating intersections. The tie bars shall be installed in required position by the method and device shown on drawings, or by approved method and device equivalent thereto. Bar coatings required by plans, and of material specified, shall be completed and the bars and coating shall be free of rust, dirt or other foreign matter at the time of installation in the concrete. Reinforcing bars shall be supported on bar chairs or other approved devices placed on maximum 36 inches center each way, and placed so that the reinforcing bar is located at the centerline of the concrete.

Where plans require an assembly of parts at pavement joints, the assembly shall be completed, placed at required location and elevation, and all parts rigidly secured in required position as shown on plans, or by approved method and devices equivalent thereto. Dowel bars shall be accurately installed in joint assemblies in accordance with drawings, each parallel to the pavement, and shall be rigidly secured in required position by such means (as shown on plans, or approved equivalent thereto) that will prevent displacement of the dowels during placing and finishing of the concrete. The assembled units comprising the load transmission devices shall be accurately installed in joint assemblies in accordance with plans. Each unit shall be vertical with its length perpendicular to the centerline of the pavement, and all units shall be rigidly secured in required position by such means (as shown on drawings, or approved equivalent thereof) that will prevent displacement of the expansion joint during placing and finishing of the concrete. Joint filler shall be accurately notched to receive each load transmission unit. All load transmission units shall be free of rust and clean when installed in the concrete.

360.11 Concrete Placing. Except by specific written authorization of the Engineer, concrete shall not be placed when the ambient temperature is

below 40°F and falling. Concrete may be placed when the ambient temperature is above 35°F and rising, the ambient temperature being taken in the shade and away from artificial heat.

The Contractor shall have available a sufficient supply of approved cotton mats, polyethylene sheeting or other approved covering materials to immediately protect concrete if the air temperature falls to 32°F, or below, if the concrete has been in place for less than 4 hours. Such protection shall remain in place during the period the temperature continues 32°F or below, or for a period of not more than 5 days. Neither salt nor other chemical admixtures shall be added to the concrete to prevent freezing. The Contractor shall be responsible for the quality and strength of concrete under cold weather conditions and any concrete damaged by freezing shall be removed and replaced at the Contractor's expense.

When the concrete reaches a temperature of 85°F, retarders shall be introduced into the mixture.

If the concrete temperature continues to rise and reaches 95°F, a plasticizer shall be introduced into the mixture. Above 95°F, ice may be used to control temperature, in lieu of a plasticizer.

For concrete between temperatures of 85°F through 95°F, the slump shall be as specified in this Item. For concrete with temperatures between 95-100°F, slumps shall be as specified by the Engineer. The temperature of the concrete shall at no time exceed 100°F. Once concrete has reached a temperature above 100°F, it shall be rejected.

The amount of retarder or plasticizer, introduced into a mixture, shall be in accordance with the manufacturer's recommendations. See Section 360.2, Materials, for requirements of admixtures.

No concrete shall be used if:

A. the concrete has developed initial set, or

B. the concrete has not been placed within 1-1/2 hours after the initial water has been added.

Pouring concrete during inclement weather, which would adversely affect the quality and/or finish of the concrete pavement does not relieve the Contractor of his responsibility to provide a pavement that complies with the Item.

360.12 Joints. All transverse and longitudinal joints in the pavement shall be at the locations and of the type shown on the drawings.

Expansion Joints:

Transverse expansion joints shall be formed perpendicular to the centerline and surface of the pavement, and shall be constructed in accordance with the drawings.

The seal space shall be created by either of the following methods:

A. Seal Space Form (aka Rip Strip) After the transverse finishing machine and before the longitudinal finishing machine has passed over the joint, the Contractor shall test the joint assembly for correctness of position and make any required adjustment in position of the joint assembly. After removal of the seal space form, the seal space above the joint assembly shall be thoroughly cleaned and the concrete faces of the seal space shall be left true to line and section throughout the entire length of the joint.

B. Other method as approved by the Engineer.

On completion of curing of the pavement, the expansion joint sealant of the type specified shall be placed in accordance with drawings. The faces of the seal space shall be washed and cleaned and surface-dry at the time sealant is placed. On completion of sealing, the pavement surface (adjacent to the joint) shall be left free of sealing material.

Sawcut Joints: - Transverse Contraction and Longitudinal

All contraction joints (transverse or longitudinal) that are not at the edge or end of a pour shall be saw cut. Metal or fiber “rip” strips placed in the uncured concrete will not be permitted. Where sawed joints are required, they shall be sawed as soon as sawing can be accomplished, without damage to the pavement, and as directed by the Engineer. Once sawing has commenced, it shall be continued until completed. The saw cut shall be made with one pass of the concrete saw. Sawing must be accomplished even in rain or cold weather. All sawing must be completed within 24 hours of the concrete pavement placement. Within 24 hours of completing the concrete pour, all sawcut joints shall be sawed and washed of all residue. Should the sawing for any day's placement fail to be completed within 48 hours; the following concrete placement shall be limited to the amount that was sawed on time. The limitation shall continue until the sawing crew demonstrates it can handle a larger volume of sawing.

The sawed cut shall be a minimum of 1/4 inch width and have a depth of one-fourth the thickness of the pavement. After sawcutting, the joint shall

be sealed with joint sealer, in accordance with the instructions supplied by the manufacturer of the joint sealant. Sealant shall fill the joint from bottom to 1/4 inch below concrete surface. Use of backer rods in sawcut joints is prohibited.

Unless otherwise specified, transverse sawed control joints shall be constructed at 20 foot intervals measured along the centerline of the pavement section, or as directed by the Engineer.

Longitudinal Construction Joints:

When constructing a longitudinal construction joint, all applicable provisions of Section 360.7 shall apply in addition to the following requirements:

The face of the bulkhead at the joint shall be grooved or recessed as necessary to provide the required spaces for the top and bottom breaker strips as shown on plans. The bulkhead shall be either drilled or notched to receive the tie bars. Tie bars shall be secured in required position by use of adequate transverse bracing and vertical supports meeting the approval of the Engineer.

360.13 Terminating Concrete Placement:

Normal Terminating Procedures. Concrete placement shall be terminated at an expansion joint or a transverse construction joint that is coincidental with a location of a proposed contraction joint.

When the concrete placement is terminated at an expansion joint or a transverse construction joint, the complete joint assembly shall be installed and rigidly secured in the required position as shown on the plans.

A bulkhead of sufficient cross-sectional area to:

A. prevent deflection and

B. accommodate the dowels

shall be provided. The bulkhead shall be shaped accurately to the cross-section of the pavement and installed as a back-up for the expansion joint header or transverse construction joint header and rigidly secured in the required position to permit accurate finishing of the concrete up to the joint.

After the concrete has been finished to the joint, formation of the joint seal space and finishing of the joint shall be executed as specified herein and in accordance with plan requirements. The back-up bulkhead shall remain in place until immediately prior to the time when concrete placement is resumed. It shall then be carefully removed in such manner that no element of the joint assembly will be disturbed. The exposed portions of the joint assembly shall be free of adherent concrete, dirt or other material.

Unscheduled Terminating Procedures. When concrete placement must be terminated at a location other than an expansion joint or transverse construction joint, all applicable provisions of Section 360.7 shall apply, in addition to the following requirements:

A bulkhead shall be installed as a vertical form to pour the concrete against. The bulkhead adjoining the pavement end shall consist of upper and lower panels, with a gap of approximately two inches between, through which the reinforcing steel mat extends. During the concrete pouring process, some concrete will extrude through the gap, which is to be left in place to create a roughly formed “keyway” into the subsequent pour section.

Concrete shall be placed and finished to this bulkhead. Any concrete that falls onto the subgrade ahead of the bulkhead shall be removed and disposed of as directed. The seam created by a construction joint of this type shall have a saw-cut seal space and shall be sealed as required for construction joints.

360.14 Finishing. All finishing shall be in accordance with ACI 325.6R “Texturing Concrete Pavements”.

The Engineer shall approve the straightedge. The surface of the concrete shall not vary from the straightedge by more than 1/16 inch per foot from the nearest point of contact, and in no case shall the maximum deviation from a ten foot straightedge to the pavement be greater than 1/8 inch. Any high spots causing a departure from the straightedge in excess of that specified shall be ground down by the Contractor to meet the surface test requirements, when required by the Engineer.

360.15 Curing. The Contractor shall prevent surface drying of the pavement before application of curing system by means that may include water fogging, use of wind screens or the use of evaporation retardants. He shall provide for protection of freshly laid concrete against pitting and washing from rain, by placement of canvas and/or waterproof covering material to protect all placed concrete. The covering material is required to be on the jobsite at the time and place of pouring.

The curing system may be:

A. Liquid Membrane. Liquid membrane curing shall be used as per Item 526 “Membrane Curing”.

B. Additional Curing Methods. Other methods meeting the requirements of ACI 308R “Standard Practice for Curing Concrete” must be submitted by the Contractor in writing prior to concrete placement and approved by the Engineer.

360.16 Protection of Pavement and Opening to Traffic. The Contractor shall erect and maintain the barricades required by the plans, and such other barricades and approved devices necessary to exclude public traffic and traffic of his employees and agents from the newly placed pavement for the periods of time hereinafter prescribed. Portions of the roadway, or crossings of the roadbed required to be maintained open for use by traffic, shall not be obstructed by the above required barricades. Crossings of the pavement required by plans, or by construction sequence, during the period prior to opening to traffic as herein specified, shall be provided with an adequate and substantial bridge, approved by the Engineer.

Cracked pavement shall be cored by Harris County any time after the 28 day cure time is complete. The location of these cores shall be selected by the Engineer. Pavement that has developed full depth cracks (greater than t/4 inch depth, where t = thickness of pavement) may, at the County’s option, be left in place and repaired by the epoxy injection method. Otherwise the cracked pavement shall be removed and replaced. There shall be no additional payment for repairs or replacement. Basis of removal for cracked pavement shall be determined by the engineer and the extent of this pavement removal shall be based on the crack pattern and number of cracks in each panel. If the cracks are wide spread (vertically or horizontally) or close to expansion joint or control joint, and over a large area of 12 foot wide panel, then entire panel shall be removed and replaced as determined by the Engineer.

Surface cracks t/4 inches and less in depth may be repaired by the epoxy injection method at no cost to the County.

Prior to epoxy injection, the Contractor shall submit to the County for approval, the injection method to be used. The Contractor shall furnish a minimum of 2 year warranty when utilizing the epoxy injection method.

New pavement sections shall be closed to all traffic, both PUBLIC and CONSTRUCTION, until the concrete has attained a compressive strength of 2,700 psi. If the Contractor or the County desires to open the new

pavement section to traffic early, an additional set of test cylinders must be requested for an early test. If the early test indicates that the minimum compressive strength requirement has been met, and if all other requirements of this Item have been met, the pavement section can be opened to traffic. If the Contractor requests the early test, the Contractor will pay the cost. If the County requests the early test, the County will pay the cost. Such opening of a new pavement section, to PUBLIC or CONSTRUCTION traffic, shall in no manner relieve the Contractor from his responsibility of the work.

On those sections of pavement to be opened to PUBLIC traffic, the pavement shall be thoroughly cleaned, stable material shall be placed, graded, and compacted against the pavement edge or curb unless otherwise specified. Joints shall be sealed and cured, and all required traffic control work shall be performed for the safety of the traffic.

The Engineer may require the opening of pavement to traffic prior to the minimum strength specified above under conditions of emergency, which in his opinion, require such action in the interest of the public. In no case shall the Engineer order opening of the pavement to traffic within less than 72 hours after the last concrete in the sections is placed unless an approved high early strength concrete was used. The Contractor shall remove any curing mats, place earth against the pavement edges, and perform other work involved in providing for the safety of traffic as required by the Engineer in ordering emergency opening. Orders for emergency opening of the pavement to traffic will be issued by the Engineer in writing.

360.17 Backfilling Behind Curbs and in Medians and Directional Islands. The Contractor is required to backfill behind all curbs and within medians and directional islands, after completion of the paving operation. The backfill material shall be on-site material having the prior approval of the Engineer. No separate payment shall be made for backfilling behind curbs and in medians and directional islands, but it shall be considered incidental to this Item.

360.18 Deficient Pavement Thickness. It is the intent of this Item that the pavement be constructed in strict conformity with the thickness and typical sections shown on plans.

Concrete Placement Method.

A. Conventional Side Form Paving: The Engineer will check the pavement thickness in accordance with the dimensions shown on the plans. The Engineer will perform 1 thickness test consisting of 1 reading at approximately the center of the paving equipment

every 500 feet or fraction thereof. All deficiencies from plan thickness shall be corrected prior to concrete placement.

B. Slip Form Paving: The Engineer will check the pavement thickness in accordance with TxDOT's Test Procedure Tex-423-A. The Engineer will perform 1 thickness test consisting of 1 reading at approximately the center of the paving equipment every 500 feet or fraction thereof. Verify deficiencies of more than 0.2 inches from plan thickness and determine the limits of deficiencies of more than 0.75 inches from plan thickness by coring. Core where directed, in accordance with ASTM C174 "Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores." Fill core holes using a concrete mixture and method approved by the Engineer.

Thickness Deficiencies Greater than 0.2 inches. When any depth test measured in accordance with Tex-423-A is deficient by more than 0.2 inches from the plan thickness, take one core at that location to verify the measurement.

If the core is deficient by more than 0.2 inches but less than 0.75 inches from the plan thickness, take 2 additional cores from the unit (500 foot length) at intervals of at least 150 feet and at locations selected by the Engineer, and determine the thickness of the unit for payment purposes by averaging the lengths of the 3 cores. (See Table for "Deficient Pavement Thickness price Adjustment Factor").

Thickness Deficiencies Greater than 0.75 inches. If a core is deficient by more than 0.75 inches, take additional cores at 10 foot intervals in each direction parallel to the centerline to determine the boundary of the deficient area. The Engineer will evaluate any area of pavement found deficient in thickness by more than 0.75 inches. As directed, the Contractor shall remove and replace the deficient areas with concrete pavement of thickness shown on the plans, without additional compensation.

Pavement Units for Payment Adjustment. Limits for applying a payment adjustment for deficient pavement thickness from 0.20 inches to not more than 0.75 inches are 500 feet of pavement in each lane. Lane width will be shown on typical sections and pavement design standards.

For pavement thickness deficiencies greater than 0.75 inches, the limits for requiring removal will be defined by coring as determined by the Engineer. The remaining portion of the unit determined to be less than 0.75 inches deficient will be subject to the payment adjustment based on

the average core thickness at each end of the 10 foot interval investigation as determined by the Engineer.

Shoulders will be measured for thickness unless otherwise shown on the plans. Shoulders 6 feet wide or wider will be considered as lanes. Shoulders less than 6 feet wide will be considered part of the adjacent lane.

Limits for applying payment adjustment for deficient pavement thickness for ramps, widenings, acceleration and deceleration lanes, and other miscellaneous areas are 500 feet in length. Areas less than 500 feet in length will be individually evaluated for payment adjustment based on the plan area.

TABLE FOR DEFICIENT PAVEMENT THICKNESS PRICE ADJUSTMENT FACTOR

DEFICIENCY IN THICKNESS DETERMINED BY CORES IN INCHES	PROPORTIONAL PART CONTRACT PRICE ALLOWED
0.00 to 0.20	100 Percent
0.21 to 0.30	80 Percent
0.31 to 0.40	72 Percent
0.41 to 0.50	68 Percent
0.51 to 0.75	57 Percent
Over 0.75	Remove and Replace

Any area found deficient in thickness by more than 0.75 inches shall be removed and replaced, at the Contractor's entire expense, with concrete of the thickness shown on drawings.

No additional payment over the contract unit price will be made for any pavements of a thickness exceeding that required on drawings and planing of concrete pavement shall not be allowed.

360.19 Non-Conforming Concrete. Any concrete deemed non-conforming, which in the opinion of the Engineer is unsatisfactory, shall be removed and replaced at the expense of the Contractor.

360.20 Quality Assurance. The Testing Laboratory’s representative will sample concrete delivered to the site in accordance with ASTM C172 and will mold four specimens for each 150 cubic yards. Each time a set of specimens is molded, the slump will be determined in accordance with ASTM C143 and the air content in accordance with ASTM C173

"Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method" or ASTM C231 "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method." Concrete cores, if required, shall be tested in accordance with ASTM C174 (9 point procedure) and ASTM C39.

360.21 Measurement. Concrete pavement shall be measured by the square yard of the specified mix design and thickness of completed and accepted pavement. Dowels, when required, are incidental to this Item, and do not require measurement.

360.22 Payment. The work performed and the materials furnished as prescribed by this Item and measured as provided under "Measurement" shall be paid for at the unit price bid for "Concrete Pavement", or "Concrete Pavement, High Early Strength", as required, or the adjusted unit price for pavement of deficient thickness as provided under "Penalty for Deficient Pavement Thickness", which price shall be full compensation for shaping and fine grading the roadbed, including furnishing and applying all water required; for furnishing, loading and unloading, storing, handling all concrete ingredients, including all freight and royalty involved; for mixing, placing, finishing and curing all concrete; for furnishing all materials for and placing longitudinal, warping, expansion, sawed control and contraction joints, and load transmission units, and joint filler material in proper position; for coating steel bars where required by plans, for furnishing and placing all reinforcing steel, for drilling dowel holes in the existing concrete pavement, providing and installing dowels and epoxy grouting them where required by the plans; and for all manipulations, labor, equipment, appliances, tools, traffic provisions and incidentals necessary to complete the work.

There are line code(s), description(s) and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 205 "Subgrade"
Item 421 "Structural Concrete"
Item 440 "Reinforcing Steel"
Item 526 "Membrane Curing"

END OF ITEM 360

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 5

ITEM 400

STRUCTURAL EXCAVATION AND BACKFILL

400.1 Description. This Item shall govern for all excavation required for the construction of all structures within the roadway limits, except pipe or box sewers for the disposal of all excavated material; and for backfilling around completed structures to the original ground level or as required by the plans. The work shall include all necessary pumping, bailing, sheeting, drainage, and the construction and removal of any required cofferdams. Unless otherwise provided, the work included herein shall provide for the removal of old structures or portions thereof (abutments, wingwalls, piers, etc.), trees and all other obstructions to the proposed construction.

Excavation will not be classified, but will be considered as "Structural Excavation", which will include the removal of all materials encountered regardless of their nature or the manner in which they are removed as well as any required backfill, and as approved by the Design Engineer.

400.2 Structural Excavation. Unless specified on the plans, or approved otherwise by the Engineer, structural excavation shall be designated as follows:

A. Width and Length - From a vertical plane outside the structure equal to the thickness of the footing or slab.

B. Depth - From bottom of footing or slab to the finished groundline or natural groundline, whichever is lower in elevation.

C. When caissons are provided, excavation is not permitted outside the outer face of the caissons.

By definition, a cofferdam is a temporary or removable structure to keep surrounding earth, water, or both out of the excavation and may be earth, timber, steel, concrete or a combination thereof.

A caisson is a permanent part of the substructure which sinks gradually into place as material is excavated within the area protected by its sidewalls. It may be either open well type or a pneumatic type caisson.

400.3 Construction Methods. Excavation shall be done in accordance with the lines and grades indicated on the plans, or as established by the Engineer.

The final elevation to which a foundation is to be constructed shall be as shown on the plans or as raised or lowered by written order of the Engineer when such alterations are judged proper to satisfactorily comply with the design requirements for the structure. Should it be found necessary, in the judgment of the Engineer to increase or decrease the depth of footings from that shown on the plans, the necessary alterations in the details of the structure shall be accomplished as directed by the Engineer. Harris County shall have the right to substitute revised details resulting from a consideration of the changes in the design condition.

When a structure is to rest on an excavated surface, special care shall be taken not to disturb the bottom of the excavation, and the final removal of the foundation material to grade shall not be performed until just before the footing is to be placed.

Protect excavations from rainfall and surface water. If the supporting soil is exposed to adverse wet or dry conditions, excavate deeper and/or wider to sound material at no additional cost to Harris County. Prior to such activity, the Contractor shall notify the Engineer.

Excavated material required to be used for backfill may be deposited, by the Contractor, in storage piles at points convenient for rehandling of the material during the backfilling operations. The location of storage piles shall, however, be subject to the approval of the Engineer, who may require that the survey centerline of the structure and the transverse or hub line of any unit of the structure be kept free of any obstruction.

Excavated material required to be wasted shall be disposed of as directed by the Engineer, and the disposal shall be in such manner as not to obstruct a stream or otherwise impair the efficiency or appearance of the structure or other parts of the work.

400.4 Cofferdams and Caissons. The term cofferdam wherever used in this Item designates any temporary or removable structure which is constructed to hold the surrounding earth, water, or both out of the excavation, whether such structure is formed of earth, timber, steel, concrete, or a combination of these. It thus includes earthen dikes, timber cribs, any type of sheet piling, removable steel sheets and the like and all necessary bracing; and it shall also be understood to include the use of pumping wells or well points for the same purpose. The cost of cofferdams shall be included as an incidental cost to excavation.

The term caisson, wherever used in this Item, designates a permanent part of the substructure, so constructed as to sink gradually into place as material is excavated within the area protected by its sidewalls. Such

caisson may be of either the open-well or pneumatic type and quantities for same will always be included as bid items separate from excavation.

In addition to interior dredging, the lowering of caissons may be facilitated by the following methods:

A. Addition of weight by increasing the thickness of caissons, where such increase is permitted by the type of design, shall be requested by the Contractor prior to beginning the work. Increased quantities due to this change shall be at the Contractor's expense.

B. By the addition of removable loads to the caisson.

C. The use of water or air jets placed around the caisson.

D. Steel shell caissons may be driven with a drop or air hammer if the Contractor, at his own expense, provides a suitable driving ring. The driving ring shall be of sufficient strength and the manner of driving shall be regulated to preclude damage to the caisson.

When no provisions for caissons is shown on the plans, it shall be the intent of this Item to require that a suitable cofferdam be provided for all excavations where such cofferdam may be necessary to control water conditions or to preclude sliding and caving of the walls of the excavation. Where no ground or surface water is encountered, the cofferdam needs to be sufficient only to protect the workmen and to avoid cave-ins or slides extending beyond the excavation limits.

The Contractor shall submit, to the Engineer, upon request, drawings showing his proposed method of cofferdam construction and other details left open to this choice, or not fully shown on the plans. All shoring designs must meet the requirements of OSHA Standard 1926.650.

The type and clearance of the cofferdam, insofar as such details affect the character of the finished work, will be subject to the approval of the Engineer, but other details of design will be left to the choice of the Contractor, who will be responsible for the successful completion of the work. The interior dimensions shall be such as to provide sufficient clearance for the construction and removal of any required forms and the inspection of their exteriors and to permit pumping outside of the forms.

In general, sheet piling cofferdams shall extend well below the bottom of the footings and shall be well braced and as water-tight as practicable.

When foundation pilings are to be driven inside a caisson or cofferdam and when it is judged impractical to dewater the caisson or cofferdam

before placing a concrete seal, the excavation may be extended below the footing grade to a depth sufficient to allow for swell of the material during pile driving operations. After the pilings have been driven, all foundation material that has risen to a level above the footing grade shall be removed. It is the intention of this provision to establish a construction tolerance to be applied when a foundation is being constructed under water. Where it is possible to dewater the caisson or cofferdam before a seal is placed, it is considered practicable to remove the foundation material to the exact footing grades after foundation pilings are driven. Backfilling in a foundation to compensate for excavation which has been extended below grade, will not be permitted. Such areas below grade shall be filled with concrete at the time the seals or base courses are placed, and the concrete quantities involved shall be at the Contractor's expense. All caisson and cofferdam designs must meet the requirements of OSHA Standard 1926.650.

Caissons or cofferdams which tilt or move laterally during the process of sinking shall be righted or enlarged, as necessary, at the sole expense of the Contractor.

Unless otherwise provided, cofferdams shall be removed by the Contractor after the completion of the substructure. The removal shall be affected in such a manner as not to disturb or mar the structure. In lieu of the entire removal of the cofferdams, the Engineer may require the Contractor to remove any portion of them or to leave them entirely in place.

400.5 Pumping or Bailing. Pumping or bailing from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of the movement of water through or alongside any concrete being placed. No pumping or bailing will be permitted during the time of the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water-tight wall. Pumping or bailing to dewater a sealed cofferdam or caisson shall not be started until the seal has set for at least 36 hours.

400.6 Backfilling. All backfills shall be constructed in layers approximately parallel to the finished grade. After completion of the backfill, it shall be continuously maintained to its finished grade, until the project is accepted.

Backfill for retaining walls, headwalls, bridge abutments, and other special structures, shall be as shown on the plans.

Each layer of backfill shall be uniform as to material, density and moisture content before beginning compaction. Water required to bring the material

to the moisture content necessary for the required compaction shall be the responsibility of the Contractor.

Unless otherwise indicated, backfill compacted mechanically shall be in loose lifts not exceeding 8 inches. Backfill shall be clean bank sand, unless otherwise directed by the Engineer, free from clay and clay lumps, shale, loam, organic matter, salts and other deleterious materials and having a plasticity index less than 3. Backfill shall be compacted to 95 percent of Standard Proctor Density (ASTM D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))") using a moisture content between optimum and 3 percent above optimum.

Do not place backfill against walls for a minimum of 7 days after structure has been in place. Place backfill against walls of partially completed structure only after approval of the Engineer. Backfill around abutments and piers shall be deposited on both sides to approximately the same elevation at the same time.

Care shall be taken to prevent any wedging action or backfill against the structure and the slopes bounding the excavation shall be stepped or serrated to prevent such wedge action.

No backfilling shall be done except in the presence of the Engineer, or his authorized representative.

400.7 Quality Assurance. The Testing Laboratory's representative will determine the moisture density relationship for each material proposed for use as backfill, in accordance with ASTM D698. In place density will be determined in accordance with ASTM D6938 "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)" or ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method", and with each type of construction.

For walls and trenches, determine the in place density at minimum for each 100 foot of wall or trench, for each lift of fill placed.

For building pads and parking areas, determine the in place density for each 4,000 square feet for each lift of fill placed.

400.8 Measurement and Payment. Will not be paid for directly, but will be considered subsidiary to the bid for structures requiring excavation and/or backfilling.

There are no line code(s), description(s), and unit(s) for this Item.

END OF ITEM 400

FOR PROJECTS INITIATED
AFTER MARCH 1, 2012
REVISION 4

ITEM 402

BANK SAND BACKFILL

402.1 Description. This Item shall govern for the furnishing, installing, manipulation, compacting and completing in place, Bank Sand as a bedding and backfill material for water and sewer lines, as construction fill for certain excavation areas, as construction fill for ruts, holes and other similar conditions; as a fill material for project clean-up and as directed by the Engineer. Bank sand shall be in accordance with these Standard Specifications and in conformity with the lines, grades and cross-sections shown on the plans and as directed by the Engineer.

402.2 Materials. Bank sand is to be free of organic matter, foreign material, clay balls, sticks, foreign objects and other objectionable material.

Bank sand shall have a plasticity index less than 3 and shall meet the following gradation:

SIEVE SIZE	% PASSING, BY WEIGHT
3/8 Inch	100
No. 200	5 – 30

Prior to use, Contractor shall identify the source of the proposed bank sand for testing.

402.3 Construction. After the water line, sewer line or other similar construction item, such as a trench, has been excavated and brought to grade, bank sand shall be furnished, placed, compacted complete in place, either as bedding or backfill material, as shown on the plan, described in these Standard Specifications or as directed by the Engineer. After the trench or excavation has been brought to grade, the bank sand shall be placed and compacted as a bedding material, the construction item shall be placed and joined properly around and over that construction item as required and as shown on the plans, described in the specifications or directed by the Engineer.

Bank sand shall be placed in layers not exceeding 8 inches. It shall be compacted with mechanical vibratory tamps to maximum dry density in accordance with ASTM D698 “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)” at a moisture content ranging from optimum to three percentage points above optimum. Water flooding will not be permitted.

402.4 Testing. The Testing Laboratory's representative will determine the moisture density relationship for each material proposed for use as backfill, in accordance with ASTM D698. In place density will be determined in accordance with ASTM D6938 "Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods" or ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method," and with each type of construction.

402.5 Measurement. No separate payment shall be made for work performed under this Item, except as indicated below. Include the cost of same in the price bid per linear foot of pipe, or wall, for which this work is a component.

402.6 Payment. "Extra Bank Sand Backfill", where required, will be measured by the cross-sectional method in its compacted position and paid for at the contract unit price bid per cubic yard. Payment under this bid item is limited to such additional bank sand backfill not shown on the plans that may be required.

There are line code(s), description(s), and unit(s) for this Item.

END OF ITEM 402

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 1

ITEM 429

TRENCH SAFETY SYSTEM

429.1 Description. This Item shall govern for furnishing all labor and materials for installation and maintenance of a trench safety system.

For any trench excavation in materials other than solid rock, greater than 5 feet in depth, or where shown on the plans, the Contractor shall provide a trench safety system. This trench safety system shall be in accordance with the appropriate requirements established in the Occupational Safety and Health Administration (OSHA), Safety and Health Regulations, Part 1926, Subpart P - "Excavations" (Latest Edition).

429.2 Measurement. Measurement of the "Trench Safety System" for gravity pipelines and boxes and for pressure pipelines shall be made by the linear foot of trench measured along the centerline of the trench, for the depth indicated. The depths shall be indicated as follows:

A. From 5 to 10 feet

B. From 10 to 15 feet

C. From 15 to 20 feet

D. Greater than 20 feet

429.3 Payment. Payment for "Trench Safety System" shall be made at the contract unit price bid, measured as stated in the preceding section, for the depth indicated.

There are line code(s), description(s), and unit(s) for this Item.

END OF ITEM 429

FOR PROJECTS INITIATED
AFTER MARCH 1, 2014
REVISION 11

ITEM 430

CONSTRUCTION OF UNDERGROUND UTILITIES

430.1 Description. This Item shall govern for all excavation required for the construction of sewers, sewer structures, pipe culverts, appurtenances and connections and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines and grades shown on the plans or as given by the Engineer and in accordance with these specifications. Trench excavation shall consist of the required excavation within the limits of the trench, the removal and proper utilization of all suitable trench excavation by placing in accordance with Item 132 “Embankment” or disposal of unusable material. This Item shall also govern for any necessary pumping or bailing and drainage and all sheeting and bracing of trench walls. Also governed by this Item are the cutting and restoration of pavement and base courses, the furnishing and placing of cement stabilized backfill, the hauling and storage of suitable excavated material for other uses and/or disposing of surplus or unsuitable materials and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.

430.2 Testing. Gravity sanitary sewer lines shall be "lamped". No sewer line shall be accepted, unless a clear lamp can be seen from manhole to manhole.

430.3 Excavation & Trench Preparation. Excavate trench to the alignment and depth required. All suitable excavated materials shall be utilized, insofar as practicable, in constructing the required underground utilities, roadway sections or in uniformly widening of embankment, flattening slopes, etc. or as directed by the Engineer. Unsuitable trench excavation and trench excavation in excess of that needed for construction shall be known as waste and shall become the property of the Contractor to be disposed of by the Contractor outside the limits of the right-of-way. The cost to haul and store suitable material for other uses or for disposal is incidental to this Item. Brace the trench and drain, as required, so that the work may be accomplished safely and efficiently. If necessary, install a dewatering system to provide a dry trench bottom. Pumps shall discharge into natural drainage channels or to drains. Shoring for excavations and trenches shall meet the requirements of the Latest Edition of OSHA Regulation 1926, Subpart P, and the Item 435 "Timber Ordered Left in Trench".

When disposing off site, the Contractor shall not place the waste (excess) material in an environmentally sensitive area, floodway or waters of the United States, including adjacent wetlands”, as defined in the Clean Water Act and the Rivers and Harbors Act, unless he has previously

obtained the appropriate Department of the Army Permit authorizing the activity. It is the responsibility of the Contractor to contact the proper authorities to determine the land use classification and to obtain necessary permits. If a disposal site is designated in the plans and is classified as wetlands, then the County shall be responsible for ensuring that the appropriate Department of the Army permit has been obtained for the activity.

For pipes less than 30 inches in diameter, the minimum width of the trench shall be the width of the outside barrel of the pipe plus 24 inches, the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches. For pipe 30 inches and larger, the minimum trench width shall be the width of the outside barrel of the pipe plus 36 inches, and the maximum width of the trench shall be the width of the outside barrel of the pipe plus 48 inches.

Side sloping or benching of the trench, where permitted, will begin at one foot above the top of the pipe and will not encroach upon private property or endanger existing or future structures or underground utilities. Depth of trench, without sheeting or bracing shall comply with OSHA Regulation 1926.650.

The full width of the trench shall be excavated to a depth below the invert elevation of the pipe so as to permit placing the bedding material specified on the Standard Civil Drawings below the outside bottom of the pipe. Any additional depth excavated by the Contractor shall be replaced with an equal depth of cement stabilized sand. The cost of this additional material, in place shall be at the expense of the Contractor.

Where necessary, excavations shall have sheeting and bracing to prevent caving. At these locations, increase the trench width as required and leave the sheeting in place until the pipe has been laid and the backfill compacted to a depth of 2 feet over the pipe. Sheeting and bracing shall be in accordance with the Item 435 "Timber Ordered Left in Trench". All sheeting and bracing shall be designed to the requirements of OSHA Standard 1926, Subpart P (Latest Edition).

Sewers shall not be constructed or sewer pipe laid in the presence of water. All water shall be removed from the excavation sufficiently prior to the sewer placing operation to insure a dry, firm bed on which to place the sewer and shall be maintained in such unwatered condition until all concrete, cement stabilized sand, and mortar are cured. Removal of water may be accomplished by bailing, pumping or by a well point system as conditions warrant. The well point installation shall be in accordance with the Item 436 "Well Pointing". A seal slab shall be installed when Well Pointing is used for dewatering.

In the event that the excavation cannot be dewatered to the point where the pipe subgrade is free of mud, excessive wet soil, sand silt or clay with water, a seal slab shall be used in the bottom of the excavation. Such seal slab shall consist of a lean concrete mixture in accordance with Item 421, “Structural Concrete”. The cast-in-place seal slab (7” thick) shall be a Class “D”, 5 sacks of cement per cubic yard with a minimum compressive strength of 1,750 P.S.I. at 7 days and 2,500 P.S.I. at 28 days. The seal slab shall have minimum #4 rebar at 18 inch on centers, in each direction.

A precast seal slab, minimum 6” thick, may be used, provided that the joints of the seal slab do not coincide with or at the joints of the pipe. Contractor shall have an option of using a three day cylinder break test at no expense to Harris County.

For unstable conditions requiring outside forms, seals, sheeting, and bracing, or where groundwater is encountered, any additional excavation in width and backfill required shall be done at the Contractor’s expense.

Portable trench boxes may be used in lieu of sheeting upon approval in writing by the Engineer. The trench box must be in accordance with OSHA Regulation 1926.650 (Latest Edition).

Use of the trench box does not relieve the Contractor of any liability for damages to person or property. When a trench box is moved, the jointed pipe or in-place backfill shall not be disturbed.

All materials from excavation operations not required for backfilling, if considered suitable shall be placed in embankments or wasted, in accordance with the Item 132 "Embankment". All material not suitable for use in embankments will be declared surplus by the Engineer and shall become the responsibility of the Contractor to dispose of as he wishes. Such surplus material shall be promptly removed from the work following the completion of the portion of the sewer involved. The cost to haul and store suitable material for other uses or for disposal is incidental to this Item.

Unless otherwise specifically approved, Contractor shall use ladder or wheel type trench-digging machinery, except where hand methods must be employed to avoid damage to existing structures above or below ground, or where hand excavation is indicated.

Engineer may limit the amount of trench opened or partially opened at any time in advance of the completed pipe laying operation and the amount of

trench left unfilled. Open no more than 500 feet of trench on any street at any one time.

430.4 Pipe Laying. No pipe shall be laid in water or when the trench conditions or weather is unsuitable for such work, unless specifically approved by the Engineer.

Fit and lay the pipe to form a smooth and uniform invert. Laying of pipe shall commence at the lowest point, so that the spigot or tongue ends point in the direction of flow.

All other types of pipe shall be laid in accordance with the applicable provisions of this Item.

Field cutting of Polyvinyl Chloride pipe shall be in accordance with the pipe manufacturer's recommendations.

Minor deflections may be obtained in pipe joints. Contractor must obtain approval when the degree of deflection is necessary to deflect from a straight line. Where necessary to make major deflections in concrete pipe, use sections of pipe with beveled ends for deflections not greater than five degrees. For deflections greater than five degrees, use fabricated fittings for concrete pressure pipe.

When the pipe laying operation is halted, seal the open end of the pipe with a temporary plug. Plug is to remain in place until the pipe laying operation recommences.

Standard plugs shall be inserted into bells of all dead end pipe.

For gravity pipelines, use concrete a minimum of 6 inches on all sides of the pipe for encasing, embedding where indicated on the plans.

430.5 Backfilling. As soon as practicable after completion of laying and jointing of pipe, backfill the trench. Not more than 200 feet of the trench shall be left open after laying the pipe. Also backfill other structures, such as manholes, and junction boxes with material selected from the excavation, that is generally suitable for use as backfill.

Trenches shall be backfilled with material selected from sewer trench excavation, or obtained from other sources, shall be free from stones, which will interfere with compaction and free of large lumps which will not break down readily under compaction. Do not use material excavated in large lumps which will not break down or which cannot be spread in loose layers. Material excavated by trenching machine will generally be suitable

for use as backfill. Cement stabilized sand shall be in accordance with the Item 433, "Cement Stabilized Sand Bedding and Backfill Material".

In the pipe zone, as shown on the drawings, cement stabilized sand placed to the depth shown by those drawings, deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to the height shown by those drawings. Moisten if necessary and tamp in approximately 4 inch layers, thoroughly compacting under and on each side of the pipe to provide solid backing against the external surface of the pipe. Walking or working on the completed pipeline, except as necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to at least 12 inches over the top of the pipe. The cement stabilized sand shall be placed in accordance with Item 433 “Cement Stabilized Sand Bedding and Backfill Material.”

Backfill above the cement stabilized sand shall be placed as follows.

For trenches under proposed pavement or through asphaltic concrete, concrete, asphalt topped concrete flexible base with asphalt topping, shell or gravel surfaces on either public or private roads, streets or driveways, place backfill above the cement stabilized sand in approximately 6 inch layers, moistened if necessary and thoroughly compacted to 95% of standard proctor in accordance with ASTM D698 “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).” Tamped backfill shall be brought up to the required grade shown by the drawings. Where pipe is laid below the existing pavement or proposed pavement, the backfill material shall be the same, or an approved equivalent, as the material used below the pavement subgrade. For trenches through unimproved roadways, unsurfaced road shoulders or unimproved driveways, the procedures are the same as above, except that compaction above the pipe zone shall be 90 percent of standard proctor.

For trenches located in areas other than those previously stated, and not designated for improvement, place the in-situ material, used as backfill, above the cement stabilized sand as shown by the drawings, in approximately 6 inch layers, moistened if necessary and compacted to 90 percent of standard proctor density in accordance with ASTM designation D698. For the top layer of backfill, place a sufficient amount of previously excavated material neatly rounded over the trench to allow for settlement during consolidation. The Contractor shall supply any deficiency in quantity of materials for backfilling trenches or filling depressions caused by settlement.

Where required as shown in the plans, pipe to be installed under railroad embankment or highway or streets shall be in accordance with Item 431 “Jacking, Boring or Tunneling Pipe” or Item 432 “Tunnel Construction”.

430.6 Restoration of Surfaces. Replace or repair sidewalks, driveway culverts, inlets, curbing, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed, to the condition equivalent to that existing prior to commencement of this work. Use concrete having a compressive strength of not less than 3,000 psi in 28 days for the replacement of curbing, gutters, inlets and sidewalks.

Use reasonable care in the removal and replacement of shrubbery and trees designated to be replaced at original locations. Where at all possible, ditch alignment will be such as to minimize this work. The restoration of asphalt topped flexible base and concrete streets shall be as specified under other items of these Standard Specifications.

430.7 Clean-Up. The Contractor shall remove from the site of the work and from public and private property temporary structures, rubbish, and waste materials, including excess excavated materials. The Contractor is responsible for disposing of all surplus earth. Any excess material from excavation that is suitable for use in road or embankment will be salvaged, stored and protected from any contamination for reuse. The Contractor shall seek approval from the Engineer before disposal of any excess earth.

The pipe laying operation shall be temporarily suspended if the clean-up is further behind than 2,000 feet.

430.8 Quality Assurance. The Testing Laboratory’s representative will determine the moisture density relationship in accordance with ASTM D698 on material secured from the trench excavation. Samples secured from the cement stabilized sand supplier shall be blended with Portland cement in accordance with the Item 433 "Cement Stabilized Sand Bedding and Backfill Material.", and the moisture density relationship will be determined in accordance with ASTM D558 “Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures”.

The Testing Laboratory’s representative will determine the in place density in accordance with ASTM D1556, “Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method” or D6938, “Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods”. The minimum level of testing will consist of at least one test for each 100 linear feet of trench per lift of backfill.

430.9 Measurement & Payment. Gravity pipelines shall be measured by the linear foot of pipe actually laid, at finished grade, exclusive of pipe installed in tunnel construction, special structures, boxes, manholes, or other special sections, along pipe of size and at depth installed. Measure depth at manholes, at intervals not to exceed 50 feet between manholes, and at breaks in profile of natural ground from flow line of pipe to natural ground surface over center of pipe. Payment for gravity pipeline, furnished, installed and measured as stated shall be at the contract unit price bid for the type of pipe, size, and depth measured, as per pipe material specification, e.g. Item 460 “Reinforced Concrete Pipe”.

Pressure pipelines shall be measured by the linear foot from the centerline of fitting to centerline of fitting, exclusive of pipe installed in tunnel construction, special structures or other special sections along pipe of the size and type installed. If depth of cut is shown on the proposal, measure depth at intervals not to exceed 50 feet and at breaks in profile of natural ground from flow line of pipe to natural ground surface over the center of the pipe.

If the depth of cut is not shown on the proposal, no consideration shall be made for depth at which the pipe is installed. Payment for pressure pipeline, furnished, installed and measured as stated shall be at the contract unit prices for the size and type (and depth, if shown on the proposal) measured.

No separate payment shall be made for concrete used for blocking, backing, encasement or embedding. Gravity lines and Pressure Pipelines shall be paid for in accordance with the applicable item of the material specification.

Concrete used in the repairing curbs, gutters and sidewalks shall be paid for by the linear foot or square yard, as designated on the proposal form. Pay for concrete used in repairing curbs, gutters and sidewalks, measured in the contract unit price bid for "Extra Concrete" of the class installed.

Pipe installed by tunneling shall be paid for in accordance with Item 431 or Item 432.

Street and driveway surfacing shall be paid for in accordance with the applicable item of those specifications.

No separate payment shall be made for ordinary bedding and select backfill, unless so indicated on the bid form.
No separate payment shall be made for hauling and storing suitable excavated trench material for other uses or for disposal of excess or unsuitable materials.

No separate payment shall be made for any bedding and backfill installed in accordance with these Standard Specifications and the Standard Civil Drawings.

Well Pointing shall be measured and paid for in accordance with the Item 436 “Well Pointing.”

Seal slabs (with rebar) shall be measured by the square yard installed along the centerline of the structure. Payment for class “D” concrete seal slab shall be made at the unit price bid per square yard and shall include the price of all labor, material and equipment necessary to complete this Item.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires drawings that shall be incorporated into the contract documents.

NOTE**:** This Item requires other Standard Specifications.

Item 132 “Embankment”
Item 421 “Structural Concrete”
Item 431 “Jacking, Boring or Tunneling Pipe”
Item 432 “Tunnel Construction”
Item 433 “Cement Stabilized Sand Bedding and Backfill Material”
Item 435 “Timber Ordered Left in Trench”
Item 436 “Well Pointing”
Item 460 “Reinforced Concrete Pipe”

END OF ITEM 430

FOR PROJECTS INITIATED
AFTER MARCH 1, 2012
REVISION 12

ITEM 433

CEMENT STABILIZED SAND BEDDING AND BACKFILL MATERIAL

433.1 Description. This Item shall govern for cement stabilized sand to be used for backfill and bedding as called for on the Standard Civil Drawings, in other parts of the Standard Specifications, or as directed by the Engineer.

433.2 Materials. Cement shall be Type I portland cement conforming to ASTM C150 “Standard Specification for Portland Cement.”

Sand shall be clean durable sand containing not more than the following:

A. Deleterious Materials

1. Clay lumps, when tested in accordance with ASTM C142 “Standard Test Method for Clay Lumps and Friable Particles in Aggregates” shall be less than 0.5 percent.

2. Lightweight pieces, when tested in accordance with ASTM C123 “Standard Test Method for Lightweight Particles in Aggregate” shall be less than 5.0 percent.

3. Organic impurities when tested in accordance with ASTM C40 “Standard Test Method for Organic Impurities in Fine Aggregates for Concrete” shall not show a color darker than the standard color.

B. The plasticity index shall be 6 or less when tested in accordance with ASTM D4318 “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.”

C. Sand shall be free of organic matter and deleterious substances and shall meet the following gradation requirement.

SIEVE SIZE	% Passing, By Weight
3/8 Inch	100
No. 200	5 – 30

Water shall be clean and clear, free of oils, acids, alkalis, organic matter or other deleterious substances and shall conform to the requirements of ASTM C1602 “Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.”

433.3 Sand-cement Mixture Product. The mixture shall consist of not less than 1-1/2 sacks of portland cement per ton of material mixture as placed. The mixture shall contain sufficient water to hydrate the cement.

The cement, sand and water shall be mixed in a pugmill type mixer, which meets the approval of the Engineer. It shall be mixed for a minimum period of two minutes per batch.

433.4 Submittals and Responsibilities of the Contractor:

A. Submit the proposed design mix and test data for cement stabilized sand mixture.

B. Facilitate testing and inspection, by furnishing any necessary labor to assist the designated Testing Laboratory in obtaining and handling samples at the project site.

433.5 Placing. The sand cement mixture shall be placed in maximum 8 inch thick lifts, loose measure around the pipe, boxes, structures, bridge approaches and paving sections. Placement and compaction shall be performed in a manner that will thoroughly fill all voids without placing undue strain on or displacement of the structure.

Cement stabilized sand backfill placed below the top of sewers, manholes, inlets or other structures shall be placed equally along all sides of the structure. Cement stabilized sand backfill/bedding shall be placed in a manner that will completely fill all voids in the trench. Hand operated tampers may be used for compaction.

Materials not placed and compacted within 4 hours after mixing shall be rejected. Do not place or compact sand-cement mixtures in standing or free water.

Cement stabilized sand bedding and backfill placed in trenches shall be compacted in accordance with Item 430 “Construction of Underground Utilities” and Item 480 “Precast Reinforced Concrete Box Sewers.”

Provide excavation and trench safety system at locations and depths required for testing and retesting during construction, at no additional cost to Harris County.

In-place density tests shall be taken at each location, each day, to test the placement of bedding/backfill material. The minimum number of tests per day shall be 1 in-place density on the bedding and 2 in-place densities on backfill. The minimum number of tests shall be for each location at the rate of 1 in-place density test per 50 linear feet of bedding and 1 in-place

density test per 50 linear feet of backfill per lift placed above the top of pipe. In-place densities shall be determined in accordance with ASTM D6938 "Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods" or ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method."

433.6 Performance. The sand cement mixtures shall produce a minimum unconfined compressive strength of 100 psi in 48 hours, when compacted to 95 percent of Standard Proctor density (ASTM D558" Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures"), without additional moisture control and when cured in plastic bags at a temperature of 73.4º F. at plus or minus 3º F. and tested in accordance with ASTM D1633 "Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders."

Random samples of the delivered product will be taken in the field at the direction of the Engineer and tested at Harris County's expense. A minimum of 1 sample per week shall be taken at random to represent a production that is less than 100 tons per week. Two samples per week shall be taken at random to represent a production greater than 100 tons per week. The Engineer shall have the option to obtain additional samples for testing.

After the molding of the soil-cement cylinders, the specimens will be tested in accordance with ASTM D1633, Method A. Two specimens will be tested at 48 hours and two specimens will be tested at 7 days.

433.7 Notification. The Testing Laboratory's representative will notify the County, Engineer, Contractor and material supplier by facsimile of all tests indicating results falling below specified strength requirements.

433.8 Measurement. Cement stabilized sand shall be measured by the square yard of material, furnished and compacted in place to the thickness specified, or as shown in the plans or acceptable material mixture, as specified by this Item, shall be measured by the ton of 2,000 pounds. Measurement shall be made by tickets delivered to the Engineer. The dray tickets shall indicate the tare, gross and net weight of the load and the location of delivery.

433.9 Payment.

A. The payment for cement stabilized sand, complete and in place, shall be at the contract unit price per square yard of the specified thickness, which unit price shall include all costs of materials, furnished, hauled, dumped, spread, shaped, and compacted.

B. Where the bid sheet specifies FOB the plant, the materials shall be loaded on Harris County vehicles and paid for by the ton of 2,000 pounds.

C. Where the bid sheet specifies FOB the job, materials shall be transported to the job site specified on the bid sheet, and paid for by the ton of 2,000 pounds.

D. When the Project Manual, plans or other specifications indicate the use of cement stabilized sand is incidental to another pay item, no direct payment for the material will be made.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 430 “Construction of Underground Utilities”
Item 480 “Precast Reinforced Concrete Box Sewers”

END OF ITEM 433

FOR PROJECTS INITIATED
AFTER MARCH 1, 2014
REVISION 3

ITEM 440

REINFORCING STEEL

440.1 Description. This Item shall govern for the furnishing and placing of reinforcing steel of the type, size and quantity designated for use in structures, as shown on the plans and in accordance with these Standard Specifications.

440.2 Materials. Unless otherwise designated on the plans, or herein, all bar reinforcement shall be deformed and shall conform to the following:

A. ASTM A615 “Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement”, Grade 40 or 60, open hearth, basic oxygen or electric furnace new billet steel.

Unless noted by these Standard Specifications, rail steel or axle steel shall not be permitted.

Grade 40 reinforcing steel shall be required when specified on the contract documents.

When no specific grade is specified on the plans, the reinforcing steel shall be a minimum Grade 60.

Where bending of bar sizes #14 or #18 of Grade 60 is required, bend testing shall be performed on representative specimens as described for smaller bars in the applicable ASTM Specification. The required bend shall be 90 degrees around a pin having a diameter of 10 times the nominal diameter of the bar.

B. Spiral reinforcement shall be either smooth or deformed bars, or wire, of the minimum size or gage shown on the plans or as specified herein. Bars for spiral reinforcement shall comply with ASTM A615, ASTM A675 “Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties” or ASTM A996 “Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.” Wire shall conform to ASTM A1064 “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.”

Unless otherwise shown on the plans, the minimum yield strength for spiral reinforcement shall be 40,000 psi.

Report of chemical analysis, showing the percentages of carbon, manganese, phosphorus and sulphur will be required of all reinforcing steel bars when it is to be welded.

The nominal size and area and the theoretical weight of reinforcing steel bars covered by this Item are as follows:

TABLE 1

BAR SIZE	NOMINAL DIAMETER INCH	NOMINAL AREA SQUARE INCH	WEIGHT PER LINEAR FOOT
#2	0.250	0.05	0.167
#3	0.375	0.11	0.376
#4	0.500	0.20	0.668
#5	0.625	0.31	1.043
#6	0.750	0.44	1.502
#7	0.875	0.60	2.044
#8	1.000	0.79	2.670
#9	1.128	1.00	3.400
#10	1.270	1.27	4.303
#11	1.410	1.56	5.313
#14	1.693	2.25	7.650
#18	2.257	4.00	13.60

C. When wire is ordered by size numbers, the following relation between size number, diameter in inches and area shall apply unless otherwise specified:

TABLE 2

WIRE SIZE	NOMINAL DIAMETER INCH	NOMINAL AREA SQUARE INCH
31	0.628	0.310
30	0.618	0.300
28	0.597	0.280
26	0.575	0.260
24	0.553	0.240
22	0.529	0.220
20	0.505	0.200

WIRE SIZE	NOMINAL DIAMETER INCH	NOMINAL AREA SQUARE INCH
18	0.479	0.180
16	0.451	0.160
14	0.422	0.140
12	0.391	0.120
10	0.357	0.100
8	0.319	0.080
7	0.299	0.070
6	0.276	0.060
5.5	0.265	0.055
5	0.252	0.050
4.5	0.239	0.045
4	0.226	0.040
3.5	0.211	0.035
3	0.195	0.030
2.5	0.178	0.025
2	0.160	0.020

Where deformed wire is required the size number shall be preceded by D, and for smooth wire, the prefix W will be shown.

D. Where plain steel wire is used for concrete reinforcement, it shall meet the requirements of ASTM A1064.

Fabricated deformed steel bar mats shall meet the requirements of ASTM A184 “Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement”, while plain steel welded wire fabric shall meet the requirements of ASTM A1064.

Deformed steel wire for concrete reinforcement and deformed steel welded wire fabric shall meet the requirements of ASTM A1064.

440.3 Bending. The reinforcement shall be bent cold, true to the shapes indicated on the plans. Bending shall preferably be done in the shop. Irregularities in bending shall be cause for rejection. Unless otherwise shown on the plans, bends shall be made in accordance with ACI 315.

Bends of 90° and greater in stirrups, ties and other secondary bars that enclose another bar in the bend, in terms of the nominal bar diameter (d), shall be as follows:

TABLE 3

BAR SIZE	GRADE 40	GRADE 60
#3, #4, #5	4d	4d
#6, #7, #8	6d	6d

All bends in main bars and in secondary bars not covered above shall be as follows:

TABLE 4

BAR SIZE	GRADE 40	GRADE 60
#3 through #8	6d	6d
#9, #10, #11	8d	8d
#14, #18	10d	10d

440.4 Fabricating Tolerances. Fabricating tolerances for bars shall be as indicated in ACI 315.

440.5 Storing. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross-sectional area and tensile proportions of a hand wire brushed specimen meets the physical requirements for the size and grade of steel specified.

440.6 Lap Splices. Splicing of bars, except where shown on the plans, will not be permitted without prior approval of the Engineer.

Splices, not provided for on the plans, will be permitted in slabs not more than 15 inches in thickness, columns, walls and parapets subject to the following:

Splices will be permitted in bars 30 feet or less in plan length. For bars exceeding 30 feet in plan length, the distance center to center of splices shall not be less than 30 feet minus one splice length, with no more than

one individual bar length less than 10 feet. Splices not shown on the plans, but permitted hereby, shall be made in accordance with Table 5. The specified concrete cover shall be maintained at such splices and bars placed in contact and securely tied together. Lap bars so that both bars will be in the same plane parallel to the nearest concrete surface.

TABLE 5

MINIMUM LAP REQUIREMENTS

BAR SIZE	GRADE 40	GRADE 60
#3	1’ - 0”	1’ - 4”
#4	1’ - 2”	1’ - 9”
#5	1’ - 5”	2’ - 2”
#6	1’ – 9”	2’ – 7”
#7	2’ – 4”	3’ - 5”
#8	3’ – 0”	4’ – 6”
#9	3’ – 10”	5’ – 8”
#10	4’ – 10”	7’ – 3”
#11	5’ – 11”	8’ – 11”

Spiral steel will be lapped a minimum of one turn.

Bar sizes #14 and #18 may not be lapped.

440.7 Welded Splices. Where shown on the plans or required by the provisions of this Item or other pertinent specifications, welded bar splices shall be used. All welding operations, processes, equipment, materials, workmanship and inspection shall conform to the American Welding Society Specification D1.4. For bars #6 and smaller, use lap weld splices with fillet welds equal to one half bar diameter on each side, for 4 inches in length. For bars #7 and larger, use butt weld splices in accordance with AWS D1.4.

All splices whether lap, weld, mechanical or coupler, shall develop the full strength of the bar. Information on mechanical splicing devices and couplers shall be submitted for approval prior to use.

440.8 Placing. Steel reinforcement shall be placed in the exact position as shown on the plans and held securely in place during the placing of the concrete. The dimensions shown are to centers of bars, unless otherwise noted. Hold bars securely in place with wire and other approved means during placement of concrete.

A. In plane of steel parallel to nearest surface of concrete, bars should not vary from plan spacing by more than one twelfth of spacing between bars.

B. In plane of steel perpendicular to nearest surface of concrete, bars shall not vary from plan placement by more than 1/4 inch.

Space steel the required distance from forms or earth by approved galvanized metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers, or approved precast mortar or concrete blocks. For approval of plastic spacers, provide samples of plastic which show no indications of deterioration after immersion in a 5 percent solution of sodium hydroxide after 120 hours.

Use galvanized metal chairs to support all reinforcing steel, except that pavement steel chairs need not be galvanized. Use a heavy bolster to support bottom layer of reinforcing in abutment caps, bent caps and other beams.

In bridge deck slabs, use two rows of supports for bottom layer of reinforcing parallel to beams for each bay. Use high chairs to support top layer.

Reinforcing steel for bridge slabs, top slabs or direct traffic culverts and the top slabs of prestressed box beams shall be tied at all intersections, except that where the spacing is less than one foot in each direction, alternate intersections only need be tied. For reinforcing steel cages or other structural members, the steel shall be tied at enough intersections to provide a rigid cage of steel. Mats or wire fabric shall overlap each other one full space as a minimum to maintain a uniform strength and shall be fastened securely at the ends and edges.

Before any concrete is placed, all mortar, mud, dirt, etc., shall be cleaned from reinforcement. No concrete shall be deposited, until the Engineer has inspected the placement of the reinforcing steel and given permission to proceed.

440.9 Submittals. The following information shall be submitted for reinforcing steel. Six sets of each item shall be submitted.

A. Product data for all materials used.

B. Shop drawings indicating locations, placement, sizes and bending. Shop drawings shall be in accordance with the ACI Manual of Practice for Detailing Reinforced Concrete Structures.

C. When welding is required, furnish report of chemical analysis, showing percentages of carbon, manganese, phosphorus and sulfur.

D. Submit certified copies of mill certificates of compliance with requirements herein specified.

E. Submit information on mechanical splicing devices, couplers, and all other reinforcing accessories.

440.10 Measurement & Payment. Reinforcing steel quantities will not be measured or paid for directly. All costs of furnishing, fabrication, placement, ties, chairs, bending, labor and equipment shall be considered subsidiary to bids for concrete structures, requiring reinforcement.

There are no line code(s), description(s), or unit(s) for this Item.

END OF ITEM 440

FOR PROJECTS INITIATED
AFTER SEPTEMBER 1, 2017
REVISION 10

ITEM 460

REINFORCED CONCRETE PIPE

460.1 Description. This Item shall govern for the furnishing and installing of reinforced concrete pipe.

460.2 Materials. Except as modified herein, materials, manufacture and design of pipe shall conform to ASTM C76 “Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe”, Class III, for circular pipe, ASTM C506 “Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe” for arch pipe or ASTM C507 “Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe” for elliptical pipe. All pipe shall be machine made or cast by a process which will provide for uniform placement of the concrete in the form and compaction by mechanical devices which will assure a dense concrete. Concrete shall be mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be assured. Transit mixed concrete will not be acceptable for use in precast concrete pipe.

In the manufacture of concrete pipe, the supplier has the option of using portland cement or portland cement plus fly ash, as defined herein. Cement plus fly ash shall be composed of portland cement and 20-30 percent fly ash, by weight. Fly ash shall be Class C or Class F, conforming to the requirements of ASTM C618 "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.”

Joint seal shall be a rubber gasket meeting the requirements of ASTM C443 “Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.” The rubber gasket shall be applied using lubricants of flax soap or equal. Mineral lubricants are not permitted.

Rubber gasket substitution shall not be permitted without written approval from the Design Engineer.

460.3 Submittals. Submit certification from the fabricator that the pipe has been tested and meets the requirements of this Item. The joint material data sheets shall be submitted for approval, by the Design Engineer.

460.4 Installation. Unless otherwise specified, the following method shall govern:

Jointing Rubber Gasket Pipe:

Lay pipe section in trench to true alignment and grade. Exceptional care shall be taken in placing pipe and making field joints. Avoid bumping the pipe in the trench. Place rubber gasket on dry spigot end of pipe. Properly lubricate spigot, with rubber gasket in place, with specified lubricants. Do not twist, roll, cut, crimp or otherwise injure gaskets or force them out of position during closure of joints. Pull or push the pipe home for closure of the joint. Correct joint rebound before backfilling the pipe. Remove foreign matter or dirt from pipe and keep clean during and after laying.

Install reinforced concrete pipe in accordance with Item 430 “Construction of Underground Utilities”, and all related drawings/plans.

Unless otherwise shown on the plans, not more than two holes may be placed in the top section of the pipe for lifting and placing. The holes may be cast, cut, or drilled in the wall of the pipe. The holes shall not exceed 3 inches in diameter at the inside surface of the pipe wall. Not more than one longitudinal wire or two circumferential wires may be cut per layer of reinforcing steel when locating lift holes in the pipe wall.

All lifting holes shall be sealed to the satisfaction of the Engineer. Tapered lifting plugs shall be used, and sealed externally and internally with an acceptable cement grout. Additionally, lifting plugs shall not protrude from the pipe greater than one-half of an inch.

460.5 Quality Assurance. Concrete pipe 54 inches and smaller in diameter shall be tested in accordance with ASTM C497 “Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile” using the method outlined by Part 4. "External Load Crushing Strength Test by the Three-Edge Bearing Method". The pipe shall be tested at a frequency of three pipe joints for each 100 joints cast, for each pipe size.

Concrete pipe 60 inches and larger shall also be tested in accordance with ASTM C497 using the method outlined by Part 6. "Core Strength Test". However, where the manufacture of the pipe is witnessed by the Engineer, tests using concrete cylinders in accordance with ASTM C39 "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens", shall be acceptable. All test specimens and testing shall be done by the producer of the concrete pipe.

Pipe previously approved and stamped by a Texas Department of Transportation (TxDOT) approved fabricator with specific stamp, which must state: “Certifies Specification Compliance” (i.e. compliance with TxDOT’s DMS - 7310 “Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification” requirements) will be accepted by all laboratories and by Harris County.

For pipes that are stamped by the fabricator as stated above, copies of test results (D-loads and compressive strengths) shall be submitted to the Engineer.

Random Inspection and Testing. Harris County reserves the right to inspect, sample, and test reinforced concrete pipe at any time to ensure compliance with this Item. The pipe manufacturing plant shall provide facilities, equipment, and access to allow for inspection regarding: the quality of materials, the process for manufacturing, and the finished pipe at the plant; in addition to the inspection that is done of the finished pipe at the site before and during the installation.

460.6 Acceptance Requirements. Variations in diameter, size, shape, wall thickness, reinforcement placing, laying length, and permissible underrun of length shall be in accordance with the applicable ASTM Standard for each type of pipe as referred in Section 460.2.

Pipe shall be free from fractures, all cracks and surface roughness. The ends of the pipe shall be normal to the walls and centerline of the pipe. Pipe shall be cured in accordance with the applicable ASTM Standard for each type of pipe as referred to herein.

The following information shall be clearly marked on each section of pipe:

A. The class and ASTM or D-Load of pipe.

B. The date of manufacture.

C. The name or trademark of the manufacturer and plant location.

D. Designated manufacturer’s certifying stamp.

E. One end of each elliptical section of pipe shall be clearly marked on the inside and outside to show the location of the top and bottom of pipe.

F. Clearly mark pipe to be used for jacking and boring (when applicable).

G. Pipe meeting sulfate-resistant concrete plan requirements (when applicable).

Marking shall be indented on the pipe section or painted thereon with waterproof paint.

Pipe shall be subject to rejection for failure to conform to any of the specification requirements. Individual sections of the pipe may be rejected because of any of the following:

A. Fractures or cracks passing through the shell/wall of pipe with exception of a single crack that does not exceed the depth of the joint.

B. Defects that indicate imperfect proportioning, mixing and molding.

C. Surface defects indicating honeycombed or open texture.

D. Damaged ends, when such damage would prevent making a satisfactory joint.

E. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more.

The painting of pipe shall not be allowed prior to delivery on the project.

460.7 Measurement & Payment. Gravity pipelines (R.C.P.) shall be measured by the linear foot of pipe actually laid, at finished grade, along pipe of size and at depth installed, in accordance with Item 430 “Construction of Underground Utilities”. Measure depth at manholes, at intervals not to exceed 50 feet between manholes, and at breaks in profile of natural ground from flow line of pipe to natural ground surface over center of pipe. Payment for gravity pipeline, furnished, installed and measured as stated shall be at the contract unit price bid for the size, type, (and depth, if shown on the proposal) measured under their respective bid line codes.

If the depth of cut is not shown on the proposal, no consideration shall be made for depth at which the pipe is installed.

Pipe installed by tunneling shall be paid for in accordance with Item 431 “Jacking, Boring and Tunneling Pipe” or Item 432 “Tunnel Construction”.

No separate payment shall be made for ordinary bedding and select backfill, unless so indicated on the bid form.

No separate payment shall be made for hauling and storing suitable excavated trench material for other uses or for disposal of excess or unsuitable materials.

No separate payment shall be made for any bedding and backfill installed in accordance with these Standard Specifications and the drawings.

Well Pointing shall be measured and paid for in accordance with the Item 436 “Well Pointing.”

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 430 “Construction of Underground Utilities”
Item 431 “Jacking, Boring or Tunneling Pipe”
Item 432 “Tunnel Construction”
Item 436 “Well Pointing”

END OF ITEM 460

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 1

ITEM 464

PVC PIPE

464.1 Description. This Item shall govern for the furnishing and installation of PVC pipe, including all fittings, painting when necessary and all incidentals necessary to do the work in accordance with the plans and these Standard Specification.

464.2 Material. The plastic pipe and fittings shall meet the requirements of ASTM D3034 “Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings”, ASTM F949 “Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings” or ASTM D2680 “Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping”, and the pipe shall have a minimum of 46 psi pipe stiffness and be of the nominal pipe size shown on the plans. All PVC pipes shall be made of resins meeting ASTM D1784 “Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds” cell classifications 12454B or 12454C.

The Contractor shall furnish manufacturer's certification that the pipe and fittings furnished to the project meet the ASTM requirements above.

Pipe and fittings shall be free from defects which, in the judgment of the Engineer, would hinder their ability to function as planned.

The dimensions of the PVC pipe shall be as shown on the plans. The fittings supplied shall properly fit the pipe supplied and shall be the same color as the pipe.

464.3 Construction Methods. The pipe shall be installed at the locations, lines, grades and dimensions shown on the plans or as revised by the Engineer in full accordance with ASTM D2321 “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.”

All fittings shown on the plans and any other fittings necessary to properly install the pipe, including splice fittings, if necessary, shall be attached to the pipe by solvent welding according to the manufacturer's recommendations.

Splicing will not be allowed unless the required length of a straight section of pipe exceeds 30 feet. This requirement may be waived by the Engineer for special conditions.

Devices required to attach the pipe to portions of structures or to other types of pipe shall be as shown on the plans or as approved by the Engineer.

Backfill material required for installation of the pipe, shall be performed according to the Item 430 "Construction of Underground Utilities". Bedding material for PVC pipe shall be in accordance with Item 433 “Cement Stabilized Sand Bedding and Backfill Material”.

After installation of all pipe and fittings which will be exposed to view in the completed structure shall be cleaned.

464.4 Measurement. PVC pipe shall be measured by the linear foot along the centerline of the pipe as installed, for the various sizes required. Any excavation and backfill required will not be measured for payment, but shall be subsidiary to this Item.

464.5 Payment. Payment for PVC pipe measured as prescribed above will be made at the unit price bid per linear foot for "PVC Pipe" of the various sizes required. Payment shall be full compensation for furnishing and installing the PVC pipe, for all fittings, clamps, anchors, guard plates, bedding, excavation and backfill, painting labor, tools, equipment and incidentals necessary to complete the work.

There are line code(s), description(s) and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 430 "Construction of Underground Utilities"
Item 433 “Cement Stabilized Sand Bedding and Backfill Material”

END OF ITEM 464

FOR PROJECTS INITIATED
AFTER MAY 1, 2014
REVISION 10

ITEM 472

INLETS

472.1 Description. This Item shall govern for furnishing and installing inlets of the type designated on the plans including but not limited to all frames, plates, grates and covers.

472.2 Materials. Reinforcing steel shall conform to the Item 440 "Reinforcing Steel". Concrete shall conform to the Item 421 "Structural Concrete". Precast concrete inlets shall be manufactured in accordance with the Item 420 "Concrete Structures".

Cement mortar shall conform to ASTM C270 “Standard Specification for Mortar for Unit Masonry”, Type M. Aggregate for mortar shall conform to ASTM C144 “Standard Specification for Aggregate for Masonry Mortar.”

Cast iron for frames, plates, covers, I-beams and grates shall be in accordance with ASTM A48 “Standard Specification for Gray Iron Castings”, Class 30 and shall be free from sand, blow holes or other defects. Frames, plates, grates and covers shall have machined bearing surfaces and conform to the Standard Civil Drawings.

472.3 Construction. All sections of the inlets will be constructed of reinforced concrete.

Prior to setting and/or casting of the inlet, the Contractor shall provide a base/bedding of 6 inch thick cement stabilized sand.

After construction/installation of the inlet, backfill with a minimum thickness of 12 inches of cement stabilized sand that completely circumvents the outside wall of the inlet, up to the elevation of the pavement. Then complete the backfill of the excavated hole, with material that’s in accordance with Item 430 “Construction of Underground Utilities”.

Inlets that are constructed/installed adjacent to and flush to the elevation of concrete pavement shall be constructed with a minimum 3/4 inch expansion joint material, that is in accordance with Item 360 “Concrete Pavement”.

Use non-shrink grout (applied per manufacturers recommendation) to attain a water tight seal at the wall opening of the inlet with the pipe.

For box culvert and arch pipe (all non-circular applications) connections, use non-shrink grout to ensure a water tight seal.

Neatly cut off inlet leads at inside face of inlet wall and point up with mortar. Shape floor with mortar as shown on the applicable Standard Civil Drawings for inlets.

472.4 Measurement. Measure depth of inlets as the vertical distance from the flow line of inlet lead to the top of curb or top of grate.

For inlets constructed with 24 inch leads, the standard depth is 6 feet deep.

Any portion of the inlet exceeding the above depth is to be measured per vertical foot of depth.

472.5 Payment.

A. Payment for Standard Type Inlets.
Payment for inlets with a standard depth shall be made at the contract unit price for each individual standard type inlet (includes non-shrink grout, cement stabilized sand backfill, & expansion joint material).

B. Payment for Inlets with an Additional Depth Greater Than 6 Feet.
When the depth of the inlet specified is greater than the standard depth by more than 6 feet, payment shall be at the contract unit price for each individual inlet (includes non-shrink grout, cement stabilized sand backfill, & expansion joint material) as follows:

"Type B Inlet with an Additional Depth Greater than 6 Feet"
"Type B-B Inlet with an Additional Depth Greater than 6 Feet"
"Type C Inlet with an Additional Depth Greater than 6 Feet"

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires Standard Civil Drawings that shall be incorporated into the contract documents.

NOTE**:** This Item requires other Standard Specifications.

Item 360 "Concrete Pavement"
Item 420 "Concrete Structures"
Item 421 "Structural Concrete"
Item 430 "Construction of Underground Utilities"
Item 440 "Reinforcing Steel"

END OF ITEM 472

FOR PROJECTS INITIATED
AFTER SEPTEMBER 1, 2017
REVISION 5

ITEM 491

REINFORCED CONCRETE SLOPE PAVING

491.1 Description. This Item shall govern for furnishing and placing reinforced concrete slope paving to the lines, grades, and depths shown on the plans.

491.2 Materials. Concrete shall be Class D concrete, in accordance with the Item 421 "Structural Concrete". Reinforcing steel shall conform to the requirements of Item 440 “Reinforcing Steel.”

With prior approval of the engineer, fly ash may be used with the cement. Cement plus fly ash shall be composed of portland cement and 20-30 percent fly ash, by weight. Fly ash shall be Class C or Class F, conforming to the requirements of ASTM C618 “Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.”

Curing materials shall be in accordance with the Item 526 "Membrane Curing".

491.3 Construction Methods. Prior to placing material, the subgrade shall be prepared to the proper section for the width and depth of slope paving as shown on the Plans. Construction joints shall be located as shown on the plans, or as otherwise indicated.

Place as a minimum requirement: 3/4 inch expansion joint material at the location where slope paving is to be placed against walls, or around columns or piling, and at maximum intervals of 80 feet throughout the length of slope paving. Nail a 3/4 inch by 1 inch deep redwood board to the top of the joint material and after the slope paving has set and cured, remove the redwood board and fill the area with joint sealant.

Unless otherwise indicated on the plans, use a minimum No. 4 reinforcing bar conforming to ASTM A615 “Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement”, Grade 60, at a maximum spacing of 12 inches in each direction. The distance from the first parallel bar to the edge of the concrete shall not exceed 3 inches.

When welded wire fabric reinforcing is substituted, it shall be equivalent to the No. 4 rebar at 12 inch on centers, at a minimum. The welded wire shall conform to ASTM A1064 “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.” Only flat sheets shall be used. Use a minimum of 6 inch lap at all splices, with not less than 1 inch, nor more than 3 inches clearance

from fabric to the edge of concrete, and no wires projecting to last member parallel to the edge of concrete.

The reinforcing steel shall be supported throughout the placing of the slope paving to maintain its position approximately equidistant from top and bottom surface of the concrete.

The minimum thickness of the reinforced concrete slope paving shall be 5 inches.

After the concrete has been placed, compacted and shaped to conform to the dimensions shown on the plans, and after it has cured sufficiently to avoid slumping, the concrete shall be finished with a wooden float to secure a reasonably smooth finish.

The concrete shall be cured in accordance with the Item 526 "Membrane Curing".

Weep holes shall be installed in the bottoms and walls of the low flow section and in the slope paving at the locations and spacing and in accordance with the details shown on the plans.

491.4 Measurement. Concrete slope protection shall be measured by the square yard of surface area, complete in place. All edge beams and/or toe walls, as well as weep holes, shall be incidental to the reinforced concrete slope paving.

491.5 Payment. Concrete slope protection shall be paid for at the contract unit price, measured as provided above. Price shall be full compensation for furnishing and placing all materials, including expansion joint material, joint sealant and reinforcing steel, surface finishing, and curing.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 421 “Structural Concrete”
Item 526 “Membrane Curing”

END OF ITEM 491

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 2

ITEM 493

RIPRAP

493.1 Description. This Item shall govern for furnishing and installing of concrete or stone riprap for common erosion protection applications in open channels.

493.2 Materials. The storage area shall be kept clean, firm, and smooth and well drained in order that the riprap can be recovered free from dirt and other foreign matter.

The riprap shall be stockpiled and handled so as not to cause undue segregation of particle sizes either in the stockpile, or while loading, hauling and handling.

The riprap shall consist of broken concrete or stone blocks and shall be dense, durable and hard material free from cracks, seams and other defects which would tend to increase deterioration from handling and natural causes.

Where broken concrete is used, all exposed metal, including rebar and wire mesh, shall be cut off flush with the surface of the block prior to placing.

Spalls, fragments and chips shall not exceed 5 percent by weight. The dimension and shape limitations do not apply to this portion of the riprap.

Riprap blocks shall be provided in cubic form, rather than elongated (flat) shapes.

The minimum thickness of each block shall be 6 inches.

No more than 25 percent of the blocks may have a length greater than 2-1/2 times the width or thickness. No length of block shall exceed 3 times the width or thickness.

The riprap shall be well graded and shall conform to the following tables unless specifically noted otherwise on the drawings:

TABLE 1 - RIPRAP GRADATION NO. 1

PERCENT LIGHTER BY WEIGHT	STONE WEIGHT (Lbs.)		VOLUME CUBIC FOOT (2)		CUBICAL SHAPE (Ea. Side, ft.)		SPHERICAL SHAPE (Dia., ft.)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
100	180	265	1.20	1.77	1.06	1.21	1.31	1.50
50	80	110	0.53	0.73	0.81	0.90	1.01	1.12
15	40	60	0.27	0.40	0.64	0.74	0.80	0.91

NOTES: The theoretical cube and sphere size is presented in the table for guidance only. The previous size and shape specifications shall govern.

Volume is based on 150 pcf, unit weight.

This gradation is to be used in normal applications, and may be noted on the drawings as standard riprap, riprap, 18 inch thick riprap mats, or other similar designations.

TABLE 2 - RIPRAP GRADATION NO. 2

PERCENT LIGHTER BY WEIGHT	STONE WEIGHT (Lbs.)		VOLUME CUBIC FOOT (2)		CUBICAL SHAPE (Ea. Side, ft.)		SPHERICAL SHAPE (Dia., ft.)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
100	260	640	1.73	4.27	1.20	1.62	1.49	2.01
50	130	200	0.87	1.33	0.95	1.10	1.18	1.37
15	40	150	0.27	1.00	0.64	1.00	0.80	1.24

NOTES: Provide a 24 inch thick mat, minimum, for Riprap Gradation No. 2.

The theoretical cube and sphere size is presented in the table for guidance only. The previous size and shape specifications shall govern.

Volume is based on 150 pcf, unit weight.

The gradation is to be used only where specifically noted on the drawings as “Riprap Gradation No. 2”.

For special applications, gradation, thickness, and other special requirements shall be as shown in the plans.

493.3 Construction Methods. The riprap shall meet the gradation and quality requirements prior to placing.

The riprap shall be placed to the slopes, lines, and grades as shown on the drawings, to provide a well-graded mass of riprap without voids.

Thickness of the riprap mat shall be as shown on the drawings, with a minimum mat thickness as shown on the gradation tables.

The riprap shall be placed in one course (lift) across the channel bottom, then up the channel side slopes. Place the riprap carefully in such a manner to avoid displacement or damage to the prepared surface or geotextile and in such a manner to avoid segregation of particle sizes. Place riprap as close to final position as feasible.

The riprap blocks are to be in close contact, well-graded, and free from pockets of small stones or clusters of large stones. Elongated riprap blocks shall be well distributed throughout the riprap mat. Individual oversized blocks will not be permitted. These shall be broken to acceptable size or removed and replaced with riprap within the gradation limits. Surface irregularities shall be minimal.

Do not drop riprap from such a height to cause breakage or to damage the geotextile (if used).

Prevent mixture or incorporation of dirt or other materials with the riprap during placing operation.

Placing of riprap by any method, machine or hand, will be permitted as long as specified requirements are obtained.

Fill spaces between larger riprap blocks with spalls and smaller blocks of the largest feasible size to form a compact mass. Do not place spalls and small blocks in place of larger size blocks.

493.4 Measurement. Riprap shall be measured by the square yard or by the ton of riprap material, as noted on the bid sheets. Riprap Gradation No. 1 when measured by the square yard shall be for a minimum specified thickness of 18 inches, complete in place. Riprap Gradation No. 2 when

measured by the square yard shall be for a minimum specified thickness of 24 inches, complete in place.

Channel excavation to the top of riprap (finish grade) is measured as shown on the bid sheets.

Excavation for the placement of Riprap Gradation No. 1 to 18 inches beyond the finish grade shall be considered incidental to placement of riprap.

Excavation for the placement of Riprap Gradation No. 2 to 24 inches beyond the finish grade shall be considered incidental to placement of riprap.

Channel fill to the top of riprap (finish grade) is measured as shown on the Bid Sheets. Channel fill, not approved by the Engineer, shall not be measured.

Geotextile under the riprap, where required (as shown on the drawings), shall not be measured and shall be considered incidental to riprap.

493.5 Payment. Payment for riprap shall be based on the unit price per square yard or the price per ton for riprap placed, as shown on the plans. Payment shall be full compensation for providing all labor, materials, geotextile, excavation and equipment necessary to complete the riprap installation.

Excavation for the placement of riprap is considered incidental.

Payment for Channel Excavation to the top of riprap (finish grade) is paid for as shown on the Bid Sheets.

Fill, as approved by the Engineer, to the top of riprap (finish grade) is paid for as shown on the Bid Sheets.

There are line code(s), description(s) and unit(s) for this Item.

NOTE: This Item requires other Standard Specification

Item 494 “Geotextiles”

END OF ITEM 493

FOR PROJECTS INITIATED
AFTER MAY 1, 2014
REVISION 3

ITEM 501

TREE PROTECTION AND TRIMMING

501.1 Description. This Item shall govern for the protection and trimming of trees indicated to be preserved. Trees located a clear distance of 3 feet or more from the tree's dripline to the proposed face of curb are to be preserved unless field conditions determine otherwise.

501.2 Quality Assurance. All tree removing, trimming and work within the tree's dripline shall be performed by or under the supervision of an arborist certified by the International Society of Arboriculture (ISA). The arborist shall indicate the trees that need to be removed, but no removal will be done without prior approval of the Engineer.

The Latest Edition of reference standards applicable to this Item are:

A. ASTM D2665 "Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings"

B. AWPA Standard U1 "Use Category System: User Specification for Treated Wood"

501.3 Job Conditions. The Contractor shall protect each tree designated to be preserved with a tree protection fence, installed in accordance with Item 559 "Construction Safety Fence" along the outside edge of the tree's dripline. The fencing shall be continuous between posts, shall be pulled taut prior to securing to posts, and shall be firmly attached to the posts with a minimum of 4 ties.

All tree protection fencing shall be installed prior to site work or construction activity. The fence shall be placed in a continuous alignment as shown on the tree protection plan or as approved by the Engineer.

Tree protection fencing shall be removed by the Contractor unless otherwise directed by the Engineer, at no additional costs, upon completion of all construction activity in each work zone area. Tree protection fencing materials used in the first work zone area(s) shall be removed and utilized in subsequent work zone areas. Materials and labor shall be paid for each linear foot of fencing installed in first two work areas. All fencing installed in subsequent work zone areas shall be paid for labor only.

Contractor shall not allow any vehicular traffic, parking of vehicles or stockpiling of excavated material or construction materials within 3 feet of the dripline of trees indicated to be preserved.

Construction equipment may operate within 3 feet of the dripline of a tree when necessary for the performance of indicated work; such operations shall be conducted with special care to avoid damaging the tree.

Water trees indicated to be preserved, as required to maintain their healthy growth during the course of construction operations (per Arborist recommendation).

501.4 Materials. Tree pruning compound shall be waterproof, antiseptic, elastic, and free of kerosene, coal tar, creosote, and other substances harmful to trees.

Topsoil shall be material free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, vegetation, and other deleterious matter.

Drainage fill shall be selected stone or gravel, graded to pass a 3 inch sieve and retained on a 1 inch sieve.

Physical barriers, if required, shall be constructed from the following material:

A. Wood Components: Number 2 Pine, pressure treated to prevent decay for 1 year in accordance with the requirements AWPA Standard U1, suitable for Use Category 4B.

B. Fence Material: Fence shall be comprised of extruded, high density polypropylene, 4 foot tall minimum and orange in color. The mesh openings shall be no larger than 3-1/2 inches x 1-1/2 inches. T-posts shall be made of fiberglass or steel and shall be 6 feet long (minimum).

C. Banding: Stainless steel or varnish coated carbon steel, 3/4 inch wide x 26 gauge.

D. PVC pipe shall conform to ASTM D2665 and be 4 inch O.D., nominal.

501.5 Execution. The Contractor shall protect tree root systems from damage due to noxious materials in solution caused by run-off or spillage during mixing and placement of construction materials, or drainage from stored materials.

The Contractor and/or any of the Contractor's workers shall not park vehicles under trees, nor perform vehicle maintenance under trees.

If required, remove branches from trees indicated to be preserved to clear for new construction. All cuts should be made sufficiently close to the parent limb or trunk without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. All lateral cuts shall be made back to a lateral that is at least 1/3 the diameter of the parent limb. Clean cuts shall be made at all times. Where directed by the Engineer, extend the pruning operation to restore the natural shape of the entire tree.

Cut branches and roots with sharp pruning instruments. Do not break or chop branches and roots. Paint cuts over 1/2 inch in size with tree pruning compound. Apply black latex paint to all fresh wounds on Oak (Quercus) species immediately after each cut is made.

501.6 Pruning. Pruning shall be completed by ISA (International Society of Arboriculture) certified arborist who has received training in proper pruning techniques. Prior to construction, all deciduous trees indicated to be preserved shall be pruned of new or recent growth to maintain the basic branching form of the trees. Extent of pruning shall be based upon the proximity of pavement to the trunk and the size of tree blockouts and the requirements for construction adjacent to the tree.

Trees having branches which extend to the ground at their outermost limit shall have such branches pruned to a height equal to the height of all vehicles requiring access below or around such trees. Provide minimum of 14 feet and maximum of 18 feet of vertical clearance over proposed street construction. The Contractor shall notify property owner in writing 48 hours prior to trimming or pruning any trees on private property for privately owned trees extended into County right-of-way.

Pruning shall be limited as much as possible to young branches. Care shall be taken to maintain older branches which provide the basic form of the tree.

501.7 Excavation Around Trees. Excavate within the dripline of trees only where indicated. Where trenching for utilities is required within dripline, tunnel under or around roots by hand digging. Do not cut main lateral roots or tap roots. Smaller roots which interfere with the installation of new work may be cut.

Where excavating for new construction is required within the dripline of trees, hand excavate to minimize damage to the root system. Provide

sheeting at excavations if required. Use narrow spading forks and comb soil to expose roots.

Relocate roots in backfill areas wherever possible. If large main lateral roots are encountered, expose beyond excavating limits as required to bend and relocate without breaking. If roots are immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.

Do not allow exposed roots to dry before permanent backfill is placed. Provide temporary earth cover, or pack with peat moss and wrap with burlap. Water and maintain exposed roots in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.

Prune branches to balance loss to root system caused by damage or cutting, per arborist recommendations.

501.8 Grading and Filling Around Trees. Maintain the existing grade within the dripline of trees, unless otherwise indicated.

Where the existing grade is above the new finish grade around trees, carefully hand excavate within the dripline to new finish grade. Cut roots exposed by excavation and provide permanent protection as recommended by the certified arborist.

Where the existing grade is 3 inches or less below new finish grade, use a topsoil fill material. Place the topsoil in a single layer and do not compact. Hand grade to the required elevation.

Where existing grade is more than 6 inches below new finish grade, provide 1 inch, schedule 40 PVC pipe, 6 feet on centers around tree perimeter, at dripline for aeration of the root system.

501.9 Repair of Trees. When trees indicated to be preserved are damaged by construction operations, remove the damaged portions as soon as possible to prevent progressive deterioration. Repair work shall be subject to the approval of the Engineer.

Remove and replace dead or damaged trees designated to be preserved which are determined by the certified arborist to be incapable of restoration to normal growth status.

501.10 Submittal Requirement. The Contractor shall submit the qualifications of ISA certified arborist for Engineer’s approval.

501.11 Measurement and Payment. Measurement and payment for tree protection and trimming shall be by the lump sum or by each in accordance with the bid proposal.

Removal of trees shall be paid for as provided in the bid proposal in accordance with Item 102 “Clearing and Grubbing”.

Tree protection with barrier (orange fence) shall be measured and paid per each or per linear feet in accordance with bid proposal.

There are line code(s), description(s), and unit(s), for this Item.

NOTE: This Item does require other Standard Specifications.

Item 102 “Clearing and Grubbing”
Item 559 “Construction Safety Fence”
Item 725 “General Source Control (SWPPP)”

END OF ITEM 501

FOR PROJECTS INITIATED
AFTER SEPTEMBER 1, 2017
REVISION 8

ITEM 530

CONCRETE CURB, CONCRETE CURB & GUTTER, SIDEWALKS AND DRIVEWAYS

530.1 Description. This Item shall govern for curb, monolithic curb and gutter, sidewalks and/or driveways, with or without reinforcing steel, composed of portland cement concrete constructed on approved subgrade, foundation material, or finished surface in accordance with the lines and grades established by the Engineer and in conformance with the details shown on the plans. ADA compliance is required for sidewalks and ramps.

As used in this Item the word "curb" refers to standard 6 inch, doweled, and mountable concrete curbs, and monolithic curb and gutter.

530.2 Materials. Concrete used in conventionally formed construction shall be minimum Class D2 concrete, meeting the requirements of Item 421 “Structural Concrete”. Concrete for extruded construction shall also be minimum Class D2.

Cement mortar shall conform to ASTM C270 “Standard Specification for Mortar for Unit Masonry”, Type M. Aggregate for mortar shall conform to ASTM C144 “Standard Specification for Aggregate for Masonry Mortar.”

In construction of concrete curb, concrete curb and gutter, sidewalks and driveways, the Contractor has the option of using portland cement or portland cement plus fly ash, as defined herein. Cement plus fly ash shall be composed of portland cement and 20-30 percent fly ash, by weight. Fly ash shall be Class C or Class F, conforming to the requirements of ASTM C618 “Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.”

Reinforcing steel shall conform to the requirements of Item 440 "Reinforcing Steel".

Membrane curing materials shall meet the requirements of the Item 526 "Membrane Curing".

Bank sand, used as bedding material for concrete sidewalks, shall meet the requirements of Item 402 “Bank Sand Backfill”.

530.3 Construction Methods. Any required excavation and backfill shall be completed in accordance with Item 400 “Structural Excavation and Backfill”, except for measurement and payment, and/or in accordance with Item 110 “Roadway Excavation” and Item 132 “Embankment”.

For conventionally formed concrete, the subgrade, foundation, or pavement surface shall be shaped to the line, grade and cross-section and if considered necessary by the Engineer, hand tamped and sprinkled. If dry, the subgrade or foundation material shall be sprinkled lightly immediately before concrete is deposited thereon.

Outside forms shall be of wood or metal, of a section satisfactory to the Engineer, straight, free of warp and of a depth equal to the depth required. They shall be securely staked to line and grade, and maintained in a true position during the depositing of concrete. Inside forms for curbs shall be of approved material, shall be of such design as to provide the curb required and shall be rigidly attached to the outside forms.

The reinforcing steel and/or dowels, if required, shall be placed in the position shown by the plans. Care shall be exercised to keep all steel in its proper location.

After the concrete has been struck off and after it has become sufficiently set, the exposed surfaces shall be thoroughly worked with a wooden float. The exposed edges shall be rounded by the use of an edging tool to the radius indicated on the plans. Unless otherwise specified on the plans, when the concrete has become sufficiently set, the inside form for curbs shall be carefully removed and the surface shall be plastered with a mortar consisting of one part of portland cement and two parts of fine aggregate. The mortar shall be applied with a template made to conform to the dimensions as shown on the plans. All exposed surfaces shall be brushed to a smooth and uniform surface.

Sidewalks shall be constructed in sections of the lengths shown on the plans. Unless otherwise provided by the plans, no section shall be of a length less than 8 feet and any section less than 8 feet shall be removed by the Contractor at his own expense. The different sections shall be separated by a premolded or board joint of the thickness shown on the plans, placed vertically and at right angles to the longitudinal axis of the sidewalk. Where the sidewalks or driveways abut a curb or retaining wall, approved expansion material shall be placed along their entire length. Similar expansion material shall be placed around all obstructions protruding through sidewalks or driveways. Sidewalks shall be marked into separate sections, each 4 feet in length, by the use of approved jointing tools. The reinforced concrete sidewalk shall be placed on a bedding material of bank sand, at a minimum of 2” thick.

Curbs, gutters and curb and gutters shall be placed in sections of 80 foot maximum length unless otherwise shown on the plans. Joints shall be

constructed at such locations and of the type as directed and specified on the plans.

All concrete placed under this Item shall contain 4 percent ± 1-1/2 percent entrained air. The completed work shall be cured for a period of not less than 72 hours in accordance with the requirements of the Item 526 "Membrane Curing". Color of concrete shall be in accordance with Item 531 "Coloring Concrete for ADA Ramps".

Extruded Concrete Curbs:
For extruded concrete construction, the concrete shall be placed by an extrusion machine approved by the Engineer. When placement is directly on subgrade or foundation materials the foundation shall be hand-tamped and sprinkled if considered necessary by the Engineer. If the concrete is placed directly on the surface material or pavement, such surface shall be thoroughly cleaned. If required by plan details, the cleaned surface shall then be coated with an approved or other coating as specified at the rate of application per vendor recommendations.

The horizontal alignment shall be maintained from a “guide” line set by the Contractor. The alignment shall strictly conform to the details shown on the plans. The forming tube of the extrusion machine shall be readily adjustable vertically, during the forward motion of the machine to provide variable heights necessary to conform to the established grade line. To provide a continuous check on the grade, a pointer or gauge shall be attached to the machine in such a manner that a comparison can be made between the extruded work and the grade line. Other methods may be used if approved by the Engineer.

The mix shall be fed into the machine in such a manner and at such consistency that the finished work will present a well compacted mass with a surface free from voids and honeycomb and true to the established shape, line and grade.

Any additional surface finishing specified and/or required, shall be performed immediately after extrusion. Joints shall be constructed at such location as directed by the Engineer and to the details shown on the plans.

All concrete placed under this item shall contain 4 percent ± 1-1/2 percent entrained air. The completed work shall be cured for a period of not less than 72 hours in accordance with the requirements of the Item 526, "Membrane Curing".

530.4 Measurement. Work and accepted material as prescribed by this Item for concrete curb, will be measured by the linear foot, complete in place.

Work and accepted material as prescribed by this Item for concrete sidewalks shall be measured by the square yard of surface area, complete in place including bank sand bedding material, as indicated on the plans.

Work and accepted material as prescribed by this Item for ADA curb ramps shall be measured by units of each, or square yard of surface area at specified depth, complete in place. When required, the Contractor's coordination of a TDLR inspection shall be an integral part of each ADA compliant sidewalk construction site.

Work and accepted material as prescribed by this Item for concrete driveways, shall be measured by the square yard of surface area, at specified depth complete in place.

530.5 Payment. The work performed and the materials furnished as prescribed by this Item and measured as provided under measurement will be paid for at the unit price bid for:

A. "Concrete Curb" of the type indicated on the plans

B. "Concrete Sidewalks" of the width, and type indicated on the plans.

C. "ADA Curb Ramps"

D. "Concrete Driveways"

The price for each item shall be full compensation for:

A. Cleaning and coating the base

B. Furnishing and applying all water, mortar, adhesives or other material, including reinforcing steel and dowel bars, if required

C. For furnishing, loading and unloading, storing, hauling and handling all ingredients, including all freight and royalty involved

D. For mixing, placing, finishing, sawing, cleaning and sealing joints and curing all concrete

E. For furnishing all materials for sealing joints and placing joints and joint filler material in proper position

F. For all manipulations, labor, equipment, appliances, tools, traffic provisions and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires Standard Civil Drawings that shall be incorporated into the contract documents.

NOTE**:** This Item requires other Standard Specifications.

Item 110 “Roadway Excavation”
Item 132 “Embankment”
Item 360 “Concrete Pavement”
Item 400 “Structural Excavation and Backfill”
Item 402 “Bank Sand Backfill”
Item 440 "Reinforcing Steel"
Item 526 "Membrane Curing"
Item 531 "Coloring Concrete for ADA Ramps"

END OF ITEM 530

FOR PROJECTS INITIATED
AFTER MAY 1, 2014
REVISION 2

ITEM 537

WHEEL STOPS

537.1 Description. This Item shall govern for the construction, furnishing and installing of precast reinforced concrete wheel stops.

537.2 Materials. Concrete shall be Class "C1" concrete and conform to Item 421 "Structural Concrete", while reinforcement shall conform to Item 440 "Reinforcing Steel".

537.3 Construction. Wheel stops shall be constructed in accordance with the Standard Civil Drawing.

537.4 Measurement. Wheel stops shall be measured by each unit, which shall include attachment pins (No.4 Grade 60 reinforcing bars, 12 inches in length with 7 inch embedment depth), furnished and installed.

537.5 Payment. Wheel stop shall be paid for at the contract unit price for each unit, furnished and installed in place. This price shall be full compensation for all materials, equipment and labor necessary to furnish and install the wheel stop.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires a Standard Civil Drawing that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications.

421 "Structural Concrete"
440 "Reinforcing Steel"

END OF ITEM 537

FOR PROJECTS INITIATED
AFTER MAY 1, 2014
REVISION 2

ITEM 560

MAINTENANCE AND CLEANUP OF THE PROJECT SITE

560.1 Description. This Item shall govern for the maintenance and cleanup of the jobsite both during the term of the construction and at the end of construction.

560.2 General Requirements. The Contractor is required to remove from the job site and dispose of all trash, excess materials, etc., accumulated as a result of and during this work in compliance with current local, State and Federal Regulations.

At such time (daily or weekly) as directed by the Engineer, the Contractor shall remove any debris, trash or excess material off the site. He shall make every effort to keep the site in a neat, presentable condition, at all times.

In addition, at the end of each month, the entire construction site shall be generally cleaned and all trash and material over the length of the site shall be removed off site to the complete satisfaction of the Engineer.

The Contractor will mow, trim and edge the right-of-way and medians on the project for the entire project duration. The mowing schedule shall be as follows:

April – October:	Once per month
November – March:	Once every six weeks

After the construction work has been completed, the Contractor shall remove all debris, trash, excess materials, forms, stakes, empty sacks etc. from the site and leave the site with a neat appearance. All excavation shall be backfilled and all excess excavated material shall be disposed of off the site of the work.

560.3 Measurement and Payment. There shall be no separate payment for this Item.

There are no line code(s), description(s), or unit(s) for this Item.

END OF ITEM 560

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 1

ITEM 562

PREPARING THE RIGHT-OF-WAY

562.1 Description. This Item shall govern for the removal of all obstructions and objectionable material from the right-of-way and designated easements, so as to prepare the right-of-way for construction.

Included under this Item is the removal of trees, shrubs, other landscaping features not designated for preservation, stumps, fences, brush, logs, curb and gutter, driveways, pavement and paved parking areas, miscellaneous stone, brick, concrete, sidewalks, drainage structures, manholes, inlets, abandoned utilities, scrap iron, rubbish and debris, if within the right-of-way or designated easements.

It is the duty and responsibility of the Contractor to locate all "live" utility facilities, within the right-of-way or designated easements and to protect these facilities, except when instructed on the plans to do otherwise.

562.2 Construction Methods. The removal of all trees, shrubs, stumps, and brush shall be in accordance with Item 102 "Clearing and Grubbing". The removal of concrete curb and gutter, concrete driveways, concrete pavement and parking areas shall be in accordance with Item 104 "Removing Old Concrete". The removal of fences shall be in accordance with Item 550 "Existing Fencing and Gates". The removal of roadway signs, mail boxes, traffic signs and light and traffic poles shall be in accordance with Item 500 "Remove and Relocate or Dispose of Traffic Signs, Mail Boxes and Roadway Signs". The removal of existing underground utilities shall be in accordance with Item 465 "Remove and Dispose of Existing Concrete or Metal Pipe". The removal of concrete inlets, boxes and other concrete structures shall be in accordance with Item 104 "Removing Old Concrete". Debris, scrap iron, cans, etc. shall be removed in accordance with Item 200 "Stripping".

562.3 Measurement. Measurement shall be the full width and length of the right-of-way or designated easement.

562.4 Payment. Payment will be on a lump sum basis for "Preparing the Right-of-Way".

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications

Item 102 “Clearing and Grubbing”
Item 104 “Removing Old Concrete”
Item 200 “Stripping”
Item 465 “Remove and Dispose of Existing Concrete or Metal Pipe”
Item 500 “Remove and Relocate or Dispose of Traffic Signs, Mail Boxes and Roadway Signs”

Item 550 “Existing Fencing and Gates”

END OF ITEM 562

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 4

ITEM 666

PREFABRICATED PAVEMENT MARKINGS

666.1 Description. This Item shall govern for furnishing and installing prefabricated pavement markings of the types, colors, shapes and sizes as shown on the plans.

666.2 Materials. Prefabricated pavement marking materials shall conform to Texas Department of Transportation Material Specification DMS-8240 "Permanent Prefabricated Pavement Markings."

Materials shall be stored in a weather-proof enclosure in such a manner to prevent damage.

666.3 Sampling. Sampling will be in accordance with TxDOT's Test Procedure Tex-732-I "Sampling Prefabricated Pavement Marking Materials."

666.4 Construction Methods.

A. General. When required by the Engineer, the Contractor and the Engineer shall review the sequence of work to be followed and the estimated progress schedule. Waste generated by this work shall be removed from the job site before the end of each working day.

Guides to mark the lateral location of pavement markings shall be established as shown on the plans or as directed by the Engineer. The Contractor shall establish the pavement marking guides and the Engineer will verify the location of the guides prior to installation.

The pavement markings shall be placed in proper alignment with the guides. The deviation rate in alignment shall not exceed 1 inch per 200 feet of roadway. The maximum deviation shall not exceed 2 inches nor shall any deviation be abrupt.

B. Seasonal Limitation. Unless otherwise directed in writing by the Engineer, pavement marking materials shall not be placed between September 30 and March 1, subject to temperature and moisture limitations specified.

C. Dimensions. Markings shall be in accordance with the color, length, width, shape and configuration shown on the plans. The alignment and location shall be as shown on the plans or as directed by the Engineer in writing.

D. Methods. All material placement shall be in accordance with the material manufacturer's instructions, unless otherwise directed in writing by the Engineer. In addition to the manufacturer's instructions, material placement shall be in accordance with surface condition, moisture and temperature requirements specified by this Item.

E. Surface Preparation. Surface preparation shall be accomplished by any cleaning method approved by the Engineer that effectively removes contaminants, loose materials and conditions deleterious to proper adhesion. Surface preparation by blast cleaning will not be required unless shown on the plans. When required, blast cleaning shall be done in accordance with Item 669 "Pavement Surface Preparation for Markings". Surfaces shall be further prepared after cleaning by sealing or priming, as recommended by the manufacturer of the pavement marking materials or as directed in writing by the Engineer.

Adhesive, when required, shall be of the type and quality recommended by the manufacturer of the pavement marking material. Portland cement concrete pavement surfaces shall not be cleaned by grinding.

F. Moisture. Pavement to which material is to be applied shall be completely dry. Pavements shall be considered dry if, on a sunny day after observation for 15 minutes, no condensation occurs on the underside of a 1 foot square piece of clear plastic that has been placed on the pavement and weighted on the edges.

G. Temperature. Pavement and ambient air temperature requirements recommended by the material manufacturer shall be followed. If no temperature requirements are established by the material manufacturer, material shall not be placed if the pavement temperature is below 60° F or above 120°F.

666.5 Performance Requirements.

A. Adhesion. Installed pavement markings shall not lift, shift, smear, spread, flow or tear by traffic action.

B. Appearance. Pavement markings shall present a neat, uniform appearance, free of excessive adhesive, ragged edges and irregular lines or contours.

C. Visibility. Installed pavement markings shall have uniform and distinctive retroreflectance when observed in accordance with TxDOT's Test Procedure Tex-828-B "Determining Functional Characteristics of Pavement Markings"

D. Observation Period. Unless otherwise shown on the plans, pavement markings shall meet all requirements of this Item for a minimum of 15 calendar days after installation. Pavement markings that fail to meet all requirements of this Item shall be removed and replaced at the expense of the Contractor. The Contractor shall replace all pavement markings failing the requirements of this Item within 30 working days following notification in writing by the Engineer. All replacement pavement markings shall also meet all performance requirements of this Item for a minimum of 15 calendar days after installation.

666.6 Measurement. This Item will be measured by each word(s), shape or symbol as shown on the plans.

666.7 Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Prefabricated Pavement Markings" of the various types, colors, shapes and sizes specified. This price shall be full compensation for cleaning the pavement by any suitable means, for furnishing and placing all materials; and for all labor, tools, equipment and incidentals necessary to complete the work.

There are line code(s), description(s) and unit(s) for this Item:

NOTE: This Item requires other Standard Specifications

Item 669 "Pavement Surface Preparation for Markings"

END OF ITEM 666

FOR PROJECTS INITIATED
AFTER NOVEMBER 1, 2008
REVISION 1

ITEM 669

PAVEMENT SURFACE PREPARATION FOR MARKINGS

669.1 Description. This Item shall govern for surface preparation of pavement surface areas any time that permanent painted or thermoplastic pavement marking, or raised pavement markers are to be applied.

669.2 Materials. Abrasive blasting medium, when used, shall be a quality commercial product capable of producing the specified surface cleanliness without the deposition of deleterious materials on the cleaned surface. Water used in blasting operations shall be potable.

669.3 Equipment. Equipment shall be in good condition. Air compression equipment shall utilize moisture and oil traps, in working order, of sufficient capacity to remove contaminants from blasting air and prevent the deposition of moisture, oil or other contaminants on the roadway surface.

669.4 Construction Methods. Pavement surface preparation is required to some degree for all forms of permanent pavement markings and raised pavement markers depending on the condition of the surface, the type of surface, and the manufacturer's recommendations.

It is the Contractor's responsibility to determine the method and degree of preparation required to sufficiently remove all dirt, dust, chemicals, oil, loose material, moisture, and other contaminants.

Both, concrete and asphalt surfaces can be prepared by sweeping, brushing, washing, air blasting, high pressure water blasting or any combination thereof. Concrete surfaces can also be prepared by sand blasting.

Whichever technique is used, it shall be carefully controlled to prevent visible damage to the pavement surface.

When new permanent pavement markings are to be placed in the same location as existing markings, small spots of the existing marking may remain if in the opinion of the Engineer, further removal would damage the pavement surface.

669.5 Payment. The work performed and the materials used in accordance with this Item for "Pavement Surface Preparation for Marking" will not be paid for directly, but will be considered subsidiary to the bid item for the pavement marking or raised pavement marker for which the surface preparation work is being performed.

There are no line code(s), description(s), or unit(s) for this Item.

END OF ITEM 669

ITEM 670

BARRICADES

670.1 Description. This Item shall govern for furnishing, installing, moving, replacing, maintaining, cleaning, and removing upon completion of work all barricades.

670.2 Materials. All barricades shall be in accordance with the requirements of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

Markings for permanent Type III barricade rails shall be alternating red and white chevron striping sloping downward at an angle of 45 degrees in the direction traffic is to pass. All parts of the barricade not striped shall be painted white.

Markings for temporary Type III barricade rails shall be alternating orange and white chevron striping sloping downward at an angle of 45 degrees in the direction traffic is to pass. All parts of the barricade not striped shall be painted white.

Where a Type III barricade extends entirely across a roadway, the stripes shall slope downward in the direction toward which traffic must turn when detouring. Where both right and left turns are provided for, the chevron striping shall slope downward in both directions from the center of the barricade.

Reflectorized sheeting used for the chevron striping on both permanent and temporary barricades shall be, as a minimum, in accordance with Item 649 "Wide Angle Prismatic Retroreflective Sheeting for Traffic Control Signs (Diamond Grade)".

The above does not preclude the requirements of the "Harris County General Conditions".

670.3 Construction Methods. All barricades shall be installed in accordance with the drawings, the TMUTCD and Item 671 "Traffic Control".

670.4 Responsibility for Damage or Claims. The Contractor shall hold harmless the County and all its representatives from all suits, actions or claims, of any character brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work or through the use of unacceptable materials in the construction of the improvement, or on account of any act of omission by the Contractor. He shall not be released from said responsibility until the roadway has

been completed and accepted, and so much of the money due the said Contractor under and by virtue of his contract may be retained by the County, or his Surety may be held until such claims have been settled and suitable evidence to that effect furnished to the County.

All barricades, whether temporary or permanent, shall be checked daily to see if they are in their proper location.

670.5 Measurement. Except for Permanent Type III barricades, this Item shall not be measured for payment. Permanent Type III barricades shall be measured by each unit of barricade constructed, complete in place.

670.6 Payment. Except for Permanent Type III barricades, payment shall not be made for this Item. Temporary Barricades shall be paid for in accordance with Item 671 “Traffic Control”.

The basis of payment for Type III barricades shall be the contract unit price bid per each unit, which price shall be full compensation for furnishing and placing all materials and for all labor, tools, equipment and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: <u>This Item requires drawings that shall be incorporated into the contract documents.</u>

NOTE: This Item requires other Standard Specifications

Item 649 “Wide Angle Prismatic Retroreflective Sheeting for Traffic Control Signs (Diamond Grade)”
Item 671 “Traffic Control”

END OF ITEM 670

FOR PROJECTS INITIATED
AFTER MAY 1, 2014
REVISION 8

ITEM 671

TRAFFIC CONTROL

671.1 Description. This shall govern for furnishing, installing, moving, replacing, maintaining, cleaning and removing upon completion of work, all barricades, signs, barriers, barrels, cones, lights, delineators, pavement markings, and other such devices and detours in conformance with the drawings or as directed by the Engineer.

A Traffic Control Plan (TCP) has been established for this project in accordance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD). The Contractor may propose an alternate TCP, and if the alternate plan is approved by the Engineer, it may be used. The alternate TCP must be prepared in accordance with Harris County Traffic Control Guidelines (Latest Edition) and sealed by a Professional Engineer registered in the State of Texas proficient in the field of Traffic Engineering.

671.2 Construction Methods. All barricades, signs and other types of traffic control devices shall conform to details shown on the drawings, and those indicated in Part VI of the TMUTCD.

Prior to beginning work, the Contractor shall designate in writing a competent person who will be responsible and available on the project site or in the immediate area to insure compliance with the TCP.

The Contractor is solely responsible for furnishing, erecting and maintaining all barricades, signs, barriers, barrels, cones, lights, delineators, pavement markings, and other such devices as necessary to adequately protect the project and workers and warn, advise and safeguard the traveling public over the entire length of the project. The Contractor's responsibility in this regard extends for the entire duration of the project, from the start of construction until acceptance by the County.

All reflective traffic control devices such as barricades, vertical panels, signs, etc. shall be maintained at all times by cleaning, replacing or a combination thereof such that during darkness and rain the reflective characteristics shall equal or exceed the retroreflective characteristics of the standard reflective panels in the Engineer's possession. Unless otherwise set forth in these Standard Specifications, the Contractor shall receive compensation for furnishing, erecting and maintaining the necessary barricades, signs, barriers, barrels, cones, lights, delineators, pavement markings, other such devices and any incidentals necessary for

the good and proper safety, convenience and direction of traffic prior to final inspection and acceptance by the County.

Detours and temporary structures necessary for public travel during the prosecution of the work will be indicated on the TCP and the cost included in the bid and contract price. Any necessary detours or temporary structures not indicated on the drawings or provided for in the specifications shall be at the expense of the Contractor. Increased maintenance costs incurred incidental to resulting traffic over an established road, street, or highway as a result of any detour shall not be considered as a cost of maintaining detours and will be paid for by the Contractor.

The Contractor shall provide at his expense, means of ingress and egress for all residents and businesses along any closed section of the work and shall provide property owners a means of access to a public road.

Temporary access driveways shall provide an all-weather surface and shall be maintained by the Contractor in a condition acceptable to the Engineer. Where indicated in the bid documents, asphalt millings may be used for temporary driveways.

No section of the work shall be closed to traffic until so directed by the Engineer. No bridge, culvert or drainage structure shall be closed until an adequate detour has been arranged and constructed.

If, in the opinion of the Engineer, the Contractor does not comply with the above requirements such work as the Engineer may deem necessary for the safety, comfort and convenience of the traveling public may be performed and the charges therefore withheld from any money due or to become due to the Contractor. The Contractor shall not be paid to provide traffic control during delays caused by the Contractor.

The above does not preclude the requirements of the “Harris County General Conditions”.

Providing, installing, moving, replacing, maintaining, cleaning and removing upon completion of work all barricades, signs, barriers, barrels, cones, lights, delineators, pavement markings, and other such devices shall be in accordance with Item 665 “Work Zone Pavement Markings”, Item 670 “Barricades”, Item 696 “Low Profile Concrete Barrier” and Item 698 “Temporary Polyethylene Water-Filled Barrier”. Flagmen shall be furnished, maintained and possess the minimum qualification and requirements stipulated in the TMUTCD. Operation of flagmen shall be as outlined in Item 672 “Flagmen.”

Temporary pavement markings shall be in accordance with Item 665 “Work Zone Pavement Markings”.

Temporary signs and supports shall be made from wood, metal, or other approved materials. Wood for signs shall be minimum 1/2 inch, medium density, outdoor grade plywood. Metal signs shall be in conformance with Item 624 “Aluminum Signs”. Reflectorized sign sheeting shall be in conformance with Item 649 “Wide Angle Prismatic Retroreflective Sheeting for Traffic Control Signs (Diamond Grade).” Signs may be erected on portable, temporary, or fixed supports for use in the work zone. Signs erected on portable supports shall be for daytime use only. All wood supports shall be painted white. Sandbags shall be used where portable or temporary sign supports require the use of weights to prevent a sign assembly from falling over. All signs shall be placed in accordance with the drawings and the TMUTCD.

671.3 Measurement & Payment. Barricades, signs, barriers, barrels, cones, lights, delineators, and other such devices shall be paid for by the month or per each Jobsite, provided the traffic control plan is properly installed and maintained. This includes preparation of an alternative Traffic Control Plan by the Contractor, if any, and approved by the Engineer.

Detours shall be paid for in accordance with Item 673 “Constructing Detours for Maintaining Two-Way Traffic”.

Work Zone Pavement Markings shall be paid for in accordance with Item 665 “Work Zone Pavement Markings”.

Barriers designated as “Low Profile Concrete Barrier” and “Temporary Polyethylene Water-Filled Barrier” shall be paid for in accordance with Items 696 and 698 respectively.

Temporary driveways and the removal of temporary driveways shall be measured and paid for as follows: “Temporary Commercial Driveways per Each” and “Temporary Residential Driveways per Each”. Payment shall include all labor and materials, including shaping, furnishing and hauling necessary to complete the work.

There are line code(s), description(s) and unit(s) for this Item:

NOTE: This Item requires other Standard Specifications.

Item 624 “Aluminum Signs”
Item 649 “Wide Angle Prismatic Retroreflective Sheeting for Traffic Control Signs (Diamond Grade)”

Item 665 “Work Zone Pavement Markings”
Item 670 “Barricades”
Item 672 “Flagmen”
Item 673 “Constructing Detours for Maintaining Two-Way Traffic”
Item 696 “Low Profile Concrete Barrier”
Item 698 “Temporary Polyethylene Water-Filled Barrier”

END OF ITEM 671

ITEM 672

FLAGMEN

672.1 Description. This Item shall govern for the furnishing of flagmen to insure the even flow of traffic through the construction site. The primary function is to move vehicles and pedestrians safely and expeditiously through or around the construction area.

672.2 General Requirements. All flagmen shall possess the minimum qualifications and meet the requirements stipulated in the Texas Manual on Uniform Traffic Control Devices (TMUTCD). The Contractor shall use flagmen for the work associated with the control and safety of all traffic and pedestrian flow throughout the project as shown in the project traffic control plan (TCP), Harris County standard guidelines, the TMUTCD, and as directed by the Engineer.

It is the responsibility of the Contractor to ensure that all flagmen are properly trained in flagging procedures. Flagmen will use paddles, lights, flags, and other equipment which meet the required guidelines and dimensions of the TMUTCD. The STOP/SLOW paddle, which gives drivers more positive guidance than a flag, shall be the primary hand-signaling device. Reusable, removable (temporary) white stop bars should be used to the maximum extent possible and removed when flaggers are not present. Flags should be limited to emergency situations and at low-speed and/or low volume locations that can be best served by a single flagger. The use of an orange vest and cap shall be required for all flagmen. For nighttime conditions, these similar garments shall be reflectorized.

The flagmen are provided at work sites to stop traffic intermittently, as required to protect the Contractor's workmen and equipment, pedestrians and motorists. The flagmen must, at all times, be clearly visible to approaching traffic for a distance sufficient to permit proper response by the motorist to flagging instructions and to permit traffic to reduce speed before entering the work site.

The use of flagmen does not relieve the Contractor of his responsibility to insure proper protection of the public, or of the construction. The Contractor is liable for all damages that occur at the construction site, as a result of accidents with citizens and motorists, even though he has provided flagmen.

All costs for flagmen shall be incidental to the other work.

672.3 Off-Duty Uniformed Local Law Officers. When directed by the Engineer, the Contractor shall use a combination of off-duty uniformed local law officers and flagmen for intersection work and for the implementation of initial traffic control phases or traffic switches (traffic directed to change lanes or stop). When off-duty uniformed local law officers are used, they shall be used in addition to flagmen, not as a substitute for flagmen. The Contractor may at his own expense elect to use off-duty uniformed local law officers when not directed by the Engineer. The Engineer may direct the use of off-duty uniformed local law officers for circumstances which could not have been reasonably anticipated in the planning of the project. The direction may be based upon, but certainly not limited to, one, or all of the following reasons:

A. traffic volume;

B. the nature and location of the work to be accomplished;

C. weather conditions;

D. the safety of the motorists, pedestrians or construction workers.

672.4 Submittal Required. If flagmen are to be used during the project the Contractor shall demonstrate ownership of 2 radios, 2 stop/slow paddles, 2 temporary white stop bars, 2 flags, 2 orange vests and 2 safety caps at the start of the project.

672.5 Measurement and Payment.

Flagmen. Flagmen shall not be paid for directly, but shall be incidental to the other work.

Off-duty Uniformed Peace Officers.
Off-duty, uniformed, peace officers shall be paid for by the hour when the use is approved as directed by the Engineer.

The Contractor may at his own expense elect to use off-duty uniformed local peace officers when not directed by the Engineer.

There are line code(s), description(s) and unit(s) for this Item:

END OF ITEM 672

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 3

ITEM 713

REINFORCED FILTER FABRIC BARRIER

713.1 Description. This Item shall govern for furnishing, installing, and removing temporary erosion protection and sediment control reinforced filter fabric barrier in accordance with these Standard Specifications and construction drawings, and as directed by the Engineer. The reinforced filter fabric barrier consists of geotextile fabric supported by a net reinforced fence stretched across and attached to supporting posts or frame and entrenched. This work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation.

713.2 Materials. Geotextile fabric (filter fabric) shall consist of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins in a woven fabric. The geotextile fabric shall meet or exceed the following specifications:

TABLE 1

SILT FENCE GEOTEXTILE FABRIC PROPERTIES			REQUIREMENTS UNSUPPORTED SILT FENCE	
	Units	Supported Silt Fence	Geotextile Elongation ≥50%	Geotextile Elongation <50%
Grab Strength				
Machine Direction	Lbs.	90	123	123
X-Machine Direction	Lbs.	90	100	100
Permittivity	Sec^{-1}	0.05	0.05	0.05
Apparent Opening Size (Max. Average Roll Value)	Mm/sieve	0.6/30	0.6/30	0.6/30
Ultraviolet Stability (Retained Tensile Strength)	%	70 after 500 hrs exposure	70 after 500 hrs exposure	70 after 500 hrs exposure

NOTES:
1. Table 1 adapted from AASHTO M 288 *Geotextile Specification for Highway Applications* Table 6. Temporary Silt Fence Property Requirements.
2. All numeric values in Table 1 except Apparent Opening Size (AOS) represent minimum average roll values (MARV). Values for AOS represent maximum average roll values.

Geotextile fabric shall contain stabilizers and/or inhibitors to make the fabric resistant to deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, and insects. Geotextile fabric shall be free of defects or flaws that affect its physical and/or filtering properties. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.

Fence posts shall be either steel or hardwood, essentially straight, with a minimum length of 4 feet. Hardwood posts shall be 2 inch x 2 inch minimum, or equivalent. Metal posts shall be either studded T or U steel type with a minimum weight of 1.28 lbs. per linear foot. Fin anchors shall be used to resist post movement as directed by the Engineer.

Net reinforced fence shall be 2 inch wide by 4 inch high welded wire fabric mesh, 14 gauge minimum. The mesh support height shall be the equivalent height, or greater, of the geotextile fabric to be attached. Plastic grid mesh or other support mesh may be substituted for welded wire mesh as approved by the Engineer.

Attachment of net reinforced fence and geotextile fabric shall be with wire ties, staples, or rings. Wire ties shall be 14 gauge minimum, staples shall be no. 9 wire minimum with a 1/2 inch minimum crown length, and rings shall be galvanized, or as approved by the Engineer.

A prefabricated unit with geotextile fabric, posts, and wire mesh meeting the minimum specifications in this Item may be used in lieu of a constructed filter fabric barrier.

713.3 Construction Methods. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing, surveying and installation of erosion protection and sediment control measures, shall be permitted until sediment control and erosion protection systems are in place.

Reinforced filter fabric barriers shall be so installed that the surface runoff will percolate through the system and allow sediment to be retained and accumulated, and may be used in conjunction with a rock filter dam (Item 750) at the outfall of a detention pond. Reinforced filter fabric barrier shall not be used as the sole best management practice at the outfall of a detention pond. Reinforced filter fabric barriers shall be installed at the locations shown on the construction drawings and in accordance with the Standard Civil Drawing or as directed by the Engineer. Reinforced filter fabric barriers shall be constructed in accordance with an approved schedule that clearly describes the timing during the construction process that the various erosion control measures will be implemented. Reinforced

filter fabric barriers shall be installed so as surface runoff will percolate through the system and allow sediment to be retained and accumulated.

Posts shall be driven to a minimum depth of 1 foot into the ground. Posts shall be a minimum of 18 inches above the ground. Posts shall be placed with a maximum spacing of 6 feet and be installed on a slight angle toward the anticipated runoff.

Trenches shall be dug along the uphill side of the fence to anchor at least 8 inches of the filter fabric to prevent underflow. The trench shall be a 6 inch x 6 inch square, or a 4 inch deep V-trench.

Net reinforced fence shall be attached to the posts. Attachment shall be at the top and mid-section. Additional ties or staples shall be added to secure the net reinforced fence to the posts as directed by the Engineer.

Geotextile fabric shall be placed against the side of the trench with approximately 2 inches across the bottom in the upstream direction. Using wire ties or rings, the geotextile fabric shall be attached to the net reinforced fence. The fabric shall be attached at the top and mid-section. The horizontal spacing of the attachment shall be every 24 inches, or less. Additional ties, rings, or staples shall be added to secure fabric to the net reinforced fence or posts as directed by the Engineer.

Geotextile fabric shall be provided in continuous rolls and cut to the length of the barrier, so as to minimize joints. When joints of two sections of fabric are necessary, the fabric shall be spliced together only at a support post. The fabric shall be overlapped a minimum of 6 inches at a post, folded, and secured at six or more places. Splices in concentrated flow areas will not be permitted.

Geotextile fabric shall be attached at the end posts at a minimum of four locations. Geotextile fabric shall be entrenched and attached to the posts so as a minimum of 18 inches of the fabric is above the ground. The trench then shall be backfilled and hand tamped as approved by the Engineer.

Contractor shall inspect the reinforced filter fabric barriers at least once every week or as directed by the Engineer. The Contractor shall remove irregularities which will impede normal flow. Erosion protection and sediment control systems shall be maintained by the Contractor until final stabilization. Damage caused to erosion protection and sediment control systems shall be repaired immediately. (Note: Maintenance for Item 713 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

The Contractor is responsible for removal and proper disposal of sediment and debris from the reinforced filter fabric barrier system and as directed by the Engineer. Sediment and debris shall not be allowed to flush into the storm sewer system, waterways, and jurisdictional wetlands, or onto adjacent properties. Sediment deposits shall be removed before they reach one-third of the height of the reinforced filter fabric barrier.

Uncontaminated sediment can be placed at the project spoil site protected by a reinforced filter fabric barrier or, if properly handled, spread out to supplement fill requirements. The Engineer will designate how the sediment deposits are to be handled. Uncontaminated sediment shall not be placed in waterways or jurisdictional wetlands, unless as approved by the Engineer. If sediment has been contaminated, then it shall be disposed of in compliance with current local, State and Federal Regulations. Offsite disposal shall be the responsibility of the Contractor.

After final stabilization and at the direction of the Engineer, the Contractor, when required, shall be responsible for removing all erosion protection and sediment control systems that are not permanent, from the project.

713.4 Quality Assurance. The Contractor is responsible for the control of the quality of materials incorporated into the construction and the quality of completed construction. The County will engage materials engineering services to provide quality assurance testing and inspection to assist the Engineer in determining the acceptability of materials and completed construction. Quality assurance services provided by the County do not relieve the Contractor of his responsibility for quality control. The Materials Engineer shall not have control of the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

713.5 Measurement. When paid for separately as a pay item, measurement for reinforced filter fabric barrier shall be by the linear foot, complete in place, measurement being made along the centerline of the top of the barrier.

715.6 Payment. Payment for reinforced filter fabric barrier shall include and be full compensation for all labor, equipment, materials, supervision and all incidental expenses for the construction of this Item, complete in place, where 60 percent of the total unit cost shall be for furnishing and installing all materials. Thus, 40 percent of the total unit cost shall be for the removal and disposal of erosion protection and sediment control systems: reinforced filter fabric barrier, after final stabilization, at the end of the project.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires a Standard Civil Drawing that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications.

Item 751 “SWPPP Inspection and Maintenance”

END OF ITEM 713

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 3

ITEM 719

INLET PROTECTION BARRIERS

719.1 Description. This Item shall govern for furnishing, installing, and removing temporary erosion protection and sediment control inlet protection barriers in accordance with these Standard Specifications and construction drawings, and as directed by the Engineer. The inlet protection barrier consists of a geotextile fabric (filter fabric) supported by a net reinforced fence structure and constructed around a storm drain inlet, catch basin, or culvert. An alternative design of the inlet protection barrier, as approved by the Engineer, consists of fiber rolls placed around a frame, staked in place (or weighted down with clean gravel bags), and constructed around a storm drain inlet, catch basin or culvert. This work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation.

719.2 Materials. Geotextile fabric (filter fabric) shall consist of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins in a woven fabric. The geotextile fabric shall meet or exceed the following specifications shown in Table 1:

TABLE 1

SILT FENCE GEOTEXTILE FABRIC PROPERTIES			REQUIREMENTS UNSUPPORTED SILT FENCE	
	Units	Supported Silt Fence	Geotextile Elongation ≥50%	Geotextile Elongation <50%
Grab Strength				
Machine Direction	Lbs.	90	123	123
X-Machine Direction	Lbs.	90	100	100
Permittivity	Sec^{-1}	0.05	0.05	0.05
Apparent Opening Size (Max. Average Roll Value)	Mm/sieve	0.6/30	0.6/30	0.6/30
Ultraviolet Stability (Retained Tensile Strength)	%	70 after 500 hrs exposure	70 after 500 hrs exposure	70 after 500 hrs exposure

NOTES:
1. Table 1 adapted from AASHTO M 288 *Geotextile Specification for Highway Applications* Table 6. Temporary Silt Fence Property Requirements.
2. All numeric values in Table 1 except Apparent Opening Size (AOS) represent minimum average roll values (MARV). Values for AOS represent maximum average roll values.

Geotextile fabric shall contain stabilizers and/or inhibitors to make the fabric resistant to deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, and insects. Geotextile fabric shall be free of defects or flaws that affect its physical and/or filtering properties. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.

Posts shall be either steel or hardwood, essentially straight, with a minimum length of 4 feet. Hardwood posts shall be 2 inch x 2 inch minimum, or equivalent. Metal posts shall be either studded T or U steel type with a minimum weight of 1.28 lbs. per linear foot. Fin anchors shall be used to resist post movement as directed by the Engineer.

Support beams shall be either steel or hardwood essentially straight. Hardwood support beams shall be 2 inch x 2 inch minimum, or equivalent. Metal support beams shall be either studded T or U steel type with or minimum weight of 1.28 lbs per linear foot, or as approved by the Engineer.

Net reinforced fence shall be 2 inch wide by 4 inch high welded wire fabric mesh, 14 gauge minimum. The mesh support height shall be the equivalent height, or greater, of the geotextile fabric to be attached. Plastic grid mesh or other support mesh may be substituted for welded wire mesh as approved by the Engineer.

Attachment of net reinforced fence and geotextile fabric shall be with wire ties, staples, or rings. Wire ties shall be 14 gauge minimum, staples shall be no. 9 wire minimum with a 1/2 inch minimum crown length, and rings shall be galvanized, or as approved by the Engineer.

A prefabricated unit with geotextile fabric, posts, supports, and wire mesh meeting the minimum specifications in this Item may be used in lieu of a constructed inlet protection barrier.

Fiber roll material for inlet protection barrier alternative design shall be as approved by the Engineer.

719.3 Construction Methods. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing, surveying and installation of erosion protection and sediment control measures, shall be permitted until sediment control and erosion protection systems are in place.

Inlet protection barriers shall be installed at the locations shown on the construction drawings and in accordance with the Standard Civil Drawing or as directed by the Engineer. Inlet protection barriers shall be

constructed in accordance with an approved schedule that clearly describes the timing during the construction process that the various erosion control measures will be implemented. Inlet protection barriers shall be installed so as surface runoff will percolate through the system and allow sediment to be retained and accumulated.

Posts shall be driven to a minimum depth of 1 foot into the ground. Posts shall be a minimum of 18 inches above the ground. Posts shall be placed with a maximum spacing of 4 feet. Horizontal support beams shall be securely attached from post to post and no higher than the top of the filtering material.

Trenches shall be dug along the upstream side of the barrier to anchor at least 8 inches of the geotextile fabric to prevent underflow. The trench shall be a 6 inch x 6 inch square, or a 4 inch deep V-trench.

Net reinforced fence shall be attached to the posts. Attachment shall be at the top and mid-section. Additional ties or staples shall be added to secure the net reinforced fence to the posts as directed by the Engineer.

Geotextile fabric shall be placed against the side of the trench with approximately 2 inches across the bottom in the upstream direction. Using wire ties or rings, the geotextile fabric shall be attached to the net reinforced fence. The fabric shall be attached at the top and mid-section. The horizontal spacing of the attachment shall be every 24 inches, or less. Additional ties, rings, or staples shall be added to secure fabric to the net reinforced fence or posts as directed by the Engineer. Geotextile fabric shall be entrenched and attached to the posts so as a minimum of 18 inches of the fabric is above the ground.

Geotextile fabric shall be provided in continuous rolls and cut to the length of the barrier, so as to minimize joints. When joints of two sections of fabric are necessary, the fabric shall be spliced together only at a support post. The fabric shall be overlapped a minimum of 6 inches at a post, folded, and secured at six or more places.

After the geotextile fabric has been securely attached, the trench shall be backfilled and hand tamped as approved by the Engineer.

For inlet protection barriers with reinforced filter fabric, if the immediately adjacent surface is a hard packed surface, the geotextile fabric shall extend outward away from the inlet protection barrier and upstream along the hard packed surface for at least 12 inches and be weighed down continuously along the perimeter of the structure with at least 4 inches of clean gravel or nylon gravel filled bags

The Contractor shall inspect the inlet protection barriers at least once every week or as directed by the Engineer. The Contractor shall remove

irregularities which will impede normal flow. Erosion protection and sediment control systems shall be maintained by the Contractor until final stabilization. Damage caused to erosion protection and sediment control systems shall be repaired immediately. (Note: Maintenance for Item 719 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

The Contractor is responsible for removal and proper disposal of sediment and debris from the inlet protection barrier system and as directed by the Engineer. Sediment and debris shall not be allowed to flush into the storm sewer system, waterways, and jurisdictional wetlands, or onto adjacent properties. Sediment deposits shall be removed before they reach one-third of the height of the inlet protection barrier.

Uncontaminated sediment can be placed at the project spoil site or, if properly handled, spread out to supplement fill requirements. The Engineer will designate how the sediment deposits are to be handled. Uncontaminated sediment shall not be placed in waterways or jurisdictional wetlands, unless as approved by the Engineer. If sediment has been contaminated, then it shall be disposed of in compliance with current local, State and Federal Regulations. Offsite disposal shall be the responsibility of the Contractor.

After final stabilization and at the direction of the Engineer, the Contractor, when required, shall be responsible for removing all erosion protection and sediment control systems that are not permanent, from the project.

719.4 Quality Assurance. The Contractor is responsible for the control of the quality of materials incorporated into the construction and the quality of completed construction. The County will engage materials engineering services to provide quality assurance testing and inspection to assist the Engineer in determining the acceptability of materials and completed construction. Quality assurance services provided by the County do not relieve the Contractor of his responsibility for quality control. The Materials Engineer shall not have control of the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

719.5 Measurement. When paid for separately as a pay item, measurement shall be by the unit, for each inlet protection barrier, complete in place.

719.6 Payment. Payment for each unit of an inlet protection barrier shall include and be full compensation for all labor, equipment, materials, supervision and for all incidental expenses for the construction of these items, complete in place, where 60 percent of the total unit cost shall be for the furnishing and installing all material. Thus, 40 percent of the total unit cost shall be for the removal of erosion protection and sediment control systems: inlet protection barriers, after final stabilization, at the end of the project.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires a Standard Civil Drawing that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications

Item 751 “SWPPP Inspection and Maintenance”

END OF ITEM 719

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 5

ITEM 724

STABILIZED CONSTRUCTION ACCESS

724.1 Description. This Item shall govern for furnishing and installing temporary erosion protection and sediment control stabilized construction access, utilized during construction operations and prior to final stabilization, in accordance with these Standard Specifications and construction drawings, and as directed by the Engineer.

724.2 Materials. Geotextile fabric shall consist of a woven monofilament or spunbond nonwoven fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins. Geotextile fabric shall equal or exceed the following average roll values or as directed by the Engineer:

A. Minimum average roll value.

1. Elongation ≥ 50%.

2. Grab Strength – 200 pounds.

3. Puncture Strength – 75 pounds.

4. UV Stability (retained strength) – 50% after 500 hours of exposure.

B. Maximum average roll value.

1. Apparent Opening Size (AOS) – 0.6 mm/#30 US sieve.

Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, insects, and deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.

Aggregate for the construction access shall consist of crushed stone, gravel, or furnace slag, or combination thereof. The aggregate shall be open graded with a size of 2 inches to 5 inches with no material diameter less than 2 inches and no material diameter greater than 5 inches. Aggregate particles shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials or organic and injurious matter. Prior to installation, all exposed metal, including reinforcing steel and wire mesh, shall be cut off flush with the surface of the crushed concrete. The depth of the aggregate shall not be less than 8 inches.

Aggregate shall be cubic or rounded form, not elongated, flat, shapes. Spalls, fragments, and chips shall not exceed 5 percent by weight.

724.3 Construction Methods. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing, surveying and installation of erosion protection and sediment control measures, shall be permitted until sediment control and erosion protection systems are in place.

Stabilized construction access shall be installed at the locations shown on the construction drawings and in accordance with the Standard Civil Drawing or as directed by the Engineer. Stabilized construction access shall be constructed in accordance with an approved schedule that clearly describes the timing during the construction process that the various erosion control measures will be implemented. Stabilized construction access shall be installed so as to prevent tracking or flowing of sediment from the construction site.

The construction access location shall be graded to provide sufficient drainage away from the proposed stabilized area. The separation geotextile fabric shall be placed to the width and length of the construction access. Aggregate shall be placed on the underlying separation geotextile fabric to the width and length of the fabric and to the specified depth, with the depth being no less than 8 inches. The separation geotextile fabric may be omitted only as approved by the Engineer.

When necessary, equipment, truck, and vehicle wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, the construction access shall be graded to drain into a sediment trap or sediment basin. The sediment trap or sediment basin for the washing area shall be the size and location shown on the construction drawings or as directed by the Engineer.

Details for stabilized construction access are shown on the drawing that is incorporated into the Standard Civil Drawings. Stabilized construction access shall be at least 14 feet wide for one way traffic and 20 feet for two way traffic and shall be sufficient for all ingress and egress unless as approved by the Engineer due to site conditions. Length of the stabilized area shall be as shown on the construction drawings, but not less than 50 feet, unless approved by the Engineer due to site conditions.

The Contractor shall provide stabilized construction access for project related access roads, parking areas, and other on-site vehicle transportation routes. Stabilization of these areas shall have the same

aggregate and thickness requirements as the stabilized construction access unless shown otherwise on the construction drawings.

Gravel bags, boards, reinforced filter fabric fence, or similar methods shall be used in combination with the stabilized construction access to prevent sediment from entering public right-of-way, storm sewer system, jurisdictional wetlands, and waterways.

The Contractor shall provide periodic top dressing, with additional aggregate, to maintain the required access roadway depth. The Contractor shall be responsible for repairing and cleaning out damaged areas used to trap sediment. All sediment and aggregate tracked or washed into public right-of-way, storm sewer system, jurisdictional wetlands or waterways shall be removed immediately.

The Contractor shall inspect the stabilized construction access at least once every week or as directed by the Engineer. Damage caused to stabilized construction access shall be repaired immediately. Stabilized construction access shall be maintained by the Contractor until construction staging requires removal or upon final stabilization of the construction site. Upon removal of the stabilized construction access, the area shall be graded as per the construction drawings and stabilized with vegetation, or other. (Note: Maintenance for Item 741 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

If an equipment or vehicle washing area is necessary, The Contractor is responsible for removal and proper disposal of sediment and debris from the sediment trap or basin. Sediment and debris shall not be allowed to flush into the storm sewer system, waterways, jurisdictional wetlands, or onto adjacent properties. Sediment deposits shall be removed before they reach 1/3 of the depth of the sediment trap or basin.

Uncontaminated sediment can be placed at the project spoil site or, if properly handled, spread out to supplement fill requirements. The Engineer will designate how the sediment deposits are to be handled. Uncontaminated sediment shall not be placed in waterways or jurisdictional wetlands, unless as approved by the Engineer. If sediment has been contaminated, then it shall be disposed of in compliance with current local, State and Federal Regulations. Offsite disposal shall be the responsibility of the Contractor.

After final stabilization and at the direction of the Engineer, the Contractor, when required, shall be responsible for removing all erosion protection and sediment control systems that are not permanent, from the project.

724.4 Quality Assurance. The Contractor is responsible for the control of the quality of materials incorporated into the construction and quality of completed construction. The County will engage materials engineering services to provide quality assurance testing and inspection to assist the Engineer in determining the acceptability of materials and completed construction. Quality assurance services provided by the County do not relieve the Contractor of his responsibility for quality control. The Materials Engineer shall not have control of the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

724.5 Measurement. When paid for directly as a pay item, measurement for stabilized construction access shall be by the square yard, complete and in place.

724.6 Payment. Payment for stabilized construction access shall include and be full compensation for all labor, equipment, materials, supervision and for all incidental expenses for the construction of these items, complete in place, where 60 percent of the total unit cost shall be for the furnishing and installing materials including excavation. Thus, 40 percent of the total unit cost shall be for the removal of erosion protection and sediment control systems: stabilized construction access, after final stabilization, at the end of the project. Construction and maintenance of sediment traps or basins associated with the stabilized construction access for the purpose of washing equipment or vehicles prior to egress to public right-of-way shall be considered incidental to stabilized construction access.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires a Standard Civil Drawing that shall be incorporated into the contract documents.

NOTE**:** This Item requires other Standard Specifications.

Item 751 “SWPPP Inspection and Maintenance”

END OF ITEM 724

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 5

ITEM 725

GENERAL SOURCE CONTROLS (SWPPP)

725.1 Description. This Item shall govern for erosion protection and sediment control related practices which shall be utilized during construction operations.

725.2 Materials. Topsoil shall conform to Item 160 “Topsoil”.

The Contractor is required to inform the Engineer of the location of the pit or pits from which the material is to be taken. Harris County shall have the right to have an independent testing laboratory test the material to determine if it meets these Standard Specifications.

725.3 Construction Methods. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing and surveying, shall be permitted until sediment control and erosion protection systems are in place.

The Contractor shall prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights of way and easements for construction. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.

Topsoil for Erosion and Sedimentation Control Systems:
When topsoil is called for as a component of another item, Contractor shall conduct erosion control practices during topsoil operation. When applying topsoil, Contractor shall maintain erosion and sediment control systems, such as swales, berms, dikes, and sediment basins. Contractor shall place the topsoil to the lines and grades and to the depths shown on the construction plans.

After the areas to receive topsoil have been brought to grade and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of at least 2 inches, to permit bonding of the topsoil to the subsoil. Contractor shall compact by passing a bulldozer up and down the slope, tracking over the entire surface area of the slope to create horizontal erosion control slots. When grading, filling, and applying topsoil around trees, Contractor shall maintain the existing grade within the drip line of trees, unless otherwise indicated.

Topsoil shall be material free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, vegetation and other deleterious matter.

Drainage fill shall be selected stone or gravel, graded to pass a 3 inch sieve and retained on a 1 inch sieve.

No sod, seed, or other vegetation shall be placed on soil that has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

Protection of Trees in Construction Area:
Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site. Heavy equipment, vehicular traffic, and stockpiles of construction materials, including topsoil, are not permitted within 3 feet of the dripline of any tree to be retained. Specimen trees shown on the construction plans shall be boxed or fenced for protection. Contractor shall water those trees indicated to be preserved, as required, to maintain their healthy growth during the course of construction operations. Contractor shall protect tree root systems from damage due to noxious materials in solution caused by runoff or spillage during mixing and placement of construction materials or drainage from stored materials.

When called for in the construction plans, tunneling under the root system for the installation of utility lines shall be accomplished by hand digging. Contractor shall not allow exposed roots to dry before permanent backfill is placed. Tree trunks, exposed roots, and limbs of the trees designed to be retained which are damaged during construction operations will be cared for as prescribed by an arborist certified by the International Society of Arboriculture (ISA), at the expense of the Contractor. The Contractor shall extend the pruning operation to restore the natural shape of the entire tree. Main lateral roots, taproots, or old main branches shall not be cut or pruned. The Contractor shall cut branches and roots with sharp pruning instruments. He shall not break or chop branches and roots. Cuts over 1/2 inch in size shall be painted with tree pruning compound. Tree pruning compound shall be waterproof, antiseptic, elastic, and free of kerosene, coal tar, creosote and other substances harmful to trees.

Dust Control:
Control dust blowing and moving on construction sites and roads for erosion and sediment control, to prevent exposure of soil surfaces, to reduce on and off site property damage, to prevent health hazards, and to prevent hazardous sight conditions. Control dust blowing by utilizing one or more of the following methods:

A. Mulches bound with natural or chemical binders such as Soiltac®, Terratack®, or equal, as approved by the Engineer.

B. Temporary or permanent vegetative cover.

C. Spray-on adhesive, such as Soil Master®, PennzSuppress®, Soil Sement®, or equal, on mineral soils when not used by traffic and as approved by the Engineer.

D. Tillage to roughen surface and bring clods to the surface.

E. Irrigation by water sprinkling.

F. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

Dust control methods shall be implemented immediately whenever dust can be observed blowing on the project site.

Equipment Maintenance and Repair:
Maintenance and repair of construction machinery and equipment shall be confined to areas specifically designated for that purpose. Designated areas shall be located, designed, and maintained so as oils, gasoline, grease, solvents, and other potential pollutants cannot be washed into the storm sewer system or any other receiving stream. Contractor shall not allow oils, gasoline, waste fluids, and other potential pollutants to spill onto the soil or seep into the ground and groundwater. Adequate waste disposal receptacles shall be provided for liquid waste, as well as solid waste. Proper spill response measures and materials will be the responsibility of the Contractor. Designated maintenance areas shall be inspected and properly maintained daily. (Note: Maintenance for Item 725 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

On a site where designated equipment maintenance and repair areas are not feasible, care shall be taken during each individual repair or maintenance operation to prevent spills of potential pollutants. All applicable local, State and Federal Regulations shall be followed for the proper handling, storage, and waste disposal of oils, gasoline, grease, solvents, and other designated potential pollutants associated with the maintenance and repair of construction machinery and equipment.

Waste Collection and Disposal:
A plan shall be implemented for the collection and disposal of on site general trash, as well as construction debris. Disposal of waste materials shall be in compliance with current local, State and Federal Regulations. Trash and debris shall not be allowed to overflow its receptacle or accumulate for excessively long periods of time. Receptacles shall be located where they will least likely be affected by storm water runoff. Trash and construction debris shall not be burned on the project right-of-way.

Special provisions shall be made for the collection and disposal of liquid, toxic, or hazardous materials.

Sanitary Facilities:
Adequate sanitary facilities shall be provided for workers. Sanitary collection and disposal shall be in compliance with current local, State and Federal Regulations.

Vehicle Washing:
Construction equipment and vehicles, such as concrete trucks, shall be washed in designated areas only, as approved by the Engineer. These designated wash areas shall be designed and maintained such as to prevent runoff from leaving the site, as well as preventing the runoff from entering a storm sewer system or into a watercourse. The designated areas shall be located where the wash water will evaporate or infiltrate directly into the ground and where runoff can be collected in a temporary holding or seepage basin. Wash areas shall not be located immediately adjacent to a storm sewer system or other watercourse or near a designated jurisdictional wetland. Concrete waste shall be permitted to dry in a controlled pit, sump, or other, and the waste shall be removed from the project site.

Storage of Construction Materials and Chemicals:
Storage of chemicals, cements, solvents, paints, pesticides, herbicides, fuels, or other potential pollutants shall be stored so that they will not be in contact with storm water runoff or cause potential leachate to the soil or groundwater. These items shall not be stored adjacent to a storm sewer system or other watercourse. Storage and use shall be in compliance with current local, State and Federal Regulations, as well as manufacturer's guidelines.

Contractor shall have a spill response program which addresses spills of construction related hazardous and toxic materials.

Demolition Areas:
Demolition projects usually generate large amounts of dust with significant concentrations of heavy metals and other toxic pollutants. Dust control techniques shall be used to limit the transport of the airborne pollutants. Water or slurries used to control dust shall not be allowed to flow into the storm sewer system or other watercourse.

Street Cleaning:
Street cleaning, such as sweeping, vacuuming, or shoveling, shall be provided along project area roadways where erosion have deposited or construction traffic have tracked sediments, mud, or debris. Contractor shall inspect the roadways daily, and perform the cleaning on a daily

basis, if necessary. Washing or flushing of sediments, mud, or debris into adjacent drainage systems is prohibited.

Dewatering:
The pumping of ponded storm water, or other waters, from the project site directly into an adjacent watercourse or storm sewer system shall not be permitted unless the water has been pretreated through a sediment basin or other method, and as approved by the Engineer.

Pesticides, Herbicides, and Fertilizers:
Contractor shall only use pesticides, herbicides, and fertilizers on the construction site as indicated in the construction specifications and plans or as approved the Engineer. Pesticides, herbicides, and fertilizers shall be stored, used, applied, and disposed of in accordance with manufacturer's guidelines and with local, state, and federal regulations. Contractor shall not dispose of the pesticide, herbicide, and fertilizer wastes, and containers, on site or in the storm sewer system or other watercourse.

725.4 Measurement and Payment. No separate payment shall be made for this Item. The work performed under this Item shall be paid for and considered incidental to Item 751 "SWPPP Inspection and Maintenance".

There are no line codes for this Item.

NOTE**:** This Item requires other Standard Specifications.

Item 160 "Topsoil"
Item 751 "SWPPP Inspection and Maintenance"

END OF ITEM 725

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 6

ITEM 741

INLET PROTECTION BARRIER
(FOR STAGE II INLETS, GRAVEL BAGS)

741.1 Description: This Item shall govern for furnishing, installing, and removing temporary erosion protection and sediment control gravel bag inlet protection barrier for a stage II inlet in accordance with these Standard Specifications and construction drawings, and as directed by the Engineer. Gravel bag inlet protection barriers for stage II inlets are geotextile fabric bags filled with clean gravel and placed around a stage II inlet, such as a curb inlet. This work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation.

741.2 Materials: Bags shall consist of geotextile fabric (filter fabric) made of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins in a woven fabric. The geotextile fabric shall meet or exceed the following specifications shown in Table 1:

TABLE 1

SILT FENCE GEOTEXTILE FABRIC PROPERTIES			REQUIREMENTS UNSUPPORTED SILT FENCE	
	Units	Supported Silt Fence	Geotextile Elongation ≥50%	Geotextile Elongation <50%
Grab Strength				
Machine Direction	lbs.	90	123	123
X-Machine Direction	lbs.	90	100	100
Permittivity	sec^{-1}	0.05	0.05	0.05
Apparent Opening Size (Max. Average Roll Value)	mm/sieve	0.6/30	0.6/30	0.6/30
Ultraviolet Stability (Retained Tensile Strength)	%	70 after 500 hrs exposure	70 after 500 hrs exposure	70 after 500 hrs exposure

NOTES:
1. Table 1 adapted from AASHTO M 288 *Geotextile Specification for Highway Applications* Table 6. Temporary Silt Fence Property Requirements.
2. All numeric values in Table 1 except Apparent Opening Size (AOS) represent minimum average roll values (MARV). Values for AOS represent maximum average roll values.

Geotextile fabric shall contain stabilizers and/or inhibitors to make the fabric resistant to deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, and insects. Geotextile fabric shall be free of defects or flaws that affect its physical and/or filtering properties. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.

The bag size shall be as follows:

Length:	18 to 24 inches
Width:	12 to 18 inches
Thickness:	6 to 8 inches

The bag shall be filled with open-graded gravel and weigh 50 to 75 pounds. The gravel shall be free from adherent coatings, salt, alkali, dirt, clay, or organic and injurious matter.

Nylon rope shall be used to secure the closure of the gravel filled bag.

741.3 Construction Methods: Gravel bag inlet protection barrier for a stage II inlet shall be installed at the locations shown on the construction drawings and in accordance with the Standard Civil Drawing or as directed by the Engineer. Inlet protection barrier for a stage II inlet shall be constructed in accordance with an approved schedule that clearly describes the timing during the construction process that the various erosion control measures will be implemented. Inlet protection barrier for a stage II inlet shall be installed so as surface runoff will percolate through the system and allow sediment to be retained and accumulated.

Gravel bags for the inlet protection barrier shall be placed so as the gravel bags are placed on each side of the curb inlet along the gutter line and continuously along the back of the curb inlet. Gravel bags shall not be placed so as the throat of the inlet is blocked. Gravel bags shall be placed in a row with ends tightly abutting the adjacent bag.

The Contractor shall inspect the gravel bag inlet protection barrier at least once every week or as directed by the Engineer. The Contractor shall remove irregularities which will impede normal flow. Erosion protection and sediment control systems shall be maintained by the Contractor until final stabilization. Damage caused to erosion protection and sediment control systems shall be repaired immediately. (Note: Maintenance for Item 741 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

The Contractor is responsible for removal and proper disposal of sediment and debris from the inlet protection barrier system and as directed by the Engineer. Sediment and debris shall not be allowed to flush into the storm sewer system, waterways, jurisdictional wetlands, or onto adjacent properties. Sediment deposits shall be removed before they reach one-third of the height of the gravel bags.

Uncontaminated sediment can be placed at the project spoil site or, if properly handled, spread out to supplement fill requirements. The Engineer will designate how the sediment deposits are to be handled. Uncontaminated sediment shall not be placed in waterways or jurisdictional wetlands, unless as approved by the Engineer. If sediment has been contaminated, then it shall be disposed of in compliance with current local, State, and Federal Regulations. Offsite disposal shall be the responsibility of the Contractor.

After final stabilization and at the direction of the Engineer, the Contractor, when required, shall be responsible for removing all erosion protection and sediment control systems that are not permanent, from the project.

741.4 Quality Assurance. The Contractor is responsible for the control of the quality of materials incorporated into the construction and the quality of completed construction. The County will engage materials engineering services to provide quality assurance testing and inspection to assist the Engineer in determining the acceptability of materials and completed construction. Quality assurance services provided by the County do not relieve the Contractor of his responsibility for quality control. The Materials Engineer shall not have control of the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

741.5 Measurement. Inlet protection barrier for a stage II inlet shall be measured as “each”, complete in place all necessary gravel bags to protect against erosion and control sediment.

741.6 Payment. Payment for a gravel bag inlet protection barrier for a stage II inlet shall include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of this Item, where 60 percent of the total unit cost shall be for the furnishing and installing all materials. Thus, 40 percent of the total unit cost shall be for the removal and disposal of erosion protection and sediment control systems: inlet protection barrier, after final stabilization, at the end of the project.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires a Standard Civil Drawing that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications.

Item 751 “SWPPP Inspection and Maintenance”

END OF ITEM 741

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 5

ITEM 750

ROCK FILTER DAMS

750.1 Description. This Item shall govern for furnishing and installing temporary erosion protection and sediment control rock filter dams utilized during construction operations and prior to final stabilization in accordance with these Standard Specifications and construction drawings, and as directed by the Engineer. Rock filter dams are temporary berms constructed of stone to intercept and slow storm water runoff to retain sediment on the construction site. Depending upon the type of rock filter dam specified in the construction plans as Type 1, 2, 3, 4, or 5, the aggregate fill may be unwrapped, wrapped in twisted hexagonal wire mesh, or confined in a gabion wire basket.

Applications of RockFilter Dams:

A. Type 1 dams may be used at toe of slopes, around inlets, in small ditches, and at dike or swale outlets. Type 1 dams are recommended for erosion and sediment control from a drainage area of 5 acres or less.

B. Type 2 dams may be used in ditches and at dike or swale outlets.

C. Type 3 dams may be used in stream flow.

D. Type 4 sack gabions may be used in ditches and smaller channels to form an erosion and sediment control dam.

E. Type 5: As shown in plans.

750.2 Materials. Geotextile fabric shall consist of a woven monofilament or spunbond nonwoven fibers consisting of long chain synthetic polymers composed of at least 95 percent by weight of polyolefins. Geotextile fabric shall equal or exceed the following average roll values or as directed by the Engineer:

A. Minimum average roll value.

1. Elongation ≥ 50%.

2. Grab Strength – 200 pounds.

3. Puncture Strength – 75 pounds.

4. UV Stability (retained strength) – 50% after 500 hours of exposure.

B. Maximum average roll value.

Apparent Opening Size (AOS) – 0.6 mm/#30 US sieve.

Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, insects, and deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.

Aggregate for the rock filter dams shall consist of crushed stone. Aggregate particles shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials or organic and injurious matter. Aggregate shall be cubic or rounded form, not elongated, flat, shapes. Spalls, fragments, and chips shall not exceed 5 percent by weight. Crushed concrete shall not be substituted for the crushed stone unless as approved by the Engineer.
Aggregate size shall depend upon the type of rock filter dam specified in the construction plans. Aggregate size based on type of rock filter dam is as follows:

A. Type 1: 3 inches to 5 inches, open graded.

B. Type 2: 3 inches to 5 inches, open graded.

C. Type 3: 4 inches to 8 inches, open graded.

D. Type 4: 3 inches to 5 inches, open graded.

E. Type 5: As shown on the plans.

Mesh is required for reinforced type rock filter dams. Mesh shall be 20 gauge galvanized double twisted hexagonal wire mesh with 1 inch diameter hexagonal openings. Mesh wire shall be zinc coated prior to being double twisted. Reinforcing spiral binders, lacing wire, and stiffeners shall be made of wire having the same coating material and same wire size as the wire mesh. Gabion wire baskets shall equal or exceed the requirements of the wire mesh.

750.3 Construction Methods. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing, surveying and installation of erosion protection and sediment control measures, shall be permitted until sediment control and erosion protection systems are in place.

Rock filter dams shall be installed at the locations shown on the construction plans and in accordance with the Standard Civil Drawing or as directed by the Engineer. Rock filter dams shall be the types specified in the construction plans. Rock filter dams shall be constructed in accordance with an approved schedule that clearly describes the timing during the construction process that the various erosion control measures will be implemented. Rock filter dams shall be installed so as to prevent downstream deposition of sediment and debris from the construction site.

The separation geotextile fabric and wire mesh shall be sized and placed in accordance with the rock filter dam detail and as specified by the type of rock filter dam shown in the construction plans. The separation geotextile fabric may be omitted only as approved by the Engineer. The separation geotextile fabric and wire mesh shall be securely staked with wooden or metal stakes to the bottom and side slopes of the ditch or channel prior to aggregate placement. Sack gabions for Type 4 rock filter dams shall be securely staked with wooden or metal stakes to the bottom and side slopes of the ditch or channel, as well.

Aggregate fill shall be placed to the width, length, height and slopes in accordance with this Item and the rock filter dam detail and as specified by the type of rock filter dam shown in the construction plans. The height of the dam shall be measured vertically from the existing ground to the top of the filter dam. The length of the dam shall be measured across the top centerline of the dam from embankment to embankment and includes the additional length embedded into the embankment. Width of the dam shall be measured along the top face of the dam.

Wire mesh shall be folded upstream side over the aggregate fill and tightly secured to itself on the downstream side using wire tires. Rings may be substituted for wire ties.

Additional aggregate fill or gravel bags shall be placed and secured at the embedded section to prevent low flows from short circuiting the dam at the adjacent dirt embankment area. Gravel bags shall meet the specifications of Item 741 “Inlet Protection Barrier (for Stage II Inlets, Gravel Bags)”.

The Contractor shall be responsible for periodic reshaping, repairing, and maintaining of rock filter dams as directed by the Engineer.

The Contractor shall inspect the rock filter dam at least once every week or as directed by the Engineer. Damage caused to rock filter dams shall be repaired immediately. Rock filter dams shall be maintained by the Contractor until construction staging requires removal or upon final stabilization of the construction site. Upon removal of the rock filter dam, the area shall be stabilized with vegetation, or other. (Note: Maintenance for Item 750 is paid for under Item 751 “SWPPP Inspection and Maintenance”)

The Contractor is responsible for removal and proper disposal of sediment and debris from the rock filter dam. Removed sediment and debris shall not be allowed to flush into the storm sewer system, waterways, jurisdictional wetlands, or onto adjacent properties. Sediment deposits shall be removed before they reach 1/3 of the height of the dam.

Uncontaminated sediment can be placed at the project spoil site or, if properly handled, spread out to supplement fill requirements. The Engineer will designate how the sediment deposits are to be handled. Uncontaminated sediment shall not be placed in waterways or jurisdictional wetlands, unless as approved by the Engineer. If sediment has been contaminated, then it shall be disposed of in compliance with current local, State and Federal Regulations. Offsite disposal shall be the responsibility of the Contractor.

After final stabilization and at the direction of the Engineer, the Contractor, when required, shall be responsible for removing all erosion protection and sediment control systems that are not permanent, from the project.

Pursuant to Section 404 of the Clean Water Act, a permit may be required for placement of fill, rock filter dams, into Waters of the United States, Waters of the State, and their associated jurisdictional wetlands. The Contractor shall not proceed with the construction of the rock filter dams in Waters of the United States, Waters of the State, and their associated jurisdictional wetlands until the permits are obtained.

750.4 Quality Assurance. The Contractor is responsible for the control of the quality of materials incorporated into the construction and quality of completed construction. The County will engage materials engineering services to provide quality assurance testing and inspection to assist the Engineer in determining the acceptability of materials and completed construction. Quality assurance services provided by the County do not relieve the Contractor of his responsibility for quality control. The Materials Engineer shall not have control of the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

750.5 Measurement. When paid for separately as a pay item, measurement for rock filter dams, Types 1,2,3,4, or 5 shall be by the linear foot, as shown on the plans, complete in place. Measurement shall be along the centerline of the top of the dam from embankment to embankment and includes the additional length which is embedded into the embankment.

750.6 Payment. Payment for rock filter dams shall include and be full compensation for all labor, equipment, materials, supervision and for all incidental expenses for the construction of these items, complete in place, where 60 percent of the total unit cost shall be for furnishing and

installation with embankment and excavation. Thus, 40 percent of the total unit cost shall be for the removal of erosion protection and sediment control systems: rock filter dams, after final stabilization, at the end of the project. Geotextile fabric, reinforcement, aggregate fill, and gravel bags shall be considered incidental expenses to this Item. Disposal of sediment and debris are considered incidental expenses to this Item.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires drawing details that shall be incorporated into the contract documents.

NOTE**:** This Item requires other Standard Specifications.

Item 741 “Inlet Protection Barrier (for Stage II Inlets, Gravel Bags)”
Item 751 “SWPPP Inspection and Maintenance”

END OF ITEM 750

FOR PROJECTS INITIATED
AFTER MAY 1, 2016
REVISION 2

ITEM 751

SWPPP INSPECTION AND MAINTENANCE

751.1 Description. This Item shall govern for inspecting, maintaining, cleaning, and replacing as necessary, all SWPPP items, in conformance with the drawings and/or as directed by the Engineer. Included in the maintenance of the SWPPP will be once per week inspections and reports, or as directed by the Engineer. The day of the week established for the inspections, shall be mutually agreed to, by Harris County and the Contractor, prior to the Contract start date.

A Storm Water Pollution Prevention Plan (SWPPP) has been established for this project in accordance with the EPA and TCEQ regulations, and as defined by the TPDES General Permit.

751.2 Construction Methods. All SWPPP items shall conform to details shown on the drawings and the Storm Water Pollution Prevention Plan in the Project Manual.

Prior to beginning work, the Contractor shall designate in writing an authorized representative who will be responsible and available on the project site or in the immediate area to insure compliance with the SWPPP.

The Contractor is solely responsible for inspecting and maintaining all the SWPPP items. The Contractor's responsibility in this regard extends for the entire duration of the project, from the start of construction until acceptance by the County.

All SWPPP items such as Sodding, Hydro-Mulch Seeding, Reinforced Filter Fabric Barrier, Inlet Protection Barrier **(**Stage I and/or Stage II**)**, Stabilized Construction Access, Concrete Truck Washout, <u>Rock Filter Dam,</u> etc. shall be maintained at all times by cleaning, replacing or a combination thereof such that after rain or other inclement weather the SWPPP items shall be equal to or exceed their like new installed condition.

The Contractor shall receive compensation for inspecting and maintaining the necessary SWPPP items, and any incidentals necessary to achieve turf establishment and an approved final inspection and acceptance by the County.

The above does not preclude the requirements of the "Harris County General Conditions".

751.3 Submittal. The Contractor shall be required to submit and fill out the SWPPP Inspection Report at least once per week, or as directed by the Engineer. The inspection and the Report shall be completed in conformance with the Storm Water Pollution Prevention Plan, and maintained at the project site. The Contractor shall maintain a corrective action log, and the SWPPP amendment log.

751.4 Measurement & Payment. Inspecting, maintaining, cleaning, and replacing any or all SWPPP items, shall be paid for by the month, provided the SWPPP is properly maintained, as approved by the Engineer. Included in the maintenance of the SWPPP will be the issues described in Item 725 “General Source Controls (SWPPP)” and required weekly inspections and Reports. All items noted in each weekly SWPPP Inspection Report shall be corrected within 72 hours, or prior to the next rain event, whichever come first, and/or as approved by the Engineer.

The SWPPP Monthly Maintenance Fee will be designated by a minimum bid amount.

If in the opinion of the Engineer, the Contractor does not comply with the above requirements of the work, a prorated portion of the SWPPP Monthly Maintenance Fee will be withheld from any money due or to become due to the Contractor.

There are line code(s), description(s) and unit(s) for this Item.

NOTE: This Item requires other Standard Specifications as designated in the Project Manual.

NOTE: This Item requires other Standard Specifications

Item 162 “Sodding For Erosion Control and Stabilization”
Item 165 “Hydro-Mulch Seeding (For Erosion Control and Stabilization)”
Item 713 “Reinforced Filter Fabric Barrier”
Item 719 “Inlet Protection Barriers”
Item 724 “Stabilized Construction Access”
Item 725 “General Source Controls (SWPPP)”
Item 730 “Concrete Truck Washout Structures”
Item 741 “Inlet Protection Barrier (For Stage II Inlets, Gravel Bags)”

END OF ITEM 751

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2/29/2024

Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

Drawing Name

COVER SHEET
A-100

10/21/2014 10:44:43 AM

ABBREVIATIONS

A/C	AIR CONDITION
ACOUS	ACOUSTIC, ACOUSTICAL
AD	AREA DRAIN
ADH	ADHESIVE
ADJ	ADJACENT OR ADJUSTABLE
ADMIN	ADMINISTATIVE, ADMINISTRATION
AFF	ABOVE FINISH FLOOR
ALUM	ALUMINUM
ALT	ALTERNATE
ANOD	ANODIZED
AP	ACCESS PANEL
APPROX	APPROXIMATED
ARCH	ARCHITECT, ARCHITECTURAL
ASPH	ASPHALT
AUTO	AUTOMATIC
AUX	AUXILARY
AVG	AVERAGE
BD	BOARD
BLDG	BUILDING
BK	BRICK
BLK(G)	BLOCK(ING)
BM	BEAM
BOL	BOLLARD
BOT	BOTTOM
BRKT	BRACKET
BSMT	BASEMENT
BU(R)	BUILT-UP ROOF
BVL	BEVELED
CAB	CABINET
CC	CENTER TO CENTER
CEM	CEMENT
CER	CERAMIC
CG	CORNER GUARD
CHBD	CHALKBOARD
C.I.	CAST IRON
CIP	CAST IN PLACE
CJT	CONTROL JOINT
CJ	CONSTRUCTION JOINT
CL	CENTER LINE
CLG	CEILING
CLO OR CLOS	CLOSET
CLR	CLEAR
CLS	CLOSURE
CLWG	CLEAR WIRE GLASS
CMJ	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
COMB	COMBINATION
COMP	COMPACT
COMPR	COMPRESS, COMPRESSIBLE
CONC	CONCRETE
CONN	CONNECT, CONNECTION
CONT	CONTINUOUS, CONTINUATION
CONTR	CONTRACTOR
CORR	CORRIDOR
CPT	CARPET
CER.T.	CERAMIC TILE
CTR	COUNTER
CFCI	CONTRACTOR FURNISH CONTRACTOR INSTALL
DBL	DOUBLE
DEPT	DEPARTMENT
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIV	DIVISION
DW	DOWN
DO	DITTO
DP	DAMPPROOFING
DR	DOOR
DS	DOWNSPOUT
DW	DISHWASHER
DWG	DRAWING
DWR	DRAWER
DF	DRINKING FOUNTAIN
E	EAST
EA	EACH
EJC	EXPANSION JOINT COVER
EJT	EXPANSION JOINT
EL OR ELEV	ELEVATION
ELEV	ELEVATOR
ELEC	ELECTRIC, ELECTRICAL
EMER	EMEGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
ENT	ENTRANCE
E.D.F.	ELECTRIC DRINKING FOUNTAIN
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EW	EACH WAY
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPOSED OR EXPANSION, EXPANDED
EXT	EXTERIOR
FD	FLOOR DRAIN
FDN	FOUNDATION
FE	FIRE EXSTINGUISHER
FEC	FIRE EXSTINGUISHER CABINET
F TO F	FACE TO FACE
FF	FINISHED FLOOR
FHC	FIRE HOSE CABINET
FIN	FINISH OR FINISHED
FIXT	FIXTURE
FL(G) OR FLR	FLOOR(ING)
FLUOR	FLUORESCENT
FP	FIREPROOF
FT	FOOT, FEET
FURN(C)	FURNISH(ED)
GA	GAUGE
GALV	GALVINIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GEN'L	GENERAL
GL	GLASS OR GLAZING
GYP	GYPSUM

H	HIGH
HARD	HARDENED
HB	HOSE BIBB
HDW	HAND DRYER
HEX	HEXAGON, HEXAGONAL
HGR	HANGER
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HPT	HIGH POINT
HR	HOUR
HW	HOT WATER
HVAC	HEATING, VENTILATION & AIR CONDITIONING
ID	INSIDE DIAMETER
INCAN	INCANDESCENT
INCL	INCLUSIVE, INCLUDE
INFO	INFORMATION
INSUL	INSULATION
INT	INTERIOR
JUNC	JUNCTION
JST	JOIST
JT	JOINT
LAB	LABORATORY
LAM	LAMINATE, LAMINATED
LAV	LAVATORY
LB(S)	POUND
LDG	LANDING
L	LONG, LENGTH
LH	LEFT HAND
LKR	LOCKER
LOC	LOCATION
LP	LOW POINT
LT(G)	LIGHT(ING)
LVR	LOUVER
MACH	MACHINE
MAINT	MAINTENANCE
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MED	MEDIUM
MEMB	MEMBRANCE
MET	METAL
MFG	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MLD	MOLD(ING)
MO	MASONRY OPENING, MOTOR OPERATED
MOD	MODIFY
MTG	MOUNTING (MOUNTED)
MUL	MULLION
MWK	MILLWORK
MWP	MEMBRANE WATERPROOFING
MTL	MATERIAL, METAL
N	NORTH
NA	NOT APPLICABLE
NAT	NATURAL
NFPA	NATIONAL FIRE PROTECTION ASSOC.
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OVER ALL
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OFF	OFFICE
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
OFCI	OWNER FURNISH CONTRACTOR INSTALLED
PART	PARTITION
PBO	PARTICLE BOARD
PERF	PERFORATE, PERFORATED
PL	PLATE
PLAS	PLASTER
PLAS. LAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PLBG	PLUMBING
PNL	PANEL
PR	PAIR
PREP	PREPARATION
PT(D)	PAINT(ED)
PVC	POLY-VINYL CHLORIDE
PVMT	PAVEMENT

PART	PARTITION
PBO	PARTICLE BOARD
PERF	PERFORATE, PERFORATED
PL	PLATE
PLAS	PLASTER
PLAS. LAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PLBG	PLUMBING
PNL	PANEL
PR	PAIR
PREP	PREPARATION
PT(D)	PAINT(ED)
PVC	POLY-VINYL CHLORIDE
PVMT	PAVEMENT

RA	RETURN AIR
RCVG	RECEIVING
RD	ROOF DRAIN
RE	REFER, REFERENCE
RECEP	RECEPTION
RECPT	RECEPTABLE
REF	REFRIGERATOR
REFL	REFLECTED
REINF	REINFORCE, REINFORCING
REQD	REQUIRED
RESL	RESILIENT
RET	RETURN
REV	REVISION
RH	RIGHT HAND
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
RR	RETURN REGISTER
RTD	RATED
RVS	REVERSE
RB	RESILIENT BASE
S	SOUTH
SCHED	SCHEDULE
SECT	SECTION
SECY	SECRETARY
SERV	SERVICE, SERVING
SHLVG	SHELVING
SHT	SHEET
SHWR	SHOWER
SIM	SIMILAR
SL	SLOPE
SLDG	SLIDING
SQ	SQUARE
SPEC	SPECIFICATIONS
SPKR	SPEAKER
ST	STREET
ST STRL OR SS	STAINLESS STEEL
STA	STATION
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STL	STEEL
STOR OR STO	STORAGE
STRUC	STRUCTURAL
SUP	SUPPORT
SUSP	SUSPENDED
SW	SWITCH
SWED	SWITCHBOARD
SYM	SYMMETRICAL
SYN	SYNTHETIC
SURF	SURFACE
TKRB	TACKBOARD
TC	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPERATURE
TZ	TERRAZZO
THK	THICK(NESS)
THR	THRESHOLD
TOIL	TOILET
TOT	TOTAL
TR	TRENCH
TRANS	TRANSPORTATION
TRD	TREAD
TOS	TYPICAL
TYP	TOP OF STEEL, TOP OF SLAB
UL	UNDERWRITERS LABORATORY
UNFIN	UNFINISHED
UON	UNLESS OTHERWISE NOTED
UTIL	UTILITY
VCT	VINYL COMPOSITION TILE
VENT	VENTILATOR
VERT	VERTICAL
VEST	VESTIBULE
VWC	VINYL WALL COVERING
VP	VISION PANEL
W	WIDTH, WEST, WASHER
W/O	WITHOUT
WC	WATER CLOSET
WD	WOOD
WOW	WINDOW
WGL	WIRE GLASS
WP	WATERPROOF
WT	WEIGHT
WTW	WALL TO WALL
WWF	WELDED WIRE FABRIC
WW	WINDOW WALL

MATERIAL & SYMBOLS

COMMON BRICK

STRUCTURAL CLAY TILE

CONCRETE MASONRY UNITS

CAST OR CUT STONE

CONCRETE

EARTH

GRAVEL

SAND

WOOD(ROUGH)

WOOD(BLOCKING)

PLYWOOD

TERRAZZO

CEMENT TOPPING

RIGID INSULATION

EXTRUDED SHAPES

BREAK METAL SHAPES

BATT OR BLANKET INSULATION

CORK OR COMPOSITE

RUBBER OR NEOPRENE

STEEL IN SECTION

BRASS OR BRONZE

STAINLESS STEEL OR ALLUMINUM

SHEET METAL (ALL METALS SMALL SCALE)

CERAMIC TILE

QUARRY TILE

RESILIENT TILE

CARPET & PAD

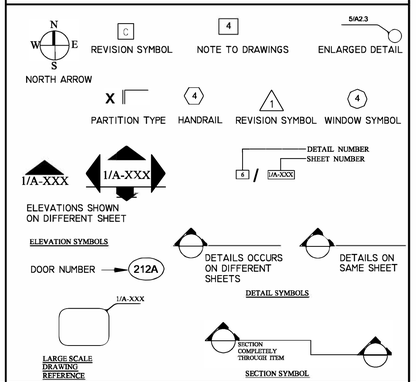
PLASTER ON METAL LATH

GYPSUM BOARD

INSULATED PARTITION SOUND OR THERMAL

WOOD FRAME PARTTITION

MATERIAL LEGEND



SCOPE OF WORK

SHEET NUMBER	SHEET NAME
A-000	COVER SHEET
A-001	INDEX, CODE & PROJECT INFO.
C0.01	CIVIL NOTES
C0.02	CIVIL NOTES
C1.00	CIVIL TOPOGRAPHICAL SURVEY
C2.00	CIVIL DEMOLITION PLAN
C3.00	CIVIL SITE PLAN
C4.00	CIVIL DRAINAGE AREA MAP
C4.01	CIVIL DRAINAGE PLAN
C4.02	CIVIL DRAINAGE CALCULATIONS
C5.00	CIVIL GRADING PLAN
C6.00	CIVIL UTILITY PLAN
C7.00	CIVIL STORM WATER POLLUTION & PREVENTION PLAN
C8.00	CIVIL CONSTRUCTION DETAILS
C8.01	CIVIL CONSTRUCTION DETAILS
C8.02	CIVIL CONSTRUCTION DETAILS
C8.03	CIVIL CONSTRUCTION DETAILS
C8.04	CIVIL CONSTRUCTION DETAILS
C8.05	CIVIL CONSTRUCTION DETAILS
S0.01	STRUCTURAL - GENERAL NOTES
S1.00	STRUCTURAL - FOUNDATION PLAN
S4.00	STRUCTURAL - TYPICAL FOUNDATION DETAILS
S4.01	STRUCTURAL - TYPICAL FOUNDATION DETAILS
S4.02	STRUCTURAL - TYPICAL FOUNDATION DETAILS
S4.03	STRUCTURAL - FOUNDATION DETAILS
	STRUCTURAL - PEMB - BLDG. A SHOP DRAWINGS
	STRUCTURAL - PEMB - BLDG B SHOP DRAWINGS
AS-100	ARCHITECTURAL OVERALL SITE PLAN
A-101	ARCHITECTURAL FLOOR PLAN AND RCP
A-102	ARCHITECTURAL OVERALL ROOF PLAN
A-201	EXTERIOR ELEVATIONS
A-301	BUILDING SECTIONS
A-311	WALL SECTIONS
A-312	WALL SECTIONS
A-401	ENLARGED KITCHEN PLAN AND ELEVATIONS
A-402	ENLARGED RESTROOM PLANS AND ELEVATIONS
A-501	DETAILS
A-601	ARCHITECTURAL PARTITION SCHEDULE AND DETAILS
A-602	ARCHITECTURAL WALL PARTITION DETAILS
A-611	ARCHITECTURAL DOOR & HARDWARE SCHEDULE & DETAILS
A-621	ARCHITECTURAL WINDOW SCHEDULE
A-681	ARCHITECTURAL FINISH SCHEDULE AND DETAILS
M-001	MECHANICAL SYMBOLS & LEGENDS
M-002	MECHANICAL SCHEDULES
M-003	MECHANICAL SPECIFICATIONS
M-101	MECHANICAL SITE PLAN
M-201	MECHANICAL FLOOR PLAN
M-301	MECHANICAL DETAILS
E-001	ELECTRICAL SYMBOL LISTS, NOTES, ABBREVIATIONS & INDEX
E-002	ELECTRICAL LINE DIAGRAM AND PANEL SCHEDULE
E-100	ELECTRICAL SITE PLAN
E-101	ELECTRICAL LIGHTING PLAN
E-102	ELECTRICAL POWER PLAN
P-001	PLUMBING SYMBOLS & LEGENDS
P-002	PLUMBING SPECIFICATIONS
P-201	PLUMBING SANITARY FLOOR PLAN
P-202	PLUMBING DOMESTIC FLOOR PLAN
P-301	PLUMBING DETAILS
P-401	PLUMBING RISERS

PROJECT: BARBARA JORDAN PARK - YOUTH CENTER

LOCATION: 8702 NOBLE STREET NEEDVILLE, TEXAS 77461

I.Applicable

2015 International Building Code
2020 National Electrical Code
2015 National Energy Conservation Code
2015 Uniform Mechanical Code
2015 Uniform Plumbing Code

II. Occupancy Classifications

Group A-3 (Assembly with unfixed seating)

V. Type of Construction

Type II-B, 100% Non-sprinkled

VI.Allowable Stories (Table 504.4)

2 Story
Actual = 1 Story

VII. Allowable Height (Table 504.3)

55 feet
Actual = 16'

VIII. Allowable Area Calculations (Group A-3) most restrictive

Allowable Area = 9,500 S.F.
Actual Area = 4,800 S.F.

IX.Fire Resistance Rating Requirements (Table 601)

Building Element	Rating (Hours)
a. Structural Frame	NA
b. Bearing Walls	0 Hour
c. Nonbearing	
1. Exterior < 30 to P.L.	0 HR (Table 602)
2. Interior	NR
d. Floor Construction	0 Hour
e. Roof Construction	NR

X. Occupant Loads (First Floor)

1. Museum Display - 3,532 S.F. / 15 = 235
2. Office - 132 S.F. / 100 = 1
3. Kitchen - 360 S.F. / 200 = 1
4. Storage - 132 S.F. / 300 = 0

Sub-total = 237

Grand Total = 237

XII. Exit Width Calculations

a. First Floor
180 x 0.20 = minimum 2 - 3' wide doors

XIII. Minimum Required Plumbing fixtures: Per table 2902.1

Group A-3 with 237 occupants

237 x 50% = (118 males and 118 females)

Water Closets: ratio 1 per 125 (males) and 1 per 65 (females)
Males: 118 x 1 / 125 = 1 water closet
Females: 118 x 1 / 65 = 2 water closets
3 water closets provided (1 WC's male + 1 Urinal and 2 WC female)

Lavatory
237 / 200 = 1 lavatories
2 lavatories provided (1 lavatory male and 1 lavatory female)

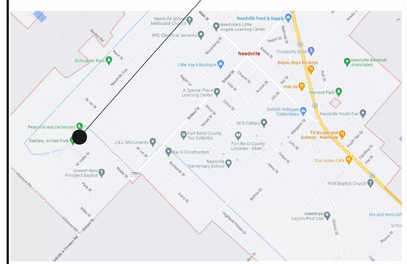
XIV. Automatic Sprinkler System (Section 903.2.8.3 Group A-3 condition 2)

No automatic sprinkler system required because the fire area is less than 12,000 S.F. and the occupant load is less than 300 as per Section 903.2.1.3.

CODE REVIEW

THE SCOPE OF WORK IS THE DESIGN AND CONSTRUCTION OF A NEW COMMUNITY CENTER

VICINITY MAP



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REGISTERED ARCHITECT ANDRE V. CHACHERE 21011 STATE OF TEXAS
2/29/2024

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

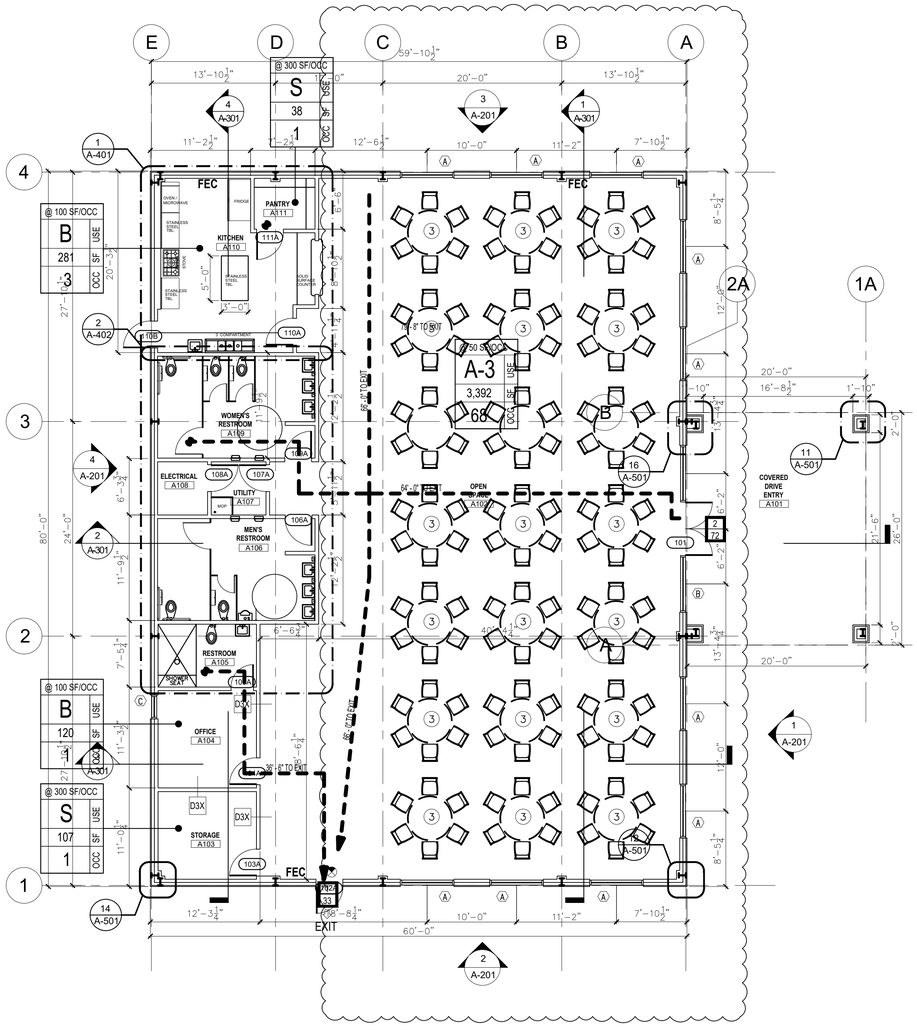
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023
COUNTY COMMENTS	04/16/2024
COUNTY COMMENTS	10/04/2024

Drawing Name

INDEX, CODE & PROJECT INFORMATION

A-001



LIFE SAFETY PLAN LEGEND

SYMBOL	DESCRIPTION
	0-HOUR SMOKE BARRIER
	1-HOUR FIRE PARTITION
	1-HOUR FIRE/SMOKE PARTITION
	2-HOUR FIRE PARTITION
	2-HOUR FIRE/SMOKE PARTITION
OCCUPANCY TAG: @ 100/OCC / B / 5,000 / 60	OCC PER GSF/NSF; USE GROUP; GSF/NSF; OCC LOAD
SMOKE COMPARTMENT TAG: SC-L1A / 150 SF	SMOKE COMPARTMENT NAME; SMOKE COMPARTMENT AREA
100'	PATH OF TRAVEL & DISTANCE
DOOR/STAIR 10 / 210	EXIT NUMBER; BUILDING EXIT / SPACE EXIT CAPACITY
	EXIT LIGHT
	EXIT LIGHT WITH DIRECTIONAL ARROW
F	FIRE ALARM PULL STATION
F	FIRE ALARM ANNUNCIATOR
FAC	FIRE APPARATUS CABINET, FIRE HOSE AND EXTINGUISHER
FHC	FIRE HOSE CABINET
FEC	FIRE EXTINGUISHER CABINET; RE: 8/A-601 FOR DETAIL
FE	FIRE EXTINGUISHER
SP	FIRE STANDPIPE
S	SMOKE DETECTOR
	SMOKE COMPARTMENT SEPARATION
	SHELL SPACE
	1 HR FIRE RATED CEILING

LIFE SAFETY LEGEND

GENERAL LIFE SAFETY /CODE INFORMATION

QUICK RESPONSE FIRE SPRINKLERS	THROUGHOUT
MAXIMUM TRAVEL DISTANCE TO EXIT	300'
MAXIMUM DEAD END CORRIDOR	50'

SMOKE COMPARTMENTS

SMOKE COMPARTMENT	SQUARE FOOTAGES

TRUE NORTH

PLAN NORTH

ARCHITECTURAL OVERALL LIFE SAFETY PLAN

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

4

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2/29/2024

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1 COUNTY COMMENTS	10/30/2024

Drawing Name

OVERALL LIFE SAFETY PLAN

A-003

GENERAL NOTES

G-1. THE CONTRACTOR SHALL NOTIFY CITY OF NEEDVILLE (REFERRED TO AS THE "CITY") OPERATIONS MANAGER AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF WORK AT (979) 793-4253. CONTRACTOR SHALL ATTEND A PRECONSTRUCTION MEETING WITH CITY AND THE PROJECT ENGINEER PRIOR TO INITIATING CONSTRUCTION. PRECONSTRUCTION MEETINGS SHALL BE HELD AT THE CITY OF NEEDVILLE OR AT A LOCATION APPROVED BY THE OPERATION MANAGER.

G-2. ALL PUBLIC INFRASTRUCTURE SHALL BE INSPECTED BY PUBLIC WORKS INSPECTOR(S) OR AUTHORIZED AGENTS(S). A FOLLOW-UP INSPECTION OF ALL PUBLIC INFRASTRUCTURE SHALL BE SCHEDULED WITHIN 60 DAYS OF THE INITIAL INSPECTION. A COMPLETE RE-INSPECTION WITH A NEW PUNCH LIST MAY BE REQUIRED AFTER THE 60 DAY PERIOD. THE CITY CONSTRUCTION INSPECTOR TO BE NOTIFIED A MINIMUM OF 24 HOURS, ON ALL PAVEMENT POURS, WATER, STORM AND SANITARY TESTING. TESTING WILL NOT BE DONE ON A SATURDAY, UNLESS PRIOR APPROVAL IS PROVIDED. COMPLETED WORK SHALL NOT BE BACKFILLED WITHOUT APPROVAL OF THE CITY.

G-3. CONTRACTOR MUST OBTAIN ALL PERMITS AND SUPPLY ALL BONDS REQUIRED BY THE CITY, PRIOR TO BEGINNING CONSTRUCTION. ALL REQUIRED PERMITS MUST BE LISTED ON SITE.

G-4. UPON COMPLETION OF A PROJECT, THE CONTRACTOR AND/OR PROJECT ENGINEER SHALL PROVIDE THE DIRECTOR OF PUBLIC WORKS AND CITY ENGINEER DETAILED, "RECORD DRAWINGS" IN REPRODUCTIVE AND ELECTRONIC FORMAT.

G-5. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, EQUIPMENT AND LABOR FOR EXCAVATION, INSTALLATION AND BACKFILLING OF WATER, SANITARY AND STORM SEWER LINES AND RELATED APPURTENANCES AS SHOWN ON THE PLANS AND/OR DESCRIBED IN THE SPECIFICATIONS.

G-6. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (2004) AND REVISIONS THERETO.

G-7. ALL WORK PERFORMED SHALL COMPLY WITH CURRENT NATIONAL SPECIFICATIONS AND STANDARD PRACTICES, APPROVED PROJECT PLANS AND SPECIFICATIONS AND ALL APPLICABLE CITY STANDARDS, CODES AND ORDINANCES.

G-8. ALL CONSTRUCTION TRAFFIC CONTROL IN THE PROJECT AREA SHALL MEET THE REQUIREMENTS OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND SHALL BE APPROVED BY THE CITY FOR ALL PROJECTS WITHIN THE CITY LIMITS.

G-9. CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES IN THE AREA PRIOR TO COMMENCING WORK IN ANY RIGHT-OF-WAY OR EXISTING EASEMENT. A VERIFICATION NUMBER FROM THE ONE-CALL UTILITY COORDINATING COMMITTEE IS REQUIRED.

G-10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO EXCAVATION AND UNCOVER EXISTING UTILITIES AT ALL "POINTS OF CROSSING" TO DETERMINE IF CONFLICTS EXIST PRIOR TO COMMENCING ANY CONSTRUCTION. NOTIFY THE PROJECT ENGINEER, CITY ENGINEER AND DIRECTOR OF PUBLIC WORKS IMMEDIATELY OF ANY CONFLICT.

G-11. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE SUCH UNDERGROUND FEATURES SUFFICIENTLY IN ADVANCE OF OPERATIONS TO PRECLUDE DAMAGE IN THE EVENT THAT UNDERGROUND FACILITIES NOT SHOWN ON THE DRAWINGS ARE ENCOUNTERED.

G-12. IN THE EVENT OF DAMAGE TO UNDERGROUND FACILITIES, WHETHER OR NOT IT IS SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL MAKE THE NECESSARY REPAIRS TO REPLACE THE FACILITY BACK IN SERVICE. ALL SUCH REPAIRS SHALL CONFORM TO THE REQUIREMENTS OF THE OWNER OF THE FACILITY.

G-13. THE CONTRACTOR SHALL PROVIDE SHEETING, SHORING AND BRACING NECESSARY TO PROTECT WORKMEN AND EXISTING UTILITIES DURING ALL PHASES OF CONSTRUCTION AS MAY BE REQUIRED BY O.S.H.A, FEDERAL, STATE AND LOCAL LAWS, CODES AND ORDINANCES.

G-14. CONTRACTOR SHALL COVER OPEN EXCAVATIONS WITH ANCHORED STEEL PLATES DURING NON-WORKING HOURS ALONG EXISTING ROADWAYS AND WITHIN TRAFFIC AREAS.

G-15. ALL TESTING FOR THIS PROJECT SHALL CONFORM TO THE CITY REQUIREMENTS. SHOULD ANY TEST RESULTS NOT MEET THE TESTING REQUIREMENTS, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REMOVE OR REPLACE SUCH MATERIALS AND INSTALLATIONS, SO THAT THE TESTING REQUIREMENTS ARE MET.

G-16. THE LOADING, UNLOADING AND HANDLING OF ALL PIPE, VALVES, HYDRANTS, FITTINGS, MANHOLES AND OTHER MATERIALS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED PRACTICES AND SHALL BE PERFORMED WITH CARE TO AVOID ANY DAMAGE TO THE MATERIALS. THE CONTRACTOR SHALL LOCATE AND PROVIDE THE NECESSARY STORAGE AREAS FOR MATERIALS AND EQUIPMENT.

G-17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFEGUARDING AND PROTECTING ALL MATERIAL AND EQUIPMENT STORED ON THE JOB SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIALS IN A SAFE AND WORKMANLIKE MANNER TO PREVENT INJURIES, DURING AND AFTER WORKING HOURS, UNTIL PROJECT COMPLETION.

G-18. THE CONTRACTOR SHALL NOT UNLOAD ANY TRACK-TYPE CONSTRUCTION MACHINERY ON ANY EXISTING PAVEMENT OR CROSS OVER ANY EXISTING PAVEMENT OR CURB DURING ANY PROJECT.

G-19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SUPERVISE AND COORDINATE ALL WORK TO INSURE THE PROPER EXECUTION. ALL WORK IS TO BE ACCOMPLISHED IN A NEAT, WORKMANLIKE MANNER, AND ALL EXCESS MATERIALS, TRASH AND DEBRIS, ETC., SHALL BE REMOVED FROM THE JOB BY THE CONTRACTOR, AT HIS EXPENSE.

G-20. CONTRACTOR SHALL REMOVE DIRT AND/OR DEBRIS DEPOSITED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY ON A DAILY BASIS. ALL EQUIPMENT AND CONSTRUCTION DEBRIS SHALL BE REMOVED FROM THE SITE AT THE END OF THE PROJECT.

G-21. EXISTING ROADS, RIGHT-OF-WAYS, EASEMENTS AND PROPERTY DISTURBED DURING CONSTRUCTION SHALL BE RESTORED AS GOOD OR BETTER THAN THE CONDITION PRIOR TO STARTING THE WORK.

G-22. UNLESS OTHERWISE REQUIRED, ALL DISTURBED AREAS SHALL BE SEEDED WITH HYDROMULCH SEEDING AND PROVIDE WATERING UNTIL VEGETATION IS ESTABLISHED.

G-23. ALL EXCESS AND/OR UNSUITABLE SOIL, AND DEBRIS AND/OR WASTE MATERIALS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY.

G-24. ADJUST MANHOLES, INLETS, FLUSHING VALVES AND WATER VALVE BOXES TO MATCH FINAL GRADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY.

G-25. UTILITY SERVICE LINES

1) ALL UTILITY SERVICE LINES ARE NOT SHOWN ON THE DRAWINGS. CONTRACTORS SHALL ANTICIPATE THAT SUCH SERVICE LINES EXIST AND REPAIR THEM IF DAMAGED DURING CONSTRUCTION. IT IS ALSO THE CONTRACTOR'S RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE OWNERS OF SUCH UTILITIES PRIOR TO WORKING IN THE AREA TO CONFIRM THEIR EXACT LOCATIONS AND/OR DEPTHS, AND TO DETERMINE WHETHER ANY ADDITIONAL UTILITIES OTHER THAN THOSE SHOWN ON THESE PLANS MAY BE PRESENT. THE CONTRACTOR SHALL DETERMINE IF ANY OF THESE UTILITIES ARE CLEAR, AND SHALL PRESERVE AND PROTECT ALL OF THESE UTILITIES SHOWN OR FOUND. IF CONFLICTS ARISE REGARDING PUBLIC UTILITIES, THE CONTRACTOR SHOULD IMMEDIATELY NOTIFY THE PROJECT ENGINEER.

2) UTILITY RELOCATIONS REQUIRED BY CONSTRUCTION SHALL BE PERFORMED BY THE APPROPRIATE UTILITY COMPANY. ANY RELOCATIONS OR TEMPORARY BRACING NOT DEEMED NECESSARY BY THE ENGINEER, BUT DESIRED FOR CONVENIENCE BY THE CONTRACTOR, SHALL BE PERFORMED BY THE APPROPRIATE UTILITY COMPANY AT THE CONTRACTOR'S EXPENSE.

3) TEXAS ONE CALL	1-800-245-4545	6) AT&T	281-341-4312
4) CENTERPOINT ENERGY-GAS	281-342-8881	7) COMCAST	713-462-1900
5) CENTERPOINT ENERGY-ELECTRIC	281-341-4930	8) CITY OF NEEDVILLE	979-793-4253

G-26. AT&T TELEPHONE

1) THE CONTRACTOR SHALL DETERMINE THE ACTUAL LOCATION OF UTILITIES BY CALLING TEXAS ONE-CALL SYSTEM AT LEAST 72 HOURS BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THE UNDERGROUND UTILITIES.

2) CONTRACTOR SHALL HAND DIG WITHIN ONE (1) FOOT OF AT&T UNDERGROUND CONDUIT OR CABLE SYSTEMS.

G-27. CENTERPOINT ENERGY (ELECTRIC)

1. OVERHEAD LINES EXIST ON THE PROPERTY AND APPROXIMATE LOCATIONS ARE SHOWN ON THE DRAWINGS. CONTRACTOR SHALL VERIFY THEIR LOCATION PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES. CONTRACTOR IS LEGALLY RESPONSIBLE FOR SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED AND LOCATE EXISTING UNDERGROUND UTILITIES, CALL CENTERPOINT ENERGY AT LEAST 72 HOURS BEFORE COMMENCING WORK.

2. CONSTRUCTION THAT WILL REQUIRE EXCAVATION CLOSER THAN THREE (3) FEET TO CENTERPOINT FACILITIES SHALL BE BORED AND JACKED WITH THE WRITTEN APPROVAL FROM CENTERPOINT.

3. CONTRACTOR SHALL HAND DIG WITHIN ONE (1) FOOT OF CENTERPOINT ENERGY UNDERGROUND CONDUIT OR AS OTHERWISE REQUIRED BY CENTERPOINT.

G-28. CENTERPOINT ENERGY (GAS)

CAUTION: UNDERGROUND GAS FACILITIES
LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC. WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567, 1-800-669-8344 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 945-8036 OR (713) 945-8037 (7:00 A.M. TO 4:30 P.M.) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.

WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MACHANIZED EXCAVATION PROCEDURES

WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200

THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY NO APPROVAL TO USE, CROSS OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT OF WAY DIVISION AT (713) 207-6248 OR (713) 207-5769

G-29. COMCAST - THE CONTRACTOR SHALL NOTIFY COMCAST AT LEAST 72 HOURS BEFORE COMMENCING WORK TO LOCATE EXISTING UNDERGROUND CABLE.

G-30. ALL PIPE AND REINFORCEMENT STEEL SHALL BE KEPT FREE OF DIRT AND DEBRIS. ANY DAMAGE TO THE COATINGS OF THE VARIOUS MATERIALS MUST BE REPAIRED OR REPLACED BY THE CONTRACTOR WITH APPROVAL BY THE CITY.

G-31. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE AND POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION.

G-32. NO CONNECTIONS SHALL BE MADE TO THE EXISTING WATER LINES OR SANITARY SEWERS UNTIL ALL PROPOSED LINES HAVE BEEN THOROUGHLY CLEANED, TESTED AND APPROVED BY THE CITY.

G-33. CONTRACTOR SHALL VERIFY PUBLIC INFRASTRUCTURE ALIGNMENT, CENTERLINE CURVE DATA AND STATIONING WITH APPROVED SUBDIVISION PLAT AND APPROVED PLANS.

G-34. ALL BACKFILL (INCLUDING CEMENT STABILIZED SAND) SHALL BE PLACED IN LIFTS THAT DO NOT EXCEED 8" (LOOSE), SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND BE TESTED BY A CERTIFIED TESTING LABORATORY.

G-35. ALL TRENCH BACKFILL SHALL BE TESTED AT A MINIMUM RATE OF ONE DENSITY TEST PER ONE LIFTS OF TRENCH BACKFILL PER 300 FEET OF TRENCH. TESTS SHALL BE TAKEN AT RANDOM LOCATION SELECTED BY THE LAB OR AS AS OTHERWISE REQUESTED BY THE CITY.

G-36. A CONSTRUCTION PROJECT THAT REQUIRES THE SWPPP, IT MUST BE INSTALLED BEFORE THE WORK BEGINS. IT MUST BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.

G-37. CONTRACTOR SHALL CONTACT CITY PUBLIC WORKS DEPARTMENT IMMEDIATELY IF WET SAND CONDITIONS ARE ENCOUNTERED. NO BEDDING SHALL BE INSTALLED IN WET CONDITIONS. WHEN WELL POINTING OR IN WET SAND CONDITIONS, MAINTAIN GROUND WATER 1' (FT.) BELOW BOTTOM OF TRENCH FOR A MINIMUM OF 24 HOURS AFTER BEDDING AND BACKFILL IS IN PLACE.

G-38. IN THE EVENT OF CONFLICT BETWEEN THE CITY OF NEEDVILLE DETAIL SPECIFICATIONS OR CONSTRUCTION NOTES, THE MORE STRINGENT REQUIREMENTS WILL GOVERN.

WATER DISTRIBUTION NOTES

W-1. EXCEPT AS OTHERWISE REQUIRED, WATER MAINS FOUR INCHES (4") THROUGH TWELVE INCHES (12") SHALL BE AWWA C-900, AWWA C-909 CLASS 150, DR 18.
WATER MAINS LESS THAN 4 INCHES (4") DIAMETER SHALL BE PVC, ASTM D-2241, SDR-21 (PR-200), WITH RUBBER GASKET JOINTS OR APPROVED EQUAL. ALL POTABLE WATER PIPE USED IN THE PROJECT MUST MEET THE REQUIREMENTS OF AMERICAN NATIONAL STANDARDS INSTITUTE/NATIONAL SANITATION FOUNDATION STANDARD 61 (ANSI/NSF61). PIPE SHALL BE CERTIFIED TO CONFORM TO ANSI/NSF-61 AND SHALL BE MARKED "NSF-PW".

W-2. ALTERNATIVE WATER MAIN PIPE MATERIAL (WITH APPROVAL OF THE CITY):
A) STEEL: AWWA C200, 150 PSI FOR LINES 4-INCHES TO 12-INCHES, 235 PSI FOR LINES GREATER THAN 12-INCHES. ALL PIPE COATINGS SHALL BE IN ACCORDANCE WITH AWWA C210. ALL NUTS AND BOLTS SHALL BE EPOXY COATED.

B) DUCTILE IRON: AWWA C151 (ANSI A21.51) FOR LINES 4-INCHES TO 54-INCHES. PIPE SHALL BE LINED WITH POLYWRAP IN ACCORDANCE WITH AWWA C104 (ANSI A21.4).

W-3. INSTALLATION OF WATER MAINS SHALL BE IN ACCORDANCE WITH CURRENT AWWA APPROVED METHODS, STANDARDS AND MATERIALS, TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (T.C.E.Q.) REGULATIONS AND CITY STANDARDS, CODES AND ORDINANCES.

W-4. ALL WATER MAINS SHALL HAVE A MINIMUM 3.5 FEET AND A MAXIMUM 5 FEET OF COVER WHEN CONSTRUCTED IN STREET RIGHTS-OF-WAY OR EASEMENTS, UNLESS APPROVED BY THE CITY.

W-5. FIRE HYDRANTS SHALL BE SET BEHIND BACK OF CURB AT APPROVED LOCATIONS. CENTER LINE OF FIRE HYDRANTS SHALL BE THREE (3) FEET FROM BACK OF CURB OF THE STREET AND/OR ONE (1) FOOT FROM RIGHT-OF-WAY LINE FOR A OPEN DITCH STREET CROSS-SECTION UNLESS OTHERWISE REQUIRED IN THE PLANS. FIRE HYDRANTS SHALL BE INSTALLED A MINIMUM OF TEN (10) FEET FROM ALL SANITARY SEWERS AND APPURTENANCES. FIRE HYDRANTS SHALL BE LOCATED OPPOSITE PROPERTY LINES OR RIGHT-OF-WAY LINE EXTENSIONS, UNLESS OTHERWISE APPROVED BY THE CITY.

W-6. GATE VALVES, FIRE HYDRANTS AND BLOWOFFS SHALL BE COUNTER-CLOCKWISE OPENING.

W-7. ALL FITTINGS, VALVES AND FIRE HYDRANTS SHALL BE CAST IRON MECHANICAL JOINT TYPE UNLESS APPROVED IN WRITING BY THE CITY. ALL MECHANICAL JOINTS SHALL BE INSTALLED WITH MECHANICAL RESTRAINED JOINTS (EBAA IRON, INC., SERIES 2000PV OR EQUAL). NIPPLES FROM FITTING TO FITTING AT GATE VALVES SHALL BE 18" IN LENGTH.

W-8. A MINIMUM HORIZONTAL CLEARANCE OF NINE FEET (9') BETWEEN WATER MAINS AND SANITARY SEWER LINES SHALL BE MAINTAINED BY THE CONTRACTOR, EXCEPT AS APPROVED BY THE CITY.

W-9. THE CONTRACTOR SHALL PROVIDE FOR A MINIMUM OF SIX INCHES (6") CLEARANCE AT STORM SEWER AND WATER LINE CROSSINGS AND TWENTY-FOUR INCHES (24") MINIMUM CLEARANCE AT SANITARY SEWER AND WATER LINE CROSSINGS. WATER LINES SHALL BE LOCATED AT A HIGHER ELEVATION THAN THE SEWER WHEREVER POSSIBLE. WHEN NOT POSSIBLE, T.C.E.Q., "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS", ARTICLE 290.44 WILL TAKE PRECEDENCE. IF A CONFLICT EXISTS, THE CONTRACTOR SHALL ADVISE THE DIRECTOR OF PUBLIC WORKS AND WATER SUPERINTENDENT IMMEDIATELY AND SHALL NOT CONTINUE FURTHER CONSTRUCTION WITHOUT CITY APPROVAL.

W-10. ABANDONMENT OF EXISTING WATER LINES SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH APPROVED IN WRITING WHEN APPROVAL FROM THE CITY PUBLIC WORKS DIRECTOR OR WATER SUPERINTENDENT IS

W-11. TAPPING SLEEVE & VALVES ON THE EXISTING CITY WATER SYSTEM WILL BE INSTALLED BY A CITY APPROVED TAPPING CONTRACTOR.

W-12. NO CONNECTION SHALL BE MADE TO ANY EXISTING WATER LINES UNTIL THE NEW WATER LINES HAVE BEEN THOROUGHLY STERILIZED, CLEANED AND TESTED AND FINAL APPROVAL FROM THE CITY'S AUTHORIZED AGENT HAS BEEN OBTAINED IN WRITING.

W-13. ALL VALVES AND HYDRANTS SHALL BE STORED SO THAT THEY ARE PROTECTED FROM FREEZING.

W-14. ALL PRESSURE PIPE INSTALLATIONS SHALL BE TESTED FOR LEAKAGE. TEST PRESSURE SHALL BE 1.5 TIMES THE MAXIMUM DESIGN PRESSURE OR 150 PSIG, WHICHEVER IS GREATER. THE TEST SHALL HAVE A MINIMUM DURATION OF FOUR HOURS AND SHALL BE OBSERVED BY THE AUTHORIZED REPRESENTATIVE OF THE CITY PUBLIC WORKS DEPARTMENT.

W-15. STERILIZATION OF NEW WATER LINES SHALL BE DONE IN ACCORDANCE WITH AWWA C-651, LATEST EDITION. A MINIMUM OF ONE SAMPLE PER 1000 FEET OF WATER MAIN OR ONE SAMPLE PER SEPARATION SECTION OF WATER MAIN SHALL BE COLLECTED. IF THE SAMPLES FAIL TO MEET THE T.C.E.Q. DRINKING WATER STANDARD REQUIREMENTS, THE FLUSHING AND TESTING PROCESS SHALL BE REPEATED.

W-16. WATER LINES SHALL HAVE SAND EMBEDMENT TO TWELVE (12) INCHES ABOVE THE TOP OF PIPE.

W-17. WATER LINE TRENCHES UNDER PAVEMENT OR WITHIN THREE (3) FEET FROM EDGE OF PAVEMENT TO BE BACKFILLED WITH CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND) FROM THE TOP OF THE EMBEDMENT TO THE BASE OF PROPOSED BASE OF PROPOSED PAVING SUBGRADE LESS 6 INCHES.

W-18. ALL WATER LINE CONSTRUCTION CROSSING EXISTING ASPHALT AND/OR CONCRETE STREETS SHALL BE BORED AND JACKED, UNLESS OTHERWISE APPROVED BY THE PROJECT ENGINEER AND THE CITY.

W-19. TRENCH SAFETY SYSTEM IS REQUIRED FOR ALL WATER MAIN CONSTRUCTION.

W-20. CONCRETE THRUST BLOCKING IS REQUIRED FOR ALL VALVES, FIRE HYDRANTS AND FITTINGS.

W-21. USE PROPER COMPACTING METHODS, SUCH AS, SHEEPSFOOT, JUMPING JACK, PLATE, ETC..

SANITARY SEWER CONSTRUCTION NOTES

S-1. SANITARY SEWERS SHALL BE CONSTRUCTED ACCORDING TO THESE PLANS AND SPECIFICATIONS AND THE CITY AND THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (T.C.E.Q.) RULES AND REGULATIONS.

S-2. ALL MANHOLES SHALL BE PRECAST IN ACCORDANCE WITH DETAILS INCLUDING THE INTERIOR COATING. BRICK MANHOLES ARE NOT ALLOWED. ALL SANITARY MANHOLES SHALL BE INSTALLED WITH INFLOW PROTECTORS.

S-3. ALLOWABLE SANITARY SEWER PIPE MATERIAL:

A) GRAVITY LINES

1. POLYVINYL CHLORIDE (PVC), PIPE AND FITTINGS MEETING THE REQUIREMENTS OF ASTM D2241 (SDR 26; PR160), ASTM D1784, ASTM D3212 AND ASTM F477. FOR DEPTH LESS THAN 4 FEET AND GREATER THAN 20 FEET, INSTALL ASTM D2241 (SDR21, PR200).

2. DUCTILE IRON (D.I.P.), AWWA C-151, AWWA C-111, STANDARD CLASS 150, WITH BELL AND SPIGOT PUSH-ON JOINTS, ALL PIPE SHALL HAVE AN INTERIOR POLYETHYLENE COATING OF 40-MILS AND AN EXTERIOR POLYETHYLENE WRAP OF 8-MILS.

B) FORCE MAINS

1. PVC, 4-INCH TO 12-INCH, AWWA C900, DR18, CLASS 150, ASTM D3139, ASTM F477. (GREEN COLOR)

S-4. ALL D.I.P. SANITARY SEWER PIPES SHALL BE LINED WITH POLYWRAP AND INSTALLED WITH CATHODIC PROTECTION.

S-5. THE CONTRACTOR SHALL NOTIFY THE CITY PUBLIC WORKS DEPARTMENT AT LEAST 24 HOURS PRIOR TO PRESSURE AND DEFLECTION TESTS ON ALL GRAVITY SANITARY SEWERS. ALL TESTS SHALL BE MONITORED BY AN AUTHORIZED AGENT OF THE CITY.

S-6. ALL GRAVITY SANITARY SEWER PIPE SHALL BE LOW PRESSURE AIR TESTED AND MANHOLES VACUUM TESTED IN ACCORDANCE WITH T.C.E.Q. REQUIREMENTS. FORCE MAINS SHALL BE HYDROSTATIC TESTED AT A MINIMUM OF 150 PSI.

S-7. DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE AND SEMI-RIGID PIPE. THE CITY MAY REQUIRE SERVICE LEADS TO BE RANDOMLY TESTED. DEFLECTION TESTS SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS. NO PIPE SHALL EXCEED A DEFLECTION OF 5%. THE TEST SHALL BE CONDUCTED USING A MANDREL HAVING AN OUTSIDE DIAMETER EQUAL TO 95% OF THE AVERAGE INSIDE DIAMETER OF THE PIPE. THE MANDREL SHALL HAVE A MINIMUM OF 9 RUNNERS WITH THE CONTACT LENGTH OF EACH RUNNER EQUAL TO OR GREATER THAN THE PIPE'S NOMINAL DIAMETER. THE TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES.

S-8. SANITARY SEWER MANHOLE RIMS, EXCEPT IN PAVED AREAS, SHALL BE SET 4-INCHES ABOVE FINISHED GRADE WITHIN STREET RIGHT-OF-WAY, AND 6-INCHES ABOVE FINISHED LOT GRADES WITHIN EASEMENTS. CLEAN FILL MAY BE PLACED ADJOINING THE MANHOLE AND GRADED AWAY FROM THE RIM FOR SURFACE WATER DRAINAGE.

S-9. SANITARY MANHOLES BELOW THE 100-YEAR FLOOD PLAIN (OR WHERE OTHERWISE REQUIRED) SHALL BE WATERPROOFED USING A NEOPRENE GASKET. ONLY STAINLESS STEEL SCREWS OR NUTS & BOLTS CAN BE USED TO HOLD DOWN THE COVER. A VENT PIPE EXTENDING ONE FOOT ABOVE THE FLOODPLAIN ELEVATION SHALL BE PROVIDED, UNLESS OTHERWISE APPROVED.

S-10. SANITARY LINES AND MANHOLES PARALLEL TO WATER LINES SHALL BE INSTALLED WITH AT LEAST A 9-FOOT HORIZONTAL SEPARATION (OUTSIDE TO OUTSIDE). SANITARY SEWERS INSTALLED CROSSING UNDER WATER MAIN SHALL COMPLY WITH T.C.E.Q. REQUIREMENTS.

S-11. ALL SANITARY SEWERS SHALL BE CONSTRUCTED ON A STRAIGHT ALIGNMENT AND ON A UNIFORM GRADE. GRAVITY SEWERS SHALL BE CONSTRUCTED WITH THE PIPE BELL FACING UPSTREAM. ALL 6-INCH SANITARY SERVICE LEADS SHALL BE LAID WITH A MINIMUM GRADE OF 0.70%

S-12. ALL SEWER LEADS AND STUBOUTS SHALL BE MARKED IN ACCORDANCE WITH THE DETAILS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MARKERS IN GOOD AND PLUMB CONDITION WITH A VERTICAL ALIGNMENT. IF DAMAGED, THE CONTRACTOR SHALL REPLACE THE MARKER.

S-13. ALL SEWER LINES (INCLUDING SERVICE LEADS) ENTERING A MANHOLE AT AN ELEVATION GREATER THAN 24-INCHES ABOVE THE MANHOLE INVERT MUST BE CONSTRUCTED WITH AN EXTERIOR DROP PIPE IN ACCORDANCE WITH THE DETAILS.

S-14. STEPS IN MANHOLES ARE PROHIBITED.

S-15. CONTRACTOR SHALL PROVIDE ADEQUATE CONCRETE THRUST BLOCKING AT ALL FORCE MAIN BENDS.

S-16. AT ALL LOTS WHERE TOP OF PIPE IS GREATER THAN 8-FEET BELOW FINISHED GRADE, PROVIDE A 6-INCH SANITARY SEWER STACK OR RISER. STACKS AND RISERS SHALL BE EXTENDED TO WITHIN 6 FEET OF FINISHED GRADE. STACKS SHALL BE MARKED FOR LOCATION AS INDICATED ON THE DETAILS.

S-17. FORCE MAIN SHALL BE LAID WITH DETECTOR TAPE LAID AT 6" ABOVE THE PIPE. THE DETECTOR TAPE MUST BEAR THE LABEL "PRESSURIZED WASTEWATER" IN 1.5 INCH HIGH LETTERS, REPEATED CONTINUOUSLY, FOR THE ENTIRE LENGTH OF THE FORCE MAIN.

STORM SEWER NOTES

ST-1. ALL STORM SEWERS SHALL MEET THE REQUIREMENTS OF THE CITY, FORT BEND COUNTY AND FORT BEND COUNTY DRAINAGE DISTRICT (WHEN APPLICABLE).

ST-2. ALL STORM SEWER MANHOLE AND INLET COVERS SHALL BE LABELED "STORM SEWER" IN ACCORDANCE WITH THE DETAILS.

ST-3. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE, A.S.T.M. C-76, CLASS III (MINIMUM) INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH THE CITY DETAILS AND FORT BEND COUNTY DRAINAGE DISTRICT CRITERIA. ALL REINFORCED CONCRETE PIPE 42-INCH DIAMETER AND GREATER SHALL HAVE WATER-TIGHT RUBBER GASKET JOINTS. CONTRACTOR MAY USE TAL-COAT OR EQUAL FOR PIPE JOINTS WITH PIPE LESS THAN 42" DIAMETER. ALL STORM SEWER SHALL BE BACKFILLED WITH SELECT FILL MATERIAL COMPACTED TO 95% STANDARD PROCTOR COMPACTION, ASTM D-698, IN ACCORDANCE WITH THE DETAILS. CONTRACTOR SHALL USE MECHANICAL ROLLER OR MECHANICAL TAMPER IN COMPACTING ALL BACKFILL FOR PROJECT.

ST-4. ALL STORM SEWER STRUCTURES SUCH AS MANHOLES AND INLETS SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND. CEMENT STABILIZED SAND BACKFILL SHALL EXTEND A MINIMUM OF TWENTY-FOUR INCHES (24") FROM THE OUTSIDE WALL OF ALL STRUCTURES. (2 SACKS OF CEMENT PER TON OF SAND.)

ST-5. AREAS ADJACENT TO THE PAVEMENT SHALL BE GRADED TO POSITIVELY DRAIN TOWARD INLETS, CONCRETE CURB AND/OR ROAD DITCHES IF DISTURBED DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE MATERIALS, LABOR AND EQUIPMENT TO PERFORM ALL GRADING OPERATIONS.

ST-6. CONTRACTOR SHALL ADJUST EXISTING WATER LINE MAINS AND WATER LINE SERVICES IN CONFLICT WITH A STORM SEWER. CONTRACTOR SHALL COORDINATE THE DISRUPTION OF WATER SERVICE DURING THE WATER LINE LOWERING OPERATION WITH THE CITY PUBLIC WORKS DEPARTMENT.

ST-7. ADJUST ALL STORM SEWER MANHOLE COVERS TO MATCH FINISHED GRADE ELEVATIONS.

ST-8. ALL PRECAST CONCRETE STRUCTURES SHALL BE REINFORCED AND SHALL BE DESIGNED TO WITHSTAND AASHTO H-20 LOADINGS.

ST-9. ALTERNATIVE STORM SEWER PIPE MATERIAL (WITH APPROVAL OF THE CITY):
A) STEEL: AWWA C200, 150 PSI FOR LINES 4-INCHES TO 12-INCHES, 235 PSI FOR LINES GREATER THAN 12-INCHES. ALL PIPE COATINGS SHALL BE IN ACCORDANCE WITH AWWA C210. ALL NUTS AND BOLTS SHALL BE EPOXY COATED.

B) DUCTILE IRON: AWWA C151 (ANSI A21.51) FOR LINES 4-INCHES TO 54-INCHES. PIPE SHALL BE LINED WITH POLYWRAP IN ACCORDANCE WITH AWWA C104 (ANSI A21.4).

STREET AND PAVING CONSTRUCTION NOTES

P-1. ALL PAVING SHALL BE CONSTRUCTED WITH THE PLANS AND SPECIFICATIONS AND CITY REQUIREMENTS.

P-2. THE CONTRACTOR SHALL NOTIFY CITY PUBLIC WORKS DEPARTMENT AT LEAST 24 HOURS PRIOR TO ANY AND ALL SUBGRADE TESTING AND CONCRETE POURS.

P-3. ALL TEMPORARY AND PERMANENT SIGNAGE MUST COMPLY WITH THE LATEST REVISION OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

P-4. CONTRACTOR SHALL PROTECT ALL UTILITIES, SIDEWALKS, PAVEMENT, ETC. AND SHALL REPAIR OR REPLACE ANY FACILITIES DAMAGED DURING PAVING OR GRADING OPERATIONS.

P-5. EXISTING PAVEMENTS, CURBS, SIDEWALKS DRIVEWAYS, ETC., DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED TO THE CITY STANDARDS.

P-6. ALL DISTURBED AREAS WITHIN STREET RIGHT-OF-WAY AND EASEMENTS NOT COVERED BY PAVEMENT OR STRUCTURE SHALL BE HYDRO-MULCHED AND WATERED UNTIL VEGETATION ESTABLISHMENT.

P-7. AREAS TO BE FILLED SHALL BE CLEARED AND GRUBBED, SCARIFIED AND COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY (+/- 2% OF OPTIMUM MOISTURE) PER ASTM D-698, TO A DEPTH OF 6" PRIOR TO FILL PLACEMENT. FILL MATERIAL SHALL BE PLACED IN MAXIMUM 8" THICK LIFTS (MEASURED LOOSE) AND COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY (+/- 2% OF OPTIMUM MOISTURE) PER ASTM D-698. FILL SHALL BE CLEAN EARTH AND BE FREE FROM TRASH, VEGETATION AND LARGE STONES. TEST REPORTS INDICATING COMPLIANCE WITH DENSITY REQUIREMENTS SHALL BE SUBMITTED TO THE CITY PRIOR TO PLACEMENT OF PAVEMENT.

P-8. THE SUBGRADE IS TO BE SCARIFIED AND COMPACTED TO 95% STANDARD PROCTOR DENSITY (+/- 2% OF OPTIMUM MOISTURE) PER ASTM D-698. THE SUBGRADE SHALL BE STABILIZED TO 8" DEPTH WITH A MINIMUM EIGHT PERCENT (8%) LIME BY WEIGHT OR AS REQUIRED TO ACHIEVE A STABILIZED SOIL P.I. OF 20 OR LESS. LIME REQUIREMENTS SUBGRADE SHALL EXTEND A MINIMUM OF 2-FEET BEHIND THE BACK OF ALL CURB AND BEYOND THE EDGE OF PAVEMENT.

P-9. TESTING OF FILL, SUBGRADE AND PAVEMENT TO DOCUMENT COMPLIANCE WITH THE CITY REQUIREMENTS SHALL BE COMPLETED BY A CERTIFIED (REFERENCE: THE ASSOCIATION FOR LABORATORY ACCREDITATION) TESTING LABORATORY APPROVED BY THE CITY. A COPY OF ALL TEST RESULTS SHALL BE SUBMITTED TO THE CITY PUBLIC WORKS DIRECTOR.

P-10. ALL INTERSECTION EDGE RETURN RADII SHALL BE 25 FEET ON LOCAL RESIDENTIAL AND MINOR COLLECTOR STREETS. ALL CUL-DE-SAC RETURN RADII SHALL BE 35 FEET UNLESS NOTED OTHERWISE. MINIMUM GRADES AT INTERSECTIONS AND IN CUL-DE-SACS SHALL BE 1.00% MINIMUM GRADE ON CURB AND GUTTER STREETS SHALL BE 0.30%.

P-11. PAVING JOINTS (TRANSVERSE AND LONGITUDINAL) SHALL BE IN ACCORDANCE WITH THE DETAILS.

P-12. WHEN A THICKER PAVEMENT ROADWAY INTERSECTS WITH A THINNER PAVEMENT ROADWAY, THE THICKER PAVEMENT SHALL BE CONSTRUCTED FOR THE ENTIRE INTERSECTION TO THE CURB RETURNS ON ALL INTERSECTING STREETS.

P-13. WHERE PROPOSED PAVEMENT IS TO CONNECT TO EXISTING CONCRETE PAVEMENT, THE CONNECTION SHALL BE COMPLETED IN ACCORDANCE WITH THE PAVEMENT UNDERCUT DETAIL.

P-14. SIDEWALKS SHALL BE LOCATED AS SHOWN ON THE PLANS. SIDEWALK RAMP CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE TEXAS ACCESSIBILITY STANDARDS (T.A.S.) AND CITY REQUIREMENTS.

P-15. ALL INTERSECTIONS SHALL BE CONSTRUCTED WITH SIDEWALK RAMPS IN ACCORDANCE WITH THE TEXAS ACCESSIBILITY STANDARDS, THE AMERICAN DISABILITIES ACT AND THE CITY REQUIREMENTS.

P-16. CONCRETE SHALL CONTAIN A MINIMUM 5-1/2 SACKS OF PORTLAND CEMENT PER CUBIC YARD OF CONCRETE WITH A MINIMUM 3500 PSI COMPRESSIVE STRENGTH AT 28 DAYS. CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4 INCHES AND AN AIR CONTENT OF 4.5 PERCENT. AIR ENTRAINMENT ADMIXTURES SHALL CONFORM TO ASTM C260. FLYASH IS NOT ALLOWED.

P-17. CONCRETE PAVEMENT THICKNESSES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DETAILS. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60. A MINIMUM OF 18" LAPS ON ALTERNATE STEEL BARS SHALL BE PROVIDED. ALL REINFORCING STEEL SHALL BE SECURELY TIED AND SUPPORTED WITH BAR CHAIRS IN ACCORDANCE WITH ACI STANDARDS. ALL RE-BAR TO BE 100% TIED, OVERLAPS WILL BE DOUBLE TIED.
SPACING FOR REINFORCING STEEL SHALL BE AS FOLLOWS:
1. 7" CONCRETE PAVEMENT - #4 BAR ON 18" CENTER EACH WAY.

2. 6" CONCRETE PAVEMENT AND DRIVEWAYS - #4 BAR ON 18" CENTER EACH WAY.

3. SIDEWALKS AND CONCRETE SLOPE PAVEMENT - MINIMUM 4-1/2" THICK CONCRETE - #3 BAR ON 24" CENTER EACH WAY. (2% CROSS SLOPE MAXIMUM)
WIRE MESH IS NOT ALLOWED IN SIDEWALKS OR STREETS WITHIN THE CITY OF NEEDVILLE OR ITS ETJ.

P-18. CONCRETE SHALL NOT BE PLACED WHEN THE AMBIENT TEMPERATURE IS 40 DEGREES FAHRENHEIT AND FALLING. CONCRETE MAY BE PLACED IF THE AMBIENT TEMPERATURE IS 35 DEGREES AND RISING. CONTRACTOR SHALL PROVIDE AN APPROVED COVERING MATERIAL (COTTON MATS, POLYETHYLENE SHEETING, ETC.) IN THE EVENT TEMPERATURE SHOULD FALL BELOW 32 DEGREES FAHRENHEIT WITHIN 72 HOURS OF PLACING CONCRETE. NO SALT OR OTHER CHEMICALS SHALL BE ADDED TO CONCRETE TO PREVENT FREEZING. NO CONCRETE SHALL BE PLACED WHEN THE MIXTURE TEMPERATURE IS ABOVE 95 DEGREES FAHRENHEIT. CONCRETE SHALL BE PLACED WITHIN 60 MINUTES OF THE BATCH TIME.

P-19. ALL CONCRETE PLACED SHALL BE UNIFORMLY SPRAYED WITH A MEMBRANE CURING COMPOUND (TXDOT DMS-4650, TYPE 2, WHITE). CURING COMPOUND SHALL BE APPLIED IN ACCORDANCE WITH TXDOT STANDARD SPECIFICATIONS.

P-20. CONCRETE SAMPLES: CYLINDERS (SET OF 4), SLUMP AND AIR ENTRAINMENT TESTS ARE REQUIRED FOR EACH 100 CUBIC YARDS AND EACH FRACTION THEREOF. A MINIMUM OF ONE SET OF SAMPLES IS REQUIRED PER CONCRETE POUR. THE CITY RESERVES THE RIGHT TO REQUEST ADDITIONAL TESTS.

P-21. FINISHED PAVEMENT SHALL HAVE CORE SAMPLES TAKEN EVERY 750 LINEAR FEET (750'), STAGGERED ACROSS THE ROADWAY CROSS-SECTION, AND IN EVERY CUL-DE-SAC. ADDITIONAL CORE SAMPLES MAY BE REQUIRED AT THE DISCRETION OF THE CITY ENGINEER. THESE CORE SAMPLES SHALL BE TESTED TO INSURE THAT THE PAVEMENT THICKNESS MEETS THE REQUIRED PROJECT THICKNESS.

P-22. PROPER TESTING AND LABORATORY DOCUMENTATION IS REQUIRED. FAILURE TO MEET THE MINIMUM PAVEMENT REQUIREMENTS WILL RESULT IN THE REJECTION OF PAVEMENT. IMMEDIATE REMOVAL AND REPLACEMENT OF SUBSTANDARD PAVEMENT SECTIONS WILL BE NECESSARY TO SATISFY THESE REQUIREMENTS.

P-23. CRACKS 1/16 INCH OR LARGER ARE NOT ACCEPTABLE IN NEW PAVEMENT. CRACKS 1/16 INCH OR LESS WILL BE ADDRESSED AN INDIVIDUAL BASIS, SUBJECT TO APPROVAL OR REJECTION.

P-24. STREET NAME SIGNS SHALL BE LOCATED AT ALL INTERSECTIONS. CONTRACTOR SHALL VERIFY STREET NAME WITH RECORDED PLAT. STOP SIGNS AND OTHER TRAFFIC SIGNAGE SHALL BE PLACED IN ACCORDANCE WITH THE PLANS AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."

P-25. A DOUBLE-REFLECTORIZED BLUE TRAFFIC PAVEMENT MARKER SHALL BE PLACED ONE FOOT OFFSET OF THE PAVEMENT CENTERLINE ON FIRE HYDRANT SIDE, AT ALL FIRE HYDRANT LOCATIONS, BY THE PAVING CONTRACTOR. FIRE HYDRANTS LOCATED AT INTERSECTIONS SHALL HAVE A MARKER PLACED ON EACH STREET.

P-26. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED, PERMANENT PREFABRICATED PAVEMENT MARKINGS MEETING THE MINIMUM REQUIREMENTS OF TxDOT, DMS-8240, TYPE A OR B, INSTALLED IN ACCORDANCE WITH TxDOT STANDARD SPECIFICATION ITEM 668. CENTERLINE PAVEMENT MARKINGS, STOP BARS AND MISCELLANEOUS MARKINGS SHALL HAVE A MINIMUM THICKNESS OF 90 MILS. LANE DELINEATION AND ROAD EDGE PAVEMENT MARKINGS SHALL HAVE A MINIMUM THICKNESS OF 60 MILS. ALL PAVEMENT MARKINGS SHALL BE INSTALLED WITH DOUBLE ADHESIVE AS REQUIRED BY THE CITY. OUTSIDE THE CITY (IN THE ETJ) COMPLY WITH FORT BEND COUNTY REQUIREMENTS.

P-27. ALL DRIVEWAYS SHALL BE LOCATED TO AVOID EXISTING CURB INLET STRUCTURES.

P-28. CONCRETE MIX DESIGN SHALL BE SENT TO THE CITY FOR APPROVAL WITH A MINIMUM OF 72 HOURS BEFORE THE FIRST CONCRETE POUR.

P-29. VEHICLES OF ALL TYPES ARE PROHIBITED FROM DRIVING ON NEW PAVEMENTS THREE (3) DAYS AFTER THE PLACING OF CONCRETE AND UNTIL THE CONCRETE HAS REACHED A MINIMUM OF 3500 PSI.

P-30. THE SUBGRADE SURFACE SHALL BE SMOOTH AND IN CONFORMITY WITH LINES & GRADES ON THE PLANS. WHEN THE SUBGRADE FAILS TO MEET DENSITY REQUIREMENTS OR SHOULD IT LOSE THE REQUIRED STABILITY, DENSITY, OR FINISH, IT SHALL BE REWORKED IN ACCORDANCE WITH TxDOT SUBARTICLE 260.4:

(7) "REWORKING A SECTION", WHICH MAY REQUIRE AN ADDITIONAL 25% OF THE SPECIFIED LIME AMOUNT.

P-31. FLOODING OF THE STREETS SHALL OCCUR 24 HOURS PRIOR TO THE INITIAL INSPECTION.

P-32. SUBGRADE DENSITIES SHALL BE RETAKEN IN THE EVENT OF A 1 INCH (1") OR GREATER RAINFALL OR IN THE EVENT THE AMBIENT AIR TEMPERATURE FALLS BELOW 32 DEGREES FAHRENHEIT FOR GREATER THAN THREE HOURS. SUBGRADE DENSITIES SHALL BE RETAKEN IF CONCRETE HAS NOT BEEN PLACED WITHIN 14 CALENDAR DAYS FROM FINAL COMPACTION.

SPECIAL NOTES

SN-1. BEFORE THE INITIAL WALK-THROUGH IS SCHEDULED,

SN-2. NEGATIVE BACTERIOLOGICAL RESULTS FOR PUBLIC WATER LINES BUST BE SUBMITTED TO PUBLIC WORKS.

SN-3. SATISFACTORY MANDREL, HYDROSTATIC, SANITARY, AND THE MANHOLE VACUUM TEST, MUST BE COMPLETED.

SN-4. THE STORM SYSTEM MUST BE COMPLETELY CLEANED FOR A LAMP INSPECTION BEFORE OR THE DAY OF THE WALK-THROUGH FOR ACCEPTANCE.

SN-5. THE MANHOLES, GRATES, VALVES AND HYDRANTS PROPERLY ADJUSTED/PAINTED TO THE CITY OF NEEDVILLE'S COLOR CODE.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WATER DISTRIBUTION SYSTEM GENERAL CONSTRUCTION NOTES

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
WATER DISTRIBUTION SYSTEM
GENERAL CONSTRUCTION NOTES

1. This water distribution system must be constructed in accordance with the current Texas Commission on Environmental Quality (TCEQ) Rules and Regulations for Public Water Systems 30 Texas Administrative Code (TAC) Chapter 290 Subchapter D. When conflicts are noted with local standards, the more stringent requirement shall be applied. Construction for public water systems must always, at a minimum, meet TCEQ's "Rules and Regulations for Public Water Systems.

2. An appointed engineer shall notify in writing the local TCEQ's Regional Office when construction will start. Please keep in mind that upon completion of the water works project, the engineer or owner shall notify the commission's Water Supply Division, in writing, as to its completion and attest to the fact that the work has been completed essentially according to the plans and change orders on file with the commission as required in 30 TAC §290.39(h)(3).

3. All newly installed pipes and related products must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61-G and must be certified by an organization accredited by ANSI, as required by 30 TAC §290.44(a)(1).

4. Plastic pipe for use in public water systems must bear the National Sanitation Foundation Seal of Approval (NSF pw-G) and have an ASTM design pressure rating of at least 150 psi or a standard dimension ratio of 26 or less, as required by 30 TAC §290.44(a)(2).

5. No pipe which has been used for any purpose other than the conveyance of drinking water shall be accepted or relocated for use in any public drinking water supply, as required by 30 TAC §290.44(a)(3).

6. Water transmission and distribution lines shall be installed in accordance with the manufacturer's instructions. However, the top of the water line must be located below the frost line and in no case shall the top of the water line be less than 24 inches below ground surface, as required by 30 TAC §290.44(a)(4).

7. Pursuant to 30 TAC §290.44(a)(5), the hydrostatic leakage rate shall not exceed the amount allowed or recommended by the most current AWWA formulas for PVC pipe, cast iron and ductile iron pipe. Include the formulas in the notes on the plans.
o The hydrostatic leakage rate for polyvinyl chloride (PVC) pipe and appurtenances shall not exceed the amount allowed or recommended by formulas in America Water Works Association (AWWA) C-605 as required in 30 TAC §290.44(a)(5). Please ensure that the formula for this calculation is correct and most current formula is in use;

$$Q = \frac{LD\sqrt{P}}{148{,}00}$$

Where:

Q = the quantity of makeup water in gallons per hour,
L = the length of the pipe section being tested, in feet,
D = the nominal diameter of the pipe in inches, and
P = the average test pressure during the hydrostatic test in pounds per square inch (psi).

o The hydrostatic leakage rate for ductile iron (DI) pipe and appurtenances shall not exceed the amount allowed or recommended by formulas in America Water Works Association (AWWA) C-600 as required in 30 TAC §290.44(a)(5). Please ensure that the formula for this calculation is correct and most current formula is in use;

$$L = \frac{SD\sqrt{P}}{148{,}00}$$

Where:

L = the quantity of makeup water in gallons per hour,
S = the length of the pipe section being tested, in feet,
D = the nominal diameter of the pipe in inches, and
P = the average test pressure during the hydrostatic test in pounds per square inch (psi).

8. Projects constructed on or after January 4, 2014 must comply with changes to the Safe Drinking Water Act that reduce the maximum allowable lead content of pipes, pipe fittings, plumbing fittings, and fixtures to 0.25 percent.

9. The system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. When the system is intended to provide firefighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow conditions as required by 30 TAC §290.44(d).

10. The contractor shall install appropriate air release devices in the distribution system at all points where topography or other factors may create air locks in the lines. All vent openings to the atmosphere shall be covered with 16-mesh or finer, corrosion resistant screening material or an acceptable equivalent as required by 30 TAC §290.44(d)(1).

11. Pursuant to 30 TAC §290.44(d)(4), accurate water meters shall be provided. Service connections and meter locations should be shown on the plans.

12. Pursuant to 30 TAC §290.44(d)(5), sufficient valves and blowoffs to make repairs. The engineering report shall establish criteria for this design.

13. Pursuant to 30 TAC §290.44(d)(6), the system shall be designed to afford effective circulation of water with a minimum of dead ends. All dead-end mains shall be provided with acceptable flush valves and discharge piping. All dead-end lines less than two inches in diameter will not require flush valves if they end at a customer service. Where dead ends are necessary as a stage in the growth of the system, they shall be located and arranged to ultimately connect the ends to provide circulation.

14. The contractor shall maintain a minimum separation distance in all directions of nine feet between the proposed waterline and wastewater collection facilities including manholes and septic tank drainfields. If this distance cannot be maintained, the contractor must immediately notify the project engineer for further direction. Separation distances, installation methods, and materials utilized must meet 30 TAC §290.44(e)(1-4) of the current rules.

15. Pursuant to 30 TAC §290.44(e)(5), the separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.

16. Pursuant to 30 TAC §290.44(e)(6), fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater line, wastewater lateral, or wastewater service line regardless of construction.

17. Pursuant to 30 TAC §290.44(e)(7), suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.

18. Pursuant to 30 TAC §290.44(e)(8), waterlines shall not be installed closer than ten feet to septic tank drainfields.

19. Pursuant to 30 TAC §290.44(f)(1), the contractor shall not place the pipe in water or where it can be flooded with water or sewage during its storage or installation.

20. Pursuant to 30 TAC §290.44(f)(2), when waterlines are laid under any flowing or intermittent stream or semi-permanent body of water the water main shall be installed in a separate watertight pipe encasement. Valves must be provided on each side of the crossing with facilities to allow the underwater portion of the system to be isolated and tested.

21. The contractor shall disinfect the new water mains in accordance with AWWA Standard C-651 and then flush and sample the lines before being placed into service. Samples shall be collected for microbiological analysis to check the effectiveness of the disinfection procedure which shall be repeated if contamination persists. A minimum of one sample for each 1,000 feet of completed water line will be required or at the next available sampling point beyond 1,000 feet as designated by the design engineer, in accordance with 30 TAC §290.44(f)(3).

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

NOTES

SCALE		
HORIZONTAL	1" = NTS	DESIGNED BY: LLT
VERTICAL	1" = NTS	DRAWN BY: TWB
		CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO:
		N-1-18
		Sheet:

VCS architects
19251 Purus Dr.
Porter, TX 77365

WECS
TEXAS BOARD OF PROFESSIONAL ENGINEERS F-19379
4611 BIGGAM DRIVE
FRESNO, TEXAS 77545
(832) 443-4150

BARBARA JORDAN PARK
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NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

NOTES

Drawing Name

N.T.S.

C0.01

GENERAL

1. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE BEGINNING CONSTRUCTION
2. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SECURITY TO PROTECT THE PROJECT SITE, CONTRACTOR PROPERTY, EQUIPMENT, AND WORK.
3. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING STREETS OF CONSTRUCTION DIRT AND DEBRIS AT CLOSE OF EACH WORK DAY.
4. THE CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY, UPON COMPLETION OF THE JOB SHALL BE AS GOOD AS OR BETTER THAN PRIOR TO STARTING WORK.
5. PRIOR TO CONSTRUCTION, THE CONTRACTOR, ALONG WITH CONCURRENCE FROM THE FIELD ENGINEER, SHALL DETERMINE HIS/HER LAY-DOWN AND/OR STAGING AREA LOCATIONS.
6. THE CONTRACTOR SHALL NOTIFY ALL PROPERTY OWNERS A MINIMUM OF 24 HOURS PRIOR TO BLOCKING DRIVEWAYS OR ENTERING UTILITY EASEMENTS.
7. TRAFFIC INGRESS AND EGRESS FOR DRIVEWAYS AND PEDESTRIAN ACCESS FACILITIES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION WITH ALL WEATHER SURFACES.
8. THE CONTRACTOR SHALL REMOVE ANY FENCES, POSTS, MAILBOXES, PLANTERS, PERMANENT TRASH CONTAINERS, CULVERTS, ETC. OR SECTIONS THEREOF, THAT ENCROACH WITHIN THE COUNTY'S RIGHT-OF-WAY. NOTE: PRIOR TO CONSTRUCTION, THE PROPERTY OWNER WAS PAID TO RELOCATE OR REPLACE THESE ITEMS OUTSIDE OF THE COUNTY'S RIGHT-OF-WAY. IF THE OWNER HAS FAILED TO DO SO, THE CONTRACTOR WILL REPLACE THEM WITH THE MINIMUM LEVEL OF QUALITY NEEDED TO SECURE THE PROPERTY AND/OR MAINTAIN MAIL DELIVERY. IN THAT CASE, PAYMENT FOR THESE INSTALLATIONS WILL BE INCLUDED AS EXTRA WORK ITEMS OR AS OVERRUNS TO EXISTING PAY ITEMS.

   ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS LOCATED OUTSIDE OF THE COUNTY'S RIGHT-OF-WAY, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE.

   ALSO, IF THESE ITEMS ARE LOCATED WITHIN THE PROJECT RIGHT-OF-WAY AND ARE DESIGNATED TO REMAIN, ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE.

   TREES, BUSHES, SHRUBBERY AND OTHER DAMAGED PLANTINGS DESIGNATED TO REMAIN SHALL BE REPLACED WITHIN 72 HOURS OF REMOVAL AND ARE TO BE THOROUGHLY WATERED-IN. NO SEPARATE PAY.
9. PAVED SURFACES, PAVEMENT MARKERS AND MARKINGS SHALL BE PROTECTED FROM DAMAGE BY TRACKED EQUIPMENT.
10. IRON RODS DISTURBED DURING CONSTRUCTION ARE TO BE REPLACED BY A REGISTERED PROFESSIONAL LAND SURVEYOR FOR THE ORIGINAL PROPERTY OWNER AT NO SEPARATE PAY.
11. CONSTRUCTION STAKING WILL BE PROVIDED BY THE CONTRACTOR. TWO COPIES OF STAKING NOTES TO BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRUCTION.
12. THE COUNTY OR THE COUNTY'S SURVEYOR SHALL PROVIDE A BENCHMARK OR TEMPORARY BENCHMARK AND SURVEY CONTROLS.
13. THE CONTRACTOR SHALL MAINTAIN UPDATED RED-LINED RECORD DRAWINGS ON SITE FOR INSPECTION BY THE ENGINEER.
14. MOWING, MAINTENANCE, AND CLEAN-UP OF THE PROJECT SHALL MEET THE REQUIREMENT OF SPECIFICATION ITEM 560 (NO SEPARATE PAY). MOWING, MAINTENANCE, AND CLEAN-UP IS REQUIRED FOR THE PROJECT LIMITS AND DURATION, REGARDLESS OF THE CONTRACTOR'S SCOPE OF ACTIVITIES WITHIN THE PROJECT LIMITS.
15. THE REMOVAL OF ANY ABANDONED UTILITIES REQUIRED TO COMPLETE THE WORK SHALL BE INCIDENTAL AND NO SEPARATE PAYMENT SHALL BE MADE.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO STOCKPILE NECESSARY MATERIAL ON-SITE OR AT A SECURED OFF-SITE LOCATION AT NO ADDITIONAL EXPENSE TO FORT BEND COUNTY. ANY SUITABLE EXCAVATED MATERIAL ON THE PROJECT WHICH IS AVAILABLE AT THE TIME OF NEED; WHETHER FROM STORM SEWER, ROADWAY, AND/OR CHANNEL EXCAVATION, SHALL BE USED BEFORE BORROW IS BROUGHT ON-SITE.
17. MANHOLES, JUNCTION BOXES, INLETS, AND RISERS ARE TO BE PRE-CAST OR CAST IN PLACE.
18. THE FOLLOWING DETAILS ARE MINIMUM REQUIREMENTS AND MAY BE SUPERSEDED BY GEOTECHNICAL ENGINEER RECOMMENDATIONS OR MORE STRINGENT REQUIREMENTS FROM THE CITY'S ETJ PROJECT IS WITHIN.
19. POP UP DRAINS ARE NOT ALLOWED IN FORT BEND COUNTY RIGHT OF WAY.

20. CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.

21 BEFORE STARTING CONSTRUCTION, CONTRACTOR SHALL VERIFY BENCHMARK ELEVATION AND NOTIFY ENGINEER IF ANY DISCREPANCY AND/OR CONFLICT IS FOUND.

22. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE FROM THE PROPOSED BUILDINGS AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.

23. CONTRACTOR SHALL PROTECT ALL MANHOLE COVERS, VALVE COVERS, VAULT LIDS, FIRE HYDRANTS, POWER POLES, GUY WIRES, AND TELEPHONE BOXES THAT ARE TO REMAIN IN PLACE AND UNDISTURBED DURING CONSTRUCTION.

24. ALL EXISTING CONCRETE PAVING, SIDEWALK, AND CURB DEMOLITION SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. DISPOSAL SHALL BE AT AN APPROVED OFF-SITE, LAWFUL LOCATION, UNLESS DIRECTED OTHERWISE BY THE OWNER.

WATER CONSTRUCTION NOTES

1. WATER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL, STANDARD SPECIFICATION, AND CONSTRUCTION DETAILS.
2. ALL 4" THROUGH 12" WATER LINE TO BE AWWA C-900 PVC DR-18 BLUE PRESSURE RATED WATER MAIN WITH 2" AND SMALLER WATER SERVICE LINE TO BE CONTINUOUS TYPE K COPPER TUBING PER COH STANDARD SPECIFICATION SECTION 02503. ALL 4"THRU 54" DI PIPE WATER LINES SHALL BE AWWA C151 WITH INSIDE LINING WITH AWWA C104 AND DOUBLE WRAPPED WITH 8-MIL POLYETHYLENE SHEETS.
3. CONCRETE THRUST BLOCKS SHALL BE PROVIDED AS NECESSARY TO PREVENT PIPE MOVEMENT. USE RESTRAINED JOINTS WHERE PREVENTING MOVEMENT OF 06" GREATER PIPE IS NECESSARY DUE TO THRUST.
4. ALL WATER LINES UNDER PROPOSED OR FUTURE PAVING AND TO A POINT OF ONE (1) FOOT BACK OF ALL PROPOSED OR FUTURE CURBS SHALL BE ENCASED IN BANK SAND TO 12" OVER PIPE AND BACKFILLED WITH CEMENT STABILIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE.
5. ALL WATER LINE AND SEWER LINE CROSSINGS SHALL BE CONSTRUCTED PER CITY OF HOUSTON AND TCEQ REGULATIONS.
6. ALL WATER VALVES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF AWWA C-500 AND SHALL BE OF THE RESILIENT SEAT TYPE.
7. ALL WATER LINES TO BE DISINFECTED IN CONFORMANCE WITH AWWA C-651 AND THE TEXAS STATE DEPARTMENT OF HEALTH. AT LEAST ONE BACTERIOLOGICAL SAMPLE SHALL BE COLLECTED FOR EVERY 1,000 LINEAR FEET OF WATER LINE AND SHALL BE REPEATED IF CONTAMINATION PERSISTS.
8. ALL BELOW GRADE VALVES SHALL BE GASKETED, HUB-END GATE VALVES WITH A CAST IRON BOX, EXCEPT WHERE FLANGES ARE CALLED OUT ON THE PLANS. THRU 12" FITTINGS SHALL BE CEMENT MORTAR LINED COMPACT DUCTILE IRON PRESSURE FITTINGS PER ANSI A21.53, OR PUSH ON FITTINGS PER ANSI A21.10 PRESSURE RATED AT 250 PSIG.
10. HYDROSTATIC TESTING: ALL WATER PIPE SHALL BE TESTED FOR LEAKAGE IN ACCORDANCE WITH THE LATEST COUNTY STANDARD CONSTRUCTION SPECIFICATIONS. TESTS ARE TO BE PERFORMED ON THE ENTIRE FOOTAGE OF WATER PIPE LINE INCLUDED IN THE PROJECT.
11. ALL WATER LINES TO HAVE MINIMUM COVER TO FINISHED GRADE AND MINIMUM 12" CLEARANCE TO OTHER UTILITIES AT CROSSING UNLESS OTHERWISE NOTED ON PLANS. ALL WATER LINE INSTALLED OVER DEEP SHALL UTILIZE RESTRAINED JOINT FITTINGS.
12. CONTRACTOR SHALL KEEP WATER PIPE CLEAN AND CAPPED (OR OTHERWISE EFFECTIVELY COVERED) OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS OR OTHER SOURCES OF CONTAMINATION FROM UNFINISHED PIPE LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.

GRADING NOTES

1. GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.
2. BEFORE STARTING CONSTRUCTION, CONTRACTOR SHALL VERIFY BENCHMARK ELEVATION AND NOTIFY ENGINEER IF ANY DISCREPANCY AND/OR CONFLICT IS FOUND.
3. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE FROM THE PROPOSED BUILDINGS AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.
4. CONTRACTOR SHALL PROTECT ALL MANHOLE COVERS, VALVE COVERS, VAULT LIDS, FIRE HYDRANTS, POWER POLES, GUY WIRES, AND TELEPHONE BOXES THAT ARE TO REMAIN IN PLACE AND UNDISTURBED DURING CONSTRUCTION.
5. ALL EXISTING CONCRETE PAVING, SIDEWALK, AND CURB DEMOLITION SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. DISPOSAL SHALL BE AT AN APPROVED OFF-SITE, LAWFUL LOCATION, UNLESS DIRECTED OTHERWISE BY THE OWNER.

CONSTRUCTION

1. FORT BEND COUNTY MUST BE INVITED TO THE PRE-CONSTRUCTION MEETING.
2. CONTRACTOR SHALL NOTIFY FORT BEND COUNTY ENGINEERING DEPARTMENT 48 HOURS PRIOR TO COMMENCING CONSTRUCTION AND 48 HOUR NOTICE TO ANY CONSTRUCTION ACTIVITY WITHIN THE LIMITS OF THE PAVING AT CONSTRUCTION@FBCTX.GOV.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM FORT BEND COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHT OF WAYS.
4. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FORT BEND COUNTY "RULES, REGULATIONS AND REQUIREMENTS" RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS AS CURRENTLY AMENDED.
5. ALL ROAD WIDTHS, CURB RADII AND CURB ALIGNMENT SHOWN INDICATES BACK OF CURB.
6. A CONTINUOUS LONGITUDINAL REINFORCING BAR SHALL BE USED IN THE CURBS.
7. ALL CONCRETE PAVEMENT SHALL BE 5½ SACK CEMENT WITH A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT EACH CURB RETURN AND AT A MAXIMUM SPACING OF 60 FEET.
8. ALL WEATHER ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
9. 4" X 12" REINFORCED CONCRETE CURB SHALL BE PLACED IN FRONT OF SINGLE FAMILY LOTS ONLY. ALL OTHER AREAS SHALL BE 6" REINFORCED CONCRETE CURB.
10. CURB HEADERS ARE REQUIRED AT CURB CONNECTIONS TO HANDICAP RAMPS, WITH NO CONSTRUCTION JOINT WITHIN 5' OF RAMPS.
11. GUIDELINES ARE SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC., DURING CONSTRUCTION – BOTH DAY AND NIGHT.
12. ALL R1-1 STOP SIGNS SHALL BE A MINIMUM OF 36"X36" WITH DIAMOND GRADE SHEETING PER TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
13. STREET NAME SIGNAGE SHALL BE ON A 9" HIGH SIGN FLAT BLADE W/REFLECTIVE GREEN BACKGROUND. STREET NAMES SHALL BE UPPER AND LOWERCASE LETTERING WITH UPPERCASE LETTERS OF 6" MINIMUM AND LOWERCASE LETTERS OF 4.5" MINIMUM. THE LETTERS SHALL BE REFLECTIVE WHITE. STREET NAME SIGNS SHALL BE MOUNTED ON STOP SIGN POST.
14. A BLUE DOUBLE REFLECTORIZED BUTTON SHALL BE PLACED AT ALL FIRE HYDRANT LOCATIONS. THE BUTTON SHALL BE PLACED 12 INCHES OFF OF THE CENTERLINE OF THE STREET ON THE SAME SIDE AS THE HYDRANT.
15. THE PROJECT AND ALL PARTS THEREOF SHALL BE SUBJECT TO INSPECTION FROM TIME TO TIME BY INSPECTORS DESIGNATED BY FORT BEND COUNTY. NO SUCH INSPECTIONS SHALL RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER. NEITHER FAILURE TO INSPECT NOR FAILURE TO DISCOVER OR REJECT ANY OF THE WORK AS NOT IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS, REQUIREMENTS AND SPECIFICATIONS OF FORT BEND COUNTY OR ANY PROVISION OF THIS PROJECT SHALL BE CONSTRUED TO IMPLY AN ACCEPTANCE OF SUCH WORK OR TO RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER.
16. STABILIZED SUBGRADE: DETERMINE THE THICKNESS OF THE STABILIZED SUBGRADE AFTER CURING AND COMPACTION. IF THE SUBGRADE DEPTH IS GREATER THAN THE PROPOSED THICKNESS BY 20% OR MORE, THE CMT LAB MUST PROVIDE VERIFICATION THE PERCENTAGE OF MATERIAL BEING USED TO STABILIZE THE SUBGRADE MEETS OR EXCEEDS PROJECT REQUIREMENTS. TEST RESULTS REQUIRED.

NOTE: FORT BEND COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.

GRADING NOTES

1. GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.
2. BEFORE STARTING CONSTRUCTION, CONTRACTOR SHALL VERIFY BENCHMARK ELEVATION AND NOTIFY ENGINEER IF ANY DISCREPANCY AND/OR CONFLICT IS FOUND.
3. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE FROM THE PROPOSED BUILDINGS AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.
4. CONTRACTOR SHALL PROTECT ALL MANHOLE COVERS, VALVE COVERS, VAULT LIDS, FIRE HYDRANTS, POWER POLES, GUY WIRES, AND TELEPHONE BOXES THAT ARE TO REMAIN IN PLACE AND UNDISTURBED DURING CONSTRUCTION.
5. ALL EXISTING CONCRETE PAVING, SIDEWALK, AND CURB DEMOLITION SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. DISPOSAL SHALL BE AT AN APPROVED OFF-SITE, LAWFUL LOCATION, UNLESS DIRECTED OTHERWISE BY THE OWNER.

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8705 PARK STREET
NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

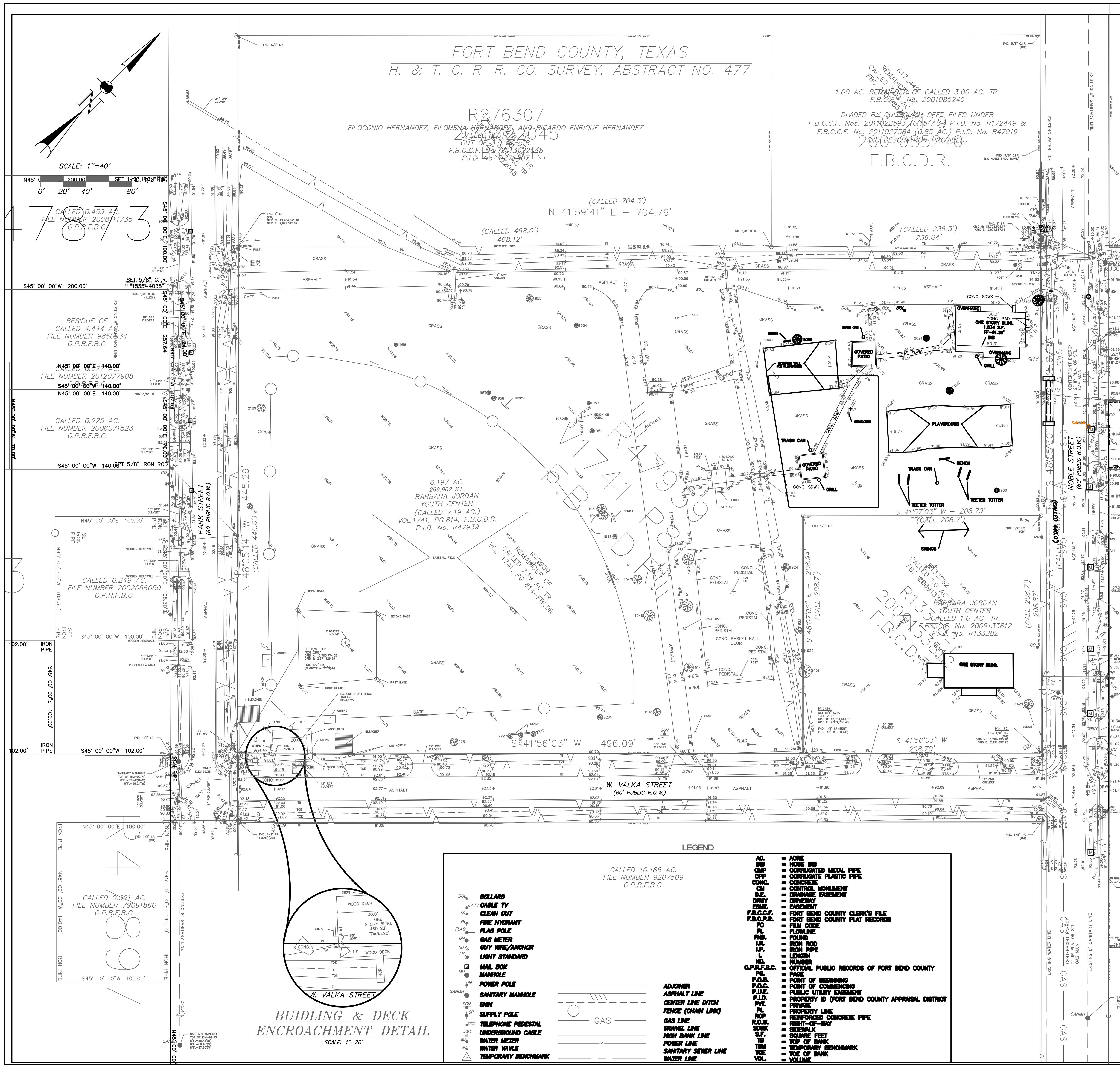
DESCRIPTION	
100% REVIEW SET	06/30/2023

NOTES

Drawing Name

N.T.S.

C0.01



PUBLIC FACILITIES LIST

COUNTY ASSISTANCE DISTRICT	NEEDVILLE COUNTY ASSISTANCE DISTRICT # 20
WCID	CITY OF NEEDVILLE
MUD	N/A
LID	N/A
DID	FORT BEND COUNTY
SCHOOL	NEEDVILLE ISD
FIRE	FORT BEND ESD 9
IMPACT FEE AREA	CITY OF NEEDVILLE
CITY OR CITY ETJ	CITY OF NEEDVILLE
UTILITIES CO.	CITY OF NEEDVILLE

LEGEND

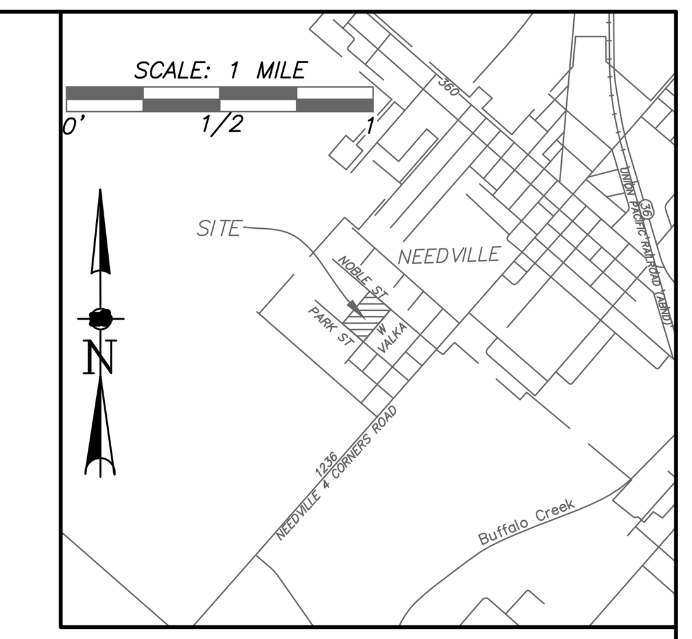
- BOL – BOLLARD
- CATV – CABLE TV
- CO – CLEAN OUT
- FH – FIRE HYDRANT
- FLAG – FLAG POLE
- GM – GAS METER
- GUY – GUY WIRE/ANCHOR
- LS – LIGHT STANDARD
- MAIL BOX
- MH – MANHOLE
- PP – POWER POLE
- SANMH – SANITARY MANHOLE
- SGN – SIGN
- SP – SUPPLY POLE
- TPED – TELEPHONE PEDESTAL
- UGC – UNDERGROUND CABLE
- WM – WATER METER
- WV – WATER VAVLE
- TEMPORARY BENCHMARK

- ADJOINER
- ASPHALT LINE
- CENTER LINE DITCH
- FENCE (CHAIN LINK)
- GAS LINE
- GRAVEL LINE
- HIGH BANK LINE
- POWER LINE
- SANITARY SEWER LINE
- WATER LINE

- AC. = ACRE
- BIB = HOSE BIB
- CMP = CORRUGATED METAL PIPE
- CPP = CORRUGATE PLASTIC PIPE
- CONC. = CONCRETE
- CM = CONTROL MONUMENT
- D.E. = DRAINAGE EASEMENT
- DRWY = DRIVEWAY
- ESMT. = EASEMENT
- F.B.C.C.F. = FORT BEND COUNTY CLERK'S FILE
- F.B.C.P.R. = FORT BEND COUNTY PLAT RECORDS
- FC = FILM CODE
- FL = FLOWLINE
- FND. = FOUND
- I.R. = IRON ROD
- I.P. = IRON PIPE
- L = LENGTH
- NO. = NUMBER
- O.P.R.F.B.C. = OFFICIAL PUBLIC RECORDS OF FORT BEND COUNTY
- PG. = PAGE
- P.O.B. = POINT OF BEGINNING
- P.O.C. = POINT OF COMMENCING
- P.U.E. = PUBLIC UTILITY EASEMENT
- P.I.D. = PROPERTY ID (FORT BEND COUNTY APPRAISAL DISTRICT
- PVT. = PRIVATE
- PL = PROPERTY LINE
- RCP = REINFORCED CONCRETE PIPE
- R.O.W. = RIGHT-OF-WAY
- SDWK = SIDEWALK
- S.F. = SQUARE FEET
- TB = TOP OF BANK
- TBM = TEMPORARY BENCHMARK
- TOE = TOE OF BANK
- VOL. = VOLUME

TREE CHART

POINT NUMBER	DIAMETER	TYPE
1912	24"	ASH
1913	24"	ASH
1914	16"	PINE
1915	16"	TALLOW
1921	28"	ELM
1922	9"	OAK
1923	15"	PECAN
1924	17"	TALLOW
1930	9"	OAK
1935	6"	CREPE MYRTLE
1937	22"	TALLOW
1946	24"	TALLOW
1947	20"	TALLOW
1948	10"	TALLOW
1949	20"	TALLOW
1950	20"	TALLOW
1951	10"	OAK
1952	6"	OAK
1953	8"	OAK
1954	10"	BEACH
1955	16"	OAK
1956	8"	TALLOW
1957	9"	TALLOW
1958	10"	TALLOW
2021	13"	OAK
2022	15"	OAK
2026	25"	ASH
2039	20"	BEACH
2119	24"	CREPE MYRTLE
2188	12"	PECAN
2189	18"	TALLOW
2225	17"	OAK
2227	12"	TALLOW
2230	10"	TALLOW
2233	11"	TALLOW
2235	12"	TALLOW
3128	20"	CREPE MYRTLE
3429	20"	OAK



VICINITY MAP

KEY MAP: 683 Z

GENERAL NOTES

1. THE SURVEYOR HAS NOT ABSTRACTED THE SUBJECT PROPERTY.
2. ALL BEARINGS AND COORDINATES ON THIS SURVEY ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NAD83, SOUTH CENTRAL ZONE NO. 4204. ALL COORDINATES ARE GRID AND MAY BE BROUGHT TO THE SURFACE BY APPLYING A SCALE FACTOR 0.99986378. GEOID USED: FORT BEND COUNTY GEOID 2012.
3. ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP NO. 48157C0400M, REVISED DATE JANUARY 29, 2021, THE SUBJECT PROPERTY LIES WITHIN ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.
4. THIS SURVEY WAS PERFORMED IN CONNECTION WITH INFORMATION DESCRIBED IN CITY PLANNING LETTER, G.F. NO. 2791023–02290 OF TEXAS AMERICAN TITLE COMPANY, DATED APRIL 11, 2023.
5. BENCHMARK – NGS MONUMENT NO. AW5478, LOCATED 0.05 MILE FROM THE INTERSECTION OF STATE HIGHWAY 36 AND FM ROAD 360 IN NEEDVILLE, TEXAS, IN FRONT OF THE AMERICAN LEGION POST ON LEFT AND IN THE GRASS BETWEEN THE HIGHWAY AND THE PARKING LOT, ELEVATION 88.20 FEET, NAVD 88 DATUM.

   5.1 TEMPORARY BENCHMARK (TBM A): A RAIL ROAD SPIKE SET IN A POWER POLE LOCATED AT THE INTERSECTION OF THE SOUTHWEST RIGHT–OF–WAY LINE OF NOBLE STREET NEAR THE NORTH BOUNDARY CORNER OF THE BARBARA JORDAN PARK. TBM HAS AN ELEVATION OF 91.28 FEET.

   5.2 TEMPORARY BENCHMARK (TBM B): A RAIL ROAD SPIKE SET IN A POWER POLE LOCATED AT THE NORTH CORNER OF THE INTERSECTION OF W. VALKA STREET AND PARK STREET, NEAR THE SOUTH CORNER OF THE BARBARA JORDAN PARK. TBM HAS AN ELEVATION OF 92.38 FEET.
6. THE WORD CERTIFY IS UNDERSTOOD TO BE AN EXPRESSION OF PROFESSIONAL JUDGMENT BY THE SURVEYOR, WHICH IS BASED ON HIS BEST KNOWLEDGE, INFORMATION AND BELIEF.
7. THIS SURVEY IS BEING PROVIDED SOLELY FOR THE USE OF THE CURRENT PARTIES AND THAT NO LICENSE HAS BEEN CREATED, EXPRESSED OR IMPLIED, TO COPY THE SURVEY EXCEPT AS IS NECESSARY IN CONJUNCTION WITH THE ORIGINAL TRANSACTION.
8. EXISTING BUILDING ENCROACHES OVER PROPERTY LINE INTO W. VALKA STREET RIGHT–OF–WAY BY AS MUCH AS 1.9 FEET. WOOD DECK ENCROACHES INTO W. VALKA STREET RIGHT–OF–WAY BY AS MUCH AS 6.4 FEET. BLEACHERS ENCROACHS INTO W. VALKA STREET RIGHT–OF–WAY BY AS MUCH AS 2.0 FEET. BLEACHERS ENCROACHS INTO PARK STREET RIGHT–OF–WAY BY AS MUCH AS 1.2 FEET.
9. PER CITY PLANNING LETTER MENTIONED ABOVE, NO EASEMENTS, RESTRICTIONS, OR LIENS WERE FOUND TO AFFECT THE SUBJECT PROPERTY.
10. UTILITIES SHOWN HEREON ARE BASED ON ABOVE GROUND OBSERVATION ONLY AT TIME OF FIELDING.
11. MINIMUM SLAB ELEVATION (NEW CONSTRUCTION): THE COUNTY ENGINEER WILL SET THE MINIMUM SLAB ELEVATION FOR EACH SUBDIVISION BASED UPON THE RECOMMENDATION OF THE DRAINAGE DISTRICT ENGINEER. THE MINIMUM SLAB ELEVATION SHOWN ON THE PLAT WILL BE SET USING THE CRITERIA GIVEN IN THE FORT BEND COUNTY DRAINAGE CRITERIA MANUAL.
    1. TWELVE INCHES ABOVE THE MAXIMUM STREET PONDING LEVER OR
    2. TWELVE INCHES ABOVE THE 100 YEAR FLOOD PLAIN.
    3. THE FOLLOWING NOTE SHALL BE SHOWN ON THE PLAT:
       "THE TOP OF ALL FLOOD SLABS SHALL BE A MINIMUM OF ______ FEET ABOVE MEAN SEA LEVEL. THE TOP OF SLAB ELEVATION AT ANY POINT ON THE PERIMETER OF THE SLAB SHALL NOT BE LESS THAN EIGHTEEN (18) INCHES ABOVE NATURAL GROUND."

CERTIFICATION

I HEREBY CERTIFY THAT THIS PLAT ACCURATELY REPRESENTS THE RESULTS OF AN ON THE GROUND SURVEY MADE UNDER MY SUPERVISION AND THAT IT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF SAID SURVEY. ALL PROPERTY CORNERS ARE AS DESCRIBED HEREON AND THERE ARE NO VISIBLE ENCROACHMENTS, CONFLICTS OR PROTRUSIONS APPARENT ON THE GROUND, EXCEPT AS SHOWN. I FURTHER CERTIFY THAT THE HEREIN PLAT AND THE SURVEY MEET THE MINIMUM REQUIREMENTS OF A CATEGORY 1B & 6, CONDITION II SURVEY, AS DESCRIBED IN THE TEXAS SOCIETY OF PROFESSIONAL LAND SURVEYORS – MANUAL OF PRACTICE.

Martin T. Roe,
Registered Professional Land Surveyor
Texas Registration No. 2106

Date Signed: ________

BARBARA JORDAN YOUTH CENTER
PARK ROAD
NEEDVILLE, TEXAS 77461

REVISIONS

REV.	DESCRIPTION	DATE

A BOUNDARY AND TOPOGRAPHIC SURVEY OF A 6.197 ACRES TRACT OF LAND BEING OUT OF AND A PART OF THAT CERTAIN CALLED 7.19 ACRE TRACT LOCATED IN SECTION No. 26, H. & T.C. RAILROAD COMPANY SURVEY, ABSTRACT No. 477, CITY OF NEEDVILLE, FORT BEND COUNTY, TEXAS, ACCORDING TO THE WARRANTY DEED RECORDED IN VOLUME 1741, PAGE 814 OF THE FORT BEND COUNTY DEED RECORDS.

SCALE: 1"=40'

DATE: 04/25/2023

REKHA ENGINEERING INC.
CIVIL ENGINEERS AND LAND SURVEYORS
7676 Hillmont Road, Suite 350
Houston, Texas 77040
713–895–8080
713–895–8081
Fax: 713–895–7686
email: jake1@pdq.net

TBPE No. F–3712

DRAWN BY: DAE | CHECKED BY: MTR | APPROVED BY: JHE
CLIENT: FORT BEND COUNTY | JOB NO: 0323–4481

REKHA ENGINEERING, INC.
CONTACT: JOHN ENGLISH
JAKE1@PDQ.NET
7676 HILLMONT, SUITE 350
HOUSTON, TEXAS 77040
(TEL) 713–895–8080

File Info: C:\Users\gerald\OneDrive\FORT BEND COUNTY\BARBRA JORDAN COMMUNITY CNTR\BARBRA JORDAN PROJECT FOLDER\B JORDAN PLN SET072524v5.dwg Sep 05, 2024 – 10:05pm gerald

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STATE OF TEXAS
GERALD PAUL WILSON
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Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

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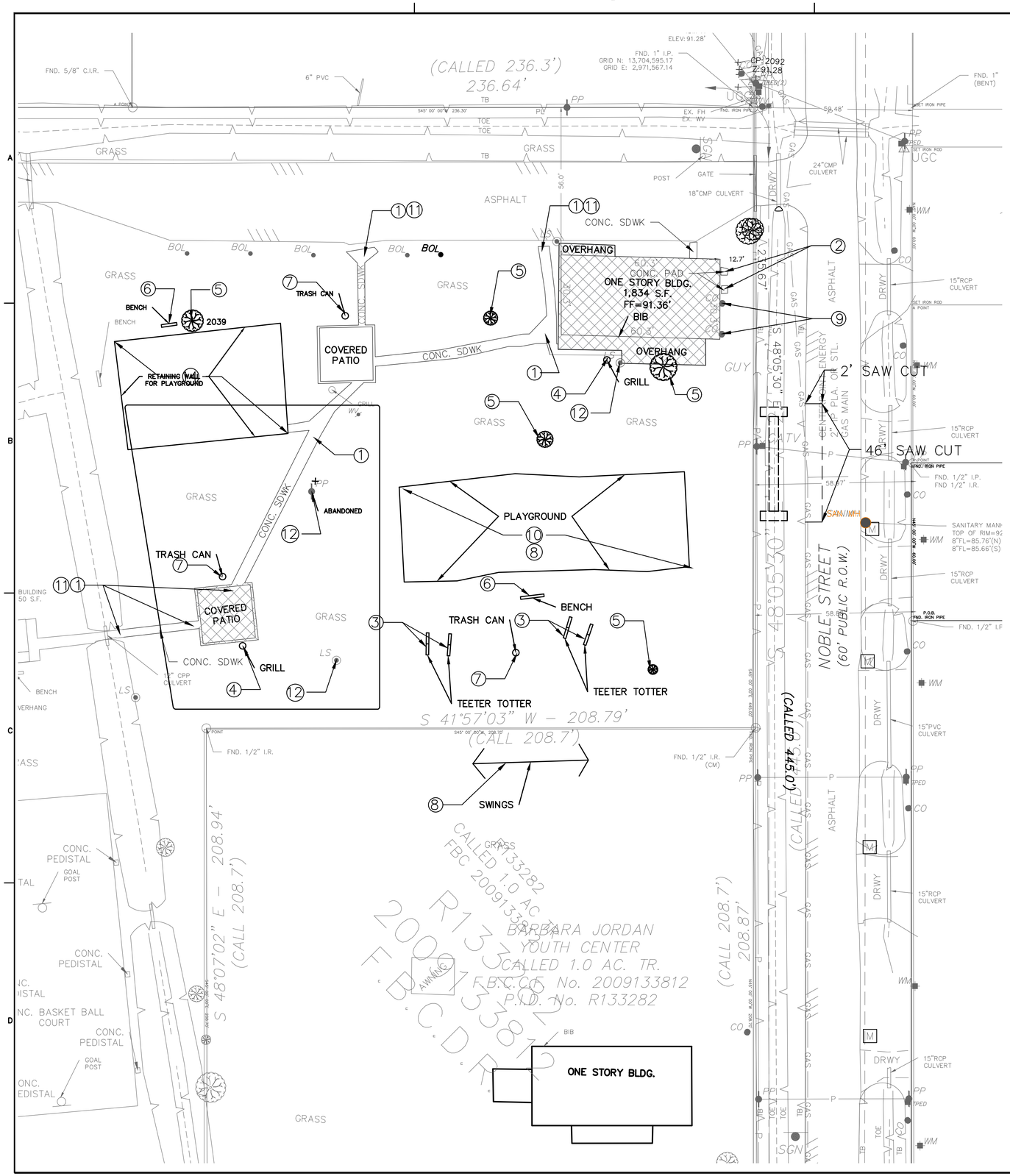
TOPOGRAPHIC SURVEY

Drawing Name

C1.00



0' 10' 20' 40'

SCALE: 1"=20'

EXIST. BUILDIG TO BE REMOVED AND DISPOSED.

GENERAL NOTES:

1. CONTRACTOR SHALL SECURE ALL REQUIRED PERMITS AND PROVIDE ALL REQUIRED NOTIFICATIONS PRIOR TO WORK.
2. ALL DEMOLITION WORK TO BE PERFORMED WITHIN PROJECT PROPERTY LINES UNLESS AUTHORIZED OTHERWISE BY APPLICABLE PROPERTY OWNER. NO WORK TO BE PERFORMED WITHIN ADJACENT STREET ROW UNTIL APPLICABLE PERMITS OBTAINED AND NOTIFICATIONS ARE PROVIDED.
3. ALL SWPPP CONTROLS TO BE INSTALLED PRIOR TO DEMOLITION WORK AS APPLICABLE, RE: SHT C7.00 & C8.01.
4. REMOVE ALL ITEMS AS REQUIRED TO FACILITATE PROPOSED CONSTRUCTION. NOTIFY ENGINEER AND OBTAIN APPROVAL PRIOR TO WORK FOR REMOVAL OF ANY ITEMS FOUND NOT INDICATED ON THIS PLAN.
5. REMNANTS OF BURIED STRUCTURES OR ABANDONED UTILITIES SHALL BE REMOVED TO A MINIMUM OF 24 INCHES BELOW FINAL SUBGRADE ELEVATION UNLESS INDICATED OTHERWISE. ALL ABANDONED UTILITIES AUTHORIZED TO REMAIN SHALL BE CAPPED WATERTIGHT.
6. ALL SOILS DISTURBED DURING THE DEMOLITION OF STRUCTURES, TREES, OR UNDERGROUND UTILITIES SHALL BE REMOVED OR REPLACED AND COMPACTED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND GEOTECHNICAL REPORT RECOMMENDATIONS.
7. WHERE APPLICABLE ALL DEMOED AREAS ARE TO BE SODDED AS DIRECTED BY THE ENGINEER.

KEY NOTES:

① REMOVE AND DISPOSE EXIST. CONCRETE SIDEWALK AND SOD.
② REMOVE AND DISPOSE EXIST. CONCRETE PAD.
③ REMOVE AND SALVAGE EXIST. TEETER TOTTER.
④ REMOVE AND SALVAGE EXIST. GRILL.
⑤ REMOVE AND DISPOSE EXIST. TREE, SHRUB OR PLANT.
⑥ REMOVE AND SALVAGE EXIST. BENCH.
⑦ REMOVE AND SALVAGE EXIST. TRASH CAN.
⑧ REMOVE AND SALVAGE EXIST. SWING.
⑨ CUT AND PLUG EXIST. SANITARY SEWER LINE.
⑩ REMOVE AND SALVAGE EXIST. PLAYGROUND SURFACE, BOARDERS, JUNGLE GYM, SLIDES AND ALL OTHER PLAYGROUND EQUIPMENT.
⑪ FULL DEPTH SAW CUT.
⑫ REMOVE AND SALVAGE EXIST. LIGHT STANDARD (LS), APPURTANCES AND FOUNDATION.
⑬ REMOVE AND SALVAGE EXIST. POWER POLE. AND FILL VOID.
⑭ REMOVE EXISTING PLAYGROUND REATINAING WALL AND PLAYGROUND APPURTANCES.

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DESCRIPTION	
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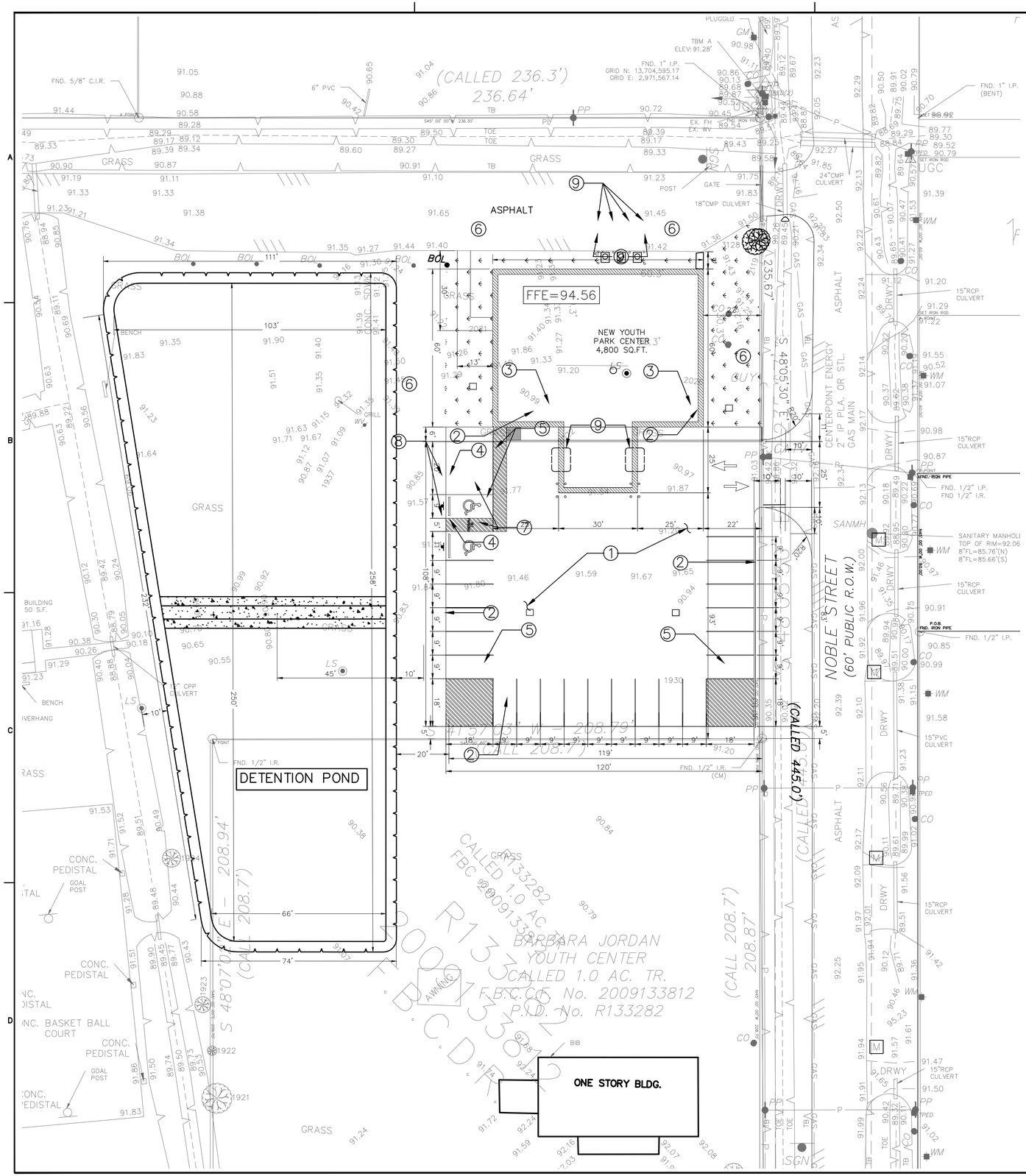
DEMOLITION PLAN

Drawing Name

C2.00



0' 10' 20' 40'
SCALE: 1"=20'

PROP. SODDING/LANDSCAPE

PROP. 2" ASPHALTIC CONCRETE PAVING

PROP. BOLLARDS

PROP. INLET

GENERAL NOTES:

1. ALL DIMENSIONS AND COORDINATES ARE TO FACE OF CURB OR OUTSIDE OF BUILDING FACE UNLESS NOTED OTHERWISE.
2. REFER TO SHT C1.00 – TOPOGRAPHIC SURVEY PREPARED BY REKHA ENGINEERING, INC., DATED 04, 25, 2023 FOR EXISTING CONDITIONS, SURVEY BENCHMARKS, HORIZONTAL AND VERTICAL CONTROL.
3. ALL DISTURBED GRASS AND NON-PAVED AREAS NOT INDICATED FOR IMPROVEMENT BY LANDSCAPING PLANS ARE TO BE STABILIZED AND RESTORED WITH 4" MINIMUM TOPSOIL AND SODDING AS INDICATED TO MATCH FINISH GRADES PER GRADING PLAN.
4. REFER TO PROJECT EARTHWORK SPECIFICATIONS AND GEOTECHNICAL REPORT FOR PREPARATION OF BUILDING AND PAVING SUBGRADES
5. REFER TO PROJECT SPECIFICATIONS FOR ALL MINIMUM AND ADDITIONAL REQUIREMENTS.
6. A GOOD GRASS COVER SHALL BE ESTABLISHED ON ALL DISTURBED AREAS.
7. PROPOSED BOLLARDS ARE SPACED AT 5' MAXIMUM ON CENTER.

KEY NOTES:

① PROP. 2" THICK ASPHALTIC CONCRETE; 4" ASPHALTIC BASE AND 6" STABILIZED SUBGRADE.

② PROP. 6" CONCRETE CURB, RE: DTL 1, SHT C8.00.

③ PROP. 4" THICK CONC. SIDEWALK, RE: SHT C8.02.

④ PROP. CONC. WHEEL STOP AND/OR PROP. PRECAST CONC. WHEEL STOP, RE" DTL 3, SHT C8.03

⑤ PROP. 4" WIDE WHITE TRAFFIC STRIPING. ALL CROSS HATCH AREA STRIPING TO BE SPACED 2" ON CENTER AT 45° DIAGONAL TO PERIMETER STRIPING AS INDICATED, RE: DTL 5, SHT C8.03.

⑥ PROP. SOLID SOD OVER 4" MIN. TOP SOIL ARE, RE: LANDSCAPE PLANS FOR TREES, SHRUBS, PLANTS AND IRRIGATION SYSTEMS.

⑦ PROP. ADA RESERVED PARKING SYMBOL PAVEMENT MARKING, RE: DTL 6, SHT C8.03.

⑧ PROP. ADA RESERVED PARKING SIGN & FOUNDATION, RE: DTL 7, SHT C8.03

⑨ PROP. BOLLARD, RE: DTL 6, SHT C8.04.

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KENDLETON, TX 77417

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER
7/19/2023

Drawing Date: 06/03/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

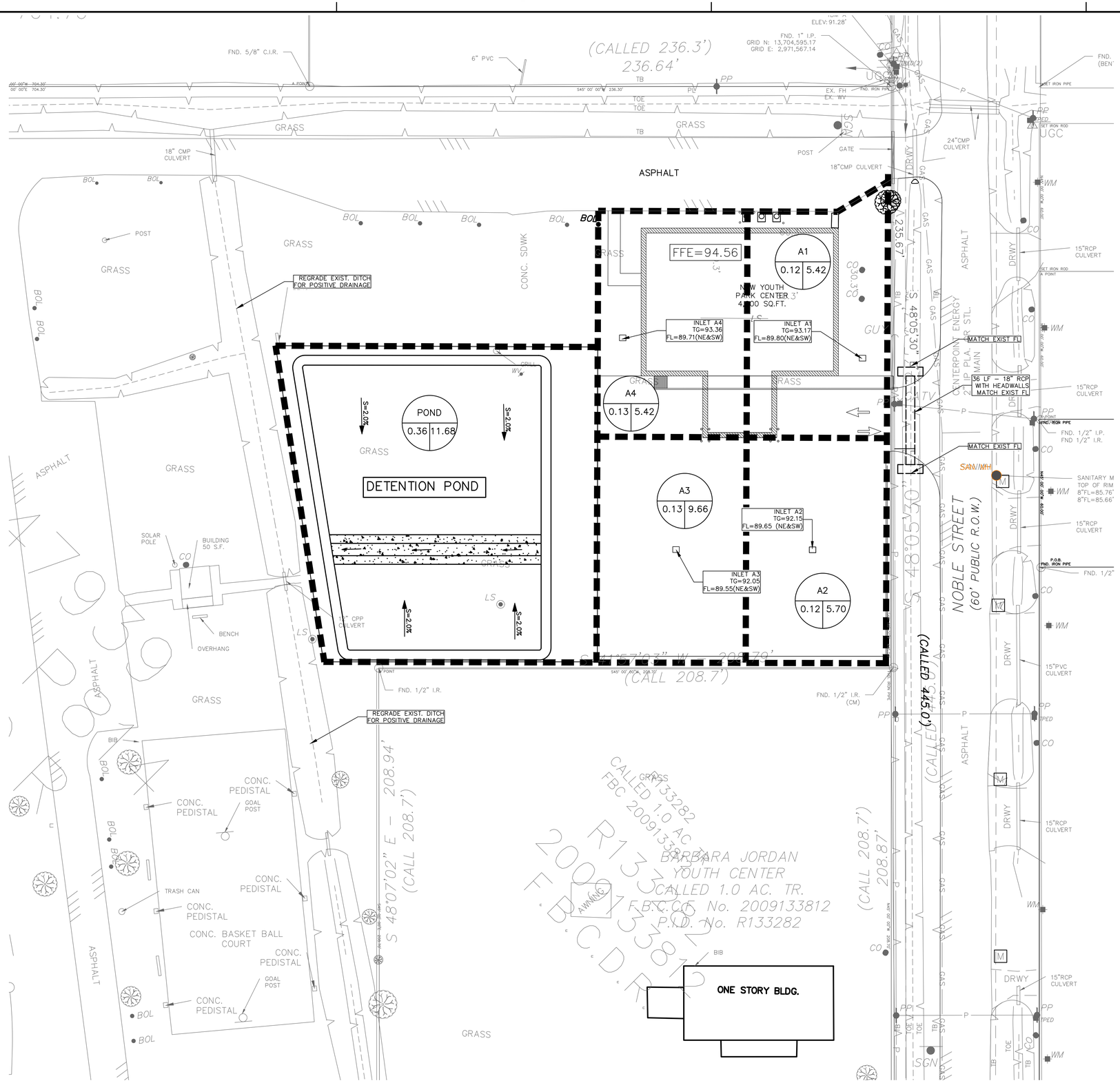
Revisions:

DESCRIPTION	
100% CD'S	06/03/2024

SITE PLAN

Drawing Name

C3.00



0' 10' 20' 40'

SCALE: 1"=20'

LEGEND :

AC	ACRES
DA	DRAINAGE AREA
FL	FLOW LINE
PROP.	PROPOSED
SW	STORM WATER
	WATER METER
	PROPOSED SANITARY SEWER LINE
	STORM SEWER LINE
	WATER LINE
	SHEET FLOW
AREA / ACRE / CFS	FOR DRAINAGE AREA

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Porter, TX 77365

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YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

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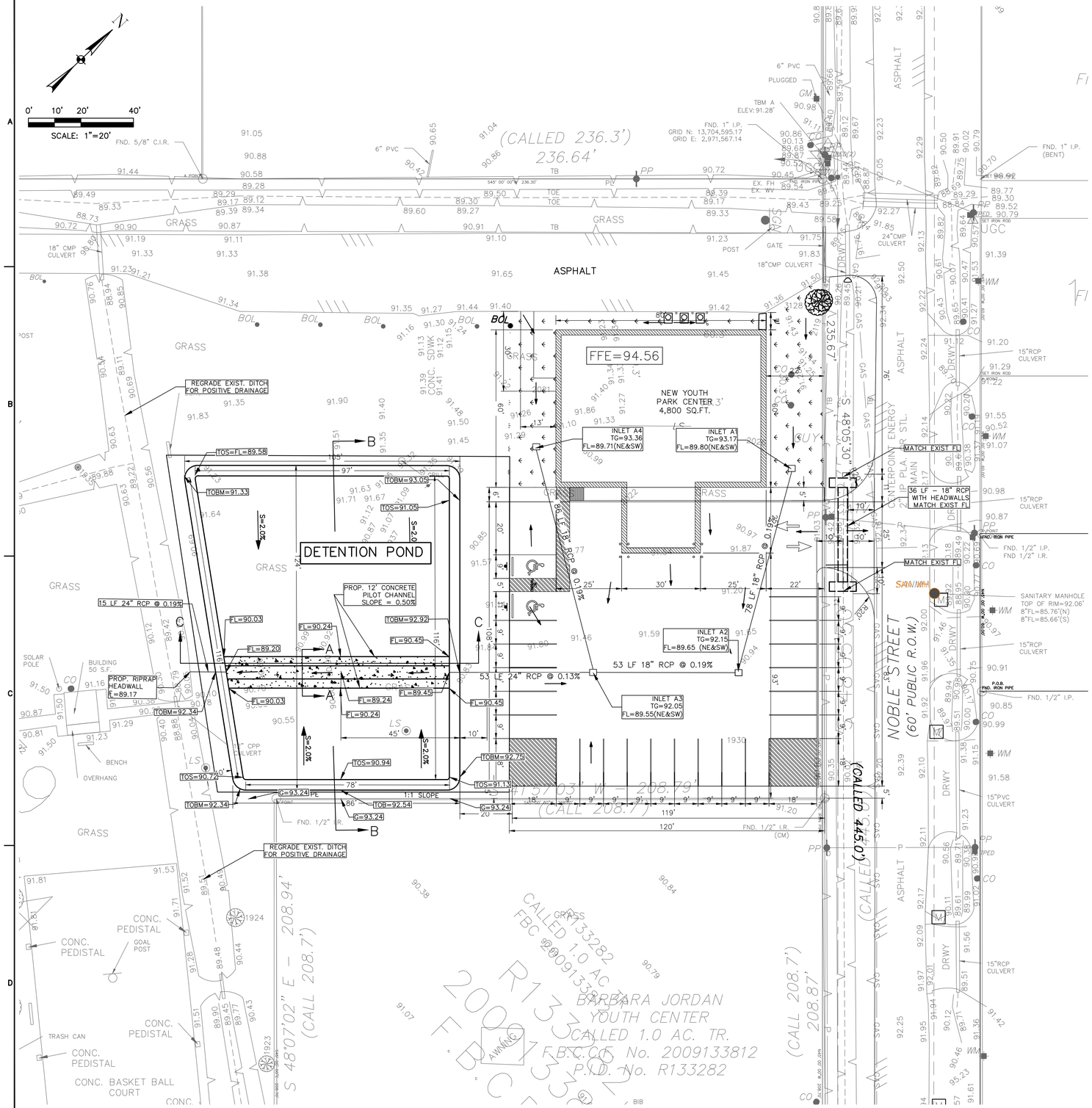
DRAINAGE AREA MAP

Drawing Name

1"=20'

C4.00



LEGEND :

FFE	FINISHED FLOOR ELEV.
→	EXTREME EVENT FLOW
TG	TOP OF GRATE
TP	TOP OF PAVEMENT
□	PROP. STORM SEWER INLET
———	PROP. STORM SEWER PIPE

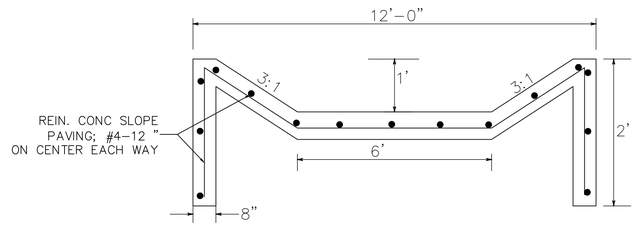
SITE RUNOFF CALCULATION
OUTFALL ORIFICE SIZE CALCULATION:

RESTRICTOR CALCULATION:

Q = 13.62 CFS
h = 4.59'
$D = Q^{0.5} (2.25h^{0.25})$
= 6.6"
USE 8"DIA. RESTRICTOR PIPE

DETENTION CALCULATIONS

PROPERTY AREA =	113,395 SF (2.603 ACRES)
DISTRIBUTED/IMPERVIOUS AREA -	
PARKING LOT	12,291 SF
BUILDING	4,800 SF
SIDEWALKS	504 SF
TOTAL IMPERVIOUS AREA	17,595 SF (0.40 ACRES)
DETENTION RATE REQUIRED =	0.94 AC-FT/AC
(FROM FBCDCM FIG. 6-1/TBL 6-1)	
REQUIRED DETENTION = ((43,560*(IMP AREA * DET RATE))	
((43,560 * (0.40 * 0.94)) =	**16,379 CF (0.38 AC-FT)**
PROPOSED DETENTION -	
DETENTION POND AREA =	11,801 SF
DEPTH OF DETENTION POND REQUIRED =	1.5 FT
TOTAL DETENTION POND VOLUME =	**17,701 CF (0.40 AC-FT)**



TYPICAL PILOT CHANNEL DETAIL
SECTION A-A
(NTS)

1. REFER TO DTL 29, SHT C8.02 FOR INLET DETAILS.
2. REFER TO SHT C5.00 – GRADING PLAN FOR ADDITINAL DIMENSIOAL AND GRADING INFORMATION.
3. REFER TO SHT C4.00 – DRAINAGE AREA MAP FOR DRAINAGE DESIGN DATA.
4. REFER TO SHT C6.00 – UTILITY PLAN FOR WASTEWATER/SANITARY UTILITIES.

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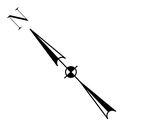
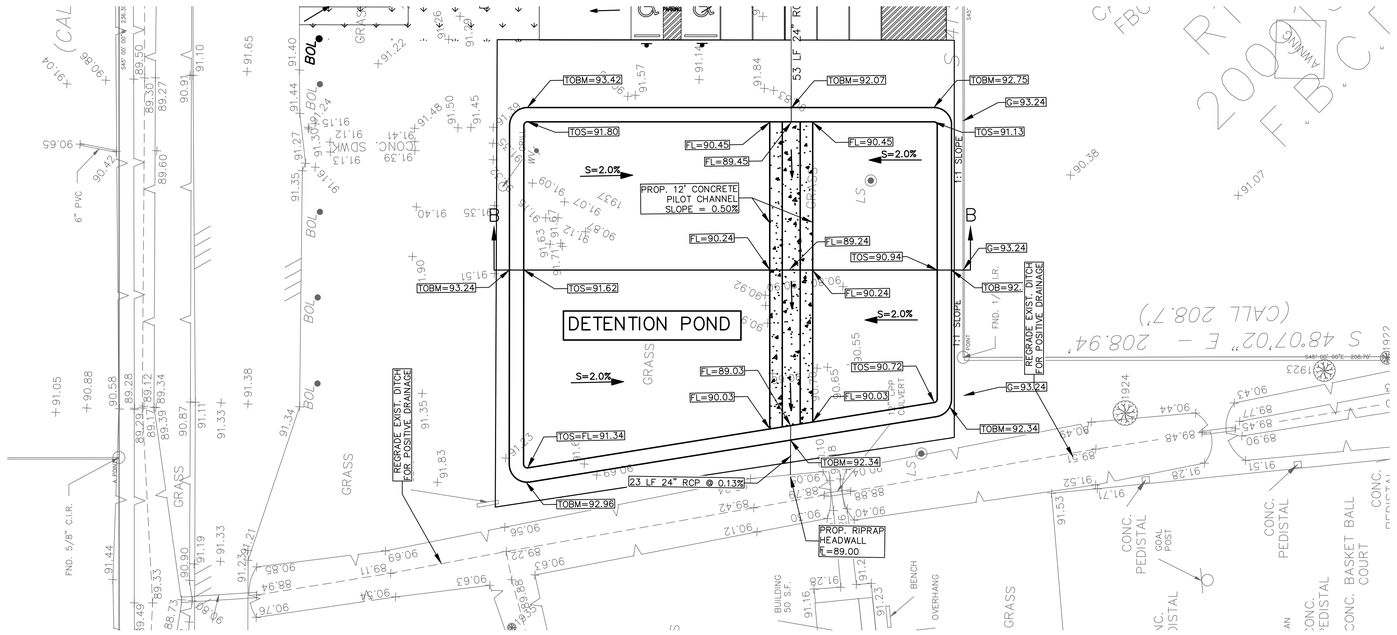
DRAINAGE PLAN

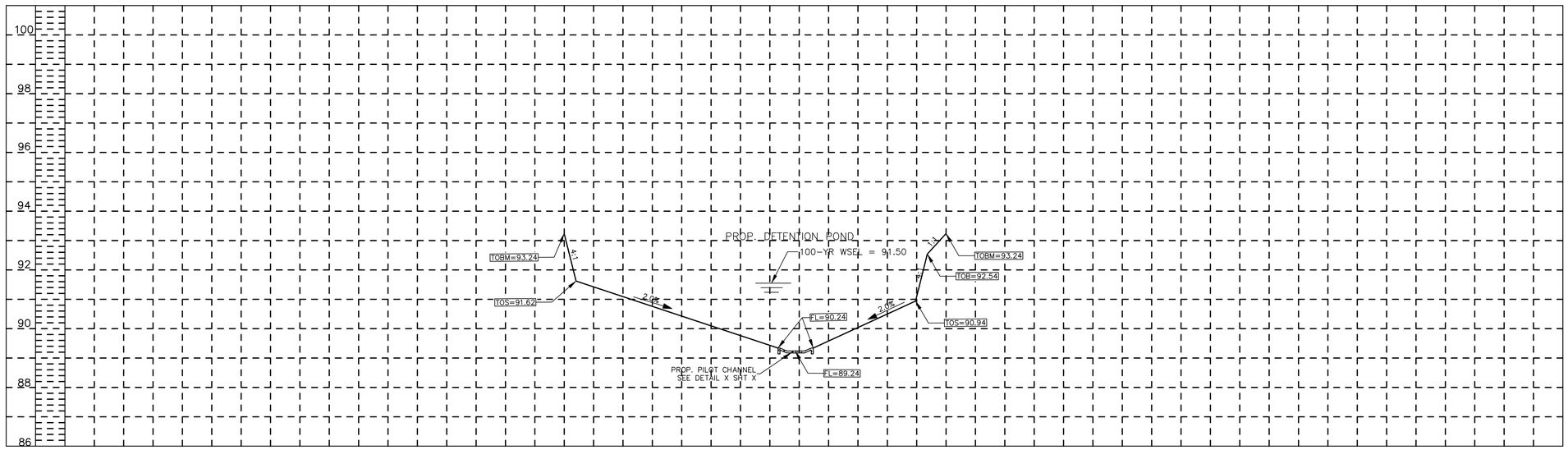
Drawing Name

C4.01





SECTION B–B



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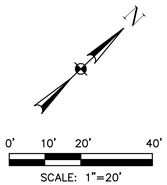
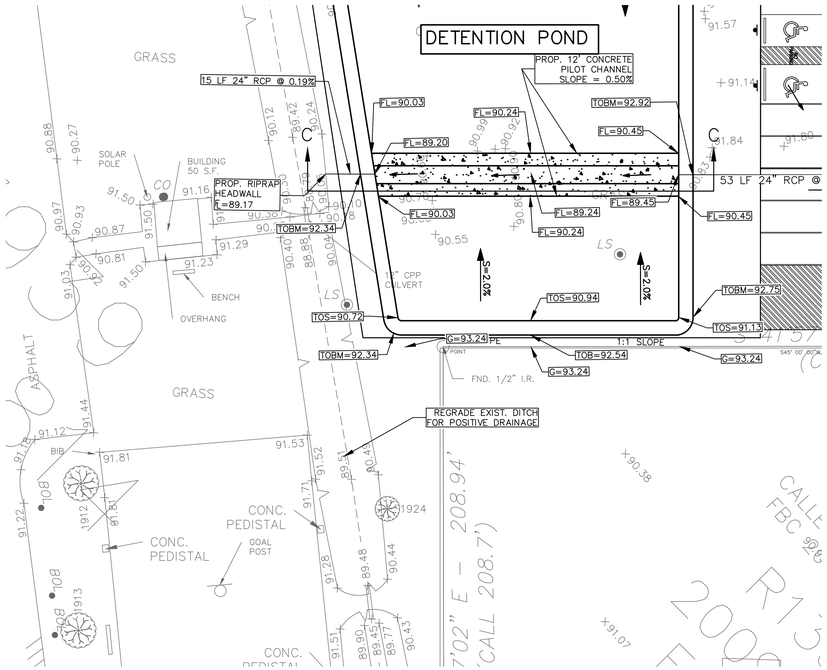
DRAINAGE PLAN

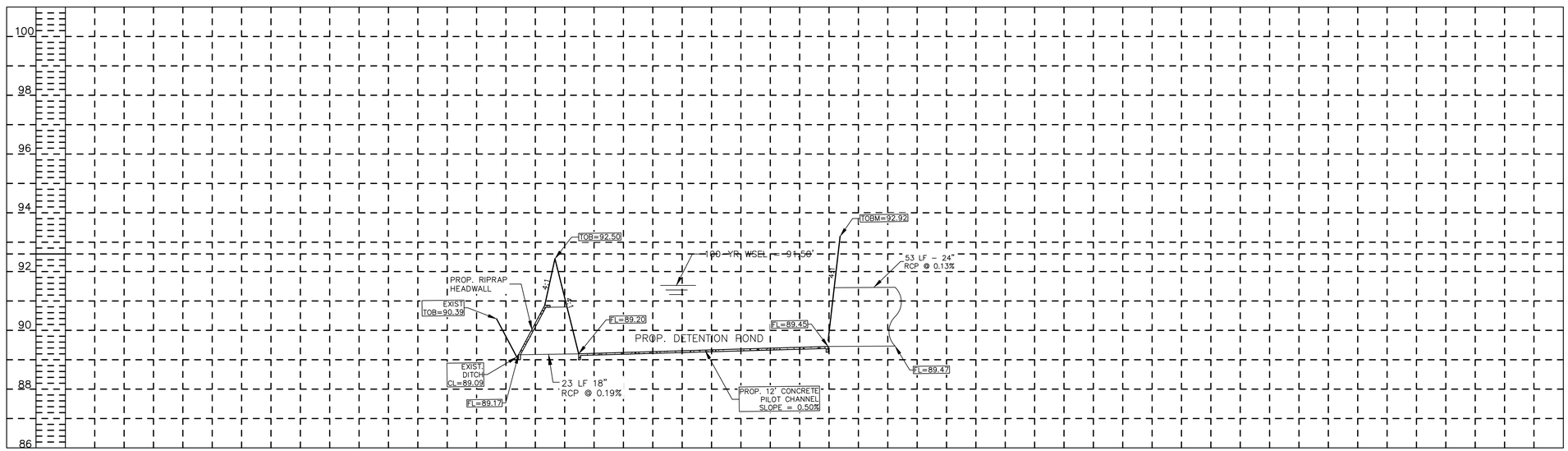
Drawing Name

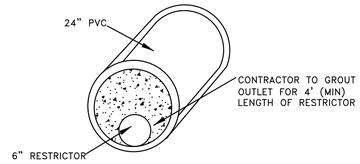
C4.02

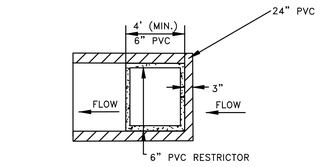




SECTION C–C







RESTRICTOR PIPE DETAIL

N.T.S.

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DRAINAGE PLAN

Drawing Name

C4.03

HGL Starting Elevation= 89.17
Design Storm= 3-year
b= 48.73
d= 8.37
E= 0.7033

MH From	MH To	Area (Acres)	Runoff Coefficient C	Sum of C*A	Intensity I (in/hr)	Sums of Flows (cfs)	Time of Conc (Min)	Reach Length (feet)	Diam. or Rise (in)	Span (ft)	Slope %	Manning's "n"	Design Capacity (cfs)	Design Velocity V (ft/s)	Fall (feet)	Manhole Deep (feet)	Flowline Elevation Upstream (feet)	Flowline Elevation Downstream (feet)	Actual Velocity V (ft/s)	Hydraulic Gradient %	Change in Head (feet)	Elevation of Hyd Grad Upstream (feet)	Elevation of Hyd Grad Downstream (feet)	Natural Ground Upstream (feet)	Natural Ground Downstream (feet)
A1	A2	0.12	0.85	0.10	5.96	0.61	11.46	78	18	78	0.19	0.011	5.42	3.07	0.15	1.48	89.80	89.65	0.34	0.19	0.15	89.61	89.46	91.28	90.94
A2	A3	0.12	0.85	0.20	5.96	1.22	11.46	53	18	53	0.19	0.011	5.42	3.07	0.10	1.29	89.65	89.55	0.69	0.22	0.12	89.46	89.34	90.94	91.46
A4	A3	0.13	0.85	0.42	5.96	2.48	11.46	86	18	86	0.19	0.011	5.42	3.07	0.16	1.58	89.71	89.55	1.41	0.26	0.22	89.50	89.28	91.29	91.46
A3	POND	0.13	0.85	0.53	5.96	3.14	11.46	53	24	54	0.19	0.011	11.68	3.72	0.10	1.91	89.55	89.45	1.00	0.25	0.13	89.41	89.28	91.46	90.84
POND	OUTFALL	0.36	0.85	0.83	5.96	4.97	11.46	15	24	15	0.19	0.011	11.68	3.72	0.03	1.09	89.20	89.17	1.58	0.71	0.11	89.28	89.17	90.29	90.15

HGL Starting Elevation= 89.17
Design Storm= 100-year
b= 42.99
d= 1.08
E= 0.5274

MH From	MH To	Area (Acres)	Runoff Coefficient C	Sum of C*A	Intensity I (in/hr)	Sums of Flows (cfs)	Time of Conc (Min)	Reach Length (feet)	Diam. or Rise (in)	Span (ft)	Slope %	Manning's "n"	Design Capacity (cfs)	Design Velocity V (ft/s)	Fall (feet)	Manhole Deep (feet)	Flowline Elevation Upstream (feet)	Flowline Elevation Downstream (feet)	Actual Velocity V (ft/s)	Hydraulic Gradient %	Change in Head (feet)	Elevation of Hyd Grad Upstream (feet)	Elevation of Hyd Grad Downstream (feet)	Natural Ground Upstream (feet)	Natural Ground Downstream (feet)
A1	A2	0.12	0.85	0.10	11.33	1.16	11.46	78	18	78	0.19	0.011	5.42	3.07	0.15	1.48	89.80	89.65	0.65	0.21	0.16	89.76	89.59	91.28	90.94
A2	A3	0.12	0.85	0.20	11.33	2.31	11.46	53	18	53	0.19	0.011	5.42	3.07	0.10	1.29	89.65	89.55	1.31	0.29	0.15	89.59	89.44	90.94	91.46
A4	A3	0.13	0.85	0.31	11.33	3.56	11.46	86	18	86	0.19	0.011	5.42	3.07	0.16	1.58	89.71	89.55	2.02	0.34	0.29	89.70	89.41	91.29	91.46
A3	POND	0.13	0.85	0.43	11.33	4.81	11.46	53	24	54	0.19	0.011	11.68	3.72	0.10	1.91	89.55	89.45	1.53	0.33	0.18	89.59	89.41	91.46	90.84
POND	OUTFALL	0.36	0.85	0.73	11.33	8.28	11.46	15	24	15	0.19	0.011	11.68	3.72	0.03	1.09	89.20	89.17	2.64	1.63	0.24	89.41	89.17	90.29	90.15

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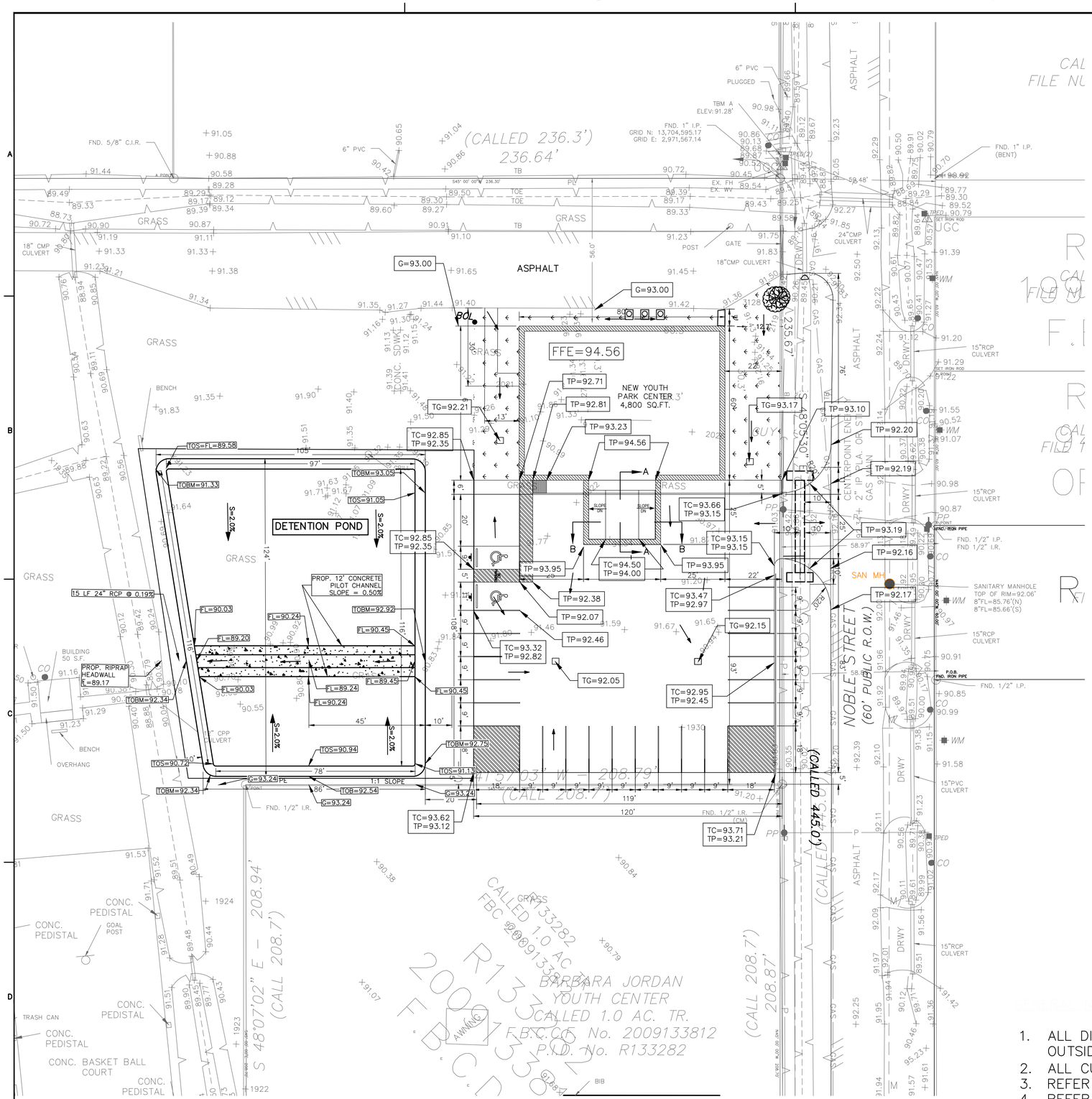
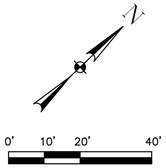
DRAINAGE CALCULATIONS

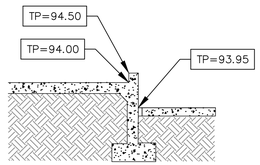
Drawing Name

C4.04

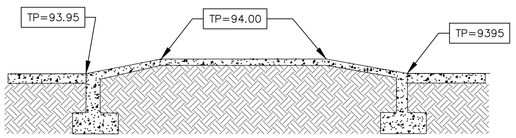




FFE	FINISHED FLOOR ELEV.
→	EXTREME EVENT FLOW
TG	TOP OF GRATE
TP	TOP OF PAVEMENT
TC	TOP OF CURB
ME	MATCH EXIST. ELEVATION
	PROP. STORM SEWER INLET
	PROP. STORM SEWER PIPE
	PROP. SODDING/LANDSCAPE



SECTION A



SECTION B

1. ALL DIMENSIONS AND COORDINATES ARE TO FACE OF CURB OR OUTSIDE OF BUILDING FACE UNLESS NOTED OTHERWISE.
2. ALL CURBS ARE 6" CURBS UNLESS NOTED OTHERWISE.
3. REFER TO SHT C8.00 – FOR CURB DETAILS.
4. REFER TO SHT C8.00 – FOR SIDEWALK DETAILS.DES
5. A GOOD GRASS COVER SHALL BE ESTABLISHED ON ALL DISTURBED AREAS.

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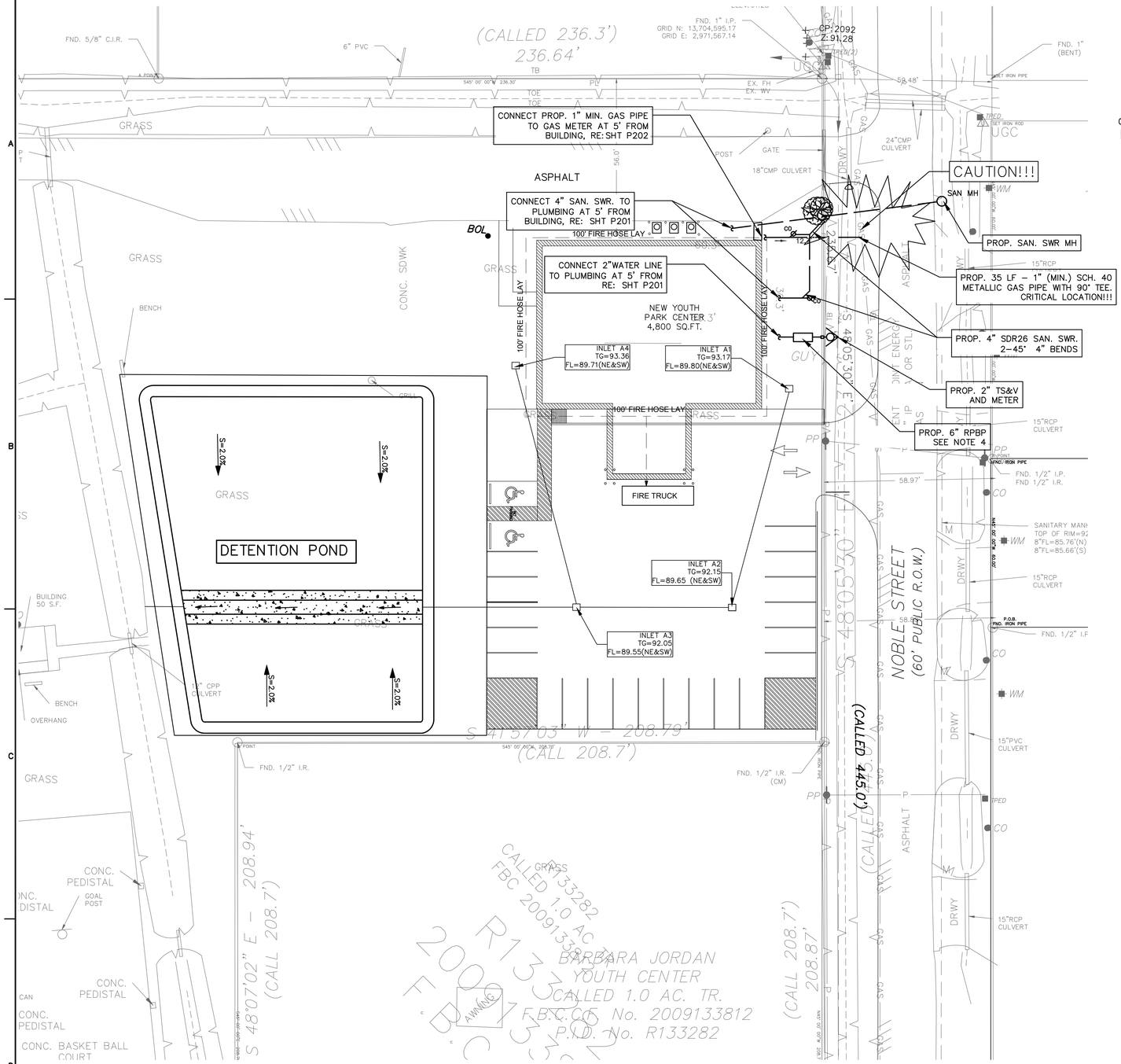
GRADING PLAN

Drawing Name

C5.00



WATER LINE (TAPPING SLEEVE & VALVE)

PROP. SANITARY SEWER LINE

PROP. STORM SEWER

CO PROP. STORM SEWER CLEAN OUT

PROP. GAS LINE

!!!CRITICAL LOCATION!!!
CONTRACTOR SHALL FIELD VERIFY THE PIPE SIZE, MATERIAL AND EXACT LOCATION OF EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION

1. ALL SANITARY SEWER PIPE AND FITTINGS SHALL BE SDR 26 PVC.
2. EXIST. SANITARY SEWER AND WATERLINE DEPTHS, FLOWLINE ELEVATIONS ARE TO BE FIELD VERIFIED.
3. REFER TO GRADING PLAN FOR PROP. GRADING & DRAINAGE IMPROVEMENTS.
4. REFER TO DTL 7; SHEET 8.04 FOR REDUCED PRESSURE BACKFLOW – PREVENTER (RPBP).
5. UTILITY LOCATION IS APPROXIMATE. UTILITIES PRESENTED ON THESE DRAWINGS ARE SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONSTRCTOR SHALL VERIFY THE EXACT LOCATION IN THE FIELD BEFORE COMMENCING CONSTRUCTION. CONTRACTOR SHALL NOTIFY TEXAS ONE CALL AT 713.223.4567/800.245.4545 AND LONE STAR ONE CALL AT 800.669.8344 AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION.
6. THE EXISTING WATER LINE AND SANITARY SEWER LINE DEPTHS ARE APPROXIMATE THE CONTRACTOR SHALL VERIFY DEPTHS BEFORE THE START OF CONSTRUCTION.

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BLACK COWBOY MUSEUM
630 CHARLIE ROBERTS LANE
KENDLETON, TX 77417

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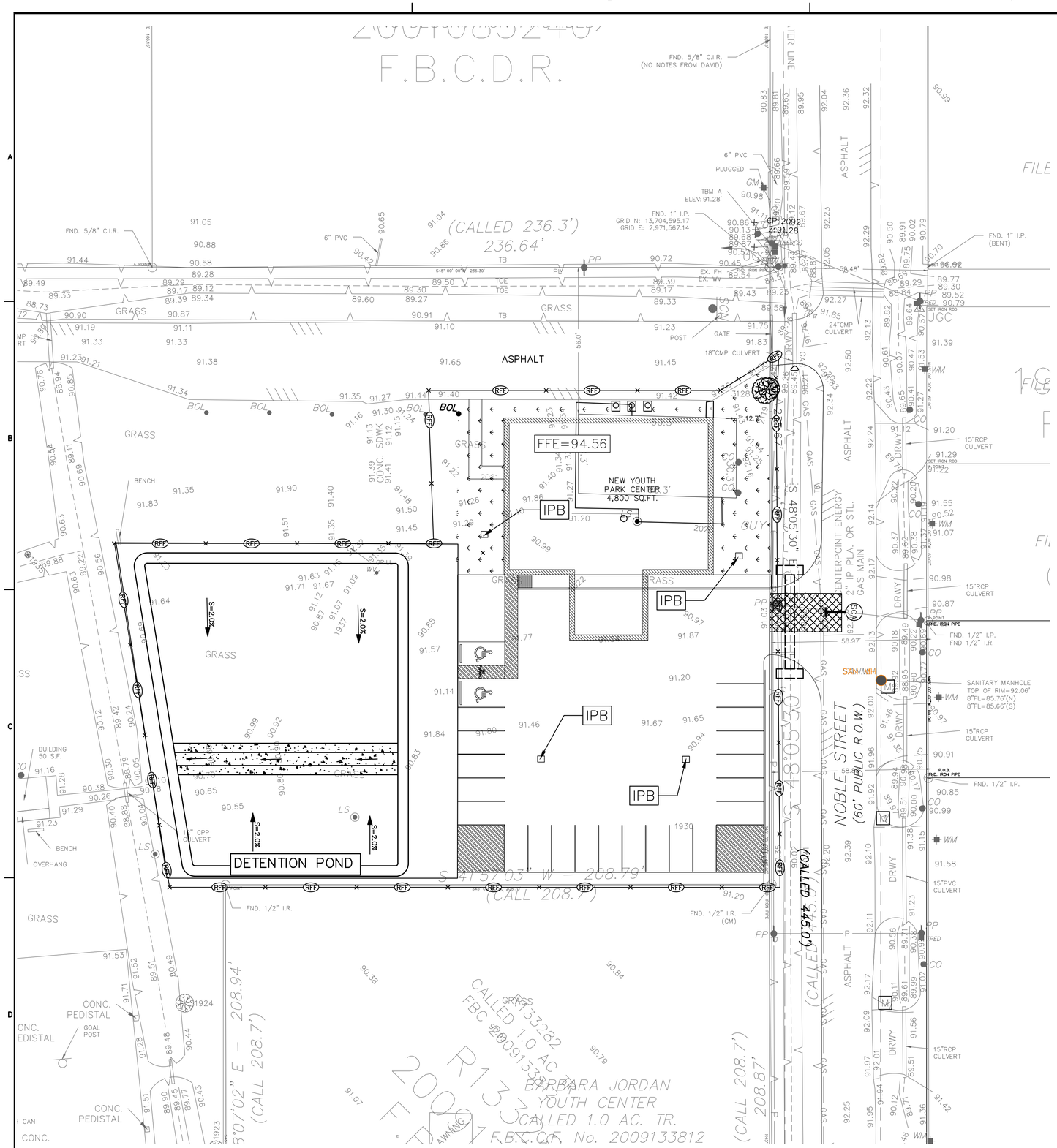
UTILITY PLAN

Drawing Name

C6.00



LEGEND :

IPB	INLET PROTECTION BARRIER (GRAVEL BAGS)
RFF	REINFORCED FILTER FABRIC FENCE
SCA	STABILIZED CONSTRUCTION ACCESS
	PROP. STORM SEWER INLET
	PROP. SODDING/LANDSCAPE

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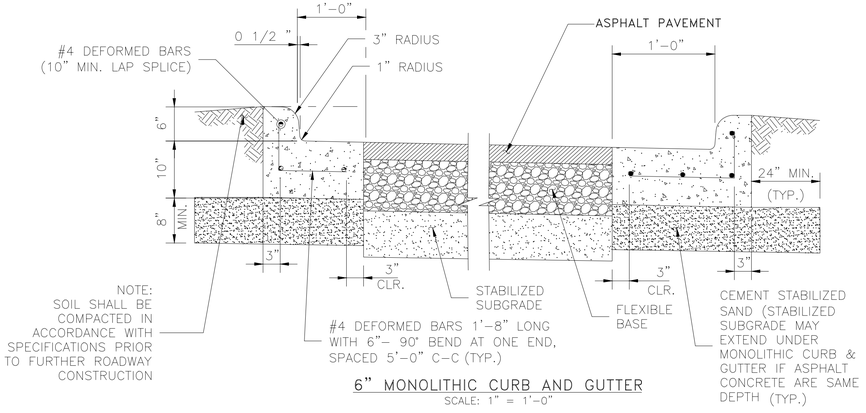
STORM WATER POLLUTION AND PREVENTION PLAN

Drawing Name

1"=20'

C7.00

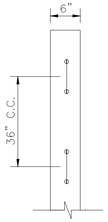


6" MONOLITHIC CURB AND GUTTER
SCALE: 1" = 1'-0"

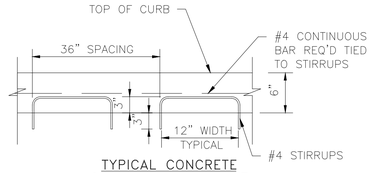
WHEEL STOP – DETAIL 3
SCALE: NTS

TYPICAL CONCRETE CURB SECTION

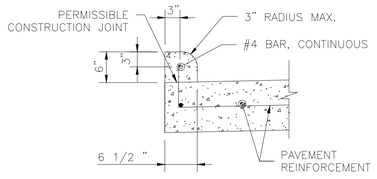
DETAIL 1
SCALE: NTS



TYPICAL CONCRETE CURB REINFORCEMENT PLAN VIEW



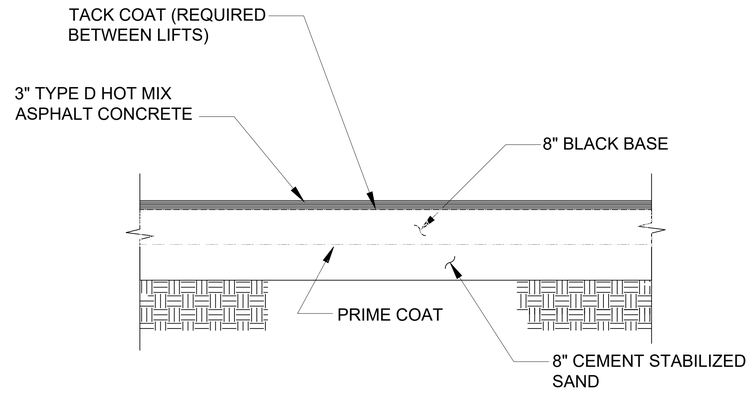
TYPICAL CONCRETE CURB REINFORCEMENT
NTS



TYPICAL CONCRETE CURB REINFORCING DETAILS
SCALE: 1" = 1'-0"

SLAB AND REBAR NOTES:

1. TYPICAL SLAB THICKNESS D=8"
2. TYPICAL REBAR SIZE AND SPACING ARE:
   a. #4 BAR @ 18" C-C LONGITUDINAL
   b. #4 BAR @ 18" C-C TRANSVERSE
3. REBAR SIZE FOR PAVEMENT LESS THAN 8" THICK
   a. #4 BAR @ 24" C-C LONGITUDINAL
   b. #4 BAR @ 24" C-C TRANSVERSE
4. REBAR SHALL NOT BE PLACED WITHIN 3" FROM THE EDGE OF PAVEMENT.
5. TYPICAL STABILIZED SUBGRADE THICKNESS IS 8 INCHES.
6. FOR HEAVY INDUSTRIAL TRAFFIC, SLAB THICKNESS AND REBAR SIZE AND SPACING WILL BE AS PER GEOTECHNICAL RECOMMENDATION.
7. ALL BENT BARS SHALL BE GRADE 40 STEEL, ALL OTHER SHALL BE GRADE 60.
8. MINIMUM LAP SPLICE 16".
9. LAP SPLICES SHOULD BE ON ALTERNATING BARS, ADJACENT LAP SPLICES ARE NOT ACCEPTABLE.



TYPICAL ASPHALT PARKING LOT SECTION

DETAIL 2
SCALE: NTS

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WECS
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4611 BIGGAM DRIVE
FRESNO, TEXAS 77545
(832) 443-4150

BARBARA JORDAN PARK
YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
95053
LICENSED
PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

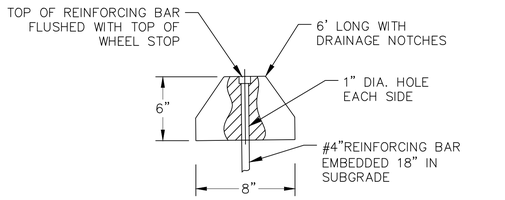
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

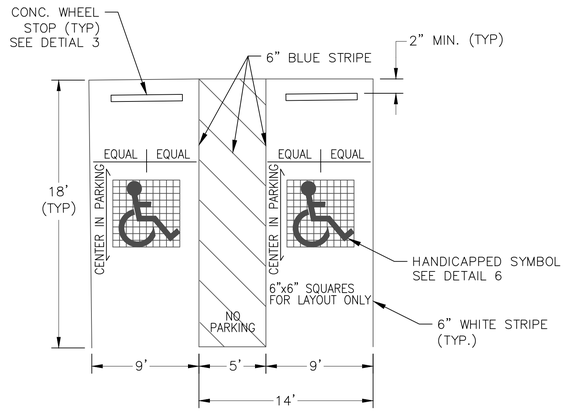
Drawing Name

C8.00



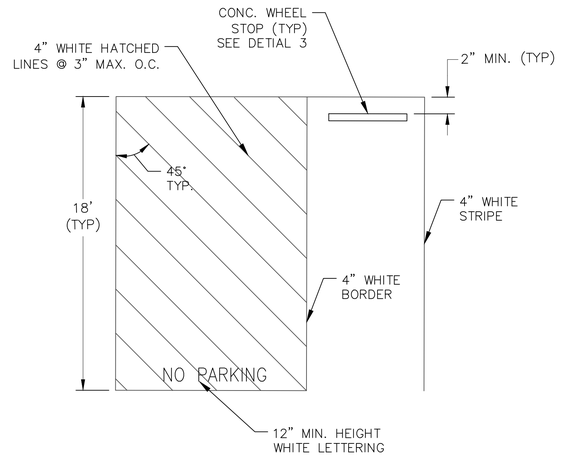
WHEEL STOP – DETAIL 3

SCALE: NTS



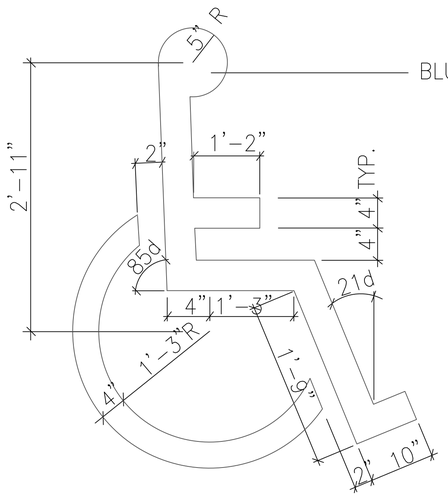
HANDICAPPED STRIPING – DETAIL 4

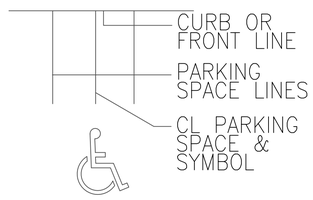
SCALE: NTS



HATCHED AREA ADJACENT TO STALL – DETAIL 5

SCALE: NTS



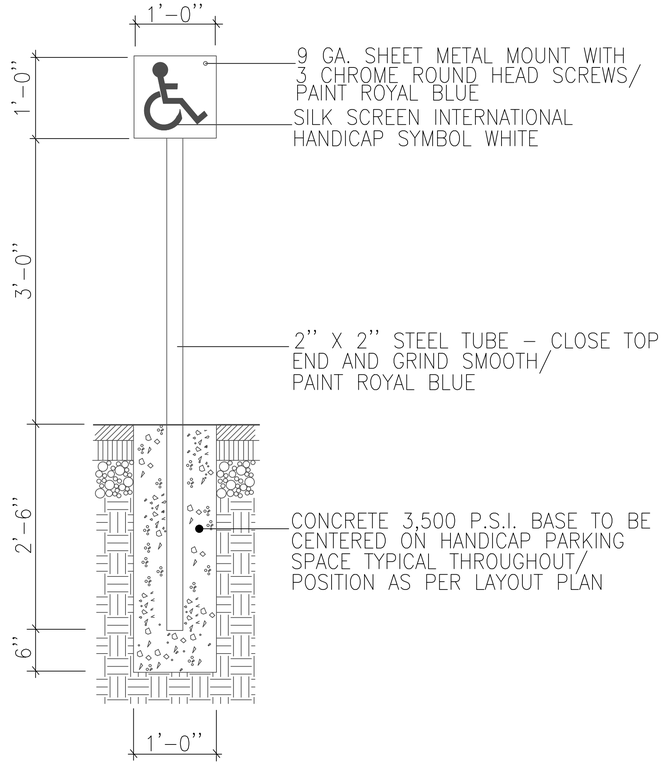


TYP. LOCATION PLAN

NOTE:
1. SEE SITE PLAN FOR LOCATIONS.
2. ADA STANDARDS FOR ACCESSIBLE DESIGN DIMENSION GOVERN.

ADA RESERVED PARKING SYMBOL PAVEMENT MARKING – DETAIL 6

SCALE: NTS



HANDICAPPED PARKING SIGN – DETAIL 7

SCALE: NTS

VCS architects
19251 Purus Dr.
Porter, TX 77365

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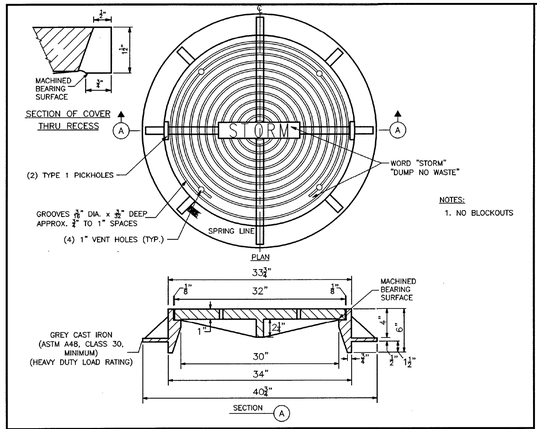
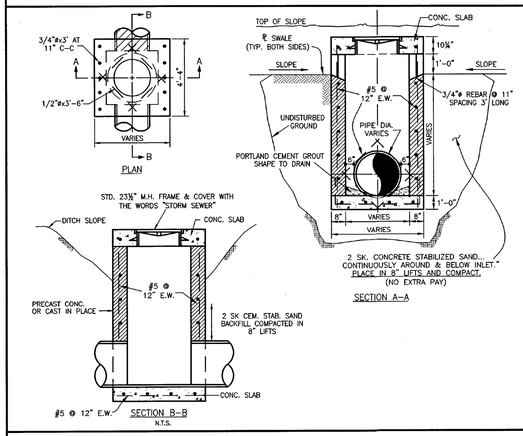
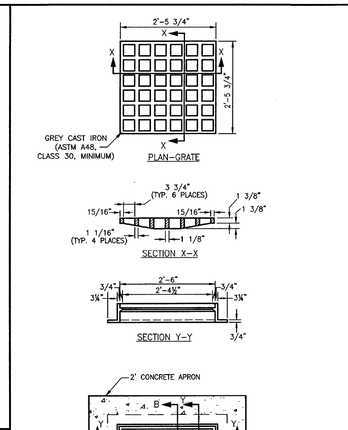


1. MANHOLE AND INLET FRAME AND COVER

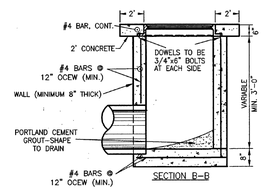


2. TYPE 'E' INLET

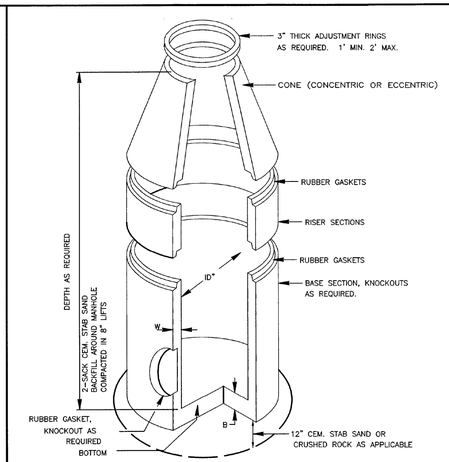


NOTES

1. INLETS TO BE PRECAST OR CAST IN PLACE ONLY.



3. TYPE 'A' INLET



SPECIFICATIONS:

CONCRETE: CLASS 1 CONCRETE WITH A DESIGN STRENGTH OF 4500 PSI AT 28 DAYS. RATES FOR H-20 LOADING.

REINFORCEMENT: STRUCTURAL REINFORCEMENT CONFORMING TO ASTM-C-478.

C.I. CASTINGS: CAST IRON FRAMES AND GRATES ARE MANUFACTURED OF GREY CAST IRON CONFORMING TO ASTM A48-76 CLASS 35.

DIMENSIONS AND WEIGHTS			
I.D. SIZE (in)	W (in)	B (in)	RISER WT/LF (lb)
48	5	6	868
60	6	8	1300
72	7	8	1811
96	9	8	3090

NOTES

1. LIFTING INSERTS AS REQUIRED.
2. ALL JOINTS SHALL BE SEALED WITH APPROVED RUBBER GASKET
3. STRUCTURE TO BE PLACED ON 12" STABILIZED BASE.
4. C.S.S. SHALL BE BROUGHT TO WITHIN 2-FT OF TOP OF MANHOLE.

4. PRECAST CONCRETE MANHOLE

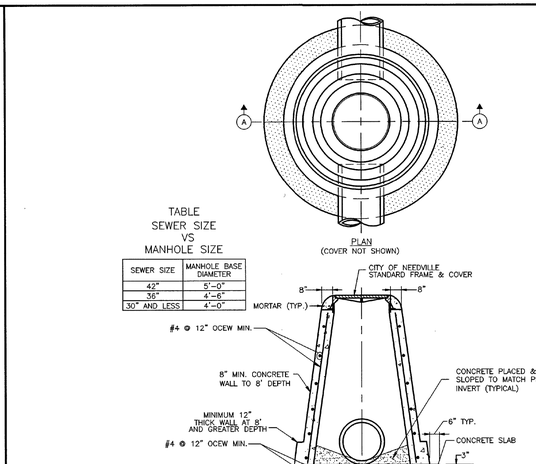


TABLE
SEWER SIZE
VS
MANHOLE SIZE

SEWER SIZE	MANHOLE BASE DIAMETER
42"	5'-0"
36"	4'-6"
30" AND LESS	4'-0"

NOTES:

1. ALL BACKFILL WITHIN 2 FEET OF THE MANHOLE AND WITHIN 4 FEET OF THE TOP RIM ELEVATION SHALL BE CEMENT STABILIZED SAND (SEE BEDDING DETAIL).
2. BACKFILL UNDER AND WITHIN 3 FEET OF PAVING SHALL MEET THE BACKFILL REQUIREMENTS FOR STORM SEWERS.
3. MANHOLE TO BE PRECAST OR CAST IN PLACE. BRICK MAY ONLY BE USED WITH CITY APPROVAL.

5. MANHOLE TYPE "C" FOR 42" DIA. R.C.P. AND SMALLER

GENERAL NOTES:

TYPE 'C' INLET - WITH NO EXTENSION
TYPE 'C-1' INLET - WITH ONE EXTENSION (5'-0" LONG)
TYPE 'C-2' INLET - WITH ONE EXTENSION (10'-0" LONG)
TYPE 'C-2A' INLET - WITH DOUBLE EXTENSION (10'-0" LONG)

6. TYPE 'C' INLET

NOTES:

1. FOR TYPE 'C-2A' INLETS PROVIDE A CENTER 6"x6" COLUMN IN THE CURB LINE BETWEEN ALL EXTENSIONS.
2. CEMENT STABILIZED SAND BACKFILL SHALL BE PLACED A MINIMUM OF 6 INCHES BELOW INLET AND A MINIMUM OF 12 INCHES AROUND INLET TO THE TOP OF STAGE 1 STRUCTURE.
3. ALTERNATIVE REINFORCED CONCRETE WALLS SHALL BE A MINIMUM OF 6" THICK WITH #4 @ 9" O.C.
4. CONCRETE PLACED AND SHAPED TO DRAIN.
5. PRECAST OR CAST IN PLACE ONLY.

7. TYPE "C" MANHOLE FOR 48" TO 72" DIA. R.C.P.

TABLE 1

DATA FOR VARIOUS PIPE DIAMETERS

PIPE DIA. (INCHES)	MIN. DEPTH	REINFORCEMENT "A"	REINFORCEMENT "B"
48"	8'-0"	#5 @ 12 E.W.	2-#6
54"	9'-4"	#5 @ 10 E.W.	2-#6
60"	10'-7"	#5 @ 8 E.W.	2-#7
66"	11'-10"	#5 @ 7 E.W.	2-#7
72"	13'-2"	#5 @ 6 E.W.	2-#7

NOTES:

1. ALL BACKFILL WITHIN 2 FEET OF THE MANHOLE AND WITHIN 4 FEET OF THE TOP RIM ELEVATION SHALL BE CEMENT STABILIZED BACKFILL (SEE BEDDING DETAIL).
2. BACKFILL UNDER AND WITHIN 3 FEET OF PAVING SHALL MEET THE BACKFILL REQUIREMENTS FOR STORM SEWERS.
3. PORTLAND CEMENT GROUT TO MATCH INVERT OF PIPE.
4. CAST IN PLACE ONLY. BRICK MAY ONLY BE USED WITH CITY APPROVAL.

GENERAL CONSTRUCTION NOTES:

1. ALL CAST CONCRETE BASES SHALL HAVE #4 REBAR @ 12" C-C EW.
2. CONCRETE SHALL BE 3500 PSI MIN.
3. USE C.S.S. BEDDING AS PER DETAILS 2 SK, COMPACTED 8" LIFTS (MAX.), TO 95% STANDARD.

NOTE:

STORM MANHOLES AND INLETS SHALL BE PRECAST CONCRETE, POURED IN PLACE, REINFORCED CONCRETE STRUCTURES MAY BE SUBSTITUTED WHEN THE PROPOSED CONSTRUCTION DETAIL IS SUBMITTED BY THE DESIGN ENGINEER FOR APPROVAL BY THE CITY.

A 4000 psi COLLAR IS REQUIRED TO BRIDGE A 3" OR LARGER GAP, DEFFLECTION OR CONNECTION OF DIFFERENT SIZE PIPES. THE COLLAR WILL BE 6" THICK 2 FT WIDE WITH #4 REBAR DOWELED INTO THE PIPE AND STRUCTURE. FOR A PIPE CONNECTION TO A MANHOLE OR BOX, THE COLLAR WILL BE 1 FOOT WIDE ON THE OUTSIDE OF THE STRUCTURE AND SEALED SMOOTHLY ON THE INSIDE OF THE STRUCTURE WITH NON-SHRINK GROUT.

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

STORM SEWER-1

SCALE		DESIGNED BY: LLT
HORIZONTAL	1" = NTS	DRAWN BY: TWB
VERTICAL	1" = NTS	CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO: N-6-18
		Sheet: C8.02

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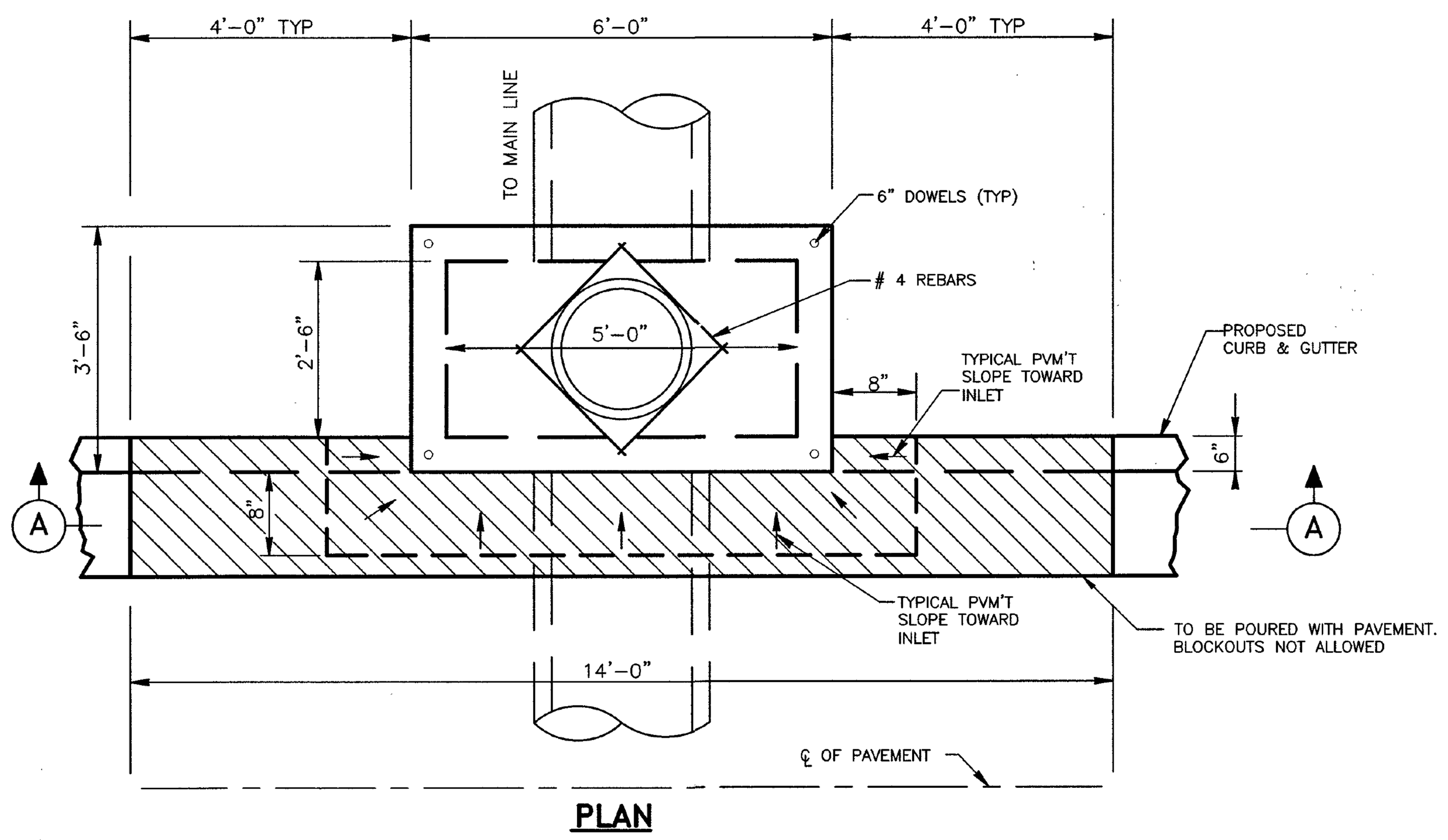
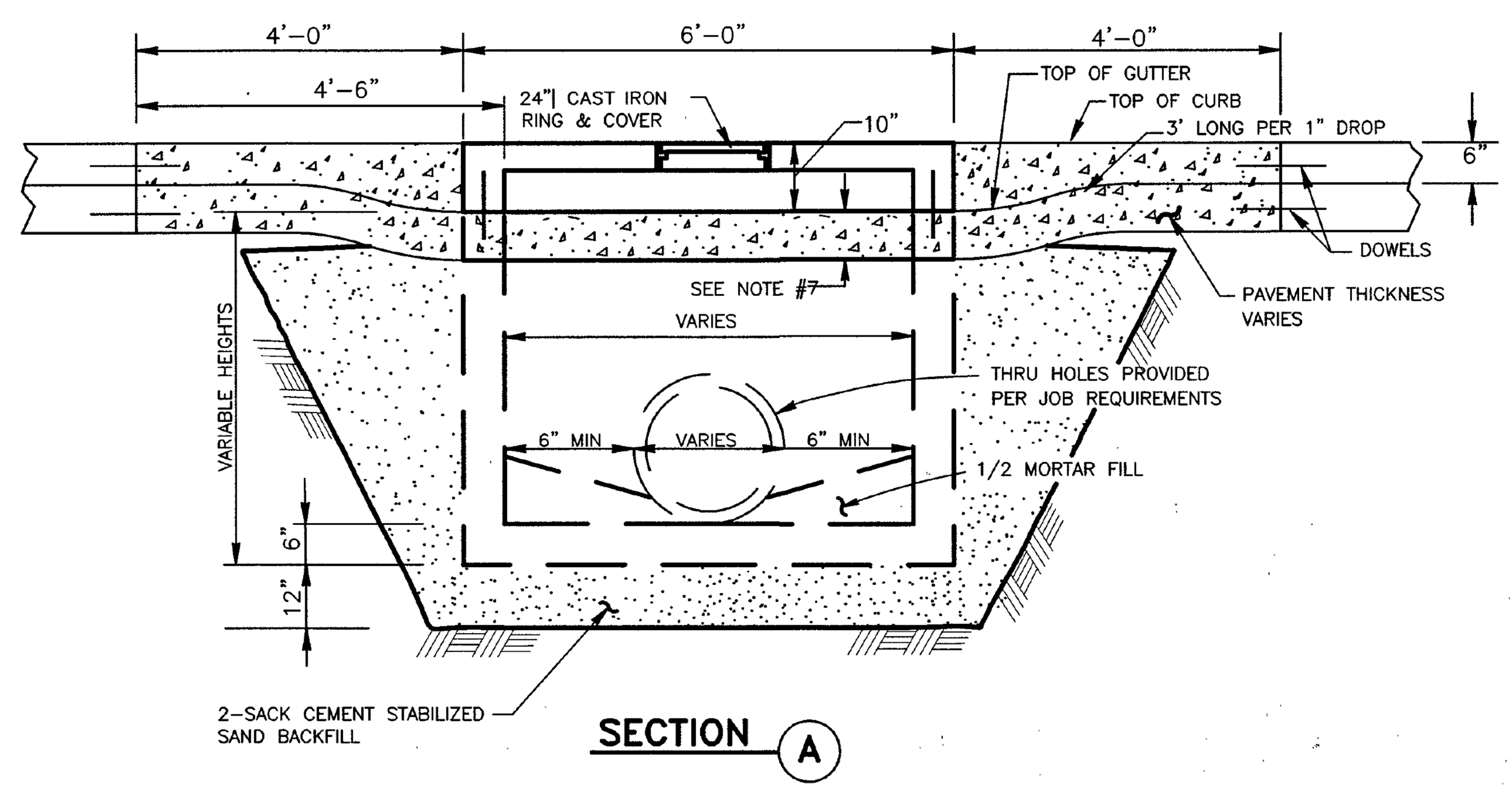
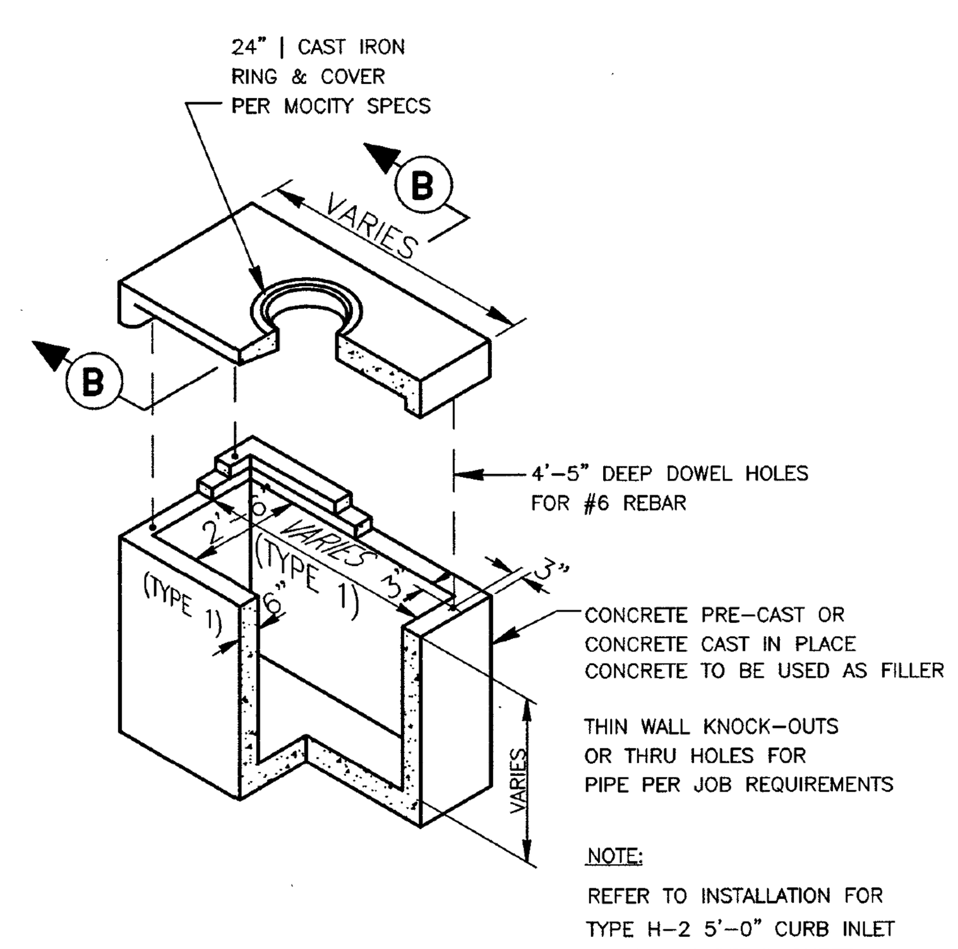
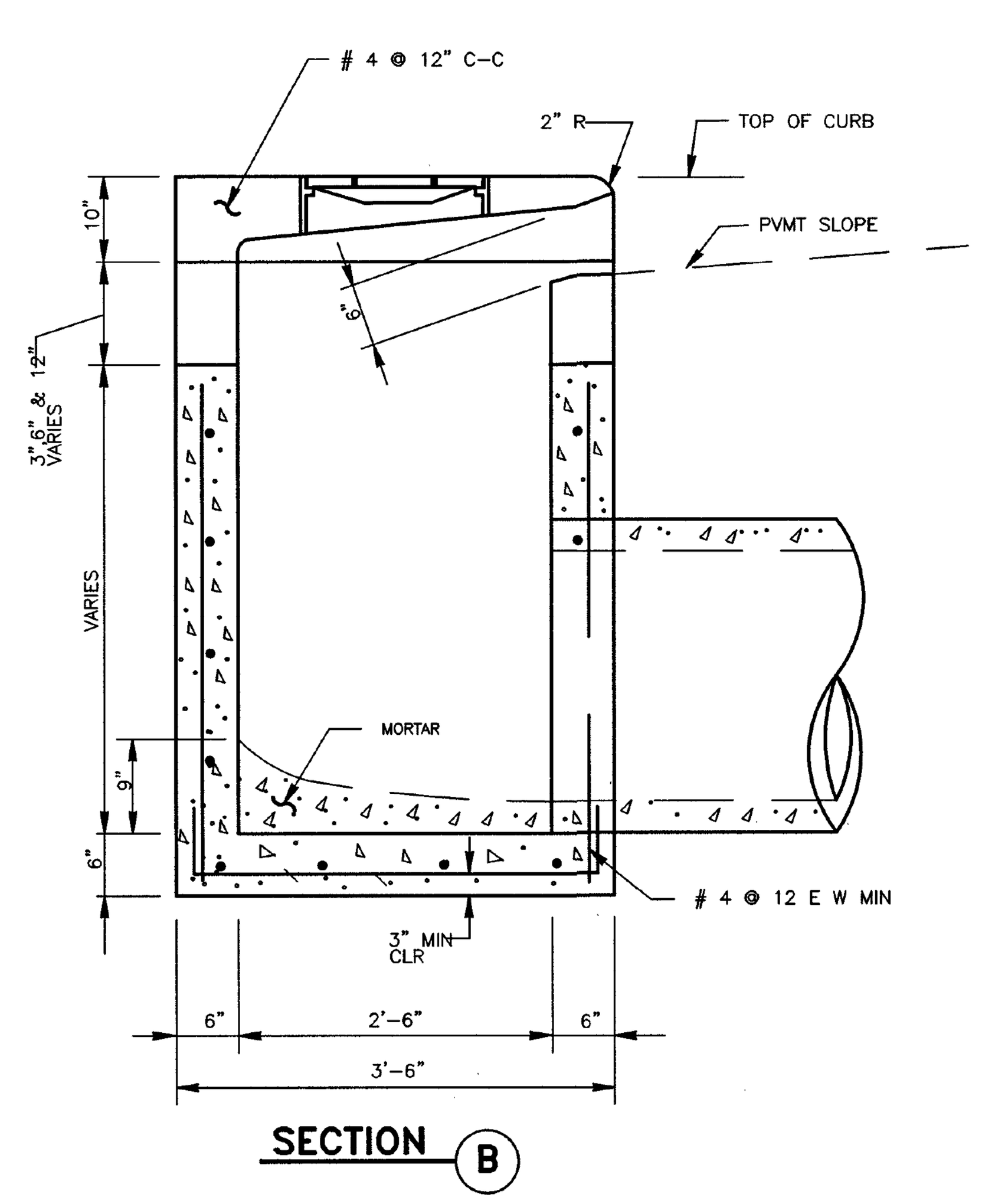


NOTES:

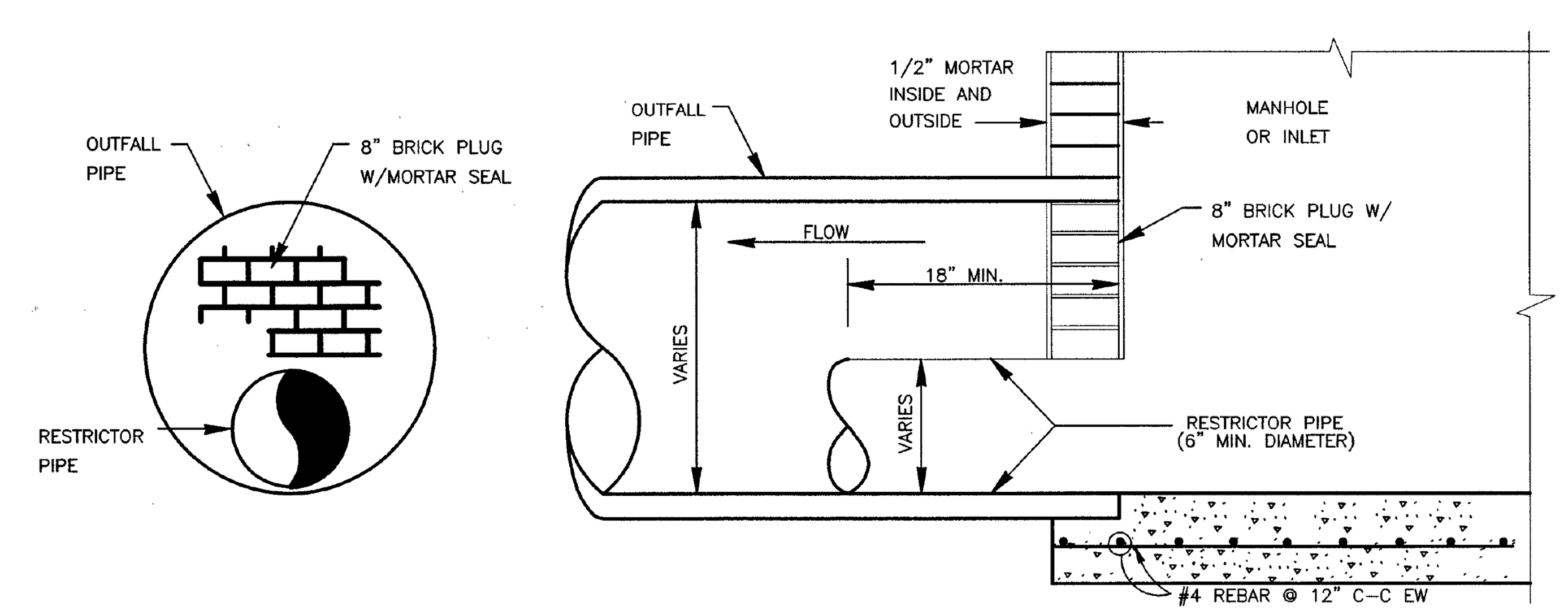
1. INLET WALLS MAY BE EXTENDED USING PRECAST RISER SECTION.
2. INLET TOPS MUST BE SECURED TO THE INLET WALL USING #6 DOWELS DRILLED AND GROUTED A MINIMUM DEPTH OF 5" INTO THE INLET WALL.
3. INLET BACKFILL SHALL BE CEMENT STABILIZED SAND TO THE TOP OF INLET FIRST STAGE.
4. GRADE 60 REINFORCED. #4 STEEL REBAR TO CONFORM TO ASTM A615 ON REQUIRED CENTERS OR EQUAL.
5. PRECAST INLET MUST BE CONSTRUCTED TO SPECIFICATIONS REQUIRED BY APPROVED DRAWINGS. (SEE GENERAL NOTES)
6. TOPS POURED-IN-PLACE REQUIRE #4 REBAR @ 12" C-C EACH WAY, 3,500 PSI CONCRETE MINIMUM AND 3" THICK MINIMUM.
7. PAVEMENT DEPTH AT INLET SHALL BE EQUAL TO OR GREATER THAN REQUIRED PAVEMENT DEPTH.
8. DEPRESS



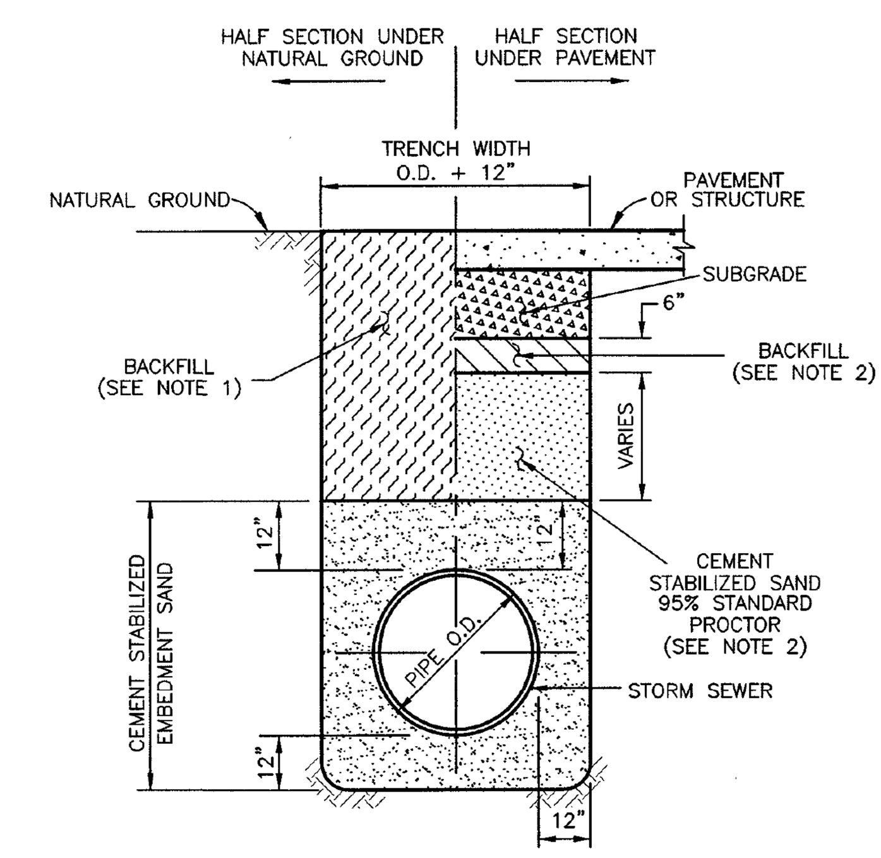




1. TYPE "H-2" PRECAST INLET



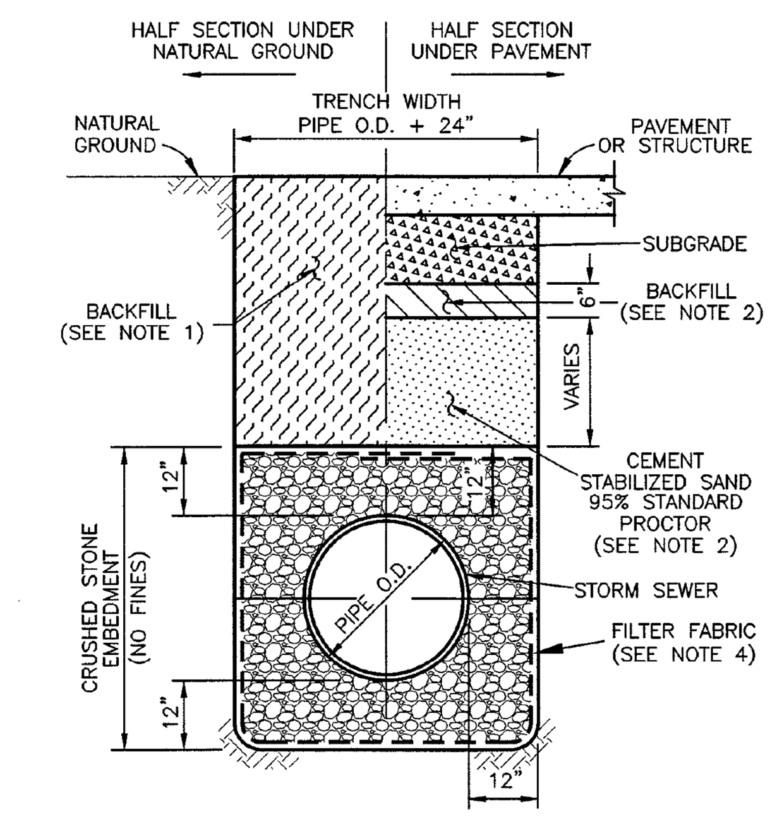
2. STORM SEWER CHOKE OUTFALL RESTRICTOR



NOTES

1. BACKFILL SHALL BE NATIVE SOIL, FREE OF DEBRIS, PLACED IN LIFTS, 8" THICK OR LESS, COMPACTED TO 95% STANDARD PROCTOR DENSITY, EXCEPT AS REQUIRED BELOW.
2. BACKFILL UNDER AND WITHIN 3 FEET OF DRIVEWAYS AND PUBLIC STREETS SHALL BE CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND), EXCEPT THE TOP 6" SHALL BE NATIVE SOIL, FREE OF DEBRIS. ALL BACKFILL UNDER PAVING SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.

3. STORM SEWER BEDDING



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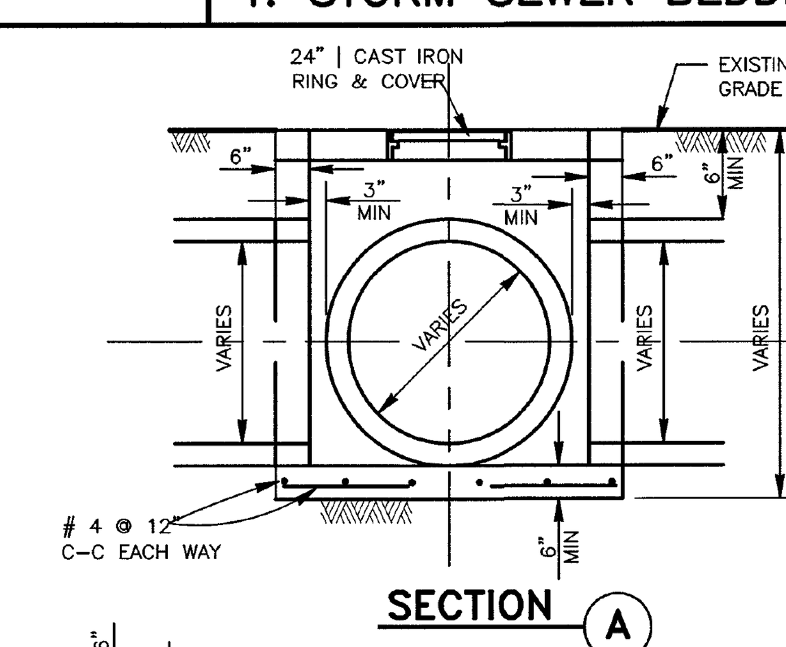
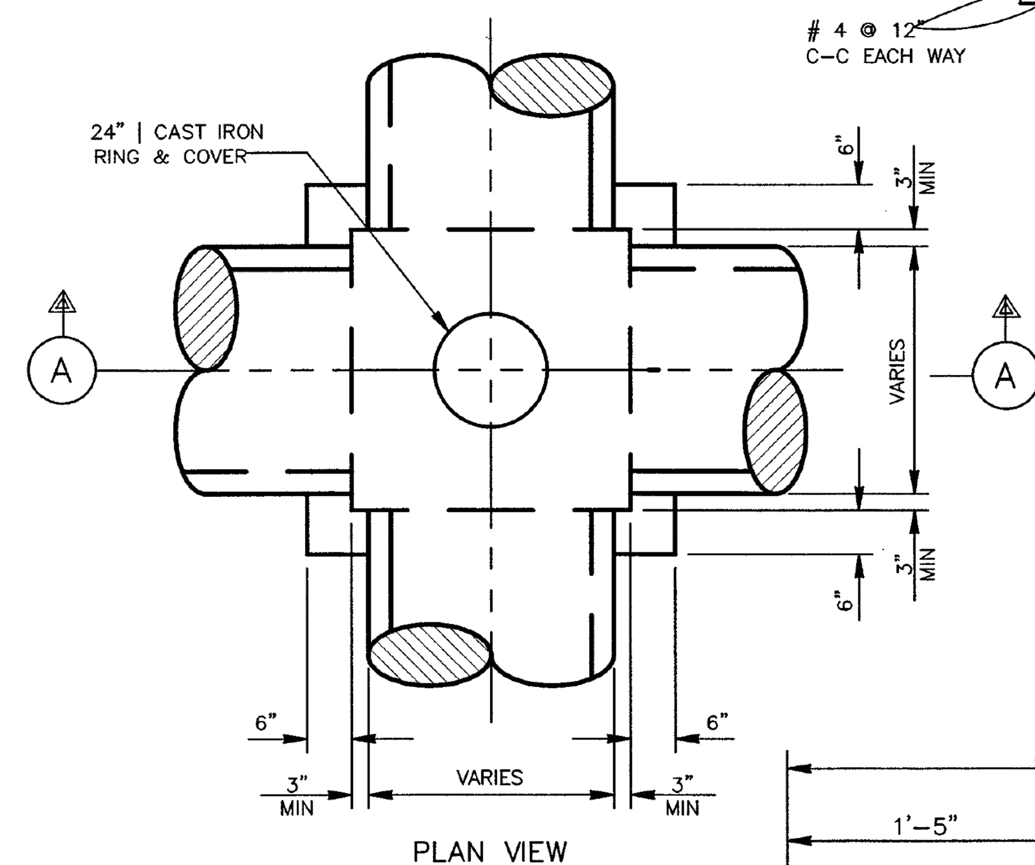
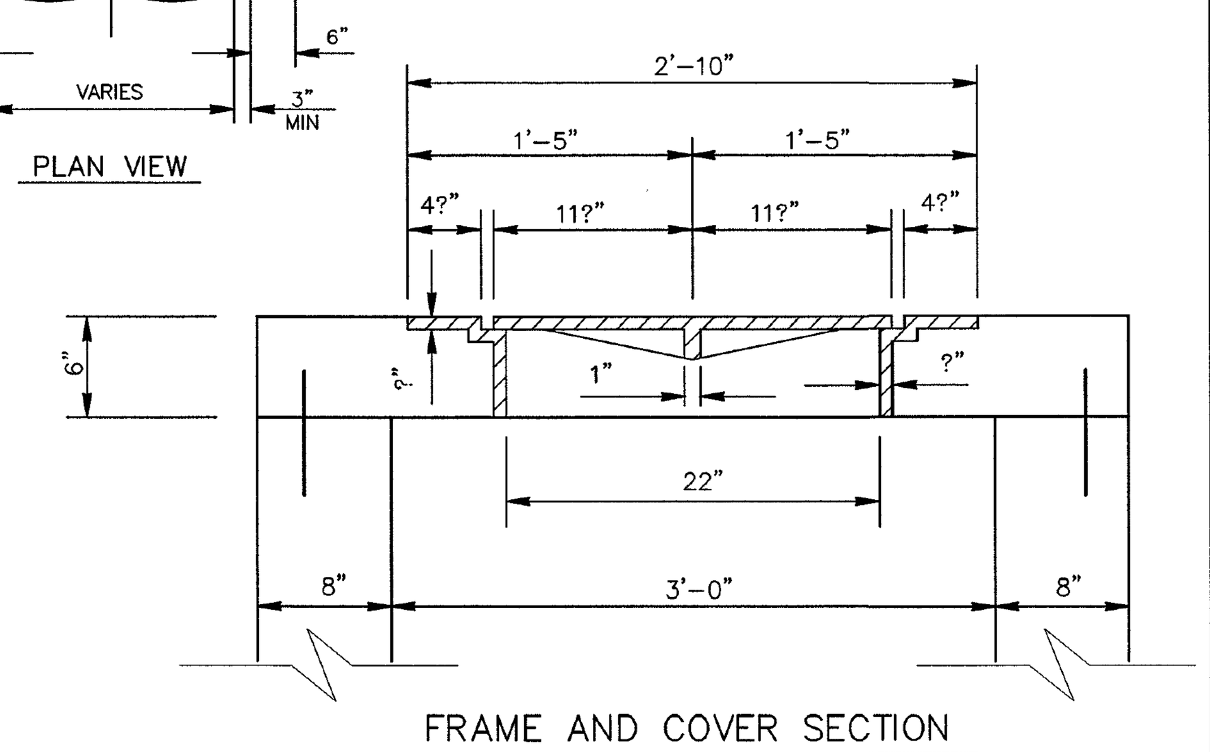
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.
4. FILTER FABRIC, ARMCO TREVIRA S1115 OR EQUAL, 18" LAP AT ALL EDGES.

4. STORM SEWER BEDDING FOR WET CONDITIONS







GENERAL CONSTRUCTION NOTES:

1. ALL CAST CONCRETE BASES SHALL HAVE #4 REBAR @ 12" C-C EW.
2. CONCRETE SHALL BE 3500 PSI MIN.
3. USE C.S.S. BEDDING AS PER DETAILS 2 SK, COMPACTED 8" LIFTS (MAX.), TO 95% STANDARD.

NOTE:

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CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS
STORM SEWER-2

SCALE		
HORIZONTAL	1" = NTS	DESIGNED BY: LLT
VERTICAL	1" = NTS	DRAWN BY: TWB
		CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO:

N-7-18

5. JUNCTION BOX

State of Texas — GERALD PAUL WILSON — 98053 — LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
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Checked By: DDV
Scale: AS NOTED

Revisions:

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100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS
Drawing Name

C8.03

File Name:I:\Details\Needville\2018 Needville STANDARD\N-7-18 - Storm.dwg Layout Tab:N-7-18 Storm Plot date:Tuesday, February 13, 2018 5:37:57 PM Save date:Tuesday, February 13, 2018 5:36:27 PM

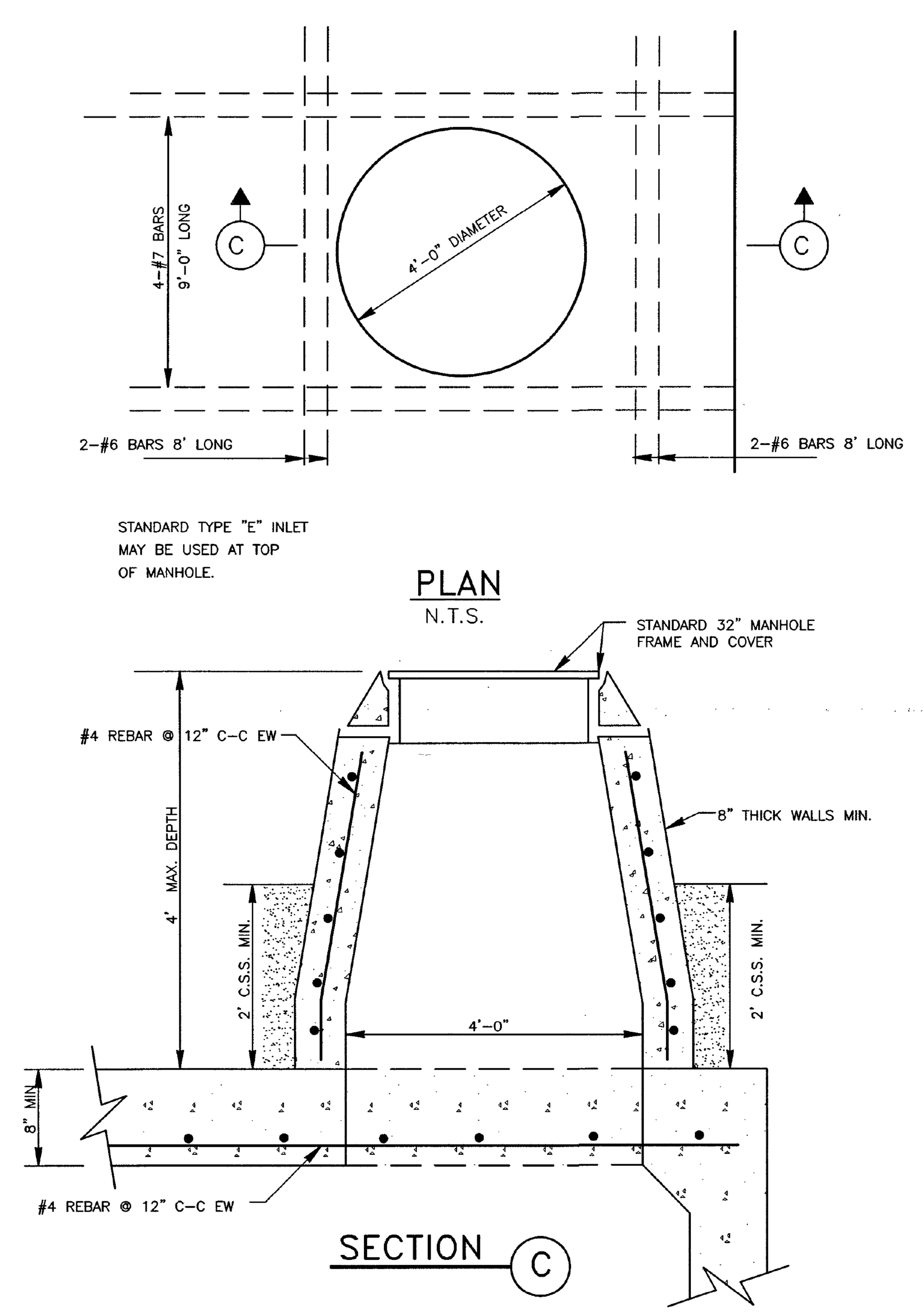
1 | 2 | 3 | 4

A

B

C

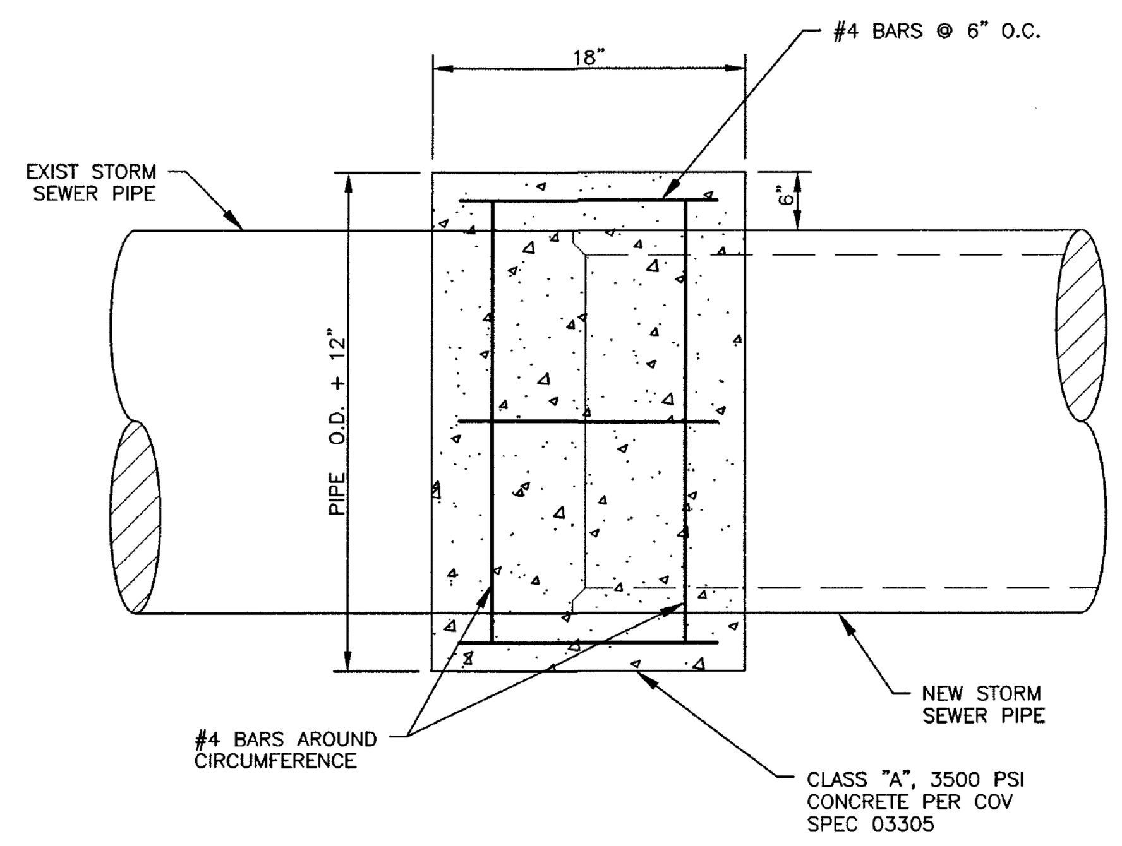
D



NOTES

1. MANHOLE TO BE PRECAST OR CAST IN PLACE ONLY.

1. MANHOLE FOR BOX SEWER



NOTES:

1. ANGLE OF PIPE NOT TO EXCEED 22½°. IF GREATER, INSTALL JUNCTION BOX.
2. AT THE CONNECTION TO A MANHOLE OR INLET, IF THE GAP IS 3" OR LARGER, A COLLAR IS REQUIRED. THE INSIDE SHALL BE SEALED WITH NON–SHRINK GROUT.

2. CONCRETE COLLAR CONNECTION

GENERAL CONSTRUCTION NOTES:

1. ALL CAST CONCRETE BASES SHALL HAVE #4 REBAR @ 12" C–C EW.
2. CONCRETE SHALL BE 3500 PSI MIN.
3. USE C.S.S. BEDDING AS PER DETAILS 2 SK, COMPACTED 8" LIFTS (MAX.), TO 95% STANDARD.

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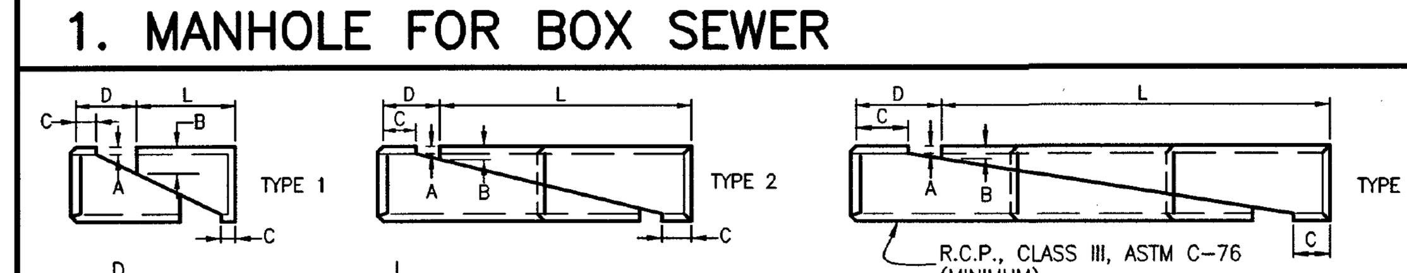
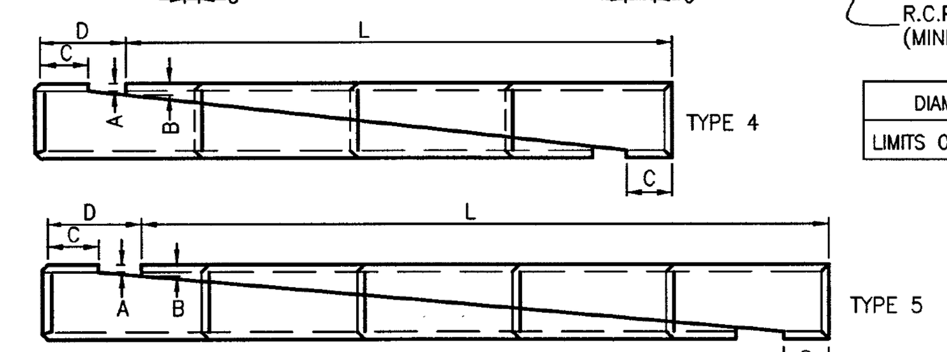
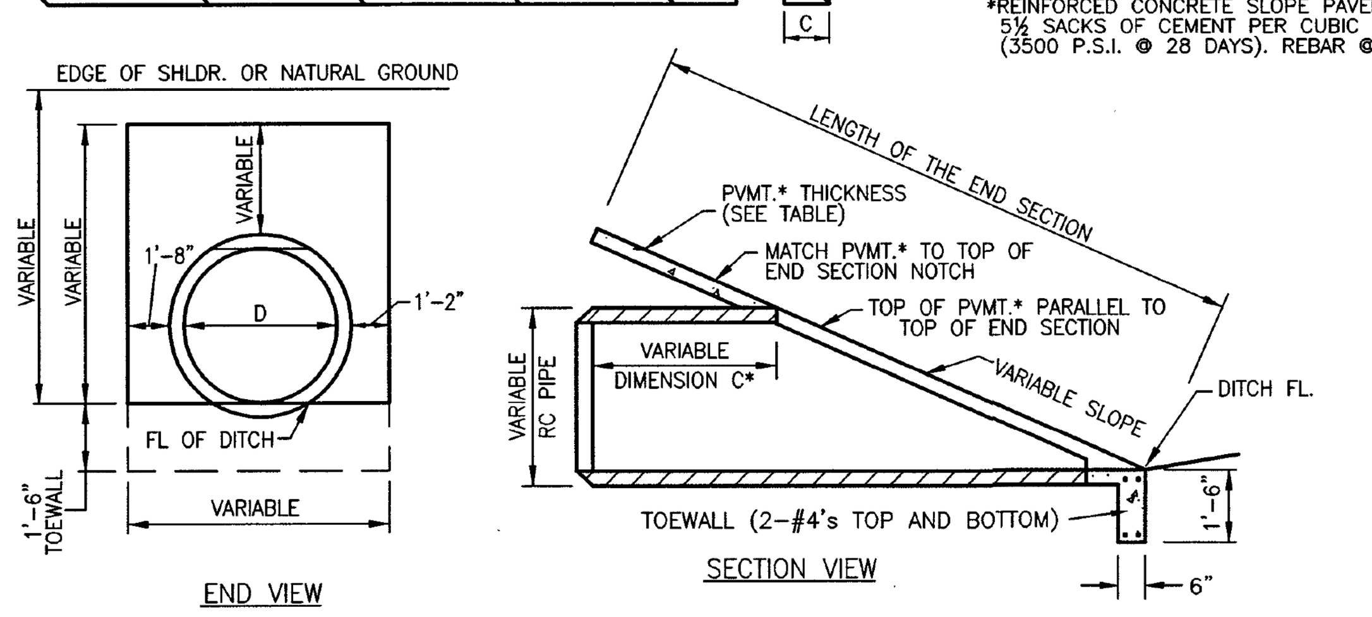




DIAMETER	18"	21"	24"	27"	30"	33"	36"	42"	48"	54"	60"
LIMITS OF PVMT.*	46"	52"	54"	57"	61"	64"	66"	75"	82"	89"	95"

DIAMETER	15"–36"	42"	48"	54"	63"
THICKNESS OF THE PVMT.*	4.5"	5"	5"	6"	6"
REBAR	#3	#3	#3	#4	#4

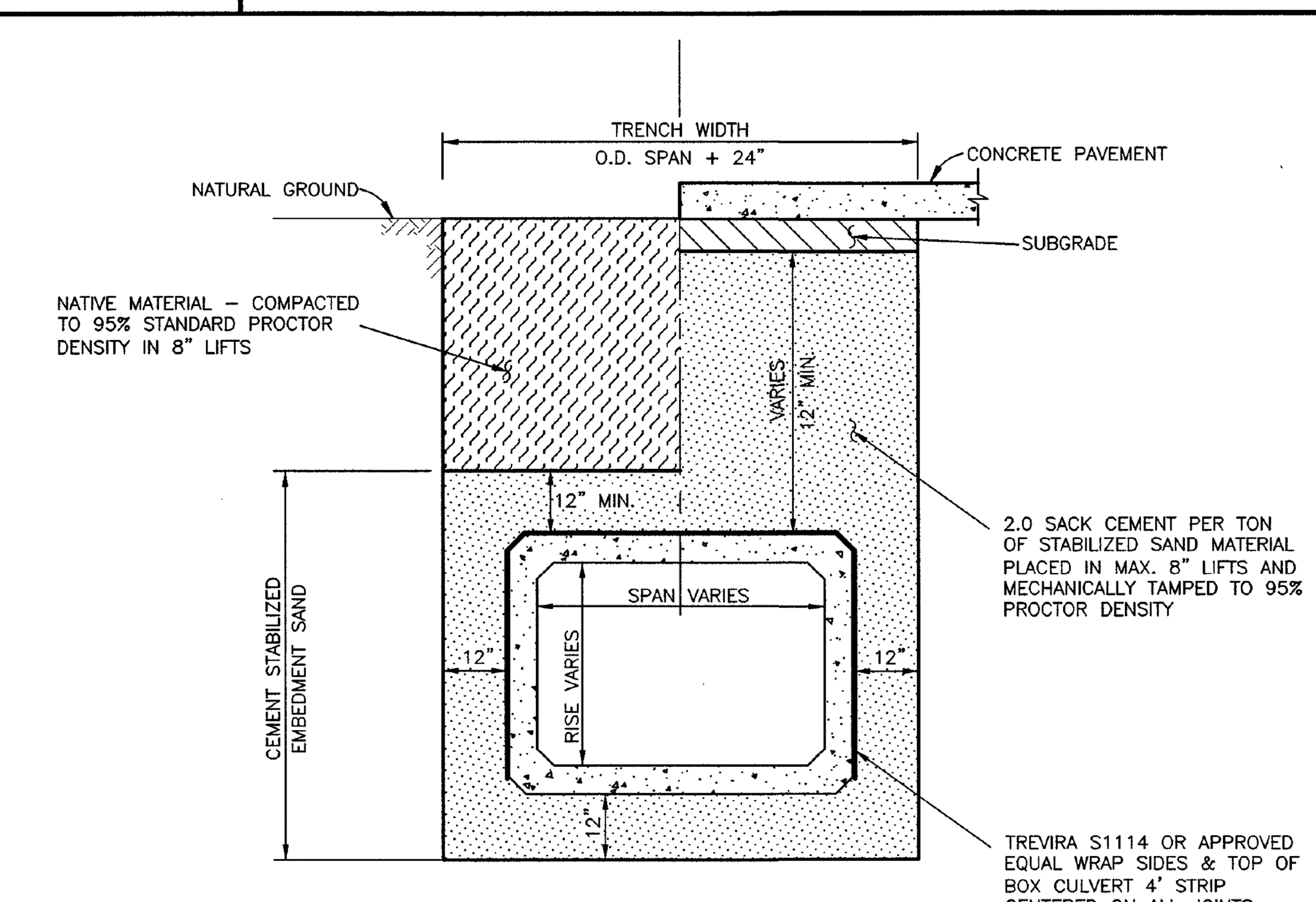
*REINFORCED CONCRETE SLOPE PAVEMENT. 5½ SACKS OF CEMENT PER CUBIC YARD (3500 P.S.I. @ 28 DAYS). REBAR @ 12" O.C.



DIA.	WALL	O.D.	SLOPE	PIPE LGTH	TYPE	A INCH	B INCH	C INCH	D INCH	L	LENGTH END SEC FT.	PVMT. DNT C.Y.**
24"	3"	30"	3:1	2–6"	2	3	9	36	54	7'–6"	11.27	0.57
			4:1	2–6"	2	3	9	24	48	5'–3"	12.33	0.56
			6:1	3–6"	3	3	9	36	72	12'–2"	18.23	0.74
27"	3"	33"	3:1	2–6"	2	3	9	31	49	7'–10"	11.6	0.6
			4:1	2–7"	2	3	9	36	60	10'–0"	14.6	0.89
			6:1	3–7"	3	3	9	54	90	15'–0"	21.54	0.91
30"	3"	37"	3:1	2–6"	2	3	9	27	45	8'–5"	12.12	0.63
			4:1	2–7"	2	3	9	30	54	10'–6"	15.29	0.72
			6:1	3–7"	3	3	9	45	81	15'–9"	22.55	0.95
3"	3"	40"	3:1	2–6"	2	3	9	22	40	6'–7"	12.65	0.66
			4:1	2–7"	2	3	9	24	48	11'–0"	15.97	0.76
			6:1	3–7"	3	3	9	36	72	16'–6"	23.57	0.98
36"	4"	44"	3:1	2–7"	2	4	10	36	54	10'–8"	14.75	0.8
			4:1	3–6"	3	4	10	26	60	13'–0"	18.21	0.88
			6:1	4–6"	4	4	10	36	72	18'–0"	25.36	1.03
42"	4"	51"	3:1	2–7"	2	4	10	27	45	11'–3"	15.81	0.96
			4:1	3–7"	3	4	10	51	75	16'–5"	21.9	1.26
			6:1	4–7"	4	4	10	54	90	22'–6"	30.41	1.57
48"	5"	58"	3:1	3–6"	3	5	11	36	54	13–6"	18.44	1.28
			4:1	3–7"	3	5	11	39	63	17'–3"	23.27	1.49
			6:1	4–7"	4	5	11	36	72	24'–0"	32.44	1.82
54"	5"	65"	3:1	3–6"	3	5	11	27	45	14'–3"	19.5	1.52
			4:1	4–6"	4	5	11	36	60	19–0"	25.43	2.19
			6:1	5–7"	5	5	11	63	99	29–3"	38.27	2.57
60"	6"	72"	3:1	3–7"	3	6	12	45	63	17'–3"	22.64	1.96
			4:1	4–7"	4	6	12	60	84	23'–0"	29.98	2.46
			6:1	5–7"	5	6	12	45	81	30'–9"	40.28	2.65

**PVMT. QUANTITY FOR ONE END SECTION

3. SLOPED END TREATMENT



NOTES:

1. 2.0 – SACK CEMENT PER TON OF STABILIZED SAND PLACED BEFORE PIPE IS PLACED.

4. REINFORCED CONCRETE BOX BEDDING DETAIL

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

STORM SEWER–3

SCALE		DESIGNED BY:	LLT
HORIZONTAL	1" = NTS	DRAWN BY:	TWB
VERTICAL	1" = NTS	CHECKED BY:	KRK
		DATE:	2/13/18
		JOB NO:	
		DWG. NO:	

N–8–18

Sheet:

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architects
19251 Purus Dr.
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YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER

8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

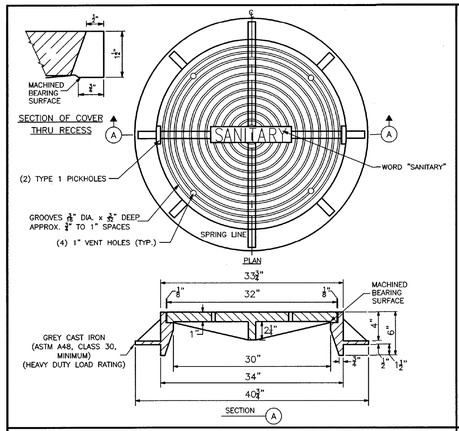
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

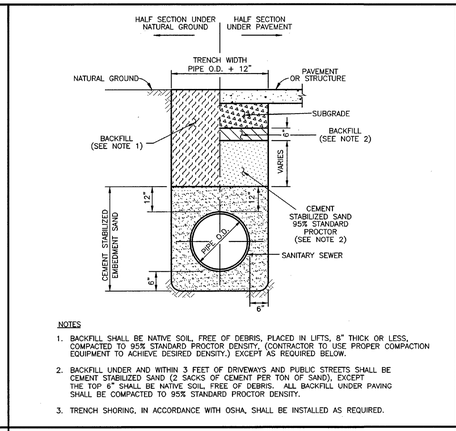
CONSTRUCTION DETAILS

Drawing Name

C8.04



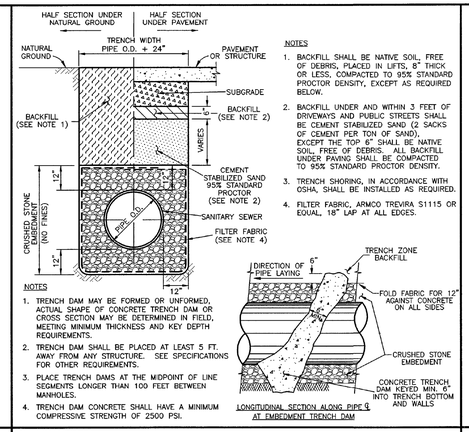
1. MANHOLE FRAME AND COVER



NOTES

1. BACKFILL SHALL BE NATIVE SOIL, FREE OF DEBRIS, PLACED IN LIFTS, 8" THICK OR LESS, COMPACTED TO 95% STANDARD PROCTOR DENSITY, (CONTRACTOR TO USE PROPER COMPACTION EQUIPMENT TO ACHIEVE DESIRED DENSITY.) EXCEPT AS REQUIRED BELOW.
2. BACKFILL UNDER AND WITHIN 3 FEET OF DRIVEWAYS AND PUBLIC STREETS SHALL BE CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND), EXCEPT THE TOP 6" SHALL BE NATIVE SOIL, FREE OF DEBRIS. ALL BACKFILL UNDER PAVING SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.

2. SANITARY SEWER BEDDING



NOTES

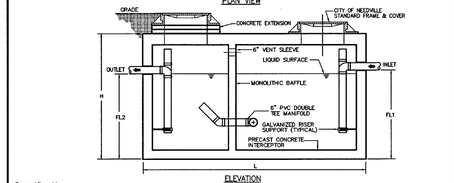
1. TRENCH DAM MAY BE FORMED OR UNFORMED, ACTUAL SHAPE OF CONCRETE TRENCH DAM OR CROSS SECTION MAY BE DETERMINED IN FIELD, MEETING MINIMUM THICKNESS AND KEY DEPTH REQUIREMENTS.
2. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY STRUCTURE. SEE SPECIFICATIONS FOR OTHER REQUIREMENTS.
3. PLACE TRENCH DAMS AT THE MIDPOINT OF LINE SEGMENTS LONGER THAN 100 FEET BETWEEN MANHOLES.
4. TRENCH DAM CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI.

LONGITUDINAL SECTION ALONG PIPE ℄ AT EMBEDMENT TRENCH DAM

3. SANITARY SEWER BEDDING FOR WET CONDITIONS

NOTES

1. BACKFILL SHALL BE NATIVE SOIL, FREE OF DEBRIS, PLACED IN LIFTS, 8" THICK OR LESS, COMPACTED TO 95% STANDARD PROCTOR DENSITY, (CONTRACTOR TO USE PROPER COMPACTION EQUIPMENT TO ACHIEVE DESIRED DENSITY.) EXCEPT AS REQUIRED BELOW.
2. BACKFILL UNDER AND WITHIN 3 FEET OF DRIVEWAYS AND PUBLIC STREETS SHALL BE CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND), EXCEPT THE TOP 6" SHALL BE NATIVE SOIL, FREE OF DEBRIS. ALL BACKFILL UNDER PAVING SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.
4. ALL EXCAVATED MATERIAL WITH A P.I. OF 12 OR LESS MAY BE USED AS BACKFILL WITH FIELD APPROVAL BY THE CITY.



Specifications

CONCRETE : CLASS 3 CONCRETE WITH DESIGN STRENGTH OF 4500 PSI AT 28 DAYS. (AASHTO H-20 LOADING) UNIT IS MONOLITHIC CONSTRUCTION AT FLOOR, FIRST STAGE OF WALL AND BAFFLE WITH SECTIONAL RISER TO REQUIRED DEPTH. (MONOLITHIC BAFFLE REQUIRED, SLIDE-IN TYPE IS NOT ACCEPTABLE).

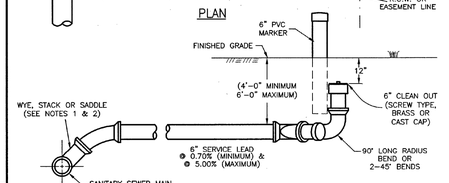
REINFORCEMENT: GRADE 60 REINFORCED WITH STEEL REBAR CONFORMING TO ASTM A615 ON REQUIRED CENTERS OR EQUAL.

C.I. CASTINGS: CITY OF NEEDVILLE STANDARD MANHOLE FRAME & COVERS. MANHOLE SHALL BE RATED FOR AASHTO H-20 LOADING.

GREASE INTERCEPTOR SCHEDULE

CAPACITY	GREASE	EMPTY	LENGTH	WIDTH	HEIGHT	INLET	OUTLET
US Gal	Capacity (LBS)	Wt (LBS)	L	W	H	FL1	FL2
500	1,200	7,000	7'-10"	4'-4"	4'-6"	3'-3"	3'-0"
750	4,900	10,000	7'-10"	4'-4"	4'-6"	4'-3"	4'-0"
1,000	6,600	13,200	8'-8"	5'-0"	4'-6"	4'-9"	4'-6"
1,500	10,300	20,000	9'-2"	5'-6"	7'-0"	5'-10"	5'-7"
2,000	13,000	24,000	12'-6"	7'-0"	6'-6"	4'-8"	4'-5"
2,500	17,500	27,000	12'-6"	7'-0"	7'-0"	5'-8"	5'-5"
3,000	21,400	30,000	12'-6"	7'-0"	8'-0"	6'-8"	6'-5"
3,500	24,000	33,000	12'-6"	7'-0"	9'-0"	7'-8"	7'-5"
4,000	28,400	36,000	12'-6"	7'-0"	10'-0"	8'-8"	8'-5"

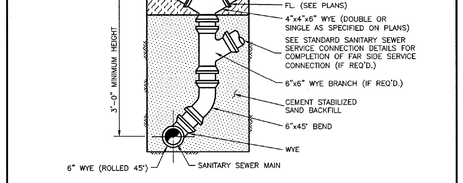
4. GREASE TRAP



NOTES:

1. FOR NEW CONSTRUCTION "IN-LINE" WYES OR SERVICE STACKS SHALL BE USED FOR SERVICE CONNECTIONS TO SANITARY SEWERS.
2. FOR SERVICE CONNECTIONS ON EXISTING SANITARY SEWERS, PROPER SIZED SADDLES AND DRILLED TAP SHALL BE USED.
3. PROVIDE DOUBLE SERVICE CONNECTION WHERE POSSIBLE.
4. DELETE DOUBLE WYE ON SINGLE CONNECTION.
5. PROVIDE CEMENT STABILIZED BEDDING AND BACKFILL PER DETAILS.
6. 6" PVC MARKER (WITH SOLVENT WELD CAP) SHALL EXTEND FROM ADJOINING THE WYE TO 2'-0" ABOVE FINISHED GRADE.

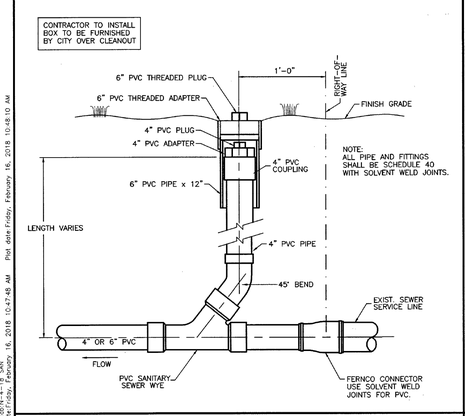
5. SANITARY SEWER SERVICE CONNECTION



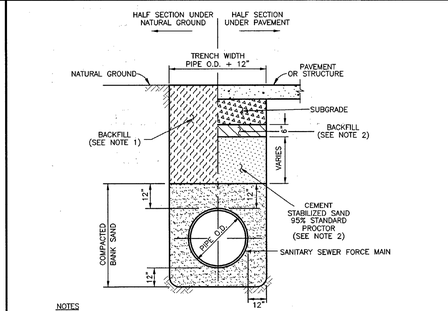
NOTES:

1. ALL STACK CONNECTIONS SHALL BE "IN-LINE" FITTINGS.
2. NO STACKS TO BE CONSTRUCTED ON EXISTING SANITARY SEWER LINES; LINES GREATER THAN 12' DEEP OR IN WET TRENCH CONDITIONS.
3. ALL FITTINGS TO BE PVC, SDR-26.
4. 6" PVC MARKER (WITH SOLVENT WELD CAP) SHALL EXTEND FROM ADJOINING THE WYE TO 2'-0" ABOVE FINISHED GRADE.

6. SANITARY SEWER STACK



7. SERVICE LINE CLEANOUT ASSEMBLY



NOTES

1. BACKFILL SHALL BE NATIVE SOIL, FREE OF DEBRIS, PLACED IN LIFTS, 8" THICK OR LESS, COMPACTED TO 95% STANDARD PROCTOR DENSITY, (CONTRACTOR TO USE PROPER COMPACTION EQUIPMENT TO ACHIEVE DESIRED DENSITY.) EXCEPT AS REQUIRED BELOW.
2. BACKFILL UNDER AND WITHIN 3 FEET OF DRIVEWAYS AND PUBLIC STREETS SHALL BE CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND), EXCEPT THE TOP 6" SHALL BE NATIVE SOIL, FREE OF DEBRIS. ALL BACKFILL UNDER PAVING SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.
4. ALL EXCAVATED MATERIAL WITH A P.I. OF 12 OR LESS MAY BE USED AS BACKFILL WITH FIELD APPROVAL BY THE CITY.

8. SANITARY SEWER FORCE MAIN BEDDING

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

SANITARY-1

SCALE		
HORIZONTAL	1" = NTS	DESIGNED BY: LLT
VERTICAL	1" = NTS	DRAWN BY: TWB
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		DATE: 2/13/18
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		N-4-18
		Sheet:

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VCS architects
19251 Purus Dr.
Porter, TX 77365

WECS
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FRESNO, TEXAS 77545
(832) 443-4150

BARBARA JORDAN PARK
YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

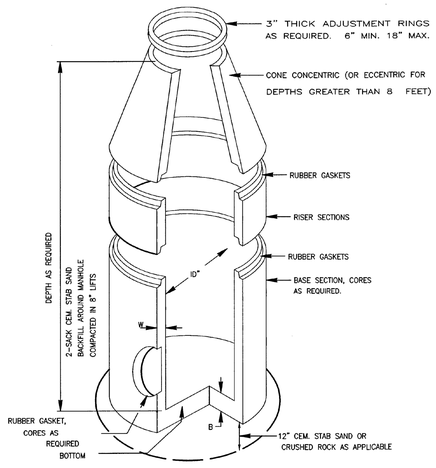
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

Drawing Name

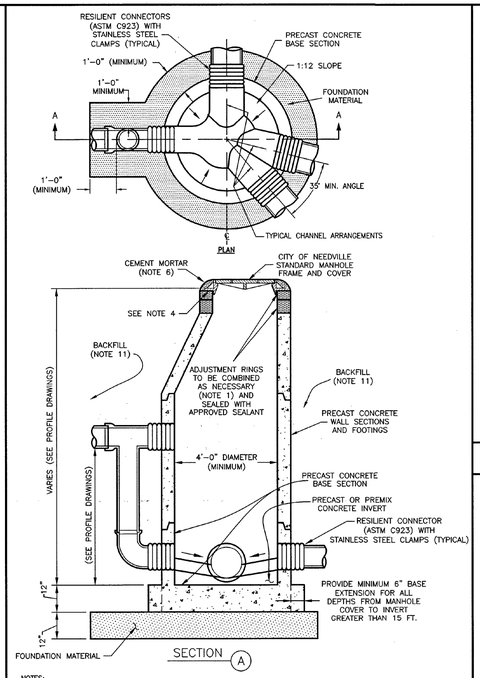
C8.05



NOTES

1. LIFTING INSERTS AS REQUIRED.
2. ALL JOINTS SHALL BE SEALED WITH APPROVED RUBBER GASKET.
3. STRUCTURE TO BE PLACED ON 12" STABILIZED BASE.
4. C.S.S. SHALL BE BROUGHT TO WITHIN 2-FT OF TOP OF MANHOLE.
5. PRE-CAST MANHOLE SHALL BE IN COMPLIANCE WITH APPROVED PRODUCT LIST.
6. THANE COAT SHALL BE IN COMPLIANCE WITH APPROVED PRODUCT LIST.
7. INVERTS SHALL COMPLY WITH C.O.M.C., INFRASTRUCTURE DESIGN MANUAL SPECIFICATIONS.
8. INFLOW PROTECTORS REQUIRED ON ALL SANITARY MANHOLES.
9. REFER TO SANITARY MANHOLE LIDS, C.S.S. NOTES, MODIFIED BEDDING DETAILS AND NOTES.

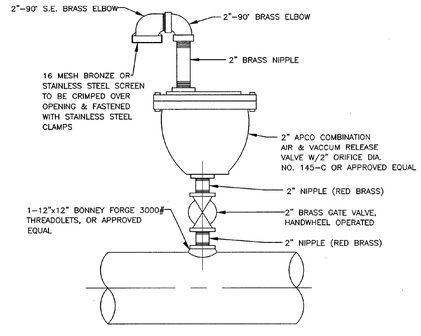
1. PRECAST SANITARY MANHOLE



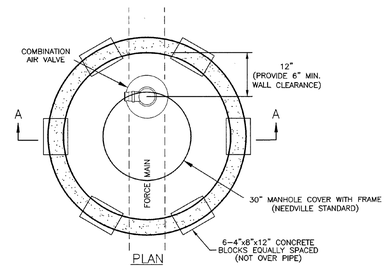
NOTES:

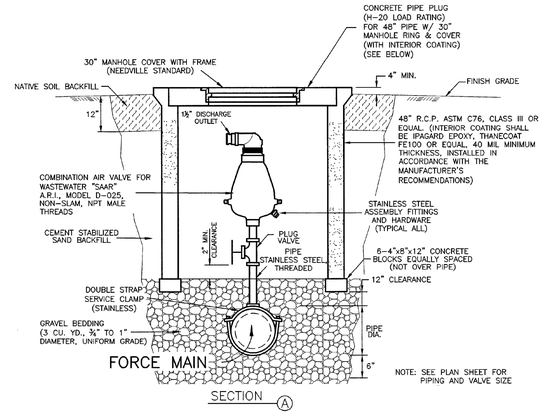
1. PRECAST CONCRETE RINGS SHALL BE PROVIDED FOR A COMBINED ADJUSTMENT HEIGHT OF AT LEAST 6". THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 12".
2. MANHOLE WALL THICKNESS FOR DEPTH EXCEEDING 12'-0" SHALL BE DETERMINED TO MEET AASHTO H-20 LOADING AND SOIL CONDITIONS OR AS OTHERWISE REQUIRED. MINIMUM THICKNESS 5".
3. MANHOLE DROP AND INTERSECTING PIPES SHALL BE INSTALLED WHEN CALLED FOR IN PLAN AND PROFILE DRAWING AND WHEN THE DROP ON INCOMING PIPE IS GREATER THAN 30".
4. SEAT MANHOLE FRAME USING AN APPROVED SEALANT.
5. ECCENTRIC PRECAST CONCRETE MANHOLE RISER SHALL BE USED.
6. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREAS.
7. MINIMUM STEEL REINFORCING IN THE PRECAST CONCRETE BASE SHALL BE #5 @ 8" CENTERS EACH WAY.
8. PRECAST CONCRETE MANHOLES TO MEET ASTM C-478, CURRENT.
9. ALL JOINTS SHALL BE SEALED WITH RUBBER GASKETS (ASTM C443) OR APPROVED EQUAL.
10. BASE SHALL INCLUDE A 12" THICK CEMENT STABILIZED SAND BASE BENEATH THE STRUCTURE. ALTERNATE: USE CRUSHED STONE AND FILTER FABRIC IN WET TRENCH CONDITIONS.
11. BACKFILL AROUND MANHOLE & DROP CONNECTION WITH 2 SACKS OF CEMENT PER TON OF SAND (100 P.S.I. MINIMUM).
12. USE STANDARD CAST IRON FRAME AND COVER WITH THE WORDS "SANITARY – CITY OF NEEDVILLE".
13. MINIMUM 4000 P.S.I. CONCRETE TO BE USED FOR CAST-IN-PLACE (C.I.P.) CONCRETE BASE.
14. GROUT INSIDE AND OUTSIDE OR EXTENSION RING(S) AND FRAME.
15. ALL INTERIOR SURFACES SHALL BE COATED WITH IPAGARD EPOXY, THANECOAT FE100 OR APPROVED EQUAL, APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION (40 MIL MINIMUM THICKNESS)
16. MANHOLES SHALL BE CONSTRUCTED USING PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, CONE AND BOTTOM. BRICK WILL NOT BE ALLOWED.

2. SANITARY SEWER MANHOLE



3. AIR RELEASE VALVE





4. SEWERAGE AIR RELEASE VALVE MANHOLE

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

SANITARY-2

SCALE	
HORIZONTAL	1" = NTS
VERTICAL	1" = NTS

DESIGNED BY: LLT
DRAWN BY: TWB
CHECKED BY: KRK
DATE: 2/13/18
JOB NO:
DWG. NO:

N-5-18

Sheet:

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GERALD PAUL WILSON 98053 LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

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C8.06

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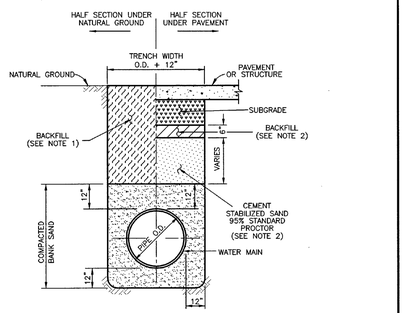
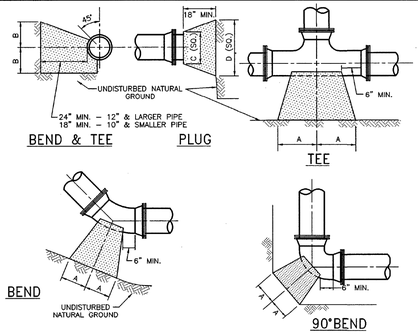
1. WATER LINE BEDDING



NOTES

1. BACKFILL SHALL BE NATIVE SOIL FREE OF DEBRIS, PLACED IN LIFTS, 8" THICK OR LESS, COMPACTED TO 95% STANDARD PROCTOR DENSITY, EXCEPT AS REQUIRED BELOW.
2. BACKFILL UNDER AND WITHIN 3 FEET OF DRIVEWAYS AND PUBLIC STREETS SHALL BE CEMENT STABILIZED SAND (2 SACKS OF CEMENT PER TON OF SAND), EXCEPT THE TOP 6" SHALL BE NATIVE SOIL FREE OF DEBRIS. ALL BACKFILL UNDER PAVING SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. TRENCH SHORING, IN ACCORDANCE WITH OSHA, SHALL BE INSTALLED AS REQUIRED.
4. ALL EXCAVATED MATERIAL WITH A P.I. OF 12 OR LESS MAY BE USED AS BACKFILL WITH FIELD APPROVAL BY THE CITY.

2. THRUST BLOCK

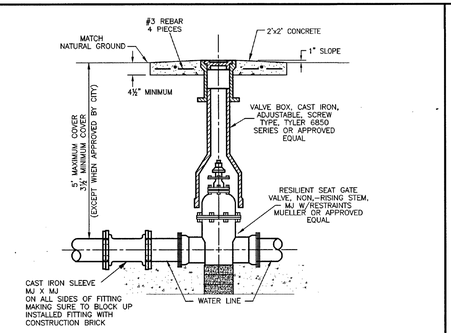


SIZE	90° BEND		45° BEND		22½° BEND		TEES		PLUGS	
	A	B	A	B	A	B	A	B	C	D
2½"	12"	7"	6"	7"	6"	6"	7"	8"	8"	14"
4"	14"	8"	7"	9"	6"	6"	8"	11"	8"	18"
6"	16"	10"	9"	10"	6"	8"	10"	12"	10"	21"
8"	22"	13"	12"	13"	8"	10"	13"	16"	12"	29"
12"	29"	21"	16"	21"	11"	16"	18"	24"	16"	41"
16"	38"	27"	21"	27"	12"	24"	24"	30"	20"	54"

NOTES:

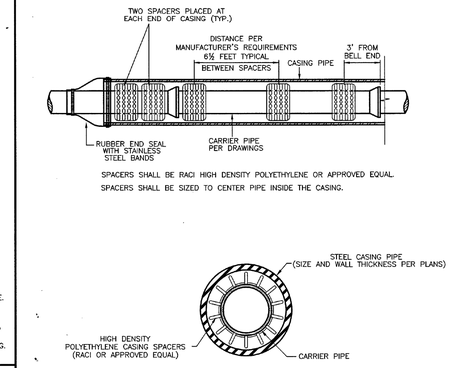
1. THRUST BLOCKS AT TRENCH FACE MUST HAVE A MINIMUM BEARING SURFACE OF 1.0 SQ. FOOT AND THE LEAST DIMENSION SHALL BE NO SMALLER THAN 1.5 TIMES PIPE DIAMETER, BUT NOT LESS THAN 1.0 FT.
2. ALL CONCRETE SHALL BE 3500 PSI AND BE PACKED AT ALL FITTINGS.
3. ALL FITTINGS SHALL BE M.J. RESTRAINED JOINT (EBAA IRON, SERIES 2000PV, OR APPROVED EQUAL) AND WRAPPED IN 8 MIL PLASTIC.

3. GATE VALVE AND BOX



NOTES:

1. PROVIDE OPERATING NUT EXTENSION, AS NEEDED, TO APPROXIMATELY THREE (3) FEET BELOW FINISHED GRADE.
2. VALVE BOX SHALL NOT TRANSMIT ANY LOAD DIRECTLY TO THE VALVE OR PIPE.
3. GATE VALVES SHALL BE COUNTER-CLOCKWISE OPEN.
4. TAPPING VALVES ARE NOT ALLOWED WHEN TAP IS SAME SIZE AS THE EXISTING MAIN EXCEPT WHEN APPROVED BY PUBLIC WORKS.
5. FOR CUT IN VALVES OR FITTINGS, PROVIDE CAST IRON SLEEVE WITH MJ X MJ ON ALL SIDES OF VALVE/FITTING. BLOCK UP INSTALLED FITTING WITH CONSTRUCTION BRICK(S).



SPACERS SHALL BE RACI HIGH DENSITY POLYETHYLENE OR APPROVED EQUAL.

SPACERS SHALL BE SIZED TO CENTER PIPE INSIDE THE CASING.

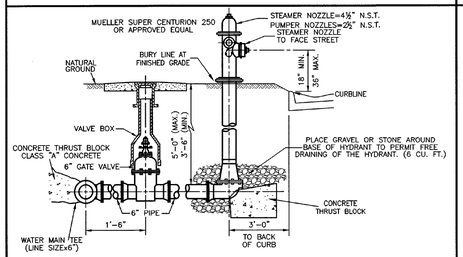
NOTES:

1. CASING SPACERS SHALL BE USED TO INSTALL THE CARRIER PIPE INSIDE THE ENCASEMENT PIPE TO PROVIDE SUPPORT AROUND THE PERIPHERY OF THE PIPE. MINIMUM CLEARANCE BETWEEN MAXIMUM O.D. OF CARRIER PIPE AND I.D. OF CASING SHALL BE ONE INCH.
2. SPACERS SHALL BE PROJECTION TYPE, WITH A MINIMUM NUMBER OF PROJECTIONS AROUND THE CIRCUMFERENCE EQUAL TO THE NUMBER OF DIAMETER INCHES OF THE CARRIER PIPE. CASING SPACERS SHALL BE TOTALLY NON-METALLIC SPACERS CONSTRUCTED OF INTERLOCKING PREFORMED SECTIONS OF HIGH DENSITY POLYETHYLENE. SPACERS SHALL BE ISO 9002 CERTIFIED FOR STRENGTH AND QUALITY.
3. THE ENDS OF THE CASING SHALL BE SEALED USING PWM MODEL 1 WA WRAP AROUND END SEAL MADE OF 1/8" THICKNESS RUBBER AND STAINLESS STEEL BANDS, OR APPROVED EQUAL.
4. EXTEND CASING A MINIMUM OF 5' BEYOND EDGE OF PAVEMENT.

PVC PIPE IN CASING

DR18 C900/C905 PVC PIPE	OD"	BELL OD"	STEEL CASING DIAMETER	RACI SPACERS MODEL#
4"	4.80"	6.38"	10"	2F 41
6"	6.90"	8.88"	12"	2F, 1G 41
8"	9.05"	11.38"	14"	3F, 1G 41
10"	11.10"	13.97"	16"	4F 41
12"	13.20"	16.34"	20"	5F 60
14"	15.30"	18.23"	22"	6F 60
16"	17.40"	20.58"	24"	7F 60
20"	21.60"	26.85"	30"	6M 90

4. FIRE HYDRANT

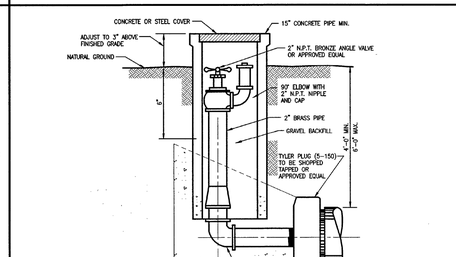


NOTES:

1. 5/8" ALL-THREAD IS TO BE USED TO TIE VALVE TO TEE AND VALVE TO HYDRANT.
2. PROVIDE MECHANICAL RESTRAINED JOINTS (EBBA IRON, SERIES 2000PV, OR APPROVED EQUAL).
3. PAINT ALL FIRE HYDRANT BARRELS CHROME ALUMINUM (ACE HARDWARE 253A110) OR AN APPROVED EUQAL BY THE CITY OF NEEDVILLE.

PAINT BONNET AND CAPS IN ACCORDANCE WITH CITY OF NEEDVILLE REQUIREMENTS BASED ON MAINLINE SIZE. (COLORS: YELLOW=6" AND LESS; WHITE=8"; GREEN=10" TO 20"; ORANGE=24" TO 60").

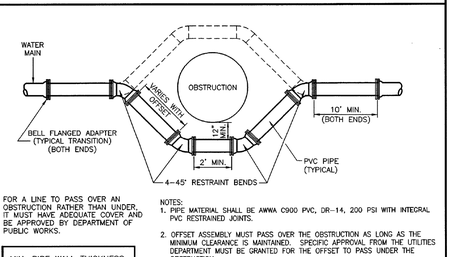
5. 2" BLOWOFF VALVE ASSEMBLY



NOTE:

1. ON OPEN-DITCH ROADWAYS, SET THE FLUSHING HYDRANTS WITHIN 3 FEET OF ROAD RIGHT-OF-WAY LINE.
2. ALL PIPING AND FITTINGS SHALL BE BRASS ALL THE WAY TO THE SADDLE.

6. WATER PIPE OFFSET ASSEMBLY



FOR A LINE TO PASS OVER AN OBSTRUCTION RATHER THAN UNDER, IT MUST HAVE ADEQUATE COVER AND BE APPROVED BY DEPARTMENT OF PUBLIC WORKS.

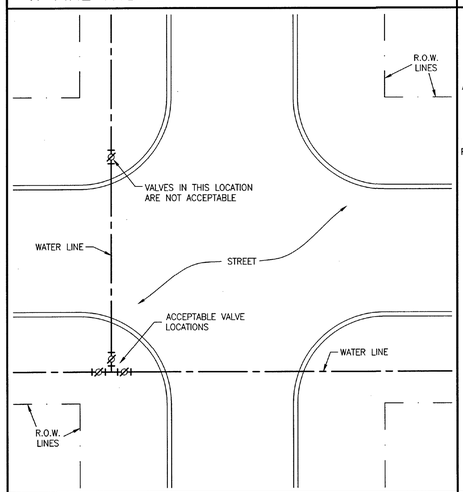
MIN. PIPE WALL THICKNESS	
4"	– 0.250"
6"	– 0.280"
8"	– 0.322"
12" AND LARGER	– 0.375"

NOTES:

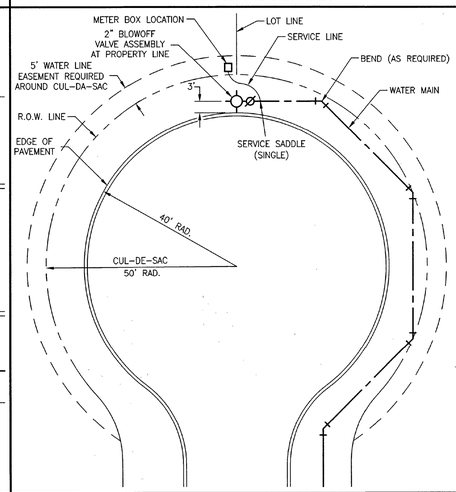
1. PIPE MATERIAL SHALL BE AWWA C900 PVC, DR-14, 200 PSI WITH INTEGRAL PVC RESTRAINED JOINTS.
2. OFFSET ASSEMBLY MUST PASS OVER THE OBSTRUCTION AS LONG AS THE MINIMUM CLEARANCE IS MAINTAINED. SPECIFIC APPROVAL FROM THE UTILITIES DEPARTMENT MUST BE GRANTED FOR THE OFFSET TO PASS UNDER THE OBSTRUCTION.
3. MATERIAL AND COATINGS SHALL BE IN ACCORDANCE WITH WATER MAIN STANDARD SPECIFICATIONS.
4. RESTRAIN EXISTING PIPING BEYOND OFFSET SECTION AS REQUIRED TO PREVENT MOVEMENT.
5. ALL PVC PRODUCTS MUST BE LISTED ON CITY OF NEEDVILLE'S APPROVED PRODUCTS LIST.

7. WATER LINE CASING

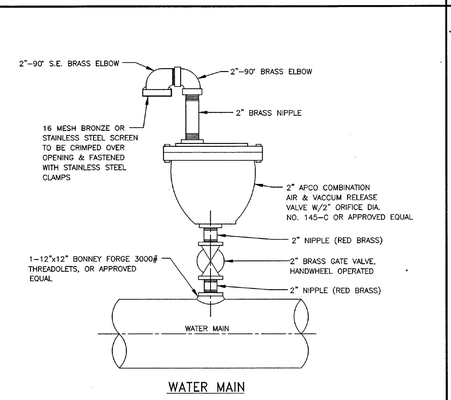
8. VALVE LOCATION PLAN



9. BLOWOFF LOCATION PLAN



10. AIR RELEASE VALVE



WATER MAIN

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

WATER-1

SCALE		DESIGNED BY: LLT
HORIZONTAL	1" = NTS	DRAWN BY: TWB
VERTICAL	1" = NTS	CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO:
		N-2-18
		Sheet:

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19251 Purus Dr.
Porter, TX 77365

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4611 BIGGAM DRIVE
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(832) 443-4150

BARBARA JORDAN PARK
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8705 PARK STREET
NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED
PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

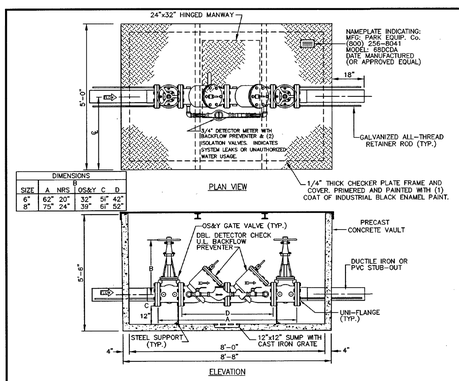
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

Drawing Name

C8.07



Specifications

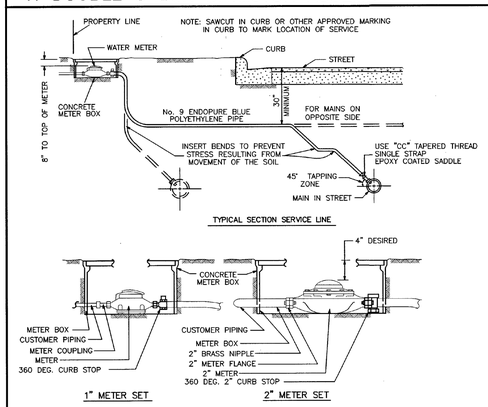
CONCRETE – Class 1 concrete with design strength of 4500 psi at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth. Gross empty weight of approximately 9,000 pounds.

REINFORCEMENT – Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

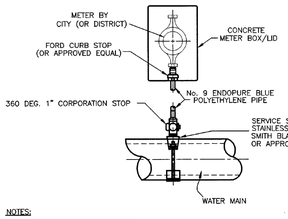
STEEL COVER – 1/4" steel skid-resistant floor plate welded to 3" angle frame with (2) 3"x2-3/8" I beam supports.

Notes:
Backflow assembly shall be factory assembled complete with concrete vault and be tested prior to setting in excavation. Manufacturer shall provide certified engineering data and buoyancy calculation.
All assembly vaults shall be backfilled with cement stabilized sand. Cement stabilized sand backfill shall extend a minimum of six inches (6") from the outside wall of all structures. (2 sacks of cement per ton of sand.)

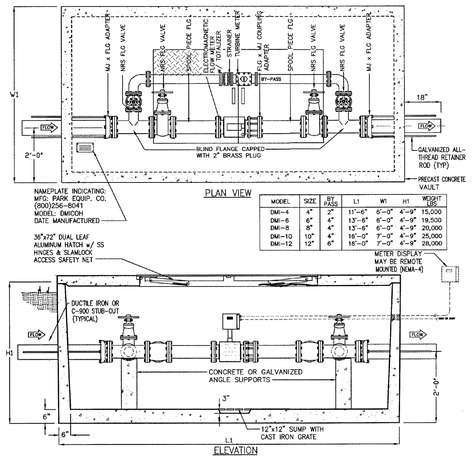
1. DOUBLE CHECK DETECTOR ASSEMBLY



4. RESIDENTIAL WATER METER AND SERVICE LINE



NOTES:
1. SINGLE WATER SERVICES ONLY.
2. USE 1" No. 9 EDOPURE BLUE POLYETHYLENE PIPE FROM CORPORATION STOP TO METER.
3. IN NEW DEVELOPMENTS, ALL RESIDENTIAL SERVICE LINES SHALL BE INSTALLED WITH INITIAL CONSTRUCTION AND SHALL BE MARKED WITH A 4"x4"x8'-0" TIMBER (PAINTED BLUE) AND EXTENDING TWO FEET (2') ABOVE FINISHED GRADE.
4. METER BOXES SHALL COMPLY WITH CITY OF NEEDVILLE REQUIREMENTS.
5. THE STANDARD RESIDENTIAL SERVICE LINE WILL BE ONE INCH, WITH A COMPRESSION (INLET) X F.I.P. (OUTLET) CURB STOP, IT MUST BE 360 DEGREE FULL PORT OPENING (REFERENCE MUELLER P-25172N). THE CURB STOP WILL BE SET IN THE BACK OF THE BOX TO ALLOW THE ENTIRE WATER METER TO FIT INSIDE.
6. WATER METER BOXES MUST NOT BE SET IN THE SIDEWALK PATH CENTERED BETWEEN THE SIDEWALK AND BACK OF CURB.
7. THE COMPRESSION CORPORATIONS FOR WATERLINE SERVICE SADDLES, WILL BE THE "CC" THREAD FOR ALL SIZES. THE PIPE FOR THE CORPORATION STOP WILL BE TAPPED ON A 45 DEGREE ANGLE.



MODEL	SIZE	BY PASS	L1	W1	H1	WEIGHT LBS.
EMI-4	4"	2"	11'-6"	6'-0"	4'-9"	15,000
EMI-6	6"	4"	13'-6"	6'-0"	4'-9"	19,500
EMI-8	8"	4"	13'-6"	6'-0"	4'-9"	20,000
EMI-10	10"	4"	16'-0"	7'-0"	4'-9"	25,000
EMI-12	12"	6"	16'-0"	7'-0"	4'-9"	25,000

Specifications

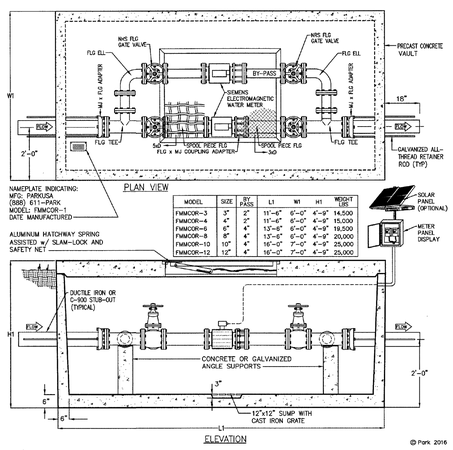
Concrete: Class II concrete with design strength of 4500 psi at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.

Reinforcement: Grade 60 reinforced. Steel rebar conforming to astm a615 on required centers or equal.

Hatchway: 1/4" aluminum diamond plate cover with extruded aluminum frame. Hatch to be furnished with 316 stainless steel snap lock & brass hinges.

Engineering data
The meter assembly shall be factory assembled in vault & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by the city. All assembly vaults shall be backfilled with cement stabilized sand. Cement stabilized sand backfill shall extend a minimum of six inches (6") from the outside wall of all structures. (2 sacks of cement per ton of sand.)

2. ELECTROMAGNETIC WATER METER WITH METERED BY-PASS



MODEL	SIZE	BY PASS	L1	W1	H1	WEIGHT LBS.
FMMCOR-3	3"	2"	11'-6"	6'-0"	4'-9"	14,500
FMMCOR-4	4"	2"	11'-6"	6'-0"	4'-9"	15,000
FMMCOR-6	6"	4"	13'-6"	6'-0"	4'-9"	19,500
FMMCOR-8	8"	4"	13'-6"	6'-0"	4'-9"	20,000
FMMCOR-10	10"	4"	16'-0"	7'-0"	4'-9"	25,000
FMMCOR-12	12"	4"	16'-0"	7'-0"	4'-9"	25,000

Specifications

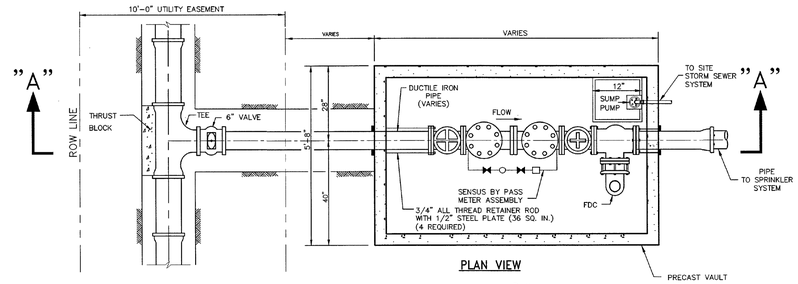
Concrete: Class I/II concrete with design strength of 4500 psi at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.

Reinforcement: Grade 60 reinforced. Steel rebar conforming to astm a615 on required centers or equal.

Hatchway: 1/4" aluminum (300 psf), diamond plate, with 1/4" extrudeed aluminum frame. Hatch to be furnished with 316 stainless steel snap lock & brass hinges.

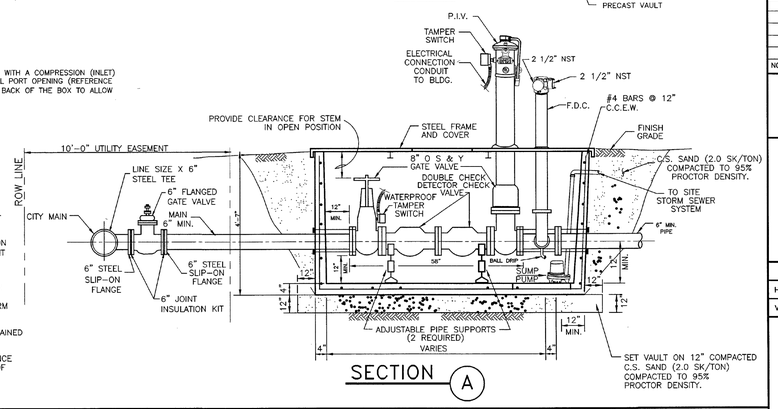
Engineering data
The meter assembly shall be factory assembled in vault & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by the city. All assembly vaults shall be backfilled with cement stabilized sand. Cement stabilized sand backfill shall extend a minimum of six inches (6") from the outside wall of all structures. (2 sacks of cement per ton of sand.)

3. FIRE/DOMESTIC WATER MAG METER ASSEMBLY 3" THRU 12"

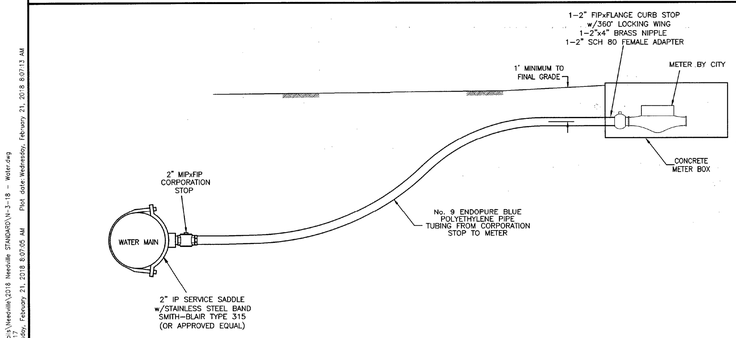


8. THE STANDARD RESIDENTIAL SERVICE LINE WILL BE ONE INCH, WITH A COMPRESSION (INLET) X F.I.P. (OUTLET) CURB STOP, IT MUST BE 360 DEGREE FULL PORT OPENING (REFERENCE MUELLER P-25172N). THE CURB STOP WILL BE SET IN THE BACK OF THE BOX TO ALLOW THE ENTIRE WATER METER TO FIT INSIDE.

NOTES:
1. FIRE HYDRANT REQUIRED WITHIN 50' LINEAR FEET OF THE FIRE DEPARTMENT CONNECTION.
2. FIRE VALVE MAY BE SUBSTITUTED FOR GATE VALVE ON THE CUSTOMER SIDE. SUPPLIED BY PARK EQUIPMENT COMPANY, OR APPROVED EQUAL.
3. ALL FIRE DEPARTMENT VAULTS SHALL BE EQUIPPED WITH A SUMP PUMP CAPABLE OF MAINTAINING WATER LEVELS BELOW THE CENTER LINE OF THE CHECK VALVES. OUTLET SHALL BE CONNECTED TO SITE STORM SEWER SYSTEM.
4. SUMP PUMP MAY BE ELIMINATED IF BOX CAN BE DRAINED VIA GRAVITY TO SITE STORM SEWER SYSTEM.
5. ALL COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13 "STANDARDS FOR THE INSTALLATION OF SPRINKLER SYSTEMS".
6. REFER TO GENERAL NOTES, WATER LINE AND STORM SEWER NOTES.



6. TYPICAL FIRE SERVICE METER



5. 2" WATER SERVICE CONNECTION

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS
WATER-2

SCALE		DESIGNED BY:	LLT
HORIZONTAL	1" = NTS	DRAWN BY:	TWB
VERTICAL	1" = NTS	CHECKED BY:	KRK
		DATE:	2/13/18
		JOB NO:	
		DWG. NO:	N-3-18
		Sheet:	

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WECS
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BARBARA JORDAN PARK
YOUTH CENTER
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NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS
Drawing Name

C8.08

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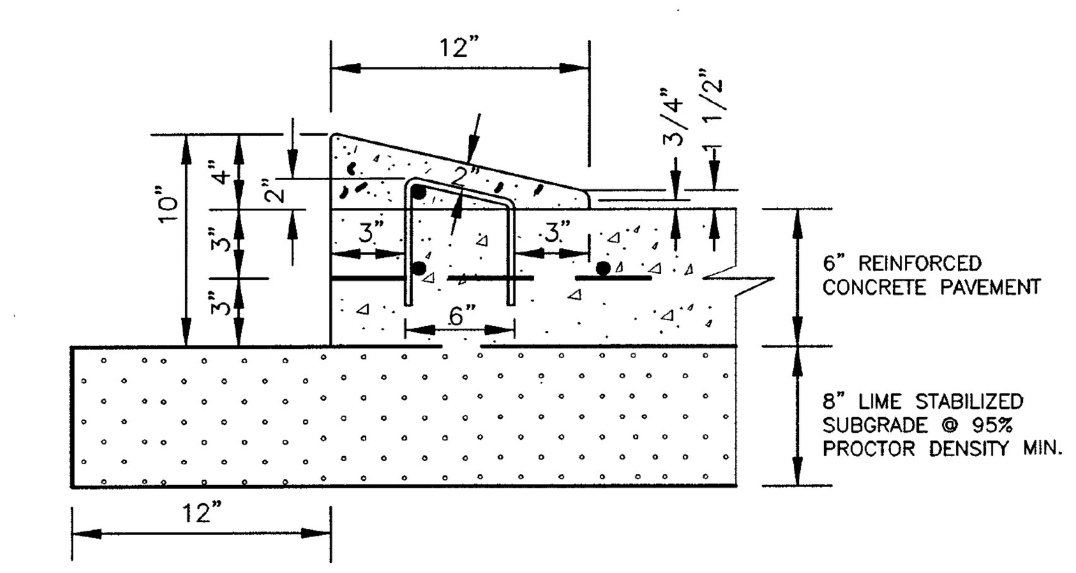
Layout: Tab1
Last Saved By: Wednesday, February 21, 2018 8:07:05 AM Plot date: Wednesday, February 21, 2018 8:07:13 AM



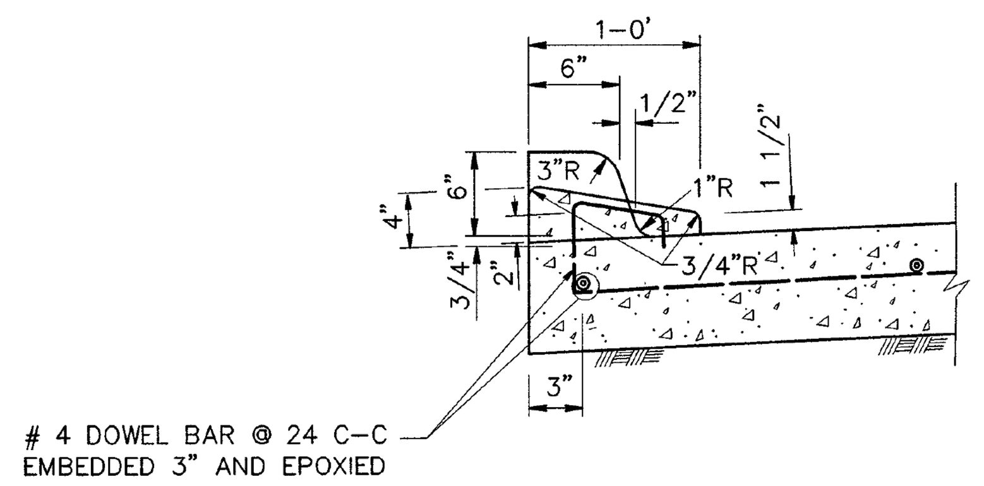
NOTES:
1.) #3 RE-BAR STIRRUPS TO BE PLACED AT INTERVALS OF 2' (FT) C-C.
2.) #4 RE-BAR LONGITUDINAL SHALL BE TIED TO EACH STIRRUP
3.) MOUNTABLE CURB ONLY ALLOWED ON ≤ 41' (FT), UNDIVIDED, RESIDENTIAL ROADWAYS WITHIN SUBDIVISIONS.

1. 4"X12" MOUNTABLE CONCRETE CURB

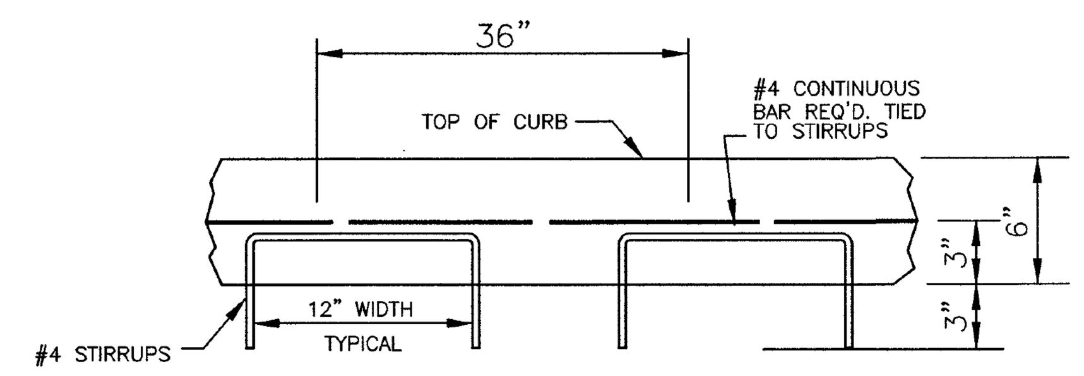
4"x12" MOUNTABLE CONCRETE CURB AND TRANSITION CURB NOTES:

1. 6-INCH CONCRETE CURB TO BE CONSTRUCTED ON ALL ESPLANADES, ISLANDS AND NON-RESIDENTIAL STREETS. RESIDENTIAL STREETS MAY BE CONSTRUCTED WITH EITHER 6-INCH CONCRETE CURB OR 4-INCH x 12-INCH CONCRETE CURB AS NOTED ON PLANS.
2. ALL 4-INCH x 12-INCH CONCRETE CURBS TO BE POURED SEPARATE FROM PROPOSED CONCRETE PAVEMENT.
3. TRANSITIONS FROM 6-INCH CONCRETE CURB TO 4-INCH x 12-INCH CONCRETE CURB TO BE ACCOMPLISHED WITHIN 5 FEET (TYP.), UNLESS OTHERWISE SHOWN. REINFORCING STEEL AS SHOWN IN "4-INCH x 12-INCH TRANSITION CURB" DETAIL IS TO BE INSTALLED.

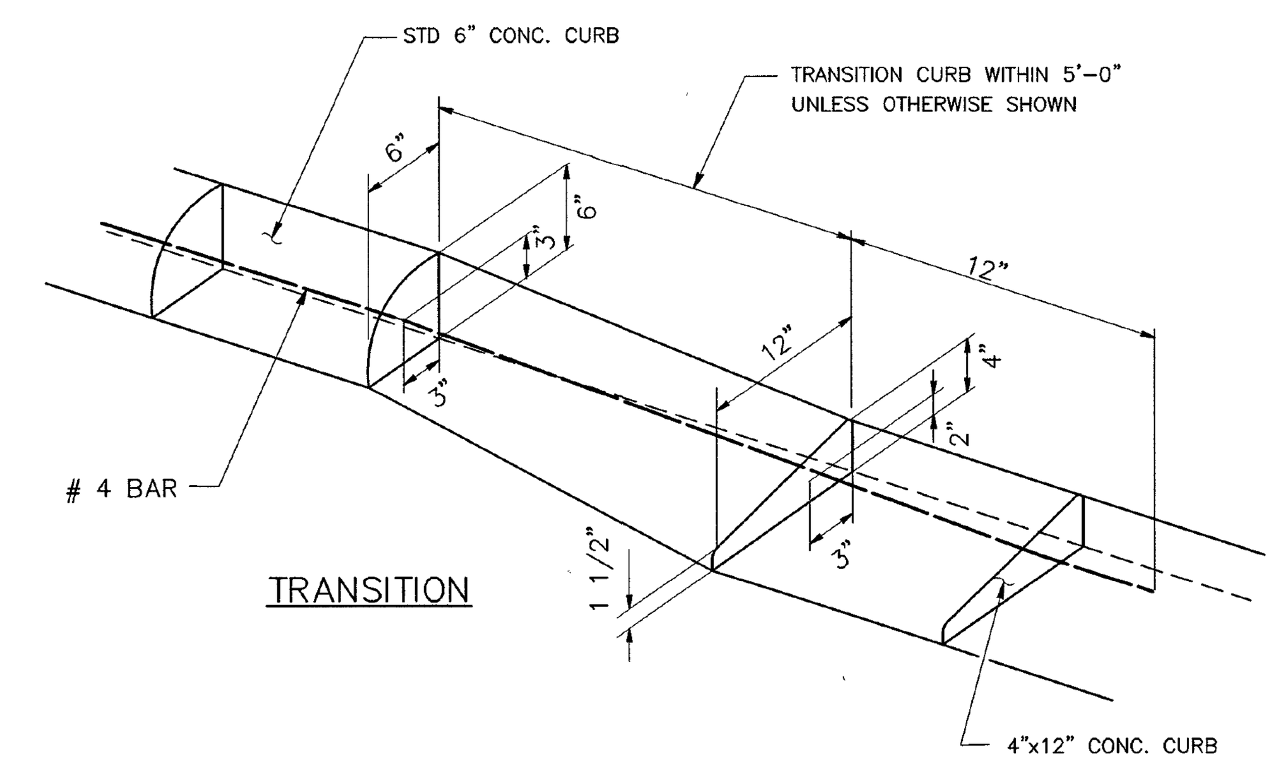
NOTES FOR DETAILS 1 & 2



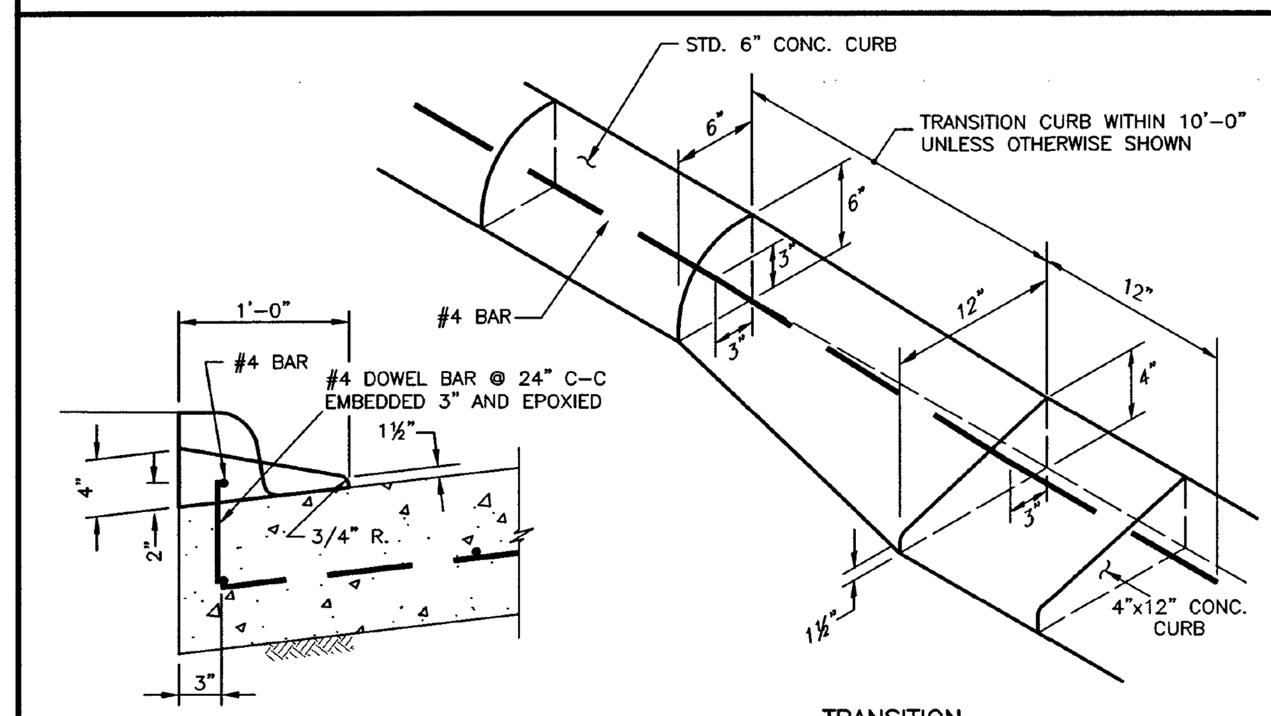
2. 4"X12" TRANSITION CURB

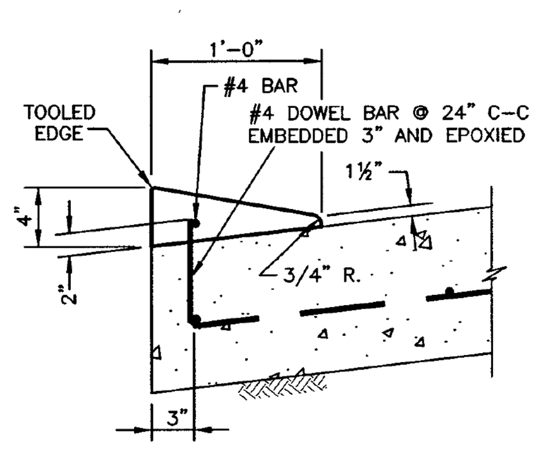


3. TYPICAL CONCRETE CURB REINFORCING



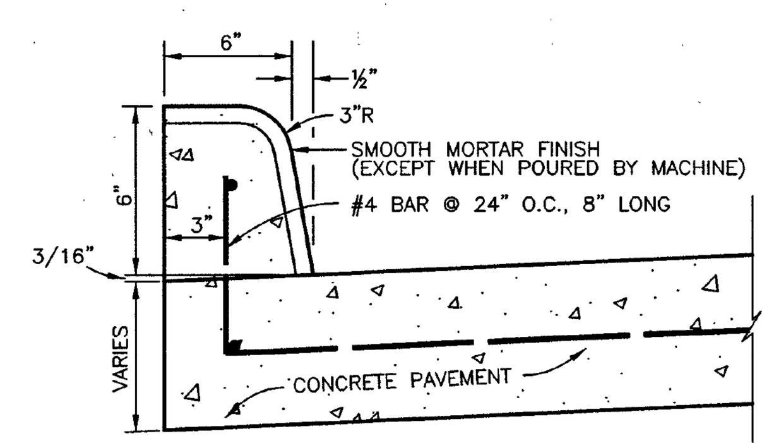
4. TYPICAL CURB TRANSITION





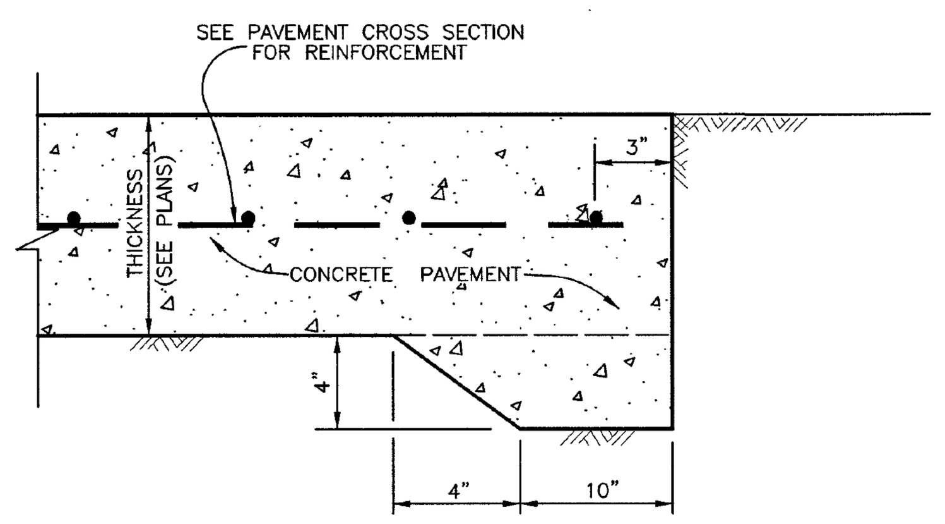
NOTES:
1. 6" CONCRETE CURB TO BE CONSTRUCTED ON ALL ESPLANADES, ISLANDS AND NON-RESIDENTIAL STREETS. RESIDENTIAL STREETS MAY BE CONSTRUCTED WITH EITHER 6" CONCRETE CURB OR 4"x12" CONCRETE CURB AS NOTED ON DRAWINGS.
2. ALL 4"x12" CONCRETE CURBS TO BE POURED SEPARATE FROM PROPOSED CONCRETE PAVEMENT.
3. TRANSITIONS FROM 6" CONCRETE CURB TO 4"x12" CONCRETE CURB TO BE ACCOMPLISHED WITHIN 10 FEET, UNLESS OTHERWISE SHOWN. IF THIS 10 FOOT TRANSITION CURB IS NOT POURED MONOLITHICALLY WITH THE PAVEMENT, THEN REINFORCING STEEL AS SHOWN ABOVE IN TYPICAL DETAIL 4"x12" TRANSITION CURB IS TO BE INSTALLED.
4. ADJUST PAVEMENT ELEVATION AND SLOPE TO ASSURE PROPER DRAINAGE THROUGH THE TRANSITION.

5. 4"X12" TRANSITION CURB

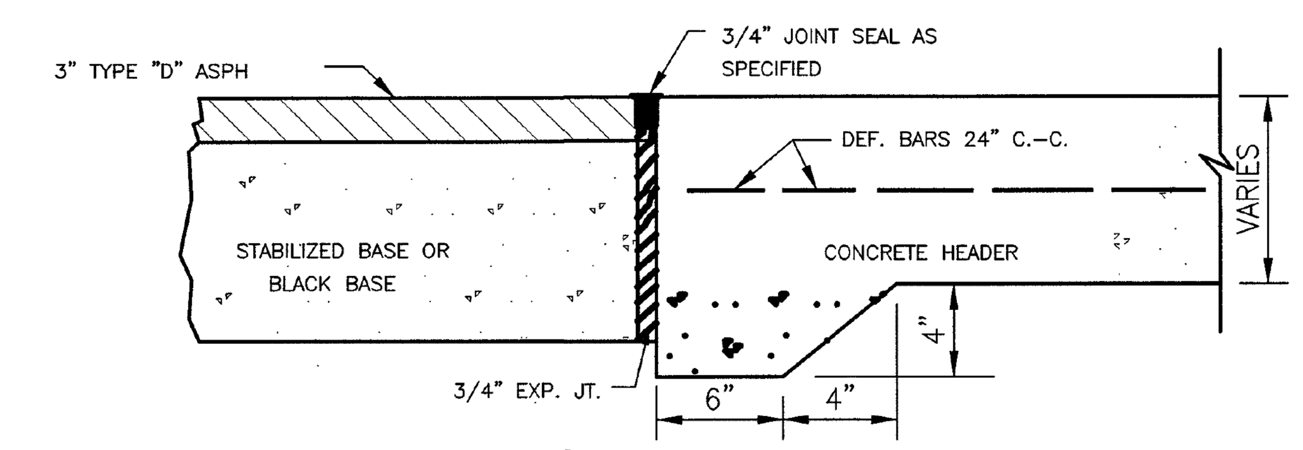


NOTES:
1. MORTAR FINISH NOT REQUIRED WHEN CURB IS POURED BY A MACHINE, BUT CURB SHALL HAVE THE SAME OUTSIDE DIMENSIONS.
2. WHEN CONCRETE CURB IS TO BE PLACED ON EXISTING CONCRETE BASE, USE #4 DEFORMED BARS, 8" LONG, 24" O.C., DOWELLED, AND SET IN QUICK SETTING CEMENT GROUT.
3. REDWOOD EXPANSION JOINTS SHALL BE INSTALLED AT ALL PAVEMENT EXPANSION JOINTS.

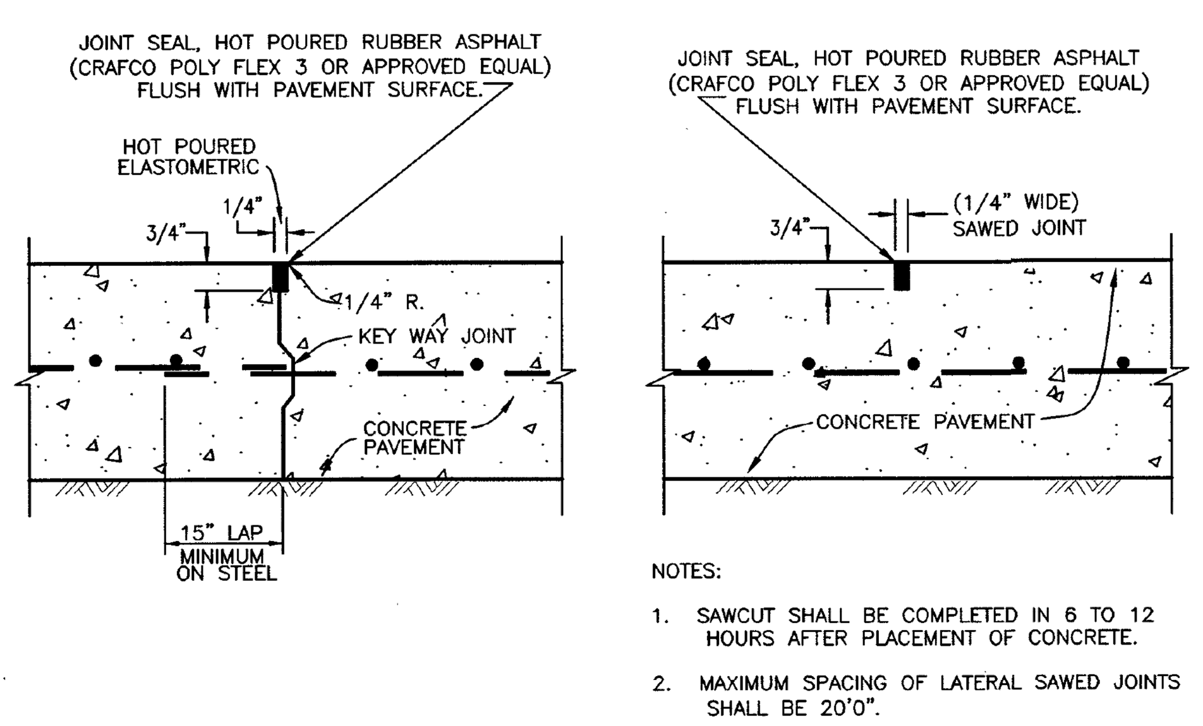
6. CONCRETE CURB



7. PAVEMENT HEADER



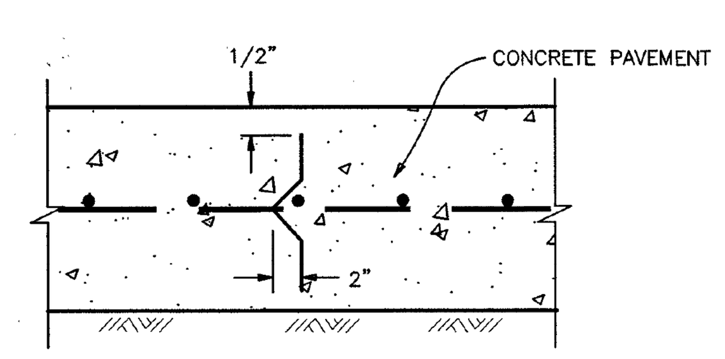
8. PAVEMENT HEADER FOR CONNECTING CONCRETE TO ASPHALT



NOTES:
1. SAWCUT SHALL BE COMPLETED IN 6 TO 12 HOURS AFTER PLACEMENT OF CONCRETE.
2. MAXIMUM SPACING OF LATERAL SAWED JOINTS SHALL BE 20'0".

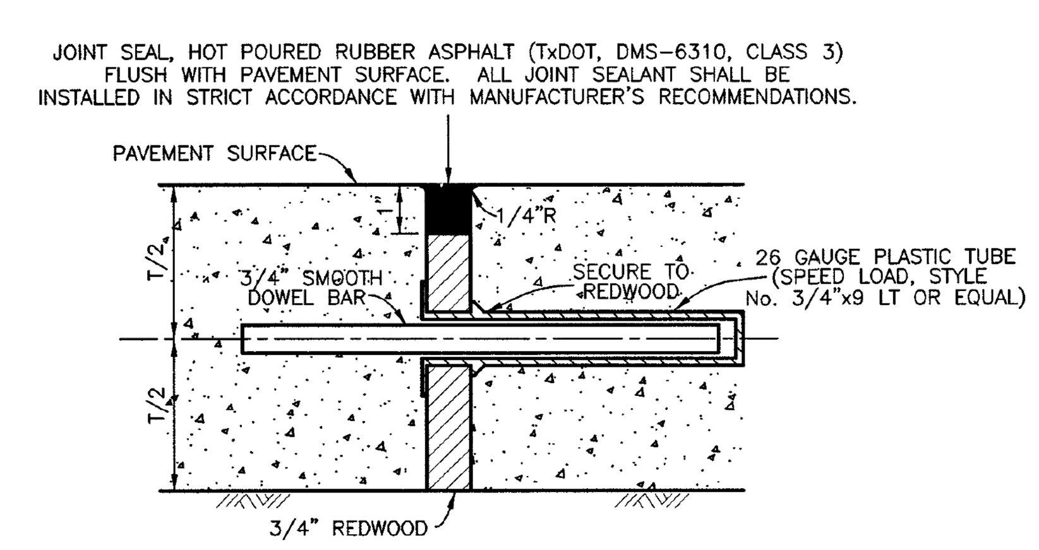
CONSTRUCTION — SAWED

9. PAVEMENT JOINTS



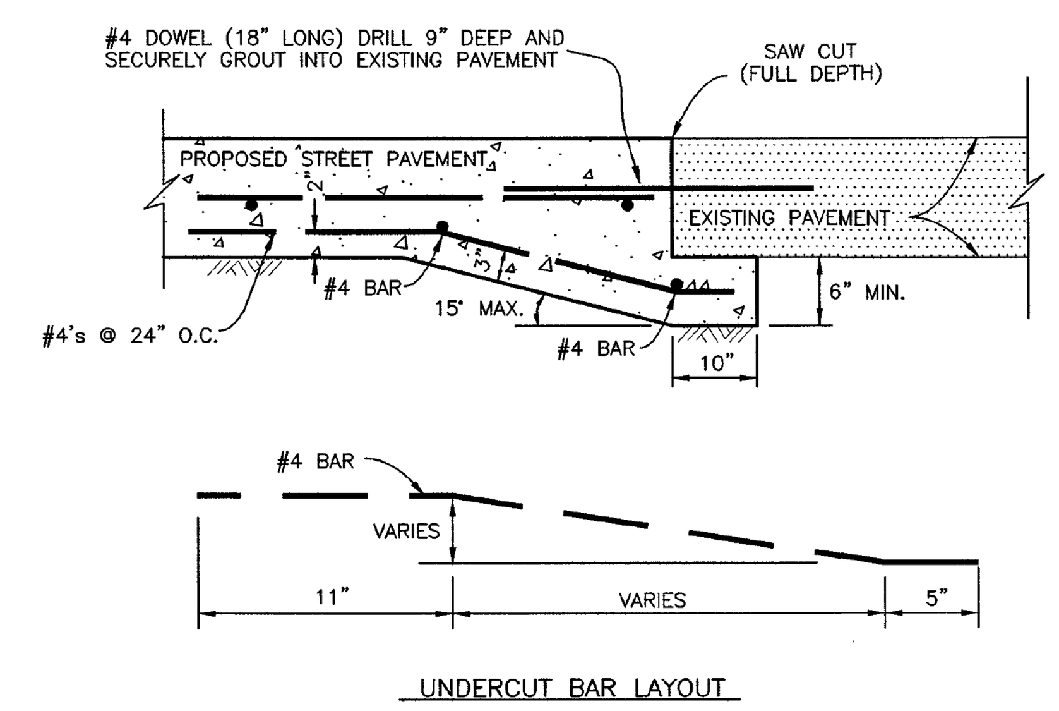
NOTES:
1. THE LOCATION OF DEFORMED STRIPS MAY BE VARIED, WITH THE APPROVAL OF THE CITY. MAXIMUM LONGITUDINAL SPACING FOR DEFORMED STRIPS SHALL BE 14'-0". DEFORMED METAL STRIPS SHALL BE PLACED VERTICALLY ALONG A STRAIGHT ALIGNMENT.

10. DEFORMED METAL STRIP



NOTES:
1. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED A MAXIMUM OF 60'-0" APART.
2. STAKES FOR TRANSVERSE JOINTS SHALL NOT BE PLACED CLOSER THAN 6" TO A LONGITUDINAL JOINT. THE TOP OF EACH STAKE SHALL NOT BE LESS THAN 2" BELOW THE FINISHED SURFACE.
3. DOWEL SHALL BE SECURED IN A HORIZONTAL ALIGNMENT PRIOR TO POURING CONCRETE.
4. INSTALL BACKER RODS (TxDOT, DMS-6310) IN ACCORDANCE WITH SEALANT MANUFACTURER'S RECOMMENDATIONS.
5. NO EXPANSION JOINT SHALL BE INSTALLED WITHIN TWO FEET (2') FROM AN INLET OPENING.

11. DOWEL TYPE EXPANSION JOINT



NOTES:
1. PAVEMENT UNDERCUT TO BE USED WHEN NO SUBGRADE STABILIZATION EXIST UNDER EXISTING PAVEMENT.

12. PAVEMENT UNDERCUT

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS
PAVING-1

SCALE		DESIGNED BY:	LLT
HORIZONTAL	1" = NTS	DRAWN BY:	TWB
VERTICAL	1" = NTS	CHECKED BY:	KRK
		DATE:	2/13/18
		JOB NO:	
		DWG. NO:	

N-9-18

Sheet:

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STATE OF TEXAS
GERALD PAUL WILSON
98053
LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

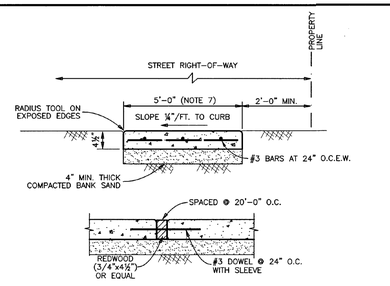
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

Drawing Name

C8.09

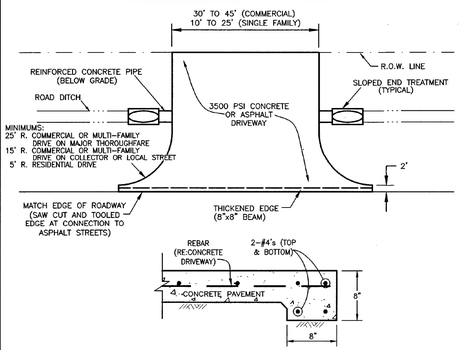


EXPANSION JOINT

NOTES:

1. CONCRETE SHALL CONTAIN A MINIMUM OF FIVE AND ONE HALF (5½) SACKS OF CEMENT PER CUBIC YARD OF CONCRETE, 3500 P.S.I. @ 28 DAYS.
2. TIE TO EXISTING STEEL IN CONNECTION TO EXISTING WALK.
3. FINISH CONCRETE IN ACCORDANCE WITH CITY REQUIREMENTS – LIGHT BROOM FINISH.
4. SCORED CONTRACTION JOINTS AT 4'–0" O.C. EXPANSION JOINT EVERY 20'–0" O.C.
5. MAXIMUM SLOPE ALONG LENGTH OF SIDEWALK AT ANY LOCATION IS 5%. MAXIMUM SLOPE ACROSS SIDEWALK AT ANY LOCATION IS 2%.
6. SIDEWALK THICKNESS AND REINFORCEMENT SHALL MATCH DRIVEWAY REQUIREMENTS WITHIN THE LIMITS OF A DRIVEWAY.
7. WIDTH MAY BE REDUCED TO 4'–0" IF A SIDEWALK PEDESTRIAN PLAN IS INCLUDED IN THE PLANS SHOWING 5'–0"x5'–0" PASSING AREAS AT A MAXIMUM SPACING OF 200 FEET.

1. CONCRETE SIDEWALK

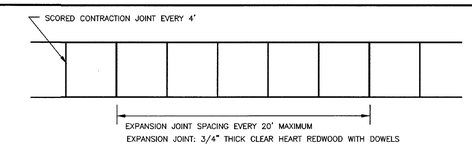


THICKENED EDGE (8'x8" BEAM)

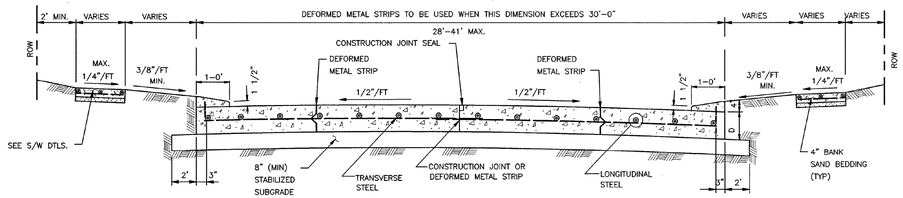
NOTES:

1. CULVERT DIAMETER SHALL BE A MINIMUM OF 15" (IN CITY ONLY) OR 24" (IN ETJ).
2. SLOPED END TREATMENTS SHALL BE INSTALLED ON ALL CULVERTS. SLOPED END TREATMENTS ON CULVERTS WITHIN COLLECTOR OR RESIDENTIAL STREET RIGHT-OF-WAYS SHALL HAVE A MINIMUM SLOPE OF 3 TO 1. SLOPED END TREATMENTS ON CULVERTS WITHIN MAJOR THOROUGHFARE RIGHT-OF-WAYS SHALL HAVE A MINIMUM SLOPE OF 6 TO 1.
3. USE C/S #1.

5. DRIVEWAY WITH OPEN DITCH

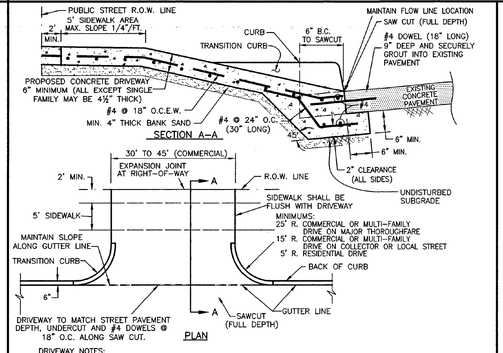


2. SIDEWALK JOINT DETAILS



* NOTE: SEE 4" x 12" MOUNTABLE CURB DETAIL

3. TYPICAL SINGLE ROADWAY SECTION FOR CONCRETE PAVEMENT WITH 4"X12" CURB

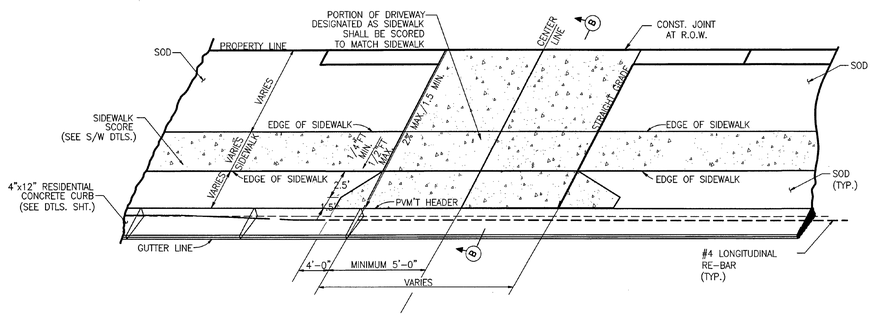


DRIVEWAY NOTES:

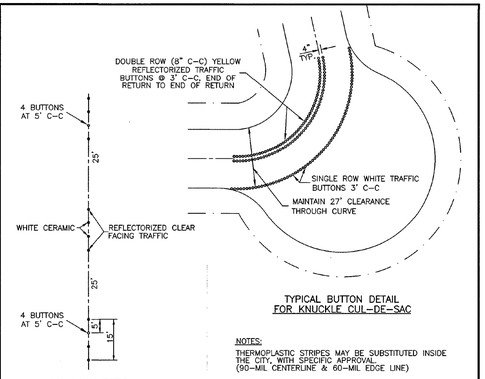
1. SAW CUT & BREAKOUT NO MORE THAN 48 HOURS PRIOR TO PROPOSED CONCRETE PLACEMENT.
2. UNACCEPTABLE SUBGRADE SHALL BE OVEREXCAVATED AND REPLACED WITH CONCRETE.
3. EDGE ALL SIDES WITH EDGING TOOL AND BROOM FINISH.
4. PROVIDE BARRICADES AND TRAFFIC WARNING DEVICES DURING CONSTRUCTION.
5. PORTLAND CEMENT CONCRETE CONTAIN A MINIMUM 5½ SACKS PER CUBIC YARD (3500 P.S.I. AT 28 DAYS).
6. REINFORCING SHALL BE ASTM A–615 GRADE WITH 10" MINIMUM OVERLAP AT JOINTS.
7. COMPACT SUBGRADE TO 95% OF STANDARD PROCTOR DENSITY (+/– 2% OF OPTIMUM MOISTURE).
8. EXTEND EXPANSION JOINT FROM STREET TO THE RIGHT–OF–WAY.

6. CONCRETE DRIVEWAY

7. 4"X12" CONCRETE CURB DRIVEWAY PLAN



4. TRAFFIC MARKINGS



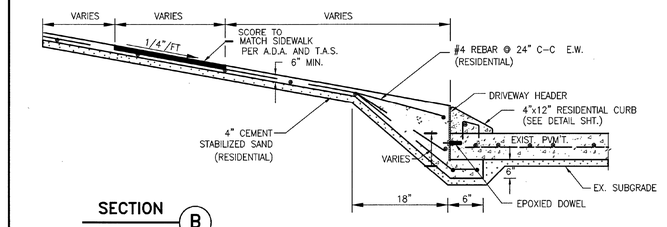
TYPICAL BUTTON DETAIL FOR KNUCKLE CUL–DE–SAC

NOTES:

THERMOPLASTIC STRIPES MAY BE SUBSTITUTED INSIDE THE CITY, WITH SPECIFIC APPROVAL. (90–MIL CENTERLINE & 60–MIL EDGE LINE)

LANE SEPARATION BUTTON DETAIL FOR SAME TRAFFIC DIRECTION

(WHITE BUTTONS) REQUIRED ON ALL BOULEVARDS



SECTION B

NO.	DATE	REVISIONS	APP.
1	6/01/17	Revise sidewalk locations	KRK

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS

PAVING–2

SCALE		DESIGNED BY: LLT
HORIZONTAL	1" = NTS	DRAWN BY: TWB
VERTICAL	1" = NTS	CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO:
		N–10–18
		Sheet:

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STATE OF TEXAS
GERALD PAUL WILSON
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LICENSED PROFESSIONAL ENGINEER
8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

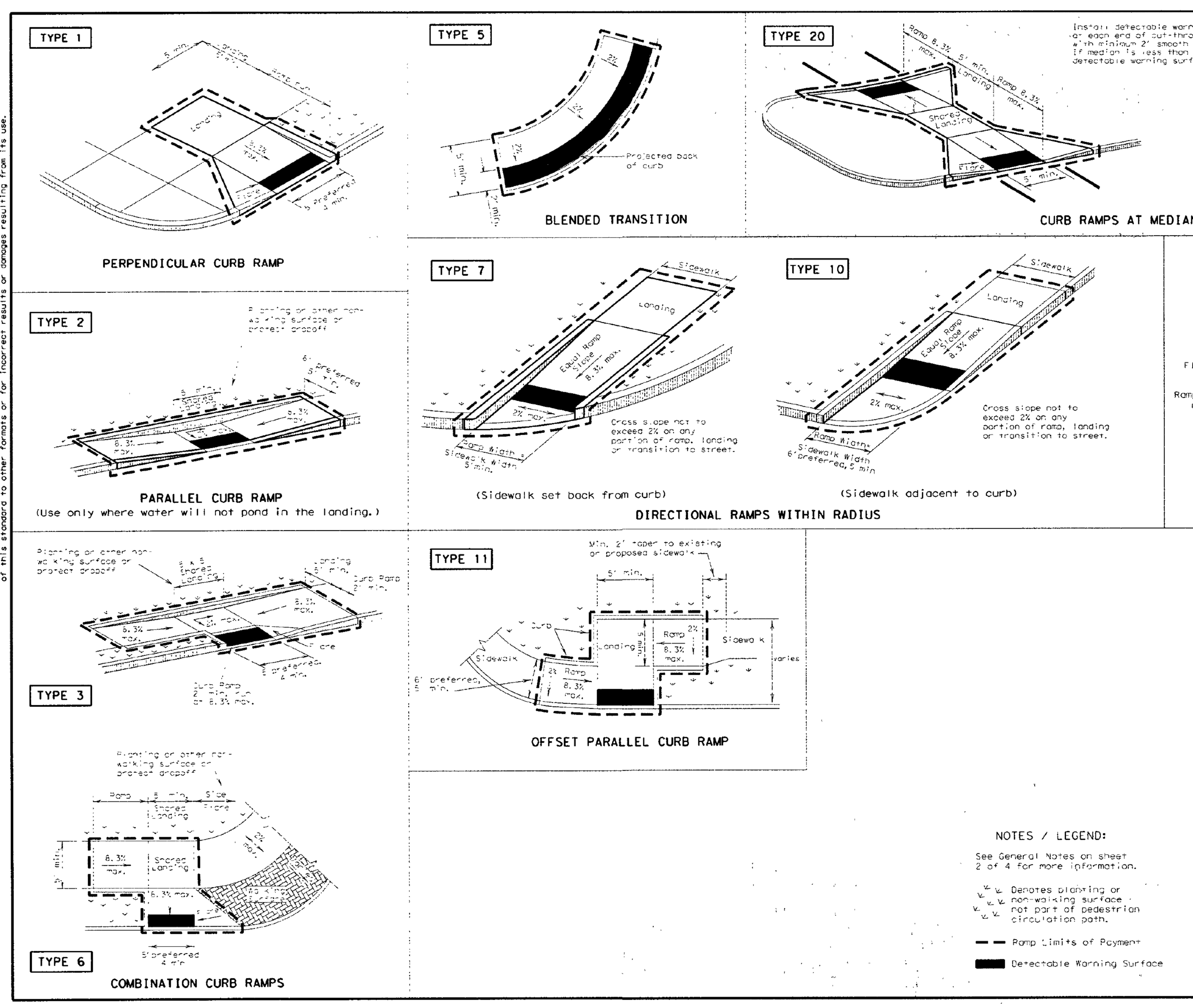
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

Drawing Name

C8.10



SHEET 1 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-12A

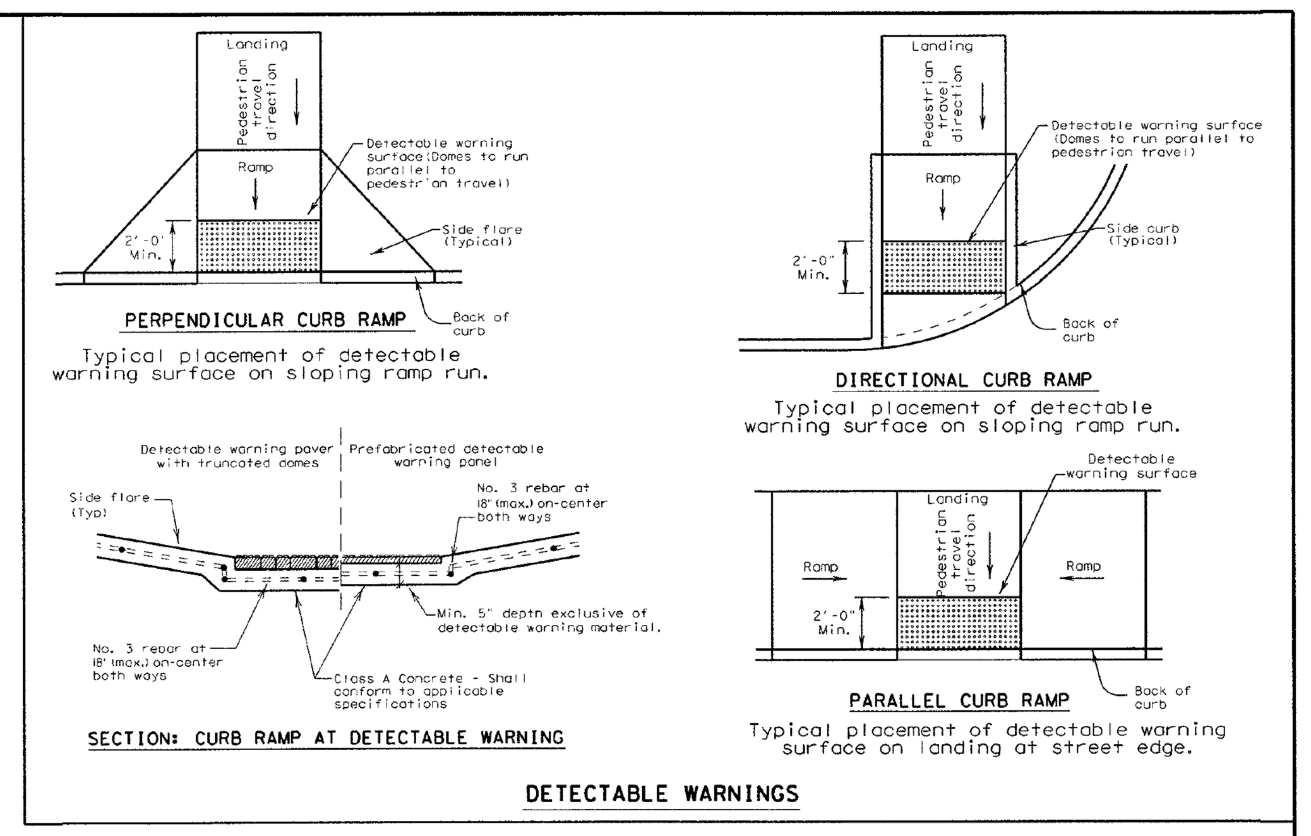
General Notes

Curb Ramps

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Lesser slopes that will still drain properly should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
4. Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC 68.102.
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Handrails are not required on curb ramps. Provide curb ramps wherever an accessible route crosses (penetrates) a curb.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Provide a smooth transition where the curb ramps connect to the street.
16. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
17. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.

Detectable Warning Material

18. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with Section 705 of the TAS. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
19. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
20. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
21. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
22. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb. Align the rows of domes to be perpendicular to the grade break between the ramp run and the street. Detectable warning surfaces may be curved along the corner radius.
23. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.



DETECTABLE WARNINGS

Detectable Warning Pavers

24. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
25. Lay full-size units first followed by closure units consisting of at least 25 percent of a full unit. Cut detectable warning paver units using a power saw.

Sidewalks

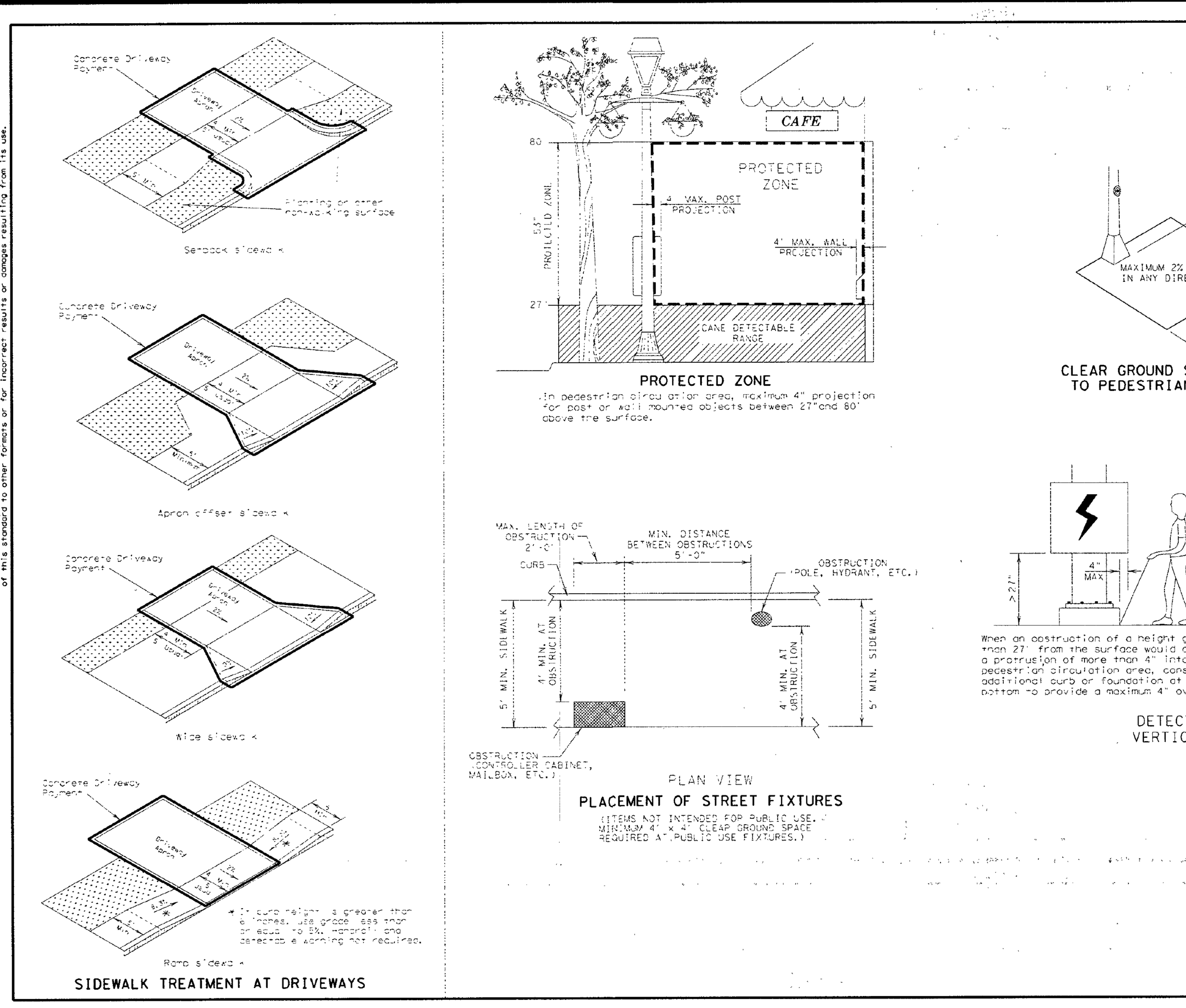
26. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within one or more reach ranges specified in TAS 308.
27. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
28. Street grades and cross slopes shall be as shown elsewhere in the plans.
29. Changes in level greater than 1/4 inch are not permitted.
30. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than 5% must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with TAS 505.
31. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
32. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
33. Sidewalk details are shown elsewhere in the plans.

SHEET 2 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-12A

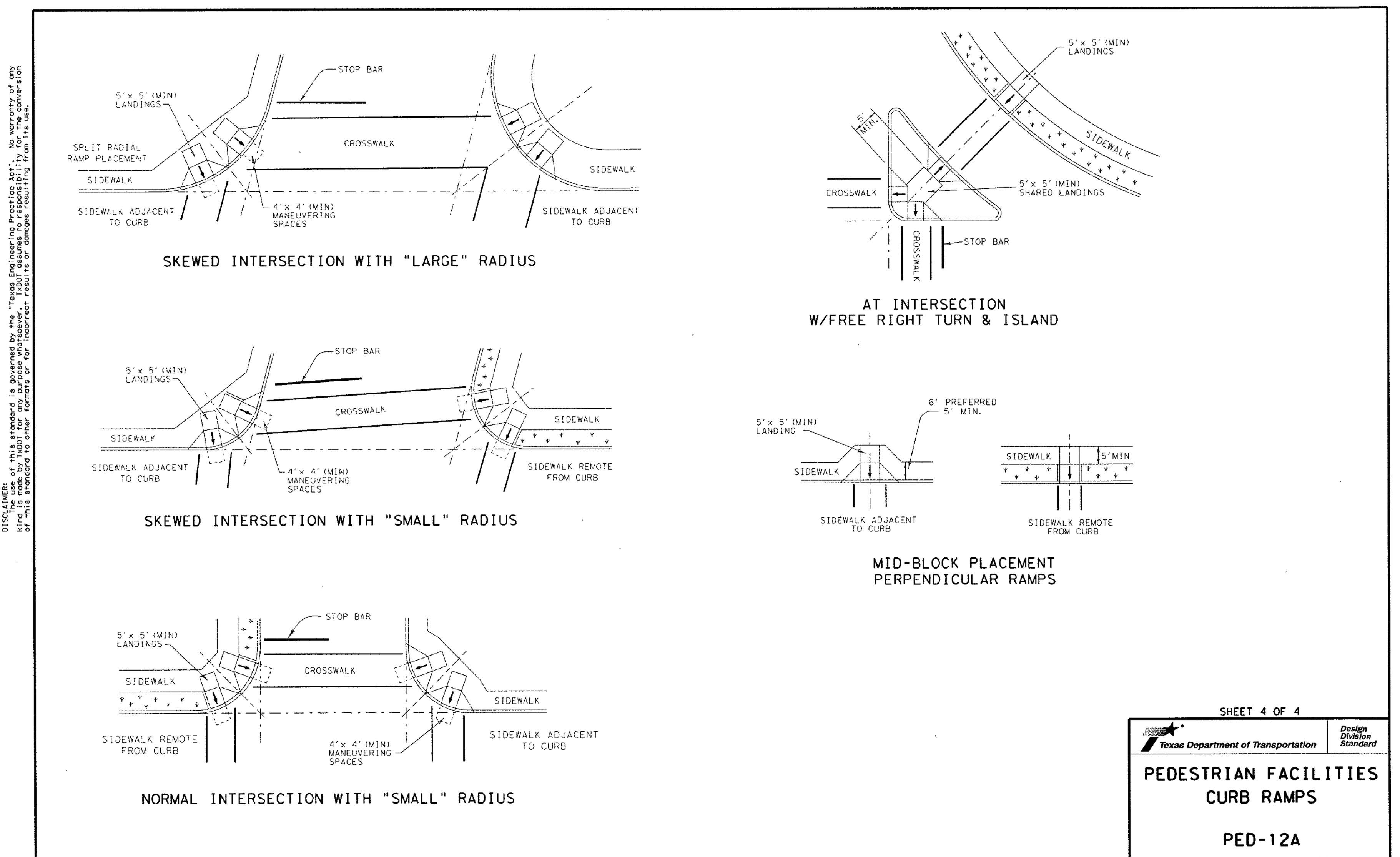


SHEET 3 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-12A



TYPICAL CROSSING LAYOUTS

SHEET 4 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-12A

NO.	DATE	REVISIONS	APP.

CITY OF NEEDVILLE
STANDARD CONSTRUCTION DETAILS
PAVING-4

SCALE		
HORIZONTAL	1" = NTS	DESIGNED BY: LLT
VERTICAL	1" = NTS	DRAWN BY: TWB
		CHECKED BY: KRK
		DATE: 2/13/18
		JOB NO:
		DWG. NO: N-12-18
		Sheet:

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NEEDVILLE, TEXAS 77461

8/19/2025

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023

CONSTRUCTION DETAILS

Drawing Name

C8.11

S T R U C T U R A L G E N E R A L N O T E S

I. COORDINATION

A. It is the responsibility of the General Contractor to obtain all Contract Documents and Addenda and to submit such documents to all subcontractors and material suppliers prior to the submittal of shop drawings, fabrication of any structural members, and construction.

B. Compatibility of the structure and provisions for building equipment supported on or from structural components shall be verified as to size, dimensions, clearances, accessibility, weights and reaction with the equipment for which the structure has been designed prior to submission of shop drawings and data for each piece of equipment and for structural components. Differences shall be noted on the submittals.

C. The details designated as "Typical Details" apply generally to the Drawings in all areas where conditions are similar to those described in the details.

D. Lateral-Force Resisting System: The ability of the structural frame to resist lateral load and provide stability under gravity loads derives from the complete installation of the lateral-force resisting systems and diaphragms described below. It shall be the Contractor's responsibility to provide all temporary bracing required to maintain the stability and safety of all elements during the construction process until all of these elements are completely installed and all designated concrete elements (if any) have reach a minimum of 75% of their design strength. The temporary supports shall not result in the over stress or damage of the elements to be braced nor any elements used as brace supports. The required structural elements are:

1. Lateral Load Resisting System
   a. Lateral-force Resisting System: Metal Building Rigid Frames that are attached to the structure in each direction.
   b. Diaphragm
      i. At the roof a Tle-Rod X-brace that is completely attached to all roof members according to specifications and that creates a continuous element linking the lateral-load resisting system to all other columns. This is component designed by pre-engineered metal building engineer.

E. The Contract Structural Drawings and Specifications represent the finished foundation, and expect where specifically shown, do not indicate the means or methods of construction. The Contractor and their Sub-Contractors shall supervise and direct the Work and shall be solely responsible for all construction means, methods, procedure, techniques, sequences and safety measures including, but not limited to, adherences to all OSHA guidelines. The Engineer shall not have control of, and shall not be responsible for, construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the Work, for the acts or omissions of the Contractor, Subcontractors, or any other person performing any of the Work, or for the failure of any of these persons to carry out the Work in accordance with the Contract Documents.

F. Where conflict exists among the various parts of the structural contract documents, structural drawings, Structural General Notes, and specifications, the strictest requirements, as indicated by the Engineer, shall govern.

G. Periodic site observation by field representative of Garza + McLain Structural Engineers, Inc. is solely for the purpose of determining if the Work is proceeding in accordance with the Structural Contract Documents. This limited site observation is not intended to be a check in an effort to inform the Owner against defects and deficiencies in the work of the Contractor.;

II. MAINTENANCE STATEMENT

A. All structures require maintenance to extend lifespan and to insure structural integrity from exposure to the environment. A planned program of maintenance shal be established by the building owner. This program shall include such items as but not limited to painting of structural steel, protective coating for concrete, sealants, caulked joints, expansion joints, control joints, spalls and cracks in concrete. Paving or finish grade shall be sloped away from building foundation such that water does not pond or stand against the foundation.

B. Site Drainage: it is recommended that the site drainage be well developed surface water should be directed away from the foundation soils. (Use a minimum slope of 5% within 10 feet of the foundation). No ponding of surface water shall be allowed near the structure during or after completion of the construction & the landscaping. The contractor shall advise the owner of the site drainage requirements. The Engineer is not liable for foundation issues if the site is not maintained.

III. CODES

A. The General Building Code used as the basis for the structural design is the International Building Code, 2015 Edition.

B. Structural Concrete: Building Code Requirements for Reinforced Concrete, American Concrete Institute, ACI 318.

C. Structural Steel: Manual of Steel Construction, American Institute of Steel Construction, Latest Edition.

D. Light Gauge Steel: Specification for the design of cold formed steel structural members, American Iron and Steel Institute, latest edition.

IV. SUBMITTALS

A. SHOP DRAWINGS SHALL BE PREPARED FOR ALL STRUCTURAL ITEMS AND SUBMITTED FOR REVIEW BY THE ENGINEER. CONTRACT DRAWINGS SHALL NOT BE REPRODUCED AND USED AS SHOP DRAWINGS. ALL ITEMS DEVIATING FROM DRAWINGS SHALL BE CLOUDED.

B. THE CONTRACTOR SHALL REVIEW SHOP DRAWINGS FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND SHALL CERTIFY THAT HE HAS DONE SO BY A STAMP NOTING THAT THE DRAWINGS HAVE BEEN "APPROVED" AND WHICH BEARS THE SIGNATURE (OR INITIALS) OF AN AUTHORIZED REPRESENTATIVE OF THE CONTRACTOR AND THE DATE. SUBMITTALS WHICH DO NOT REFLECT THE CONTRACTOR'S APPROVAL, SIGNATURE AND DATE WILL BE RETURNED WITHOUT REVIEW.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DELAYS CAUSED BY REJECTION OF INADEQUATE SHOP DRAWINGS.

D. WHERE REVIEW AND RETURN OF SHOP DRAWINGS IS REQUIRED OR REQUESTED, THE ENGINEER WILL REVIEW EACH SUBMITTAL AND, WHERE POSSIBLE, RETURN WITHIN TWO WEEKS OF RECEIPT.

E. CORRECTIONS OR COMMENTS ON SHOP DRAWINGS OR MANUFACTURER'S DATA SHEETS DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. THE ENGINEER'S REVIEW IS FOR GENERAL CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRECTING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION, AND COORDINATING HIS WORK WITH THAT OF ALL OTHER CONTRACTORS.

F. GENERAL CONTRACTOR SHALL SUBMIT ONE REPRODUCIBLE COPY AND THREE MAXIMUM BOND OR BLUE LINE COPIES. ENGINEER WILL REVIEW, COMMENT AND RETAIN ONE COPY OF EACH SUBMITTAL AND TRANSFER COMMENTS ONTO THE REMAINING BOND OR BLUE LINE COPIES AND REPRODUCIBLE FOR DISTRIBUTION TO ARCHITECT, OWNER, AND CONTRACTOR. ADDITIONAL COPIES SUBMITTED WILL NOT HAVE COMMENTS TRANSFERRED TO THEM. GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING AND DISTRIBUTING ENGINEERING COMMENTS TO THEIR SUBCONTRACTORS.

G. SUBMITTAL LIST AND SCHEDULE - THE GENERAL CONTRACTOR SHALL PREPARE A DETAILED LIST AND SHEDULE OF ALL SUBMITTAL ITEMS TO BE SENT TO THE STRUCTURAL ENGINEER PRIOR TO THE START OF CONSTRUCTION. THIS LIST SHALL BE UPDATED AND REVISED AND KEPT CURRENT AS THE JOB PROGRESSES THE SUBMITTAL LIST SHALL BE ORGANIZED AS SHOWN BELOW:

1. SHOP DRAWINGS
2. MANUFACTURERS LITERATURE FOR PRODUCTS, ASSEMBLIES AND HARDWARE.
3. PRODUCTS, ASSEMBLIES AND HARDWARE
4. PRODUCTS CERTIFICATIONS, MILL CERTIFICATES AND AFFIDAVITS

H. SHOP DRAWINGS

1. THE GENERAL CONTRACTOR SHALL SUBMIT FOR ENGINEER REVIEW SHOP DRAWINGS FOR THE FOLLOWING ITEMS:
   A. CONCRETE REINFORCING STEEL
   B. HORIZONTAL/VERTICAL PENETRATIONS IN GRADE BEAMS
   C. STRUCTURAL STEEL
   D. CONCRETE MIX DESIGNS (30 TESTS)
   E. PRE-ENG MTL BLDG (*,#)
   F. PRE-ENG MTL BLDG REACTIONS (*,#)
   G. METAL ROOF DECK SPAN TABLES
   H. EXTERIOR WALL PANELS SPAN TABLES
   I. VAPOR RETARDER AND TAPE
   J. CURING COMPOUND
   K. STOREFRONT WIND PRESSURES (SEALED BY TEXAS P.E.)

ITEMS MARKED (*) SHALL HAVE DRAWINGS SEALED BY A REGISTERED ENGINEER IN THE STATE WHERE THE PROJECT IS OCATED, ITEMS MARKED (#) SHALL BE SUBMITTED TO ENGINEER FOR OWNER'S RECORD ONLY AND WILL NOT HAVE THE ENGINEER'S SHOP DRAWINGS STAMP AFFIXED.

I. THE OMISSION FROM THE SHOP DRAWINGS OF ANY MATERIAL REQUIRED BY THE CONTRACT DOCUMENTS TO BE FURNISHED SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPOSIBILITY OF FURNISHING AND INSTALLING SUCH MATERIALS, REGARDLESS OF WHETHER THE SHOP DRAWINGS HAVE BEEN REVIEWED AND APPROVED.

J. MANUFACTURERS LITERATURE - SUBMIT TWO COPIES OF MANUFACTURER'S LITERATURE FOR ALL MATERIALS AND PRODUCTS USED IN THE CONSTRUCTION OF THE PROJECT.

K. REPRODUCTION - THE USED OF REPRODUCTIONS OF THESE CONTRACT DOCUMENTS BY AN CONTRACTOR, ERECTOR, FABRICATOR, OR MATERIAL SUPPLIER IN LIEU OF PREPARATION OF SHOP DRAWINGS SIGNIFIES HIS ACCEPANCE OF ALL INFORMATION SHOWN HEREON AS CORRECT, AND OBLIGATES HIMSELF TO ANY JOB EXPENSE, REAL OR IMPLIED, ARISING DUE TO ANY ERRORS THAT MAY OCCUR HEREON.

L. LETTERS -

1. PRE-ENGINEERED METAL BUILDING SUPPLIERS TO PROVIDE A LETTER STATING THAT PRE-ENGINEERED METAL BUILDING HAS BEEN INSTALLED PER THE SHOP AND ERECTION DRAWINGS WITHOUT DEVIATION.
2. LETTER FROM THE G.C. STATING ALL STRUCTURAL ELEMENTS WERE INSTALLED PER THE CONTRACT DOCUMENTS WITHOUT DEVIATIONS.

V. TESTING LABORATORY SERVICES

A. Work specified herein shall be performed by aqualified independent Testing Laboratory, selected and paid by the Owner The Contractor shall be responsible for notifying the Independent Testing Laboratory at least 24 hours of advance of materials that require testing. The contractor shall pay for all retests of materials not meeting the requirements in the Contract Documents. Reports of each Test shall be prepared by the Independent Testing Laboratory and submitted promptly to the Owner, Contractor, Architect, and Engineer. Items found not to comply with the Construction Documents shall be brought to the immediate attention of the Contractor and Architect/ Engineer for resolution.

1. Drilled Footing operation: Make continuouse inspections to determine that the proper bearing stratum is obtained and utlized for bearing, that the bells are the correct size and shafts are clean and dry before pouring concrete. Provide reports of all pertinent data as shown in ACI 336, submit drilled footing logs to Engineer.

2. Filling and Backfilling operation:

   i. Analyze backfill samples delivered by the contractor to determine compliance with graduation and quality requirements of the geotechnical report.
   ii. Make in place compaction tests for moisture content, moisture density relationship, and density of materials in place. Perform test once for each lift. Perform one test for each 2000 square feet of area per lift.

3. Concrete inspection and testing:

   i. Secure composite samples of concrete at the jobsite in accordance with ASTM C172.
   ii. Mold and cure four specimens from each sample in accordance with ASTM C31. Test specimens in accordance with ASTM C39 for each pour for concrete.
   iii. Test one cylinder @ 7 days, 2 @ 28 days, and hold one for 56 days (test only if 28 day strength is low.)
   iv. Make one slump test for each set of cylinders following the procedural requirements of ASTM C143 and C172.
   v. Determine total air content of air entrained concrete in accordance with ASTM C231. Perform one test for each strength test.

4. Concrete Reinforcement: Inspect all concrete reinforcing steel and embedded metal assemblies prior to placement of concrete for compliance with Contract Documents and shop drawings. All instances of non-compliance shall be immediately brought to the attention of the contractor for correction, and if uncorrected, reported to the engineer. Verify Reinforcing size, Stirrup Spacing, and Clear cover.

5. Structural steel: visual Inspection all connections, all high strength bolts are tightened roof pane connections, wall panel connections, and visual inspection of all members.

VI. BUILDING PAD PREPARATION

A. The building pad preparation shall follow the recommendations provided in the project Geotechnical Report by Aviles Engineering Corporation Report No. G118-23 to reduce PVR to 1" or less, no expections.

B. After the building pad has been prepared, provide a vapor retarder that conforms to ASTM E1745. Class A or better with a maximum water vapor permeance of 0.1 perms per ASTM E96. Vapor retarder shall be no less than 10 mils thick.

VII. DRILLED UNDER-REAMED FOOTINGS

Foundation design is based on estimated reactions by G+M; PEMB reactions are required prior to drilling footings to verify foundation sizes.

A. Footing design is based on the following design criteria:
   a. Allowable End Bearing: 4,000 psf Sustained 6,000 per Total

B. Footing design is in accordance with the recommendations in the following geotechical report:
   a. Geotechical engineer: Aviles Engineering Corporation
   b. Date of report: September 2023
   c. Project No. G118-23

C. Bearing stratum to be 8'-0" below existing grade.

D. Footings not specifically loacted on the plan shall be located on centerline of column above. Where no column occurs, locate on centerline of wall or beam.

E. Provide dowels from shaft into concrete above using same bar size and number as shown for pilaster above. Where no pilaster occurs, use dowels of same size and number as pier reinforcing steel. Extend dowels 36 bar diameters into pier and beam, wall, pilaster or column u.n.o.

F. Elevation of top of shaft, unless noted otherwise as the drawings is at the bottom o fthe deepest intersecting beam or wall supported by the pier.

G. Reinforcing cage shall be held securely away from earth at sides and bottom by sets of 3 spacers at a maximum spacing of 8-ft. along the length of the cage and 1'-0" from the bottom.

H. Shaft reinforcing and concrete shall be placed immediately after drilling operations are complete; in no case shall a Footing be drilled that cannot be poured by the end of the workday.

I. See plans for Shaft and Under-ream sizes, reinforcing and depth.

J. The contractor shall verify depths of Footings before Shaft steel is cut. Shaft steel may be delivered to the jobsite in standard lengths and cut as required. Provide 64 bar diameter laps in all vertical Shaft reinforcing.

K. Reinforcing steel shop drawings shall include placing drawings for templates to set dowels in Shaft.

L. Top of Shaft shall be of the specified diameter. Form top of Shaft if required to maintain the specified diameter. Any concrete extending beyond the specified diameter shall be removed.

M. Temporary steel casing may be required during Shaft drilling operations. Prior to the placement of concrete, any seepage water shall be removed from the Shaft holes. Special construction procedures in accordance with ACI 336.1-89 and ACI 336.3R-89 and specifications shall be followed during extraction of the casing and during concrete placement.

N. Contractor shall include in bid documents, unit-coats for casing if required and unit-coat for greater and lesser depth of drilling for each Shaft size.

O. All Shafts shall be inspected by a qualified Geotechnical representative in order to ensure that the proposed bearing material has been reached in accordance with the recommendations given in the geotechnical report.

P. The Testing Laboratory shall make and maintain accurate records of the drilled shaft depths, bearing stratum, depth of penetration into bearing stratum, diameter and location (including off center eccentricities), and shall submit this information to the Engineer.

VIII. CAST IN PLACE CONCRETE

A. CLASSED OF CONCRETE
All concrete shall conform to the requirements as specified in the table below unless noted otherwise on the drawings:

Concrete Mix Schedule:

Conc. Class	Strength psi	Agg. Type	Agg. Size	Slump Inches	Max w/c	Notes
A	3000	NWT	1 1/2"	5-7	-----	-----
B	3500	NWT	1 1/2"	5-7	-----	-----

a) "NWT" refers to normal concrete having air dry unit weight of approximately 145 PCF (ASTM 33 aggregate).
b) Where w/c ratio is not indicated in the Concrete Mix Schedule, it shall be as necessary to meet strength requirements.
c) Where the w/c ratio is shown, it shall be adhered to regardless of strength requirements.
d) Where the w/c ratio is shown, it shall be adhered to regardless of strength requirements.
e) "Strength" is required compressive cylinder strength at an age of 28 days.
f) min cment content shall be 5 sack for 3000 psi.

Mix Usage Shedule:

Description of Use	Concrete Class	Air Content
Footings	A	----------
Grade Bms/Slab-on-fill	B	

B. Provide 4 percent plus or minus 1 1/2 percent of entrained air in concrete permanently exposed to the weather and elsewhere at the contractors option. Except for Slab-on-fill.

C. Horizontal construction joints in concrete pours shall be permitted only where indicated on the drawings. All vertical construction joints shall be made in the center of spans in accordance with the typical details. Contractor shall submit proposed locations for construction joints not shown on drawings for review by the Architect and Structural Engineer. Additional construction joints may require additional reinforcing as specified by the Engineer which shall be provided by the contractor at no additional cost to the owner.

D. Embedded conduits, pipes, and sleeves shall meet the requirements of ACI 318-95, Section 6.3, including the following:

1. No conduits or pipes embedded within the slab-on-fill.

IX. SLAB ON FILL

A. Provide control joints or construction joints at the centerlines of all columns or as shown on the drawings.

B. Tooled or sawcut jointws shall be 1/4 the depth of the slab. Sawcut joints shall be made using a "Saf-Cut" brand concrete saw within 4 hours after the completion of the finishing operation.

C. Metal keyway forms or bulkheads shall be removed prior to placement of adjacent pours.

D. Tool edges of concrete at all construction joints.

X. CONCRETE REINFORCING

A. Concrete reinforcement for the project shall conform to the following:

1. All Reinforcing Steel shall be ASTM A615, Grade 60 unles noted otherwise in the drawings or these notes.
2. Welded Reinforcing Steel. Provide reinforcing steel conforming to ASTM A708.
3. Deformed Bar Anchors. ASTM A496 minimum yield strength 70,000 PSI as note4d on the drawings. Reinforcing bars shall not be substituted for deformed bar anchors.
4. Welded wire reinforcement. Welded smooth wire reinforcement. ASTM A185, yield strength 65,000 PSI where noted on the drawings. Welded wire reinforcement to be provided in flat sheets.

B. Detailing of reinforcing steel sahll conform to the American Concrete Institute 315 Detailing Manual and all hooks and bends in reinforcing bars shall conform to ACI detailing standards unless shown otherwise.

C. Placement of Welded Wire Reinforcement:
Wherever welded wire reinforcement is specified as reinforcement, it shall be continuous across the entire concrete surface and not interrupted by beams or girders and properly lapped one cross wire spacing plus 2".

D. Reinforcement in Housekeeping Pads:
Provide welded smooth wire reinforcement 6X6-W2.9xW2.9 minimum in all housekeeping pads supporting mechanical equipment whether shown on the drawings or not unless heavier reinforcement is callled for on the drawings.

E. In unscheduled grade beams, walls, and slabs, detail reinforcing as follows:

1. Class B Lap beam top reinforcing bar at mid span.
2. Class B Lap bem bottom reinforcing bars at the supports.
3. Provide Class B lap at other location pending Engineer's approval.
4. Provide standard hooks in top and bottom bars at cantilever and discontinuous ends of beams, walls and slabs.
5. Provide corner bars for all face bars at the inside and outside faces of intersecting beams or walls. Corner bars are not required top and bottom bars that are hooked.
6. Provide 2=#4 diagonal barws at all slab re-entrant corners placed under the top mat of steel.

F. Welding of reinforcing steel will not be permitted unless specifically shown on drawings.

G. Heat shall not be used in the fabrication or installation of reinforcement.

H. Reinforcing steel clear cover shall be as follows:

1. Drilled Shafts	3"
2. Earth-formed Grade Bms	2" top, 3" sides, 3" bottom
3. Slab-on-fill	2"

XI. ALLOWANCES

A. Concrete Reinforcement G.C. shall carry a one ton allowance for fabricating delivering and Installing one ton or Reinforcement as Directed-by-Engineer in Field.

B. Concrete G.C. shall carry an allowance for the placement of 50 cubic yards of concrete.

XII. DESIGN LOADS

A. Dead Loads include the self weight of the structural elements and the following superimposed loads:

1. Ceiling and Mechanical	6 psf
2. Roofing and insulation	4 psf

B. Live Loads

OCCUPANCY OR USE	UNIFORM -(psf)	CONCENTRATED (lbs.)
1. Level 1 Floor	100	
2. Roof (unreduced)	20	N/A

C. Wind Load Class Room
Wind lateral load on structural frame is based on ASCE 7-10 using ultimate wind speed as fellows:

1. Basic Wind Speed (3 sec, ult)	138 mph
2. Exposure	C

a. Gross WInd Pressures on Wall Components and Cladding are as follows:

Wall Area	10 ft² Trib Area	100 ft² Trib Area
	-41.7	-40.3
	-51.3	-37.1

b. Refer to ASCE 7 for the definition of "a".

D. Handrails and Guardrails: Handrails and guardrails shall be designed for 50 pound/ft applied horizontally at right angles to the top rail as well a a 200 pound concentrated load applied in any direction at any point along the top rail. The railing shall have attachment devices to adequately anchor to the supporting structure. Intermediate rails (all except handrail), balusters, and panel fillers shall be designed to with stand a horizontally applied normal load of 50 lbs on an area not to exceed one square foot, including openings and space in between rails.

E. Texa Architectural Barrier Act Standard. The structural strength of grab bars, tub and shower seatsw, fasteners, and mounting devices shall meet the following specifications:

1. Bending stress in a grab bar or seat induced by the maximum bending moment from the application of 250 lbf shall be less than the allowable stress for the material of the grab bar or seat.
2. Shear stress than induced in a grab bar or seat by the application of 250 lbf shall be less than the allowable shear stress for the material of the grab bar or seat. If the connection between the grab bar or seat and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress.
3. Shear force induced in a fastener or mounting device from the application of 250 lbf shall be less than the allowable lateral load of either the fastener or the mounting Device or the supporting structure, whichever is the smaller allowable load.
4. Tensile force induced by a fastener by a direct tension force of 250 lbf plus the maximu moment from the application of 250 lbf shall be less than the allowable withdrawal load between the fasstener and the supporting structure.
5. Grab bars shall not rotate within their fittings.

XIII. PRE-ENGINEERED METAL BUILDING

A. Codes and Standards:
   a. Buiding Code, See Codes Section of these Structural General Notes.
   b. AISC Manual of Steel Construction (14th Edition).
   c. AISI Design of Cold Formed Steel Structural Members.

B. The Entire Building Structure is included and covers Rigid Moment Frames, Portal Moment Frames, Longitudinal Bracing, End Wall Post and Beams, Interior Columns, Host girders and supports, Roof Purlins, Roof Deck Panels and Horizontal cross bracing in plane of roof as well as Anchor bottt diameter. Interior Mezzanine, Baseplates, connections, and Spandrel Beams.

C. Design the Pre-Engineered Metal Building Structure to the following Criteria:
   a. Vertical Dead Load for Roof (Not Including Self Weight of Rigid Frames, Purlins and Metal Roof) minimum 10 psf in class rooms. Review MEP drawings for piping, mechanical units, and sprinklers pipe runs.
   b. Vertical Live Load (Reducible for Tributary Areas) 20 psf.
   c. Lateral Wind Load per Building Code. Design wind Speed shall be 131 MPH Minimum Exposure.
   d. Purlins to be designed for upward and downward wind pressure. Provide calculations showing purlin design for positive and negative wind pressure in combination per ASCE7.

D. Metal Roofing Panels:
   a. Design of Primary and Secondary Structural Members and exterior covering material is to bein accordance with the Metal Building Manufacturer's Association (MBMA) "Low Rise Building systems manual" as applicable and AISI "Specification of design of Cold Formed Steel Structural Members" as Applicable.
   b. Design Panels to Support Both Vertical Downward Loads and Uplift Load duw to Wind Forces.
   c. Deck Panel Design Calculations must show the Shape, Dimensions, Section Properties and Yield Stress of the particular Decking being used.
   d. Roof system must carry U.L. Wind Uplift Class 90 Rating and Roof Assembly to carry a Factory Mutual Class I-60, Publication I-28 Rating to ensure Structural Integrity.
   e. Panels to be Material, Type, and Finish as Noted.
   f. Panel Ends and Edges to be Lapped and Fastened Together.
   g. Panel to be Properly Positioned and Aligned.
   h. Panel-to-Structural Members and Panel-to-Panel Fasteners must be made with a positive connection at each Purlin and each side Lap. Provide Fasteners which a Capacity to resist the Appropriate Tributary Uplift Force and are of a Type which Permits Thermal Movement (Expansion and Contraction) to take place without Detrimental Effect to the Roof Panel and Structure.
   i. Openings Through Roof Panels must be Structurally Analyzed. Headers and Purlins of Proper Size and Strength to Support Tributary Vertical Loads to be Provided.

E. All Columns Base Plate Must be set for Full Contact bearing.

F. All bases for the Columns to be "Pinned" and not Assumed as Fixed. No Moment forces to be transferred into the building foundation. Increase the forces in the Rigid Framews due to 1/4" lateral movement of the supports.

G. Metal Building and Calculations to be signed and sealed by a professional engineer registered in the State of Texas.

H. Horizontal girts supporting windows shall be deisgned for an inplane deflection of L/360 unless a more stringert deflection criteria is Required by window manufacturer. Contractor to coordinate.

I. Portal frame columns shall stop 2'-0" from top of Level 1 slab unless requested in writing and approved by Garza+McLain.

J. PEMB provider shall submit calculations for wind pressures used to specify exterior wall panels and roof panels along with metal panel span tables and connection requirements signed and sealed.

K. All roof purlins shall be designedfor acollateral load of 10 psf. As Well positive and negative wind pressures.

L. Horizontal girts supporting stucco shallll be designed for an out of plane deflection of L/360; brick L/480..

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EXPIRATION: 5-31-2024
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STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER
11-03-23

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

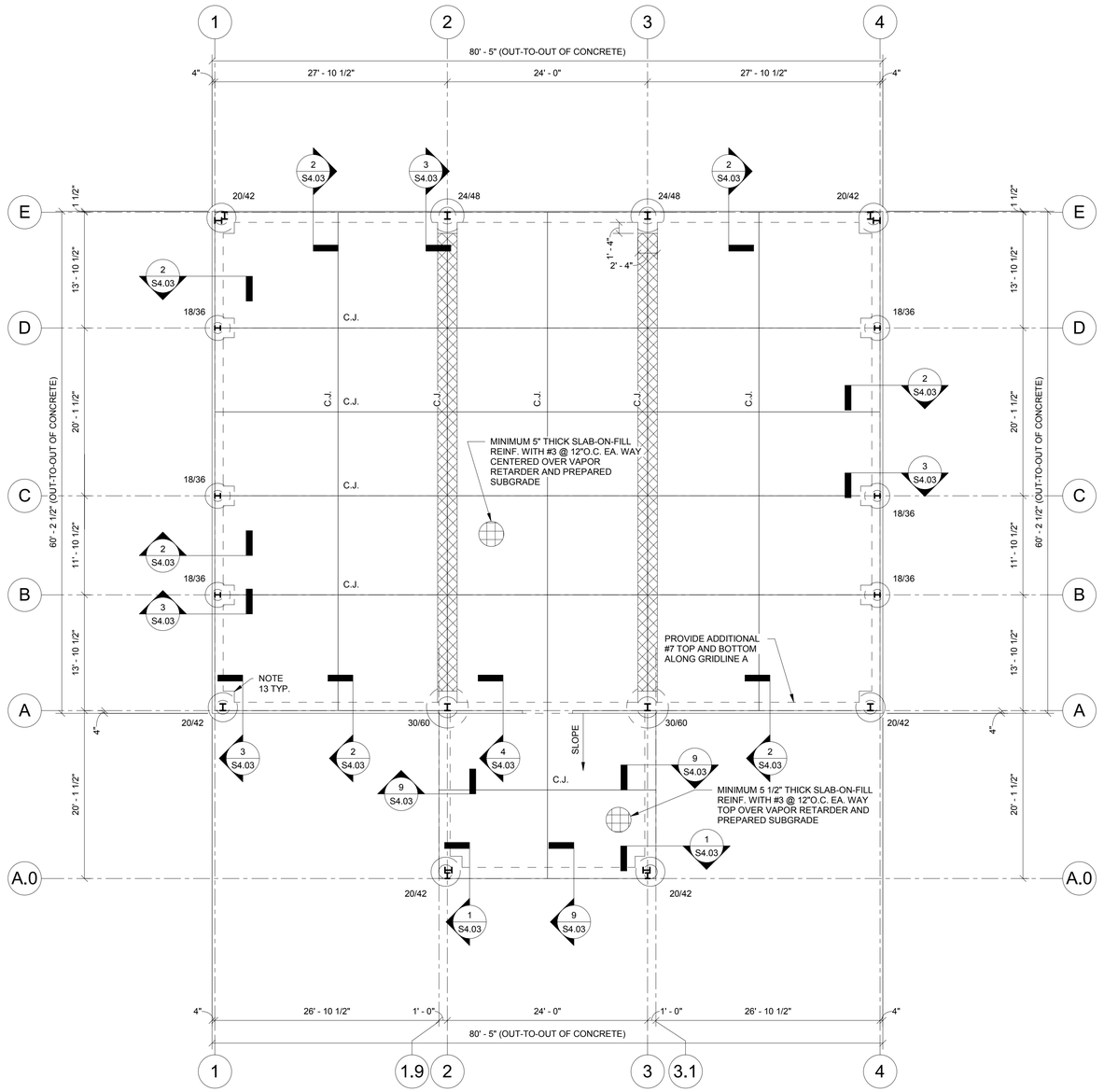
Revisions:

DESCRIPTION	
ISSUE FOR CONSTRUCTION	11/03/2023

STRUCTURAL GENERAL NOTES

Drawing Name

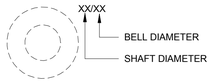
S0.01



PLAN NOTES:

1. FINISH FLOOR ELEVATION= 0'-0" UNLESS NOTED OTHERWISE MEAN SEA LEVEL ELEVATION
2. TOP OF STRUCTURAL CONCRETE ELEVATION = FINISH FLOOR UNLESS RECESED TO RECEIVE FLOORING MATERIALS.
3. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF FLOOR RECESSES, DROPS AND SLOPES NOT DIMENSIONED ON PLAN.
4. CENTER LINES OF DRILLED SHAFTS NOT SPECIFICALLY LOCATED ON PLAN BY NOTE OR DIMENSION SHALL BE LOCATED AS FOLLOWS:
   A. SUPPORTING FREESTANDING COLUMNS: CENTER LINES OF COLUMN.
   B. SUPPORTING GRADE BEAMS AND WALLS: CENTER LINE OF GRADE BEAM OR WALL IN ONE DIRECTION. GRID OR AS NOTED IN OTHER DIRECTION. AT CORNER CONDITIONS: CENTER LINES OF GRADE BEAMS OR WALLS.
   C. COLUMNS EMBEDDED IN GRADE BEAMS OR WALLS (PILASTERS): CENTER LINES OF THE COLUMN.
5. C.J. DENOTES CONTROL JOINT.
6. REFER TO SHEET S4.00 - S4.02 FOR TYPICAL FOUNDATION DETAILS.
7. REFER TO STRUCTURAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
8. REFER TO ARCH'L DRAWINGS FOR ADDITIONAL INFORMATION.

9. FOOTINGS ARE NOTED ON PLAN AS THUS:



10. ALL COLUMNS, PERIMETER ANGLES, METAL PANELS, ANCHOR RODS, VERTICAL GIRTS, HORIZONTAL GIRTS, RIDGID FRAMES, PORTAL FRAMES, ROOF PANELS, AND CONNECTIONS TO BE SUPPLIED BY PEMB PROVIDER. ESSENTIALLY ALL ITEMS REQUIRED FOR METAL BUILDING SHALL BE PROVIDED BY PEMB SUPPLIER. C&F

11. FOUNDATIONS HAVE BEEN SIZED BASED ON ESTIMATED REACTIONS. THE PEMB PROVIDER MUST PROVIDE REACTIONS TO G+M A MINIMUM OF 4 WEEKS PRIOR TO POURING FOOTINGS FOR VERIFICATION.
12. TOP OF BASE PLATE FOR ENDWALL COLUMNS IS AT FINISH FLOOR.
13. PROVIDE STIRRUPS AT 6"O.C. AT BUMP OUT.

1 ***FOUNDATION PLAN***

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

PLAN NORTH

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Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

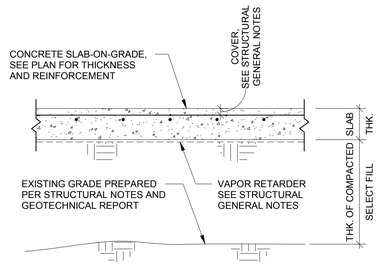
Revisions:

DESCRIPTION	
ISSUE FOR CONSTRUCTION	11/03/2023

FOUNDATION PLAN

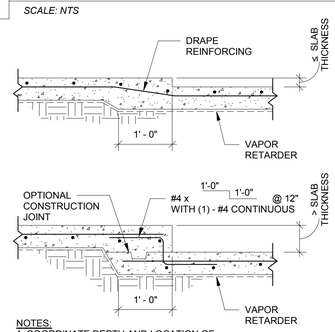
Drawing Name

S1.00



1 TYPICAL DETAIL SUBGRADE PREPARATION SLAB-ON-FILL CONSTRUCTION

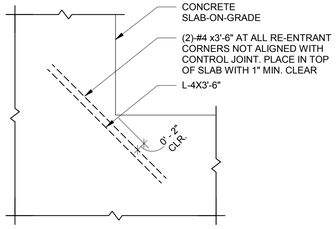
SCALE: NTS



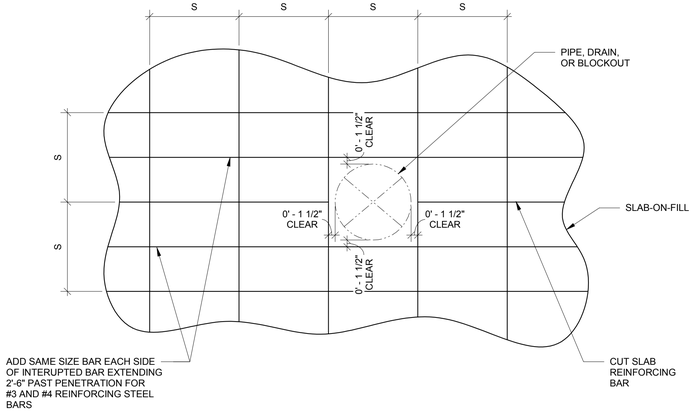
NOTES:
1. COORDINATE DEPTH AND LOCATION OF DEPRESSIONS WITH ARCHITECTURAL DRAWINGS.
2. PROVIDE (1) - #4 x 4'-0" TOP AT INTERIOR CORNERS OF DEPRESSION, SEE 10S3.02 SIMILAR.

4 TYPICAL SLAB-ON-GRADE DEPRESSION DETAIL

SCALE: NTS

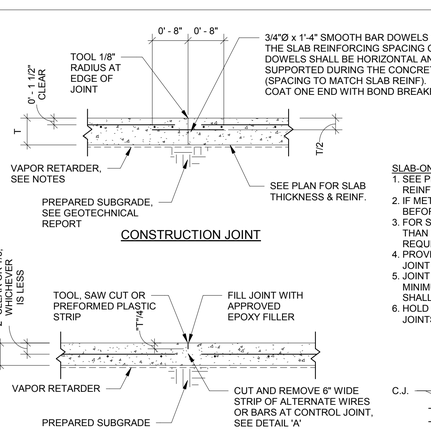


PLAN VIEW



2 TYPICAL ADDITIONAL SLAB REINFORCING STEEL DETAIL AT INTERRUPTED BARS AT SLAB-ON-FILL CONSTRUCTION

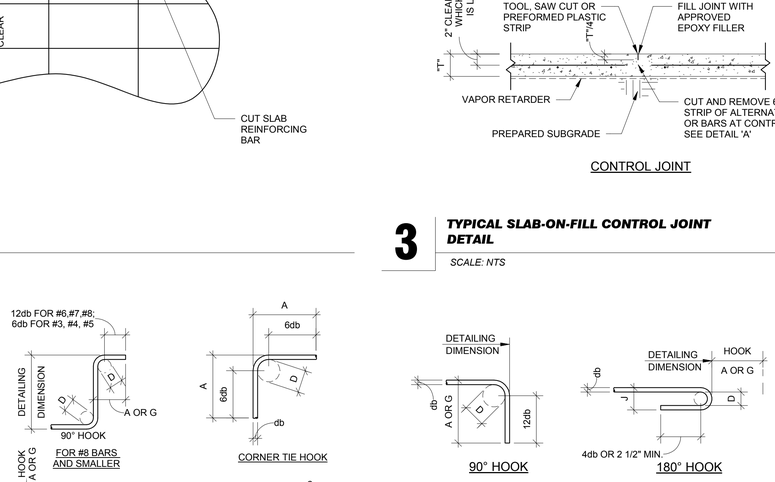
SCALE: NTS



SLAB-ON-GRADE NOTES:
1. SEE PLAN FOR THICKNESS OF SLAB (T) AND REINFORCING.
2. IF METAL FORMS ARE USED, REMOVE THEM BEFORE PLACING ADJACENT SLAB.
3. FOR SLABS WITH THICKNESS (T) GREATER THAN 6", THICKENED EDGES ARE NOT REQUIRED AT JOINTS.
4. PROVIDE A CONSTRUCTION OR CONTROL JOINT ON THE CENTER LINES OF COLUMNS.
5. JOINT FILLER MATERIAL SHALL HAVE A MINIMUM SHORE HARDNESS OF 35 AND SHALL CONFORM TO ASTM D2240.
6. HOLD DOWELS IN PLACE AT CONSTRUCTION JOINTS WITH DOWEL BASKETS.

3 TYPICAL SLAB-ON-FILL CONTROL JOINT DETAIL

SCALE: NTS



RECOMMENDED END HOOKS, ALL GRADES

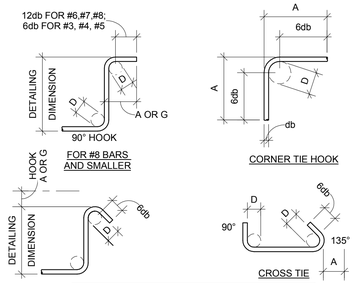
BAR SIZE	FINISHED BEND DIAMETER D. (IN.)	180° HOOK		90° HOOK
		A OR G,(IN.)	J. (IN.)	A OR G,(IN.)
#3	2 1/2	5	3	6
#4	3	6	4	8
#5	3 3/4	7	5	10
#6	4 1/2	8	6	12
#7	5 1/2	10	7	14
#8	6	11	8	16
#9	9 1/2	15	11 3/4	19
#10	10 1/2	17	13 1/4	22
#11	12	19	14 3/4	24
#14	18 1/2	27	21 3/4	31
#18	24	36	28 1/2	41

D = INSIDE DIAMETER OF BEND

DEVELOPMENT LENGTHS OF STANDARD HOOKS IN TENSION
GRADE 60 REINFORCEMENT - NORMAL WEIGHT CONCRETE

BAR SIZE	f'c=3000 PSI		f'c=4000 PSI		f'c=5000 PSI	
	Lhb	0.7 Lhb	Lhb	0.7 Lhb	Lhb	0.7 Lhb
#3	9	7	8	6	7	6
#4	11	8	10	7	9	7
#5	14	10	12	9	11	8
#6	17	12	15	11	13	10
#7	20	14	17	12	15	11
#8	22	16	19	14	17	12
#9	25	18	22	16	20	14
#10	28	20	25	18	22	16
#11	31	22	27	19	24	17
#14	38	-	33	-	29	-
#18	50	-	43	-	39	-

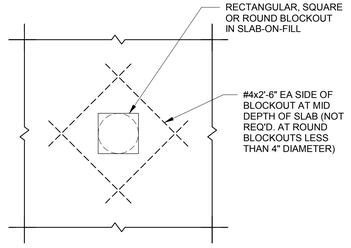
NOTES:
1. Ldh = DEVELOPMENT LENGTH OF STANDARD HOOKS IN TENSION (INCHES).
2. Ldh = Ldh UNLESS CONDITIONS OF NOTE 3 ARE SATISFIED.
3. Ldh = 0.7Ldh FOR #11 BARS AND SMALLER WHEN SIDE COVER (NORMAL TO PLANE OF HOOK) IS NOT LESS THAN 2 1/2 INCHES AND FOR 90° HOOKSS COVER ON BAR EXTENSION BEYOND HOOK IS NOT LESS THAN 2 INCHES.
4. HOOKS ARE NOT CONSIDERED EFFECTIVE FOR DEVELOPING BARS IN COMPRESSION.
5. Ldh SHALL BE MULTIPLIED BY 1.2 FOR EPOXY-COATED HOOKED REINFORCING BARS.
6. SEE DETAIL "TYPICAL DETAIL STIRRUP AND TIE HOOK TYPES" FOR HOOK LENGTHS.



STIRRUP AND TIE HOOK SCHEDULE

BAR SIZE	D (IN.)	90° HOOK A OR G (IN.)	135° HOOK A OR G (IN.)
#3	1 1/2	4	4
#4	2	4 1/2	4 1/2
#5	2 1/2	6	5 1/2

D = INSIDE DIAMETER OF BEND



PLAN VIEW

6 TYPICAL ADDITIONAL REINFORCING AT BLOCKOUT IN SLAB-ON-FILL DETAIL

SCALE: NTS

7 TYPICAL DETAIL STIRRUP AND TIE HOOK TYPES

SCALE: NTS

8 TYPICAL DETAIL END HOOK TYPES

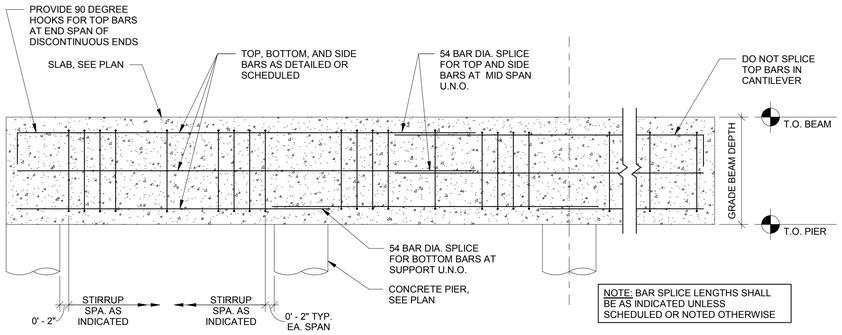
SCALE: NTS

9 TYPICAL DETAIL END HOOK TYPES

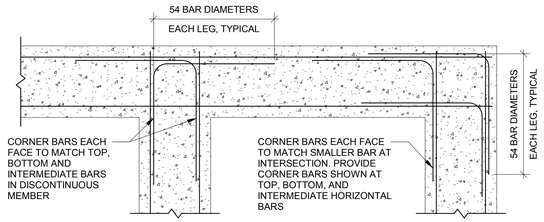
SCALE: 3/4" = 1'-0"

5 TYPICAL SLAB-ON-FILL RE-ENTRANT CORNER REINFORCING DETAIL

SCALE: NTS

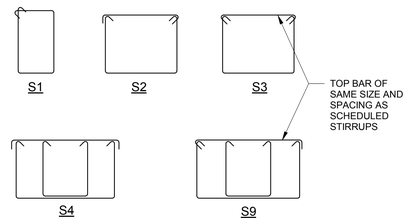


NOTE: BAR SPLICE LENGTHS SHALL BE AS INDICATED UNLESS SCHEDULED OR NOTED OTHERWISE



PLAN VIEW

NOTES:
1. WHERE 90 DEGREE HOOKS ARE SCHEDULED OR DETAILED FOR TOP BARS, CORNER BARS MAY BE OMITTED.
2. MATCH SIZE, LOCATION, AND NUMBER OF HORIZONTAL BEAM AND WALL BARS, EXCEPT THAT WHERE THERE ARE MORE THAN 2 TOP OR BOTTOM BARS, ONLY THE INSIDE AND OUTSIDE BARS MUST BE MATCHED.
3. STOP DETAILED REINF. 2" SHORT OF FORM.



NOTES:
1. ALL HOOKS TO BE FABRICATED AS REQUIRED BY ACI.
2. TOP CAP OF STIRRUPS S2 AND S9 SHALL BE INSTALLED SUCH THAT 135° HOOK END IS NOT ON THE SIDE CONFINED BY THE SLAB.

10 GRADE BEAM REINFORCING TYPICAL SECTION

SCALE: NTS

11 TYPICAL CORNER BARS AT WALL OR GRADE BEAM INTERSECTION DETAIL

SCALE: NTS

12 TYPICAL STIRRUP TYPES

SCALE: NTS

11/3/2023 1:53:33 PM

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11-03-23

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
ISSUE FOR CONSTRUCTION	11/03/2023

TYPICAL FOUNDATION DETAILS

Drawing Name

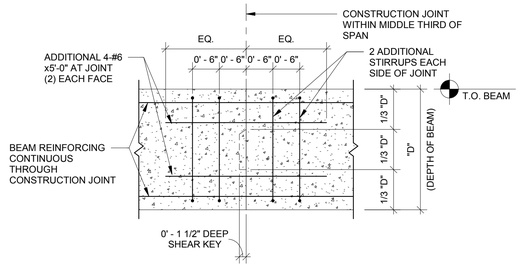
S4.00

TENSION LAP SPLICES - CLASS B FOR TOP & BOTTOM BARS (GRADE 60 UNCOATED BARS-NORMAL WEIGHT CONCRETE)						
BAR SIZE	F'c=3000 psi		F'c=4000 psi		F'c=5000 psi	
	ld TOP	ld BOT	ld TOP	ld BOT	ld TOP	ld BOT
#3	2'-4"	1'-9"	2'-0"	1'-6"	1'-10"	1'-5"
#4	3'-1"	2'-4"	2'-8"	2'-1"	2'-5"	1'-10"
#5	3'-10"	3'-0"	3'-4"	2'-7"	3'-0"	2'-4"
#6	4'-8"	3'-7"	4'-0"	3'-1"	3'-7"	2'-9"
#7	6'-9"	5'-2"	5'-10"	4'-6"	5'-3"	4'-0"
#8	7'-9"	5'-11"	6'-8"	5'-2"	6'-0"	4'-7"
#9	8'-8"	6'-8"	7'-6"	5'-9"	6'-9"	5'-2"
#10	9'-10"	7'-6"	8'-6"	6'-6"	7'-7"	5'-10"
#11	10'-11"	8'-4"	9'-5"	7'-3"	8'-5"	6'-6"

NOTE:
FOR CLASS "A" SPLICE (PERMITTED ONLY WHEN NOT MORE THAN HALF THE BARS SPLICED & SPLICES STAGGERED BY THE DISTANCE OF SPLICE LENGTH), USE SAME AS "ld" = TENSION DEVELOPMENT LENGTH TABLE.

"ld" TENSION DEVELOPMENT LENGTH FOR BEAM, SLAB, & WALL REBAR (GRADE 60 UNCOATED BARS - NORMAL WEIGHT CONCRETE)						
BAR SIZE	F'c=3000 psi		F'c=4000 psi		F'c=5000 psi	
	ld TOP	ld BOT	ld TOP	ld BOT	ld TOP	ld BOT
#3	1'-9"	1'-4"	1'-6"	1'-2"	1'-5"	1'-1"
#4	2'-4"	1'-10"	2'-1"	1'-7"	1'-10"	1'-5"
#5	3'-0"	2'-3"	2'-7"	2'-0"	2'-4"	1'-9"
#6	3'-7"	2'-9"	3'-1"	2'-4"	2'-9"	2'-1"
#7	5'-2"	4'-0"	4'-6"	3'-6"	4'-0"	3'-1"
#8	5'-11"	4'-7"	5'-2"	3'-11"	4'-7"	3'-6"
#9	6'-8"	5'-2"	5'-9"	4'-5"	5'-2"	4'-0"
#10	7'-6"	5'-10"	6'-6"	5'-0"	5'-10"	4'-6"
#11	8'-4"	6'-5"	7'-3"	5'-7"	6'-6"	5'-0"

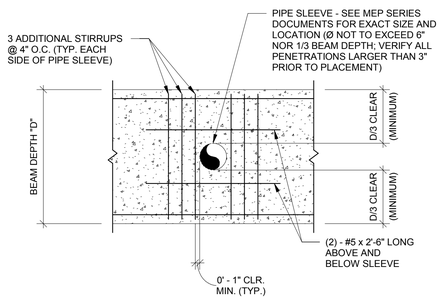
NOTES:
1. "TOP" BARS ARE HORIZONTAL REBAR WITH MORE THAN 12" OF FRESH CONCRETE CAST BELOW THE BARS AT THE DEVELOPMENT LENGTH.
2. "ld" FOR #3 & #4 BARS IN SLAB OR WALL ARE CONSERVATIVE AND MAY BE REDUCED (TO 0.75 TIMES FOR #3 BARS AND 0.94 TIMES FOR #4 BARS) FROM THE TABULATED VALUES.
3. FOR LIGHT-WEIGHT INSULATING CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.



ELEVATION

NOTES:
1. CONTRACTOR TO SUBMIT CONSTRUCTION JOINT LAYOUT AND COORDINATE WITH REINFORCING STEEL FABRICATOR.
2. JOINT TO BE LOCATED AT MIDDLE THIRD OF SPAN.
3. THIS DETAIL APPLIES TO BEAMS ≤ 4'-0" DEPTH.

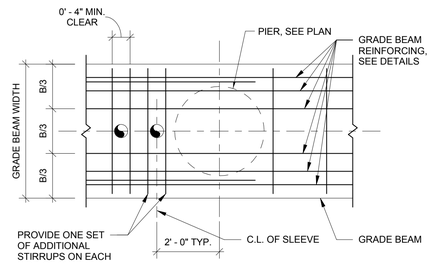
KEY WIDTH	
GRADEBEAM WIDTH "T"	W
< 12"	3 1/2"
12" TO 16"	5 1/2"
16" TO 20"	7 1/4"
20" TO 24"	9 1/4"
24" TO 30"	11 1/4"



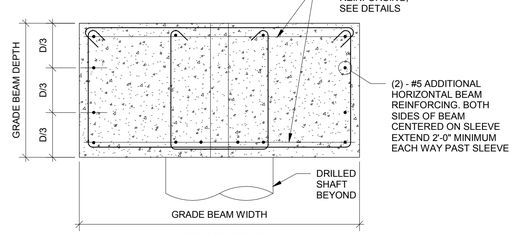
NOTES:
1. NOTIFY ENGINEER IMMEDIATELY IF HORIZONTAL SLEEVE CANNOT BE INSTALLED AS SHOWN. ADDITIONAL REINFORCING MAY BE REQUIRED.
2. PIPE OR PIPE SLEEVE MUST COMPLETELY PASS THROUGH WIDTH OF BEAM PRIOR TO TURNING VERTICAL, NO EXCEPTIONS.

1 TENSION LAP SPLICES - CLASS B FOR TOP AND BOTTOM BARS

SCALE: NTS



PLAN VIEW



SECTION VIEW

NOTES:
1. REQUIRED BEAM SLEEVES ARE TO BE COORDINATED WITH MEP CONTRACTORS. REQUIRED SLEEVES MAY OR MAY NOT BE SHOWN ON THE STRUCTURAL DRAWINGS. GENERAL CONTRACTOR SHALL SUBMIT PLAN SHOWING LAYOUT OF ALL SLEEVES.
2. SLEEVES SHALL BE LOCATED ON THE BEAM CENTERLINE OR AT LEAST WITHIN THE MIDDLE THIRD OF THE GRADE BEAM WIDTH.
3. CONTINUOUS BEAM REINFORCING MAY BE SLIGHTLY DISPLAY (3" MAXIMUM) OR ADJACENT BARS BUNDLED (2 BAR BUNDLE MAXIMUM) TO FACILITATE SLEEVE INSTALLATION. DO NOT CUT, OFFSET, OR BEND REINFORCING.
4. SLEEVES OCCURRING ON OPPOSITE SIDES OF A PIER MUST BE IN LINE.
5. THE OUTSIDE DIAMETER OF A SLEEVE MAY NOT EXCEED 15% OF THE WIDTH OF THE GRADE BEAM THROUGH WHICH IT MUST PASS. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF THE RECORD FOR DIRECTIONS WHEN A SLEEVE SIZE OR LOCATION DOES NOT MEET THE CONDITIONS ESTABLISHED ABOVE.
6. SLEEVE OR PIPE MUST COMPLETELY PASS THROUGH BEAM DEPTH PRIOR TO TURNING HORIZONTAL, NO EXCEPTIONS.

5 TYPICAL SECTION VERTICAL PENETRATION, CONCRETE GRADE BEAM

SCALE: NTS

2 TENSION DEVELOPMENT LENGTH FOR BEAM, SLAB, & WALL REBAR

SCALE: NTS

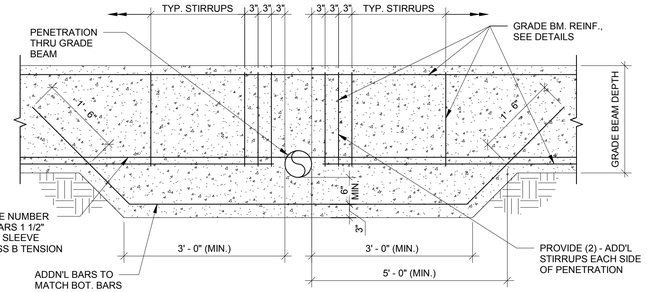
3 TYPICAL BEAM CONSTRUCTION JOINT DETAIL

SCALE: NTS

4 TYPICAL HORIZONTAL GRADE BEAM PENETRATION SECTION

SCALE: NTS

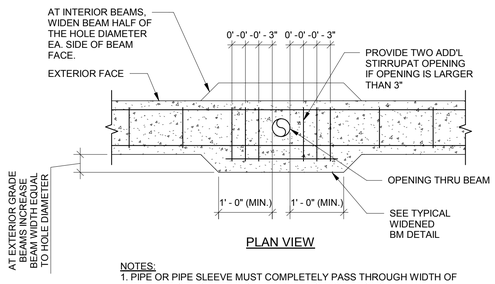
NOTES:
1. PIPE OR PIPE SLEEVE MUST COMPLETELY PASS THROUGH WIDTH OF BEAM PRIOR TO TURNING VERTICAL, NO EXCEPTIONS.



ELEVATION VIEW

6 TYPICAL DETAIL HORIZONTAL PENETRATION OPENING THRU GRADE BEAM AT BOTTOM LONGITUDIAL REINFORCEMENT

SCALE: NTS

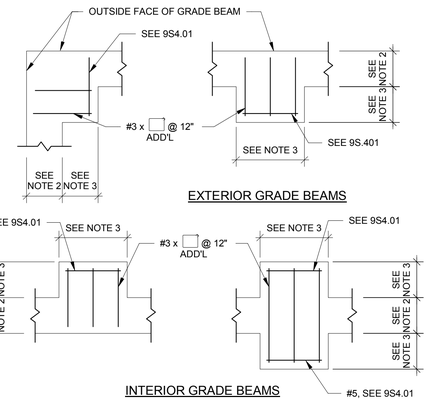


PLAN VIEW

NOTES:
1. PIPE OR PIPE SLEEVE MUST COMPLETELY PASS THROUGH WIDTH OF BEAM PRIOR TO TURNING VERTICAL, NO EXCEPTIONS.

7 TYPICAL DETAIL VERTICAL PENETRATION THRU GRADE BEAM LARGER THAN 15% OF THE GRADE BEAM WIDTH

SCALE: NTS



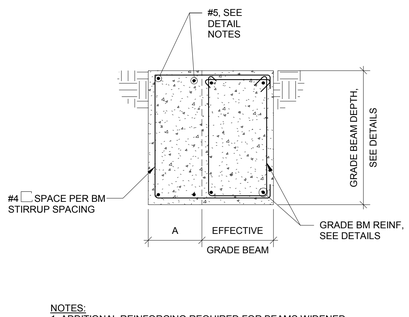
EXTERIOR GRADE BEAMS

INTERIOR GRADE BEAMS

NOTES:
1. PLAN VIEWS FOR TYPICAL WIDENED GRADE BEAMS ARE SHOWN. FOR SIMILAR CONDITION NOT SHOWN, SEE 7S4.02.
2. SEE DETAILS FOR GRADE BEAM WIDTH.
3. GRADE BEAM WIDTH OR 1'-2", WHICHEVER IS GREATER.

8 TYPICAL DETAIL ADDITIONAL BARS AT WIDENED GRADE BEAM AT COLUMNS

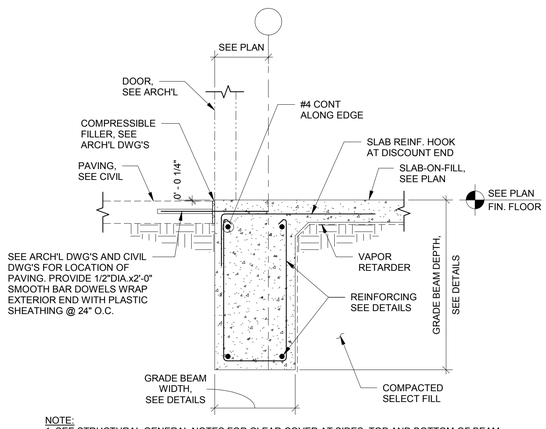
SCALE: NTS



NOTES:
1. ADDITIONAL REINFORCING REQUIRED FOR BEAMS WIDENED BY 3" OR MORE.
2. FOR A < 6" PROVIDE 1-#5 CONT. TOP AND BOTT.
3. FOR 6" ≤ A ≤ 14" PROVIDE (2) - #5 CONT. TOP AND BOTTOM.
4. NOTIFY ENGINEER IF "A" IS GREATER THAN 14".

9 TYPICAL WIDENED GRADE BEAM SECTION

SCALE: NTS



NOTE:
1. SEE STRUCTURAL GENERAL NOTES FOR CLEAR COVER AT SIDES, TOP AND BOTTOM OF BEAM.

10 TYPICAL DETAIL PAVING ATTACHMENT TO PERIMETER FOUNDATION AT DOOR

SCALE: NTS

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Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

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TYPICAL FOUNDATION DETAILS

Drawing Name

S4.01

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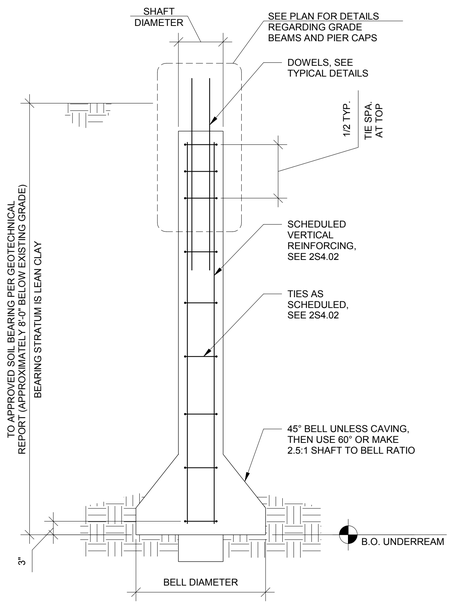


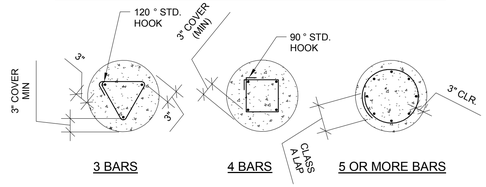
ELEVATION

NOTES:
1. SEE TYPICAL DETAIL "SHAFT BAR PLACEMENT DETAIL" FOR SHAFT REINFORCING AND BAR PLACEMENT.
2. MINIMUM DEPTH IS BASED ON EXISTING NATURAL GRADE AS SPECIFIED IN THE SOILS REPORT.

1 TYPICAL DRILLED PIER WITH UNDERREAMED SHAFT SECTION

SCALE: NTS

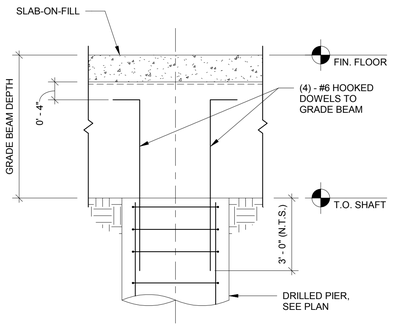
DRILLED PIER UNDERREAM VERTICAL SHAFT REINFORMENT SCHEDULE		
SHAFT DIAMETER	VERTICAL BARS	TIES (USE #3 @ 12" U.N.O.)
12	(3) - #5	#3 @12"
14,16	(4) - #6	#3 @12"
18	(5) - #6	#3 @12"
20	(6) - #6	#3 @12"
24	(8) - #6	#3 @12"
30	(12) - #6	#3 @12"
36	(10) - #7	#3 @12"



NOTES:
1. SEE TYPICAL DRILLED PIER WITH UNDERREAMED SHAFT DETAIL.
2. EQUALLY SPACE ALL VERTICAL BARS.

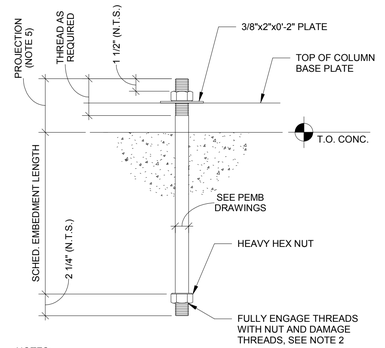
2 SHAFT BAR PLACEMENT DETAIL

SCALE: NTS



3 TYPICAL GRADE BEAM TO PIER OR WALL DETAIL

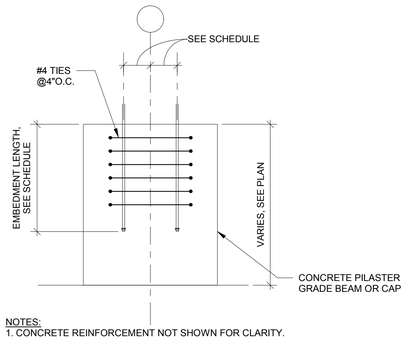
SCALE: NTS



NOTES:
1. SEE PEMB COLUMN SCHEDULE FOR ANCHOR ROD SIZE.
2. ROD THREADS AT THE EMBEDDED END SHALL BE DAMAGED AT TWO PLACES DIRECTLY BELOW THE HEAVY HEX NUT. TACK WELD MAY BE USED.
3. UNLESS NOTED OTHERWISE, ALL BOLTS SHALL BE TIGHTENED TO A "SNUG TIGHT" CONDITION AS DEFINED BY AISC AFTER THE CONCRETE IS AT LEAST 14 DAYS OLD.
4. THE HOLE IN THE PLATE WASHER SHALL BE 1/16" LARGER THAN THE BOLT DIAMETER.
5. PROJECTION SHALL BE MINIMUM LANGTH AS REQUIRED TO ACCOMMODATE, BASE PLATE, WASHER, NUT PLUS 1 1/2".

4 TYPICAL ANCHOR ROD DETAIL

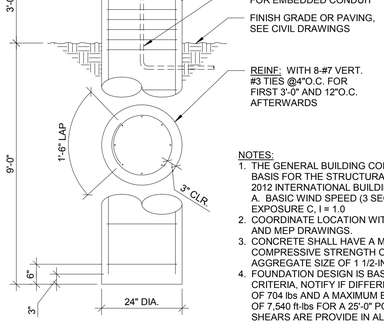
SCALE: NTS



NOTES:
1. CONCRETE REINFORCEMENT NOT SHOWN FOR CLARITY.

5 TYPICAL TIE REINFORCING STEEL AROUND ANCHOR BOLTS

SCALE: NTS



ELEVATION

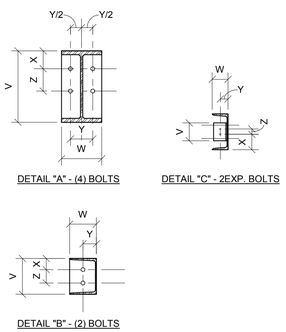
NOTES:
1. THE GENERAL BUILDING CODE USED AS THE BASIS FOR THE STRUCTURAL DESIGN IS THE 2012 INTERNATIONAL BUILDING CODE WITH A. BASIC WIND SPEED (3 SEC) 139 MPH EXPOSURE C, I = 1.0
2. COORDINATE LOCATION WITH ARCH'L, CIVIL AND MEP DRAWINGS.
3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 psi. WITH AGGREGATE SIZE OF 1 1/2-INCHES.
4. FOUNDATION DESIGN IS BASED ON FOLLOWING CRITERIA, NOTIFY IF DIFFERENT: BASE SHEAR OF 704 lbs AND A MAXIMUM BASE MOMENT OF 7,540 ft-lbs FOR A 25'-0" POLE. MOMENTS AND SHEARS ARE PROVIDE IN ALLOWANCE STRESS.
5. PROVIDE SIGNED AND SEALED CALCULATIONS OR DETAILS REGARDING THE LIGHT POLE AND ANCHOR RODS THAT MEET THE SPECIFIED LOADS.

6 TYPICAL LIGHTPOLE FOUNDATION DETAIL (25'-0" TALL POLE)

SCALE: NTS

BASE PLATE & ANCHOR ROD SCHEDULE										
MARK	BASE PLATE DIMENSIONS					DETAIL	ANCHOR BOLTS / ADHESIVE ANCHORS			BASE PLATE WELD
	V	W	Y	Z	T		NO.	DIA.	EMBED LENGTH	

NOTES:
1. ALL BASE PLATES SHALL BE ASTM A572 GRADE 50KSI.
2. ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 U.N.O. SUPPLEMENT 2.
3. REFER TO 5S4.02 FOR ADDITIONAL REINFORCEMENT AT COLUMN ANCHOR RODS (NO BRACE).
4. SEE 4S4.02 FOR ADDITIONAL INFORMATION REGARDING ANCHOR RODS LENGTH.



7 PEMB BASE PLATE & ANCHOR BOLT SCHEDULE

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

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Checked By: DDV
Scale: AS NOTED

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TYPICAL FOUNDATION DETAILS

Drawing Name

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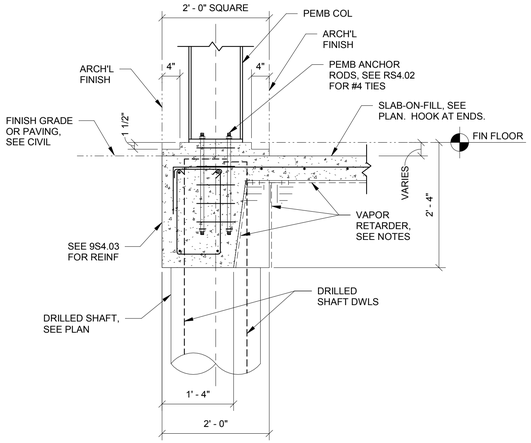
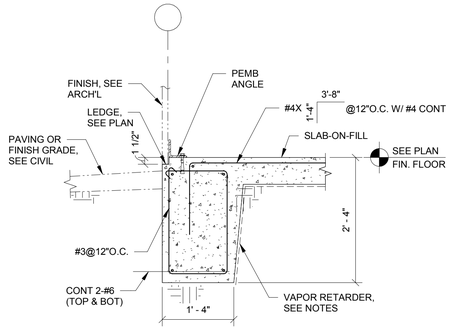


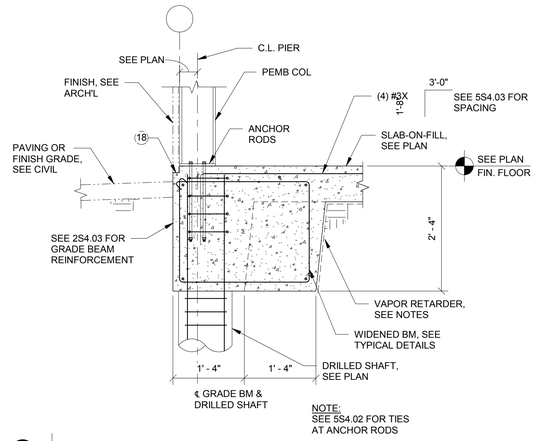
1 TYPICAL REINFORCING DETAIL AT COLUMNS

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



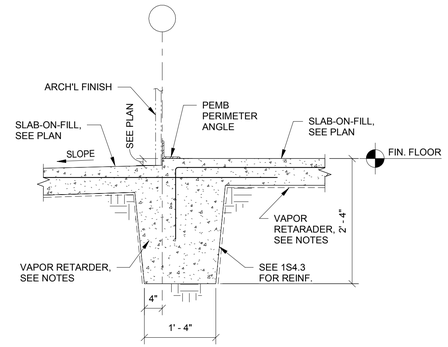
2 TYPICAL PERIMETER DETAIL

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



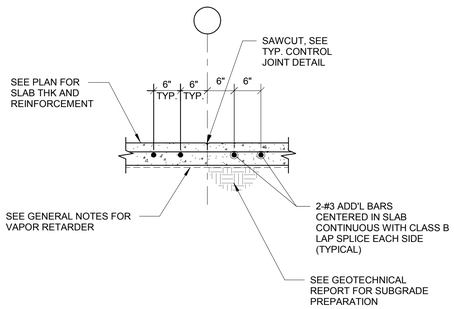
3 ENDWALL DETAIL @ COLUMN

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



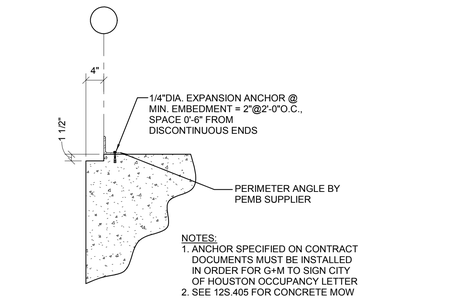
4 DETAIL

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



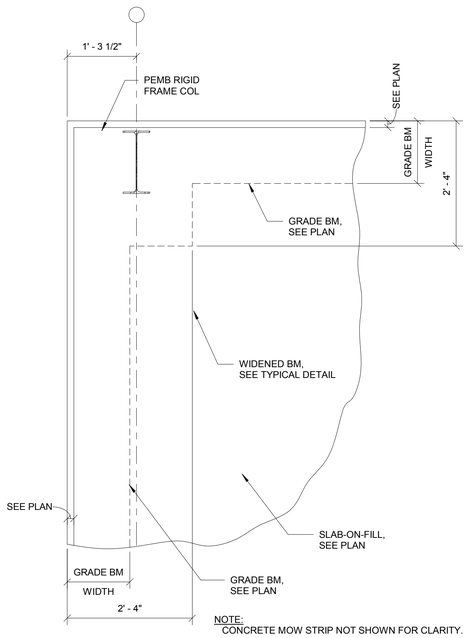
5 TYPICAL CONTINUOUS REINFORCING AT CONTROL JOINTS DETAIL ALONG COLUMN LINES

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



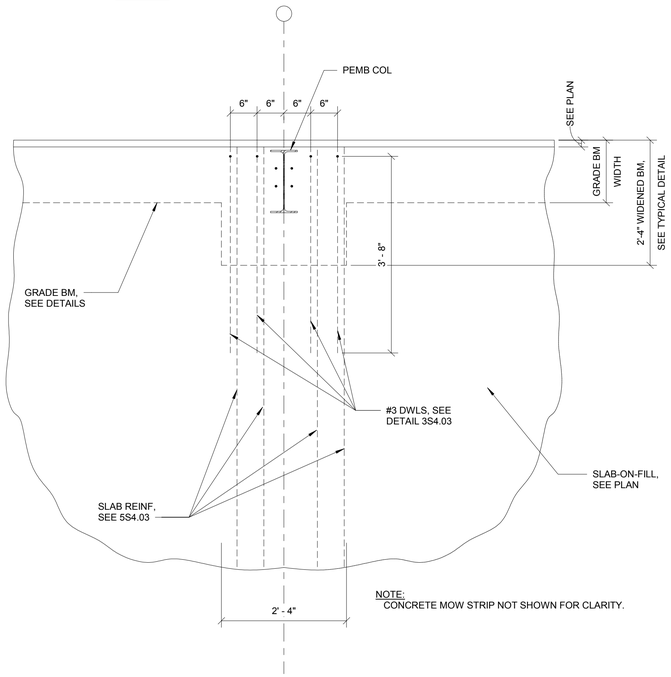
6 TYPICAL PERIMETER ANGLE ATTACHMENT DETAIL

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



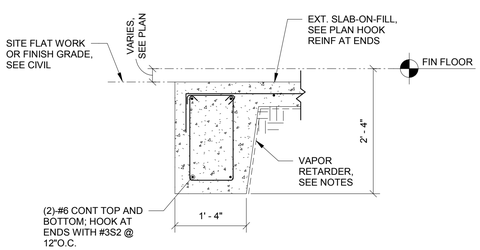
7 TYPICAL CORNER PLAN DETAIL

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



8 DETAIL

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



9 DETAIL

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

11/3/2023 1:53:35 PM

VCS architects

19251 Purus Dr.
Porter, TX 77365

CONSULTANTS

Garza + McLain
www.garza-mclain.com
STRUCTURAL ENGINEERS, INC.
13313 Southwest Freeway, Suite 163
Sugar Land, Texas 77478
(281) 494-1230 (voice)
(281) 494-1234 (fax)
FIRM NO.: F-9331
EXPIRATION: 5-31-2024
JOB NO.: 230057

BARBARA JORDAN PARK
YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

STATE OF TEXAS
GABRIEL GARZA
90960
LICENSED
PROFESSIONAL ENGINEER
11-03-23

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

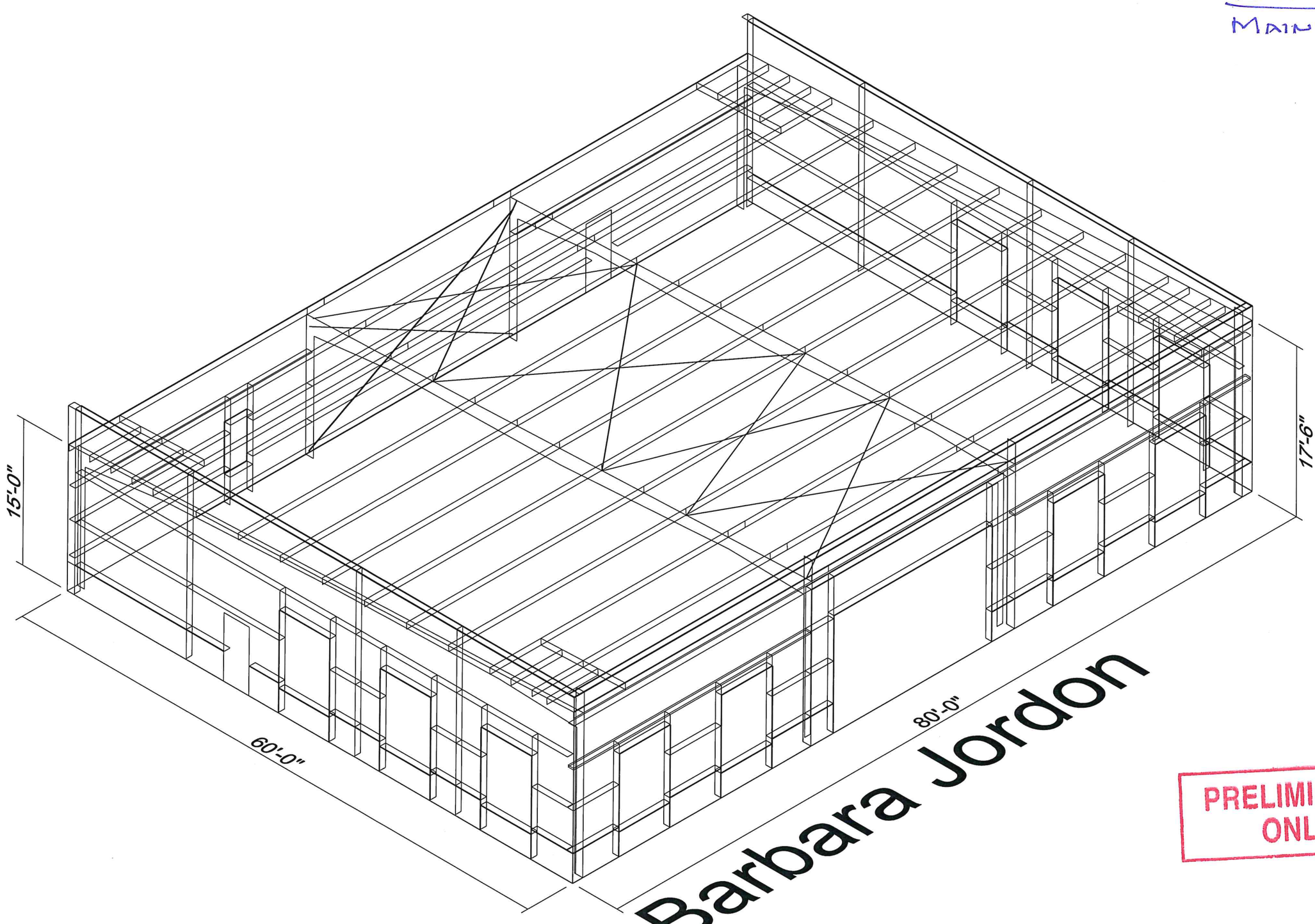
DESCRIPTION	
ISSUE FOR CONSTRUCTION	11/03/2023

FOUNDATION DETAILS

Drawing Name

S4.03

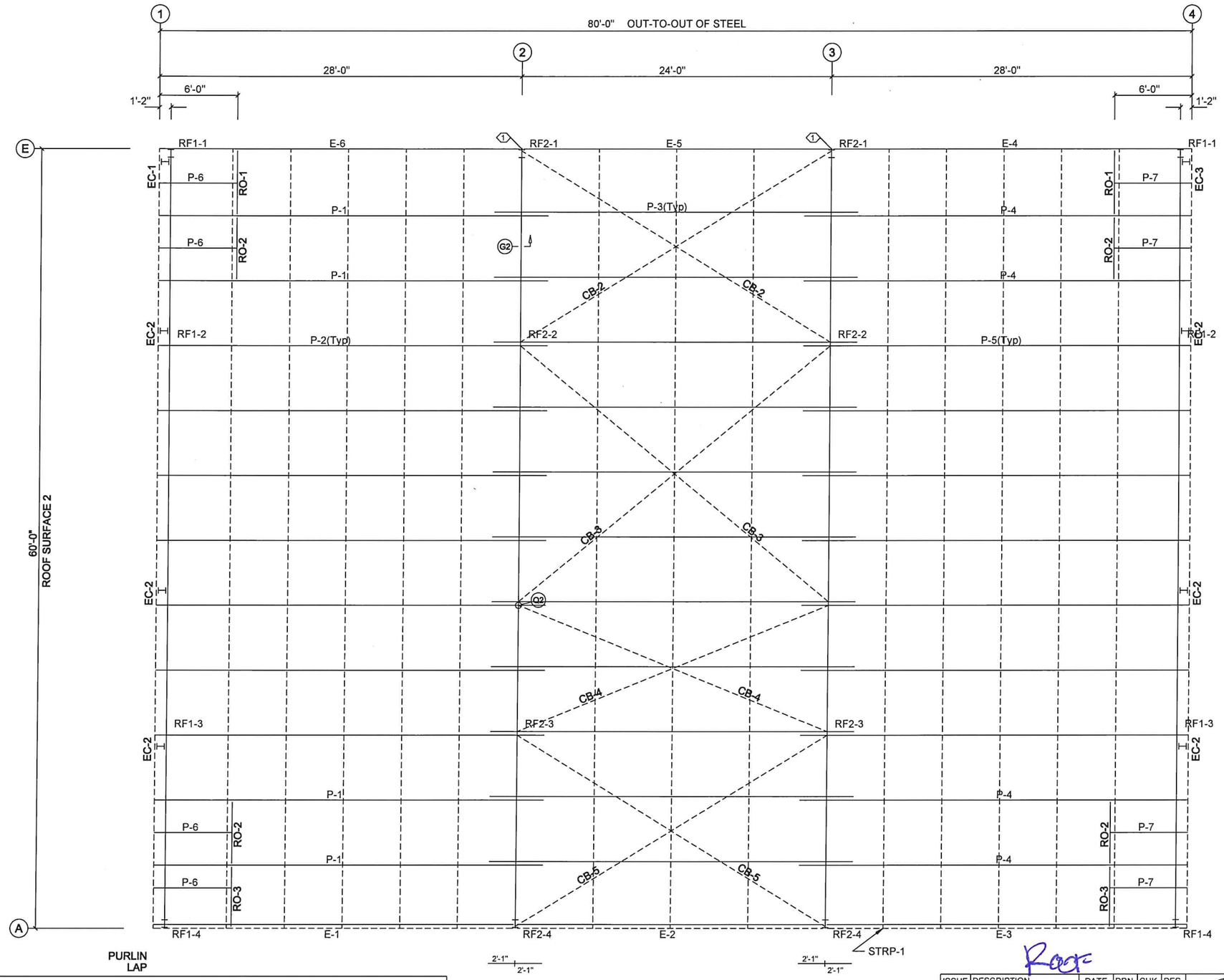
BLDG "A"
MAIN BLDG



Barbara Jordon

PRELIMINARY
ONLY

SPECIAL BOLTS ROOF PLAN					
◇ ID	QUAN	TYPE	DIA	LENGTH	WASH
1	4	A325	1/2"	1 1/4"	0



IMPORTANT NOTES:

High R-value roof insulation systems require two layers of insulation. The sag straps that prevent purlin roll may conflict with faced roof insulation between purlins. Rigid Global Buildings recommends an unfaced layer between the purlins that can be cut around the required framing.

ROOF FRAMING PLAN

Roof

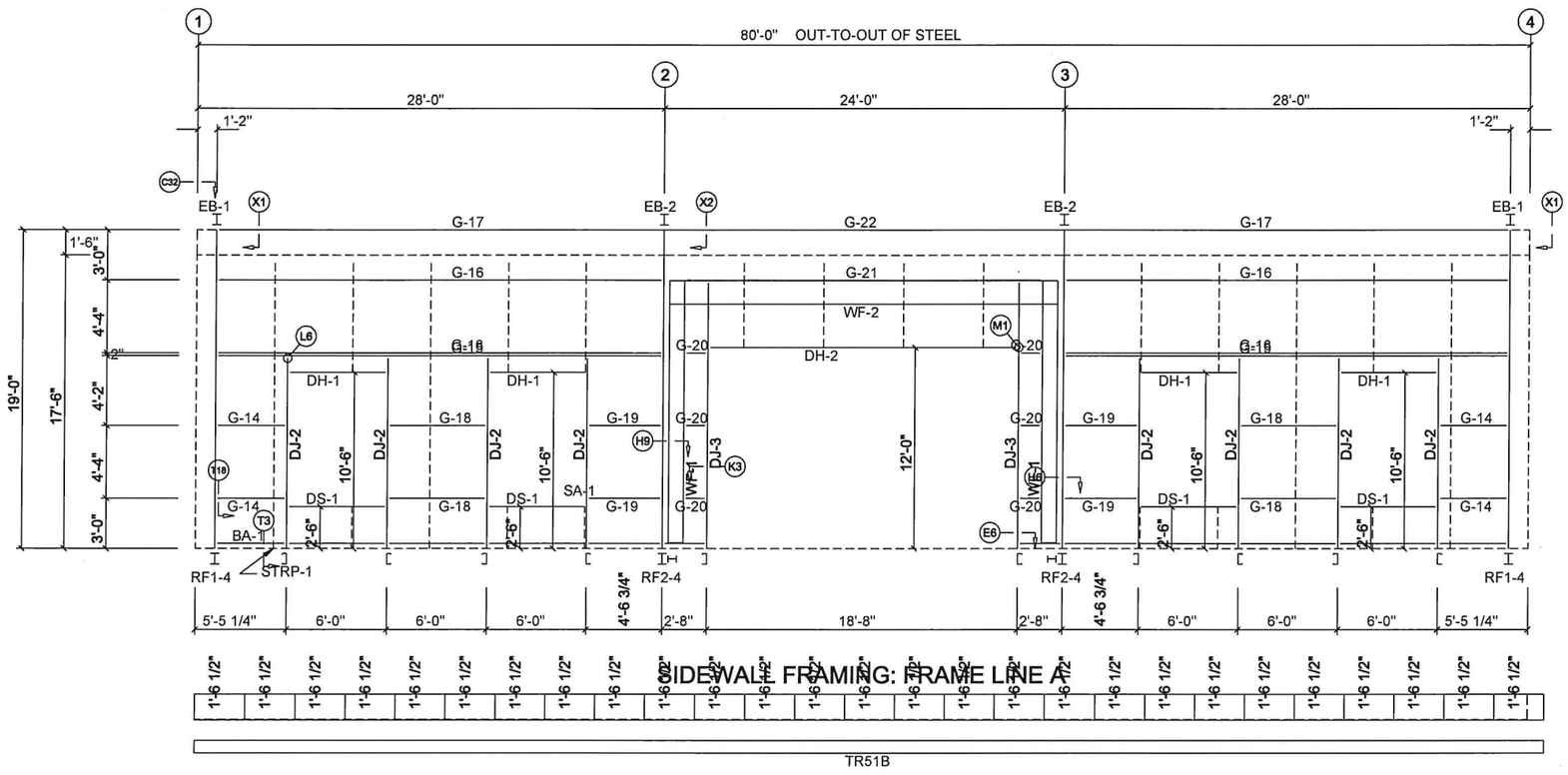
ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

PRELIMINARY ONLY

DESCRIPTION	ROOF FRAMING		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	A
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
AGENCY	JOB NO.	SCALE N.T.S.	SHEET NO. XXX OF XXX ISSUE A

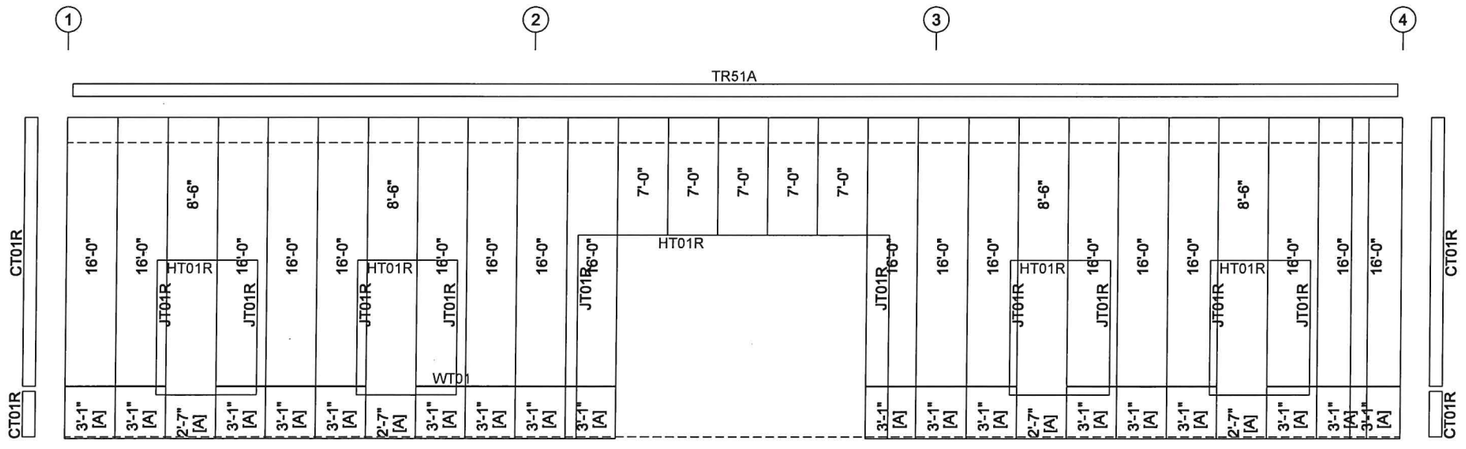
BOLT TABLE FRAME LINE A				
LOCATION	QUAN	TYPE	DIA	LENGTH
EB-1	4	A325	5/8"	1 1/2"
EB-2	4	A325	5/8"	1 1/2"
WF-1 - WF-2	8	A325	5/8"	2"
WF-1 - RF2-4	8	A325	5/8"	1 1/2"



SIDEWALL FRAMING: FRAME LINE A

PARAPET BACK SHEETING & TRIM: LINE A

26 Ga. PR - Glvm.Plus



SIDEWALL SHEETING & TRIM: FRAME LINE A

26 Ga. PR - S2000 Standard

[A] 26 Ga. PR - Glvm.Plus

FRONT SIDEWALL

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	

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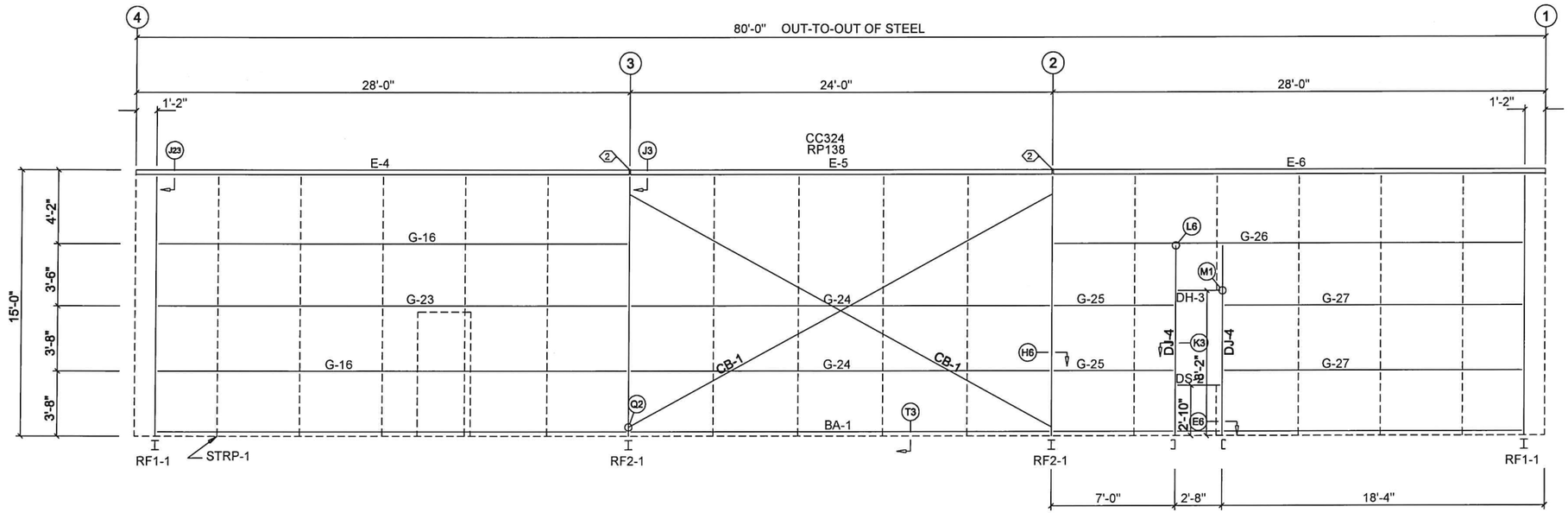
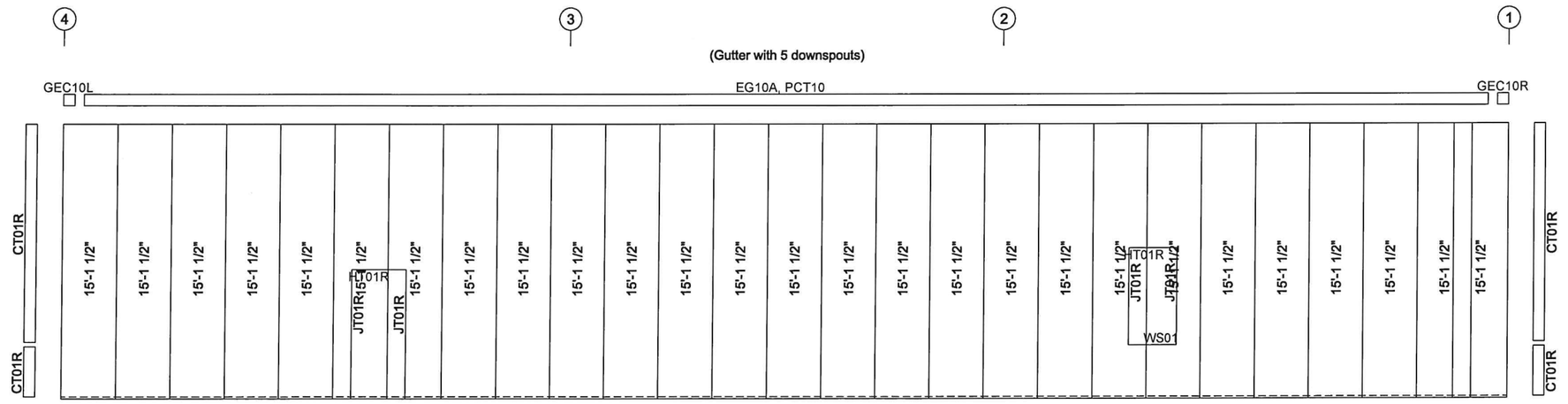
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	SIDEWALL FRAMING
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SALES NO. / JOB NO.	SCALE: N.T.S. / DRWG NO.: XXX OF XXX / ISSUE: A

SPECIAL BOLTS					
○ ID	QUAN	TYPE	DIA	LENGTH	WASH
2	4	A325	1/2"	1 1/4"	0



SIDEWALL FRAMING: FRAME LINE E



SIDEWALL SHEETING & TRIM: FRAME LINE E

26 Ga. PR - S2000 Standard

BACK SIDEWALL

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	AVS	MBS	MBS

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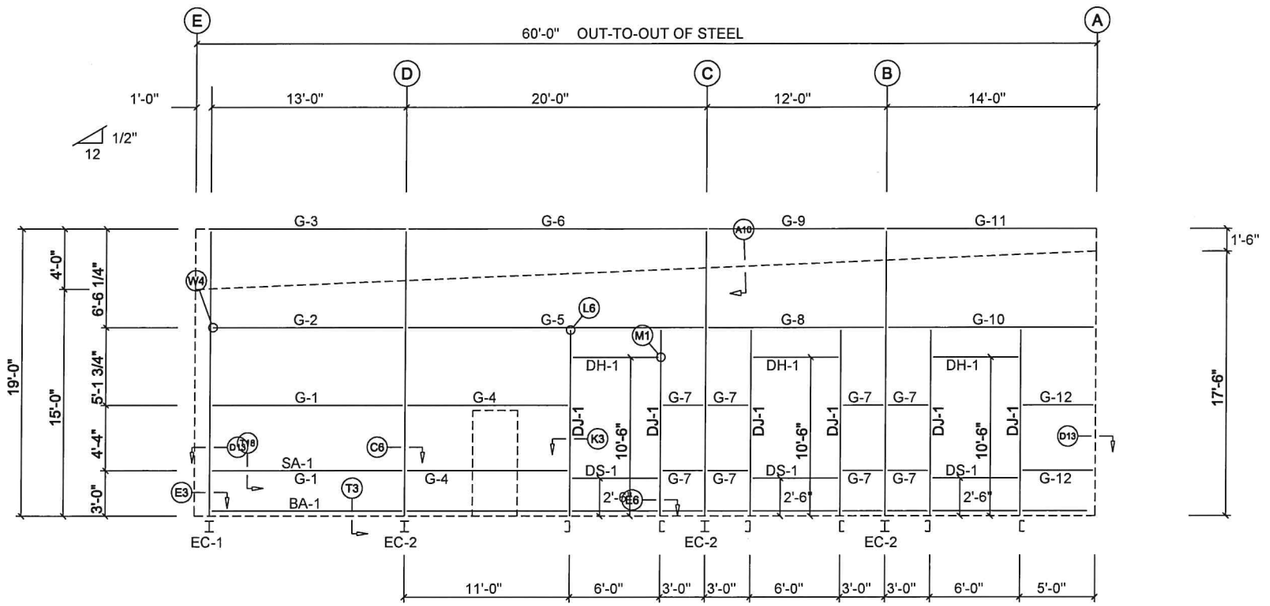
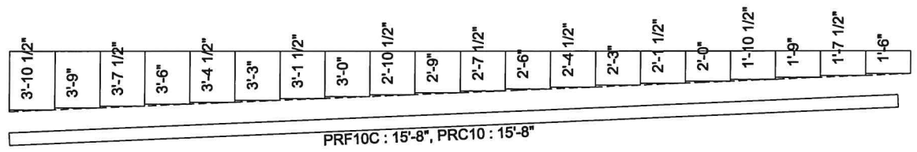
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	SIDEWALL FRAMING
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SALES NO.	JOB NO. / SCALE: N.T.S. / DWG NO. XXX OF XXX / ISS. A

BOLT TABLE FRAME LINE 1				
LOCATION	QUAN	TYPE	DIA	LENGTH
Columns/Raf	2	A325	1/2"	1 1/4"

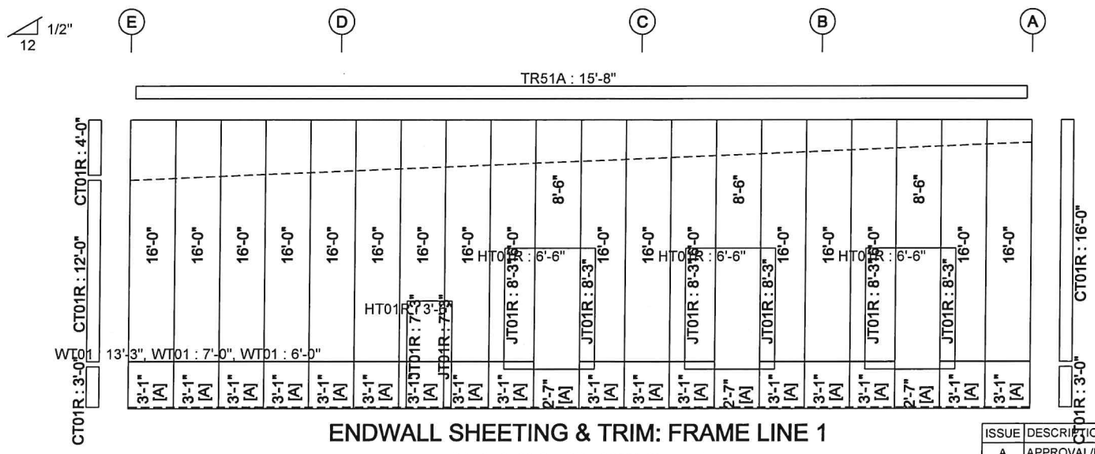


ENDWALL FRAMING: FRAME LINE 1



PARAPET BACK SHEETING & TRIM: LINE 1

PANELS: 26 Ga. PR - Glvm.Plus



ENDWALL SHEETING & TRIM: FRAME LINE 1

PANELS: 26 Ga. PR - S2000 Standard

[A] PANELS: 26 Ga. PR - Glvm.Plus

NOTE:
FIELD CUT PANEL TO SUIT ROOF SLOPE:

LEFT ENDWALL

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ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
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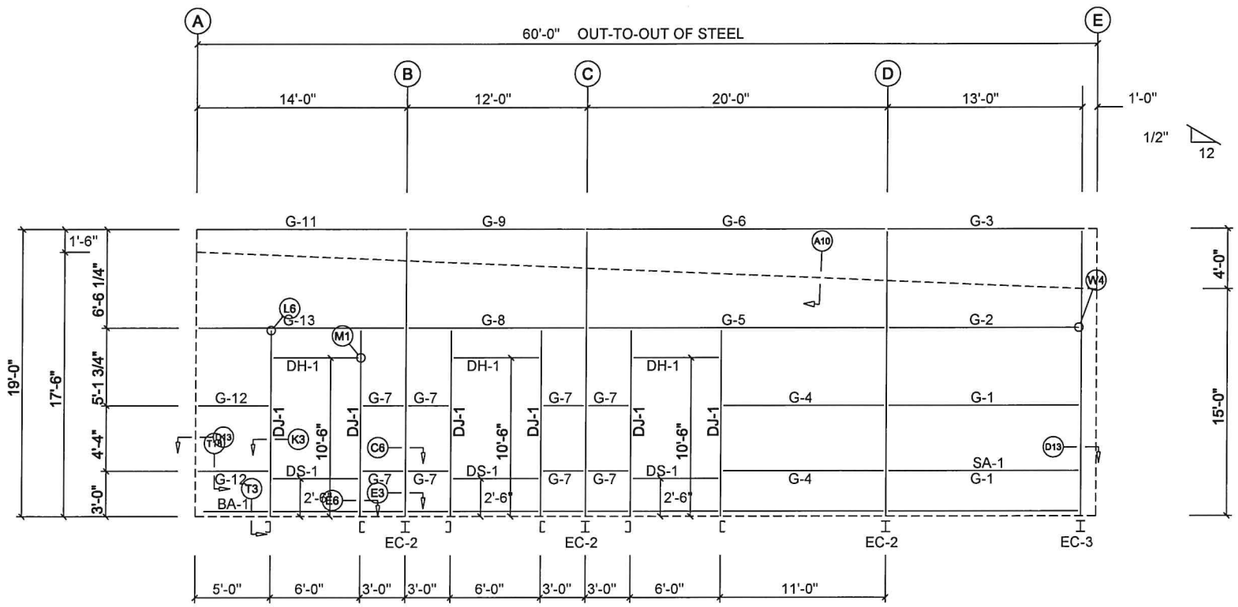
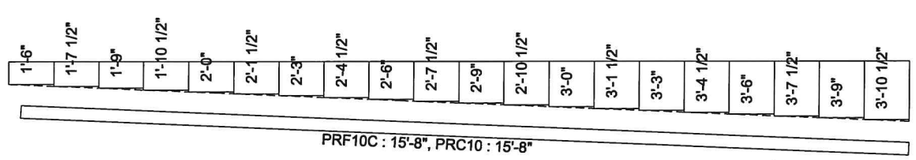
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ENDWALL FRAMING		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	A
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
PAGE NO	SCALE: N.T.S.	SHT. NO. XXX OF XXX	ISSUE A

BOLT TABLE FRAME LINE 4				
LOCATION	QUAN	TYPE	DIA	LENGTH
Int_Column/Raf	2	A325	1/2"	1 1/4"
Cor_Column/Raf	2	A325	1/2"	1 1/4"

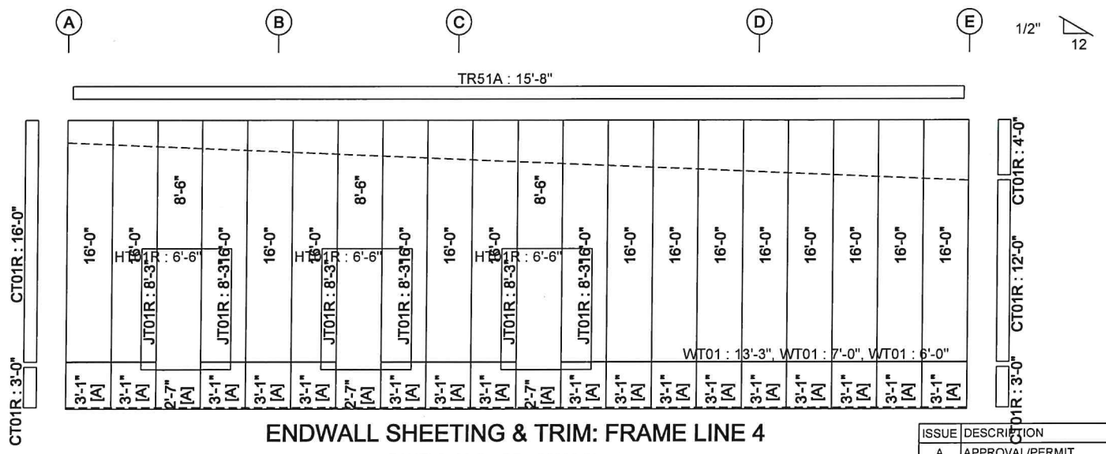


ENDWALL FRAMING: FRAME LINE 4



PARAPET BACK SHEETING & TRIM: LINE 4

PANELS: 26 Ga. PR - Glvm.Plus



ENDWALL SHEETING & TRIM: FRAME LINE 4

PANELS: 26 Ga. PR - S2000 Standard

[A] PANELS: 26 Ga. PR - Glvm.Plus

NOTE:
FIELD CUT PANEL TO SUIT ROOF SLOPE:

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID ENDWALL

PRELIMINARY ONLY

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
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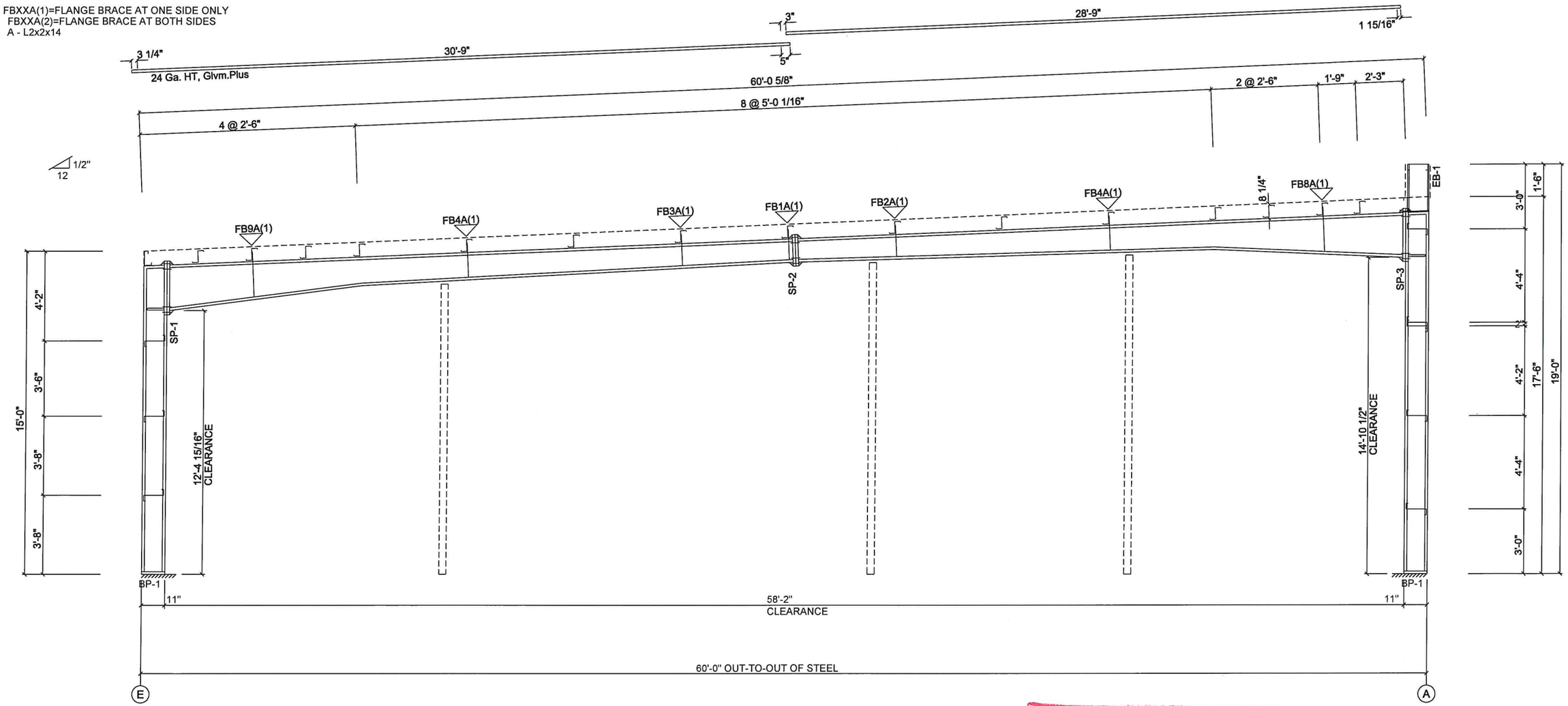
Fax : (281) 443-9064

DESCRIPTION	ENDWALL FRAMING
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
DWG NO	XXX OF XXX
ISSUE	A

SPLICE PLATE & BOLT TABLE									
Mark	Qty Top	Bot	Int	Type	Dia	Length	Width	Thick	Length
SP-1	4	4	0	A325	0.625	2.00	6"	1/2"	2'-5 7/16"
SP-2	4	4	0	A325	0.625	2.00	6"	1/2"	1'-4 3/4"
SP-3	4	4	0	A325	0.625	2.00	6"	1/2"	2'-4 15/16"

BASE PLATE TABLE			
Col Mark	Plate Size Width	Thick	Length
BP-1	8"	1/2"	11 1/2"

FBXXA(1)=FLANGE BRACE AT ONE SIDE ONLY
FBXXA(2)=FLANGE BRACE AT BOTH SIDES
A - L2x2x14



RIGID FRAME ELEVATION: FRAME LINE 1 4

GENERAL NOTES:

CONSTRUCTION NOTES FOR THE RIGID FRAMES.
1. ALL PRIMARY STRUCTURAL STEEL SHALL BE FABRICATED FROM 50 OR 55 KSI STEEL.
2. ALL FIELD CONNECTIONS OF PRIMARY FRAMING MEMBERS SHALL BE BOLTED. WITH A325 H. S. BOLTS AND INSTALLED BY THE 'TURN OF THE NUT' METHOD.
3. ALL FIELD CONNECTIONS OF SECONDARY FRAMING SHALL BE BOLTED WITH A307 MACHINE BOLTS.
4. WELDING PROCESSES USED BY MANUFACTURER ARE IN ACCORDANCE WITH SEC. 1.3 OF AWS D 1.1.
5. A325 High Strength bolt shall be tightened with one washer. Refer to General Notes 1.5 and 1.6 on cover sheet for tightening methods and installation inspections.

PRELIMINARY ONLY

SEALING OF THIS DRAWING DOES NOT IMPLY OR CONSTITUTE THAT RIGID GLOBAL ENGINEER IS THE ENGINEER OF RECORD OR THE DESIGN PROFESSIONAL FOR THIS PROJECT. ONLY THE DESIGN OF THE METAL BUILDING SYSTEM AS FURNISHED BY RIGID IS INCLUDED. FOUNDATION ANALYSIS, ELECTRICAL, AND MECHANICAL SYSTEMS, AND/OR OTHER PARTS SUPPLIED BY ANYONE OTHER THAN RIGID ARE SPECIFICALLY EXCLUDED. NO INSPECTION OR SUPERVISION IS IMPLIED.

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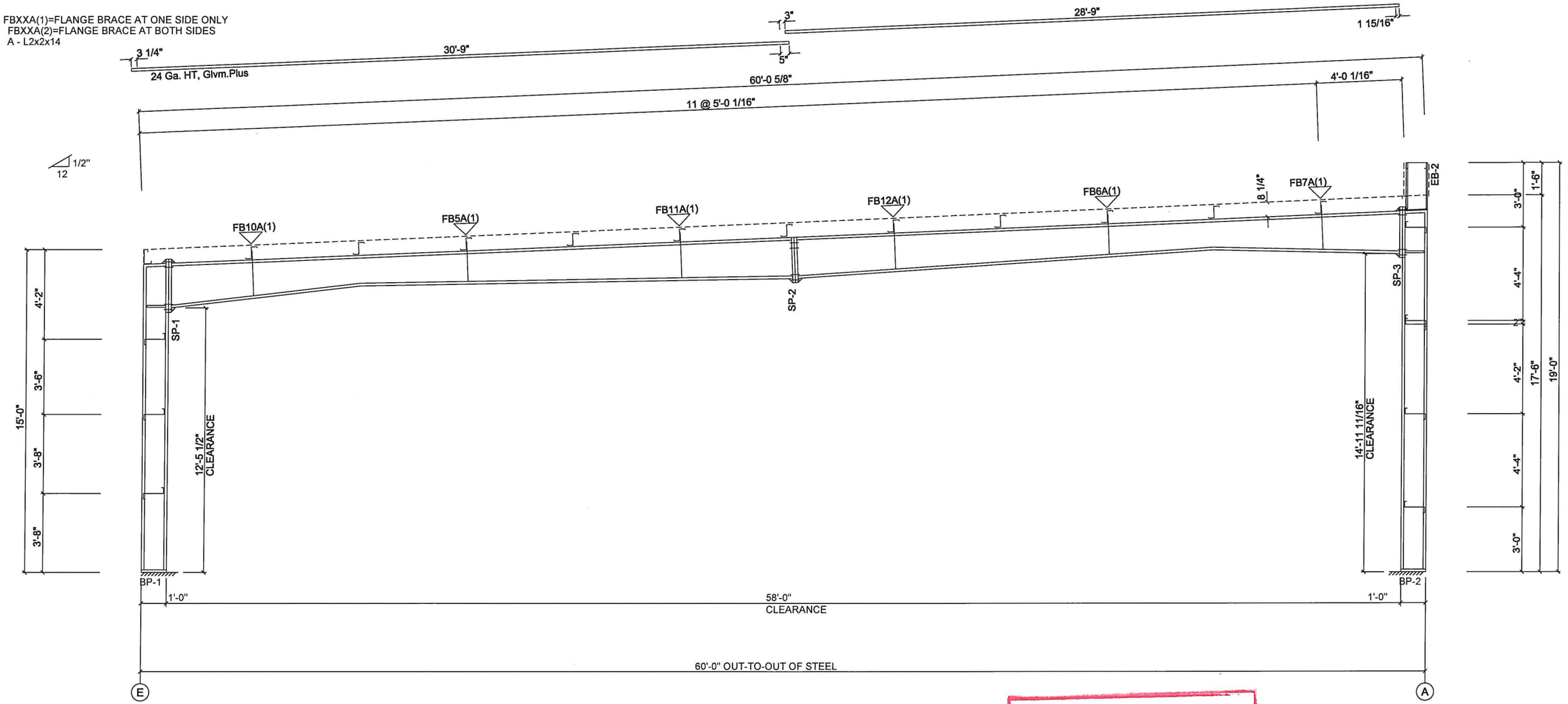
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	RIGID FRAME ELEVATION
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
JOB NO.	SCALE: N.T.S. / DWG NO.: XXX OF XXX / ISSUE: A

SPLICE PLATE & BOLT TABLE									
Mark	Qty Top	Bot	Int	Type	Dia	Length	Width	Thick	Length
SP-1	4	4	0	A325	0.750	2.25	6"	1/2"	2'-4 15/16"
SP-2	4	4	0	A325	0.750	2.75	6"	3/4"	2'-0 1/8"
SP-3	4	4	0	A325	0.750	2.25	6"	1/2"	2'-3 11/16"

BASE PLATE TABLE			
Col Mark	Plate Size Width	Thick	Length
BP-1	8"	1/2"	1'-0 1/2"
BP-2	8"	1/2"	1'-0 1/2"

FBXXA(1)=FLANGE BRACE AT ONE SIDE ONLY
FBXXA(2)=FLANGE BRACE AT BOTH SIDES
A - L2x2x14



RIGID FRAME ELEVATION: FRAME LINE 2 3

GENERAL NOTES:

CONSTRUCTION NOTES FOR THE RIGID FRAMES.
1. ALL PRIMARY STRUCTURAL STEEL SHALL BE FABRICATED FROM 50 OR 55 KSI STEEL.
2. ALL FIELD CONNECTIONS OF PRIMARY FRAMING MEMBERS SHALL BE BOLTED WITH A325 H. S. BOLTS AND INSTALLED BY THE 'TURN OF THE NUT' METHOD.
3. ALL FIELD CONNECTIONS OF SECONDARY FRAMING SHALL BE BOLTED WITH A307 MACHINE BOLTS.
4. WELDING PROCESSES USED BY MANUFACTURER ARE IN ACCORDANCE WITH SEC. 1.3 OF AWS D 1.1.
5. A325 High Strength bolt shall be tightened with one washer. Refer to General Notes 1.5 and 1.6 on cover sheet for tightening methods and installation inspections.

PRELIMINARY ONLY

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ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
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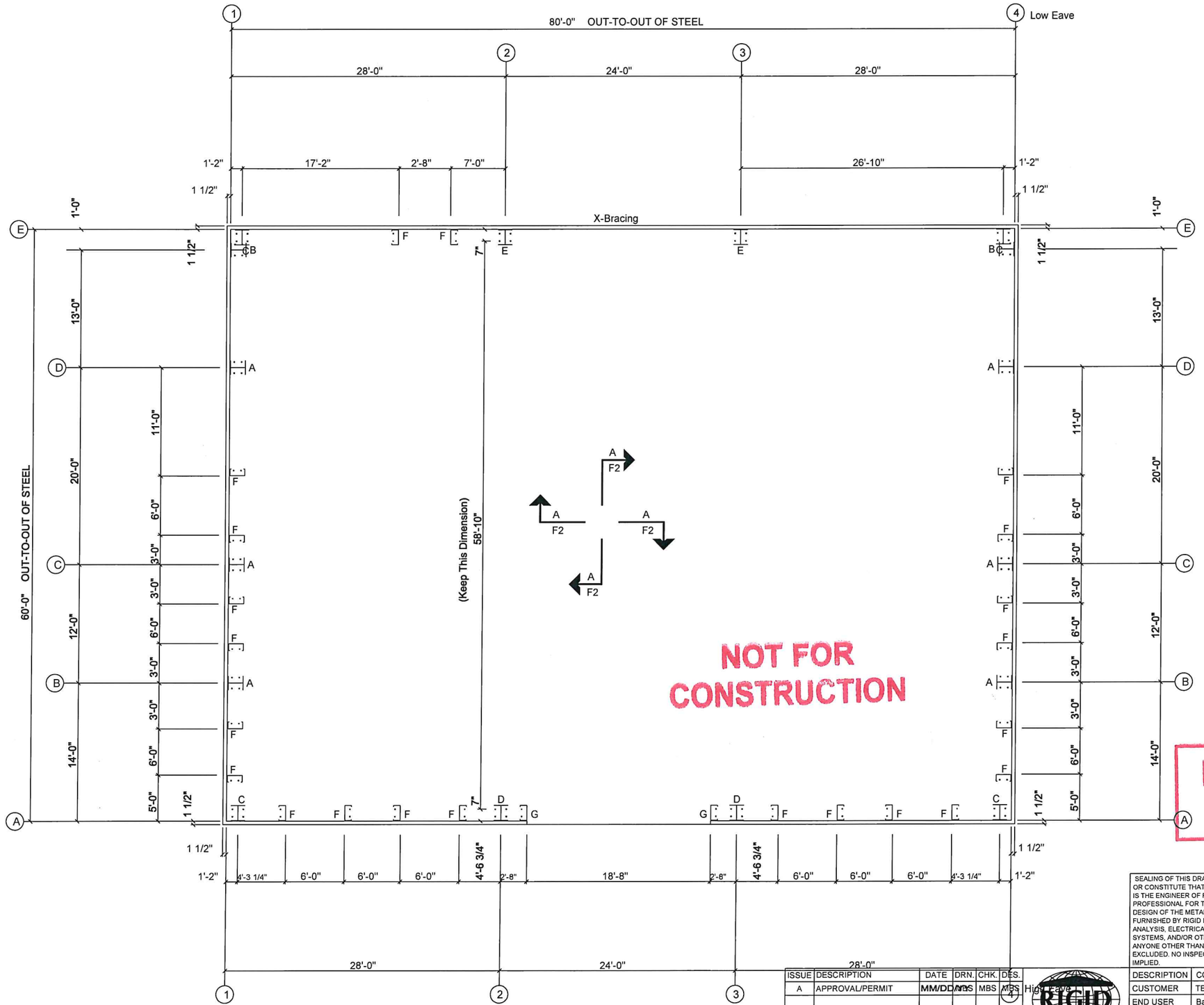
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	RIGID FRAME ELEVATION		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	A
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
JOB NO.	SCALE N.T.S.	DWG NO. XXX OF XXX	SHEET A

Dia= 5/8"
Dia= 3/4"
Dia= 7/8"



NOT FOR CONSTRUCTION

PRELIMINARY ONLY

COLUMN LAYOUT PLAN

NOTE: All Base Plates @ 100'-0" (U.N.)

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ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
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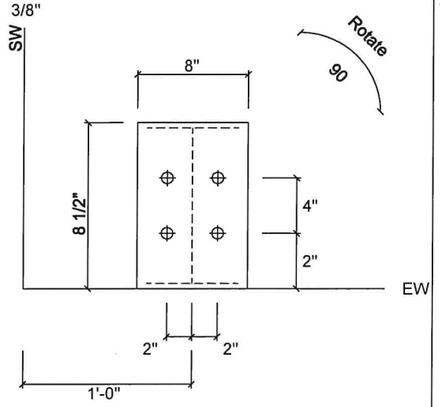
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

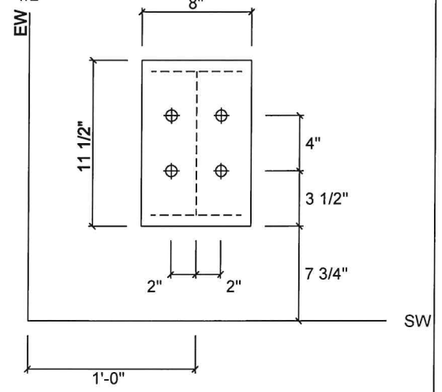
DESCRIPTION	COLUMN LAYOUT PLAN
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
DWG No.	XXX OF XXX
REV.	A

Dia= 3/4"
Thk= 3/8"



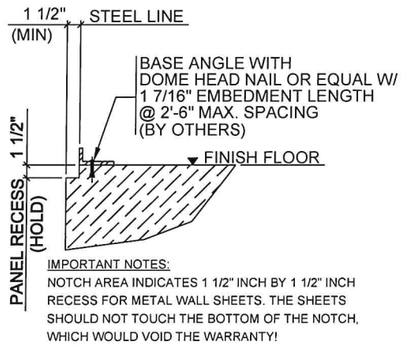
DETAIL A

Dia= 3/4"
Thk= 1/2"



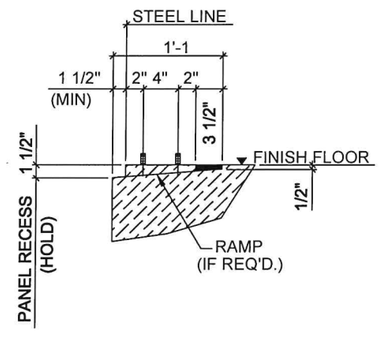
DETAIL B

NOT FOR CONSTRUCTION

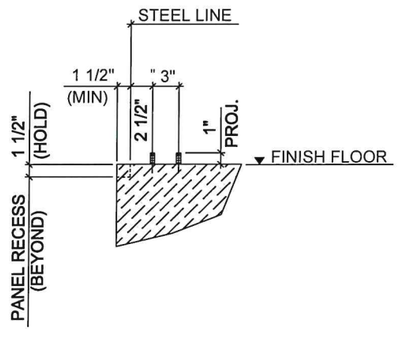


IMPORTANT NOTES:
NOTCH AREA INDICATES 1 1/2" INCH BY 1 1/2" INCH RECESS FOR METAL WALL SHEETS. THE SHEETS SHOULD NOT TOUCH THE BOTTOM OF THE NOTCH, WHICH WOULD VOID THE WARRANTY!

A TYP. SECTION THRU PANEL RECESS



B TYP. SECTION THRU FRAMED OPENING



C TYP. SECTION THRU WALK DOOR

PRELIMINARY ONLY

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GENERAL NOTES:

1. THE ANCHOR BOLT DETAILS SHOWN ON THIS DRAWING LOCATE THE ANCHOR BOLTS IN REFERENCE TO BOTH THE BUILDING STEEL LINE AND THE OUTSIDE OF RIGID'S SUGGESTED PANEL RECESS OF 1-1/2".
2. THE ANCHOR BOLT SETTING PLAN LOCATES ANCHOR BOLTS IN REFERENCE TO THE OUTSIDE OF THE PANEL RECESS SHOWN. IF THE ACTUAL PANEL RECESS IS DIFFERENT FROM WHAT IS SHOWN ON THE ANCHOR BOLT SETTING PLAN, THEN ALL REFERENCE DIMENSIONS FROM THE OUTSIDE OF THE PANEL RECESS MUST BE DETERMINED BY THE CUSTOMER.
3. BOTTOM OF ALL BASE PLATES ARE AT THE SAME ELEVATION. (UNLESS NOTED)

NOTE:

ONLY ANCHOR BOLTS SETTING PLAN ISSUED & STAMPED "FOR CONSTRUCTION" SHALL BE USED IN SETTING ANCHOR BOLTS. 'RIGID GLOBAL BUILDINGS' SHALL NOT BE RESPONSIBLE FOR ERROR OR DISCREPANCY IF THE DRAWING USED IS NOT VALID FOR CONSTRUCTION.

QTY.	SYMBOL	DIA.	PROJ.
0	✦	1/2"	1"
0	⊕	5/8"	2"
0	⊕	3/4"	2 1/2"
0	⊕	7/8"	2 3/4"
0	⊕	1"	3"
0	⊕	1 1/8"	3 1/2"
0	⊕	1 1/2"	3 1/2"

ANCHOR BOLT DETAIL

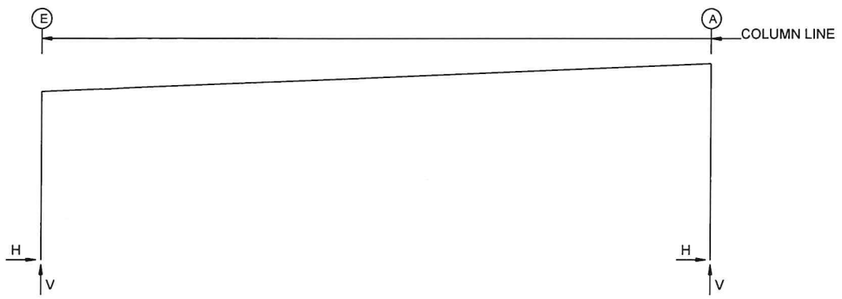
ANCHOR BOLT PROJECTION "PROJ." IS MEASURED FROM BOTTOM OF BASE PLATE	DETAIL OF ANCHOR BOLT AS PER THE SUPPLIER
LENGHT OF "PROJ." SHOWN IS FOR ONE NUT + ONE WASHER	NUTS & WASHERS BY SUPPLIER
ANCHOR BOLTS NOT BY RIGID GLOBAL BUILDINGS	

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT DETAILS		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	B
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
ENG'S NO.	JOB NO.	SCALE: N.T.S.	SHT. NO. XXX OF XXX
			REV. A

FRAME LINES: 1 2 3 4



RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1*	E	1	4.7	7.2	2	-8.6	-9.9	4	0.750	8.000	11.50	0.500	0.0
1*	A	3	6.1	-5.9	1	-4.7	7.3	4	0.750	8.000	11.50	0.500	0.0
		1	-4.7	7.3	5	5.3	-9.4						
1*	Frame lines:	1 4											

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
2*	E	1	6.5	12.0	2	-9.7	-13.1	4	0.875	8.000	12.50	0.500	0.0
					4	-4.4	-17.6						
2*	A	3	7.3	-8.5	1	-6.5	12.1	4	0.750	8.000	12.50	0.500	0.0
		1	-6.5	12.1	4	4.8	-17.7						
2*	Frame lines:	2 3											

NOTES FOR REACTIONS

1. All loading conditions are examined and only maximum/minimum H or V and the corresponding H or V are reported.
2. Positive reactions are as shown in the sketch. Foundation loads are in opposite directions.
3. Bracing reactions are in the plane of the brace with the H pointing away from the braced bay. The vertical reaction is downward.
4. Building reactions are based on the following building data:

Width (ft)	=	60.0
Length (ft)	=	80.0
Eave Height (ft)	=	15.0/ 17.5
Roof Slope (rise/12)	=	0.5
Dead Load (psf)	=	2.5
Collateral Load (psf)	=	0.0
Roof Live Load(psf)	=	20.0
Frame Live Load(psf)	=	12.0
Wind Speed (mph)	=	138.0
Wind Code	=	IBC 15
Exposure	=	C
Closed/Open	=	C
Importance Wind	=	1.00
Importance Seismic	=	1.00
Seismic Zone	=	A
Seismic Coeff (Fa*Ss)	=	0.11

5. Loading conditions are:
   1. Dead+Collateral+Live
   2. 0.6Dead+0.6Wind_Left1
   3. 0.6Dead+0.6Wind_Right1
   4. 0.6Dead+0.6Wind_Long1L
   5. 0.6Dead+0.6Wind_Long1R
   6. 0.6Dead+0.6Wind_Right2+0.6Wind_Suction
   7. 0.6Dead+0.6Wind_Pressure+0.6Wind_Long2L
   8. Dead+0.6Wind_Right2+0.6Wind_Suction

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	-----Dead---- Horiz	Vert	-----Live---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert
1*	E	1.1	1.9	3.7	5.2	-15.5	-18.4	-1.6	-8.5	-13.0	-12.8	0.9	-3.0
1*	A	-1.1	2.0	-3.7	5.3	8.3	-16.5	11.2	-11.8	5.8	-10.9	8.7	-6.3
2*	E	1.4	2.8	5.1	9.1	-17.5	-24.7	-0.3	-12.5	-14.4	-15.1	2.8	-2.8
2*	A	-1.4	2.9	-5.1	9.2	7.7	-22.0	13.5	-17.1	4.6	-12.3	10.3	-7.4

Frame Line	Column Line	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert	-Seismic_Long Horiz	Vert
1*	E	-9.3	-17.2	-4.6	-10.2	-0.1	0.0	0.1	0.0	0.0	0.0
1*	A	10.0	-17.6	4.6	-10.2	-0.1	0.0	0.1	0.0	0.0	0.0
2*	E	-8.8	-32.1	-4.4	-23.7	-0.1	0.0	0.1	0.0	0.0	-0.2
2*	A	9.3	-32.4	4.2	-23.6	-0.1	0.0	0.1	0.0	0.0	-0.2

1* Frame lines: 1 4
2* Frame lines: 2 3

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz
1	E	0.2	-0.7	1.1
1	D	0.2	-2.5	3.1
1	C	0.2	-3.0	3.5
1	B	0.2	-2.6	3.0
4	B	0.2	-2.6	3.0
4	C	0.2	-3.0	3.5
4	D	0.2	-2.5	3.1
4	E	0.2	-0.7	1.1

ENDWALL COLUMN: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1	E	6	0.6	0.1	7	-0.4	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	0.6	0.2									
1	D	6	1.8	0.1	7	-1.5	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
1	C	6	2.1	0.1	7	-1.8	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	2.1	0.2									
1	B	6	1.8	0.1	7	-1.6	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	B	6	1.8	0.1	7	-1.6	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	C	6	2.1	0.1	7	-1.8	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	2.1	0.2									
4	D	6	1.8	0.1	7	-1.5	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	E	6	0.6	0.1	7	-0.4	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	0.6	0.2									

BUILDING BRACING REACTIONS

Wall Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1								(h)
F_SW	A	2,3	6.8	8.9	0.2	0.2			(b)
R_EW	4								(h)
B_SW	E	3,2	16.1	8.9	0.3	0.2			

(b)Wind bent in bay, base above finish floor
(h)Rigid frame at endwall

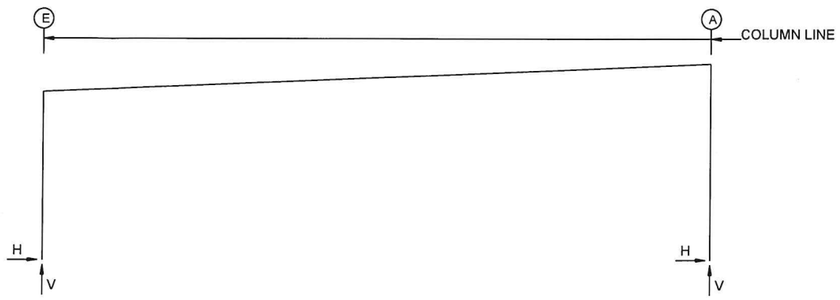
PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
DRWG. NO.	XXX OF XXX
ISSUE	A

FRAME LINES: 1 2 3 4



RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1*	E	1	4.7	7.2	2	-8.6	-9.9	4	0.750	8.000	11.50	0.500	0.0
1*	A	3	6.1	-5.9	1	-4.7	7.3	4	0.750	8.000	11.50	0.500	0.0
		1	-4.7	7.3	5	5.3	-9.4						
1*	Frame lines:	1 4											

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
2*	E	1	6.5	12.0	2	-9.7	-13.1	4	0.875	8.000	12.50	0.500	0.0
					4	-4.4	-17.6						
2*	A	3	7.3	-8.5	1	-6.5	12.1	4	0.750	8.000	12.50	0.500	0.0
		1	-6.5	12.1	4	4.8	-17.7						
2*	Frame lines:	2 3											

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	-----Dead---- Horiz	Vert	-----Live---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert
1*	E	1.1	1.9	3.7	5.2	-15.5	-18.4	-1.6	-8.5	-13.0	-12.8	0.9	-3.0
1*	A	-1.1	2.0	-3.7	5.3	8.3	-16.5	11.2	-11.8	5.8	-10.9	8.7	-6.3
2*	E	1.4	2.8	5.1	9.1	-17.5	-24.7	-0.3	-12.5	-14.4	-15.1	2.8	-2.8
2*	A	-1.4	2.9	-5.1	9.2	7.7	-22.0	13.5	-17.1	4.6	-12.3	10.3	-7.4

Frame Line	Column Line	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert	-Seismic_Long Horiz	Vert
1*	E	-9.3	-17.2	-4.6	-10.2	-0.1	0.0	0.1	0.0	0.0	0.0
1*	A	10.0	-17.6	4.6	-10.2	-0.1	0.0	0.1	0.0	0.0	0.0
2*	E	-8.8	-32.1	-4.4	-23.7	-0.1	0.0	0.1	0.0	0.0	-0.2
2*	A	9.3	-32.4	4.2	-23.6	-0.1	0.0	0.1	0.0	0.0	-0.2

1* Frame lines: 1 4
2* Frame lines: 2 3

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING: A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
DRW. No.	XXX OF XXX
ISSUE	A

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz
1	E	0.2	-0.7	1.1
1	D	0.2	-2.5	3.1
1	C	0.2	-3.0	3.5
1	B	0.2	-2.6	3.0
4	B	0.2	-2.6	3.0
4	C	0.2	-3.0	3.5
4	D	0.2	-2.5	3.1
4	E	0.2	-0.7	1.1

ENDWALL COLUMN: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1	E	6	0.6	0.1	7	-0.4	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	0.6	0.2									
1	D	6	1.8	0.1	7	-1.5	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
1	C	6	2.1	0.1	7	-1.8	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	2.1	0.2									
1	B	6	1.8	0.1	7	-1.6	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	B	6	1.8	0.1	7	-1.6	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	C	6	2.1	0.1	7	-1.8	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	2.1	0.2									
4	D	6	1.8	0.1	7	-1.5	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	1.8	0.2									
4	E	6	0.6	0.1	7	-0.4	0.1	4	0.750	8.000	12.50	0.375	0.0
		8	0.6	0.2									

NOTES FOR REACTIONS

1. All loading conditions are examined and only maximum/minimum H or V and the corresponding H or V are reported.
2. Positive reactions are as shown in the sketch. Foundation loads are in opposite directions.
3. Bracing reactions are in the plane of the brace with the H pointing away from the braced bay. The vertical reaction is downward.
4. Building reactions are based on the following building data:

Width (ft)	=	60.0
Length (ft)	=	80.0
Eave Height (ft)	=	15.0/ 17.5
Roof Slope (rise/12)	=	0.5
Dead Load (psf)	=	2.5
Collateral Load (psf)	=	0.0
Roof Live Load(psf)	=	20.0
Frame Live Load(psf)	=	12.0
Wind Speed (mph)	=	138.0
Wind Code	=	IBC 15
Exposure	=	C
Closed/Open	=	C
Importance Wind	=	1.00
Importance Seismic	=	1.00
Seismic Zone	=	A
Seismic Coeff (Fa*Ss)	=	0.11

5. Loading conditions are:
   1 Dead+Collateral+Live
   2 0.6Dead+0.6Wind_Left1
   3 0.6Dead+0.6Wind_Right1
   4 0.6Dead+0.6Wind_Long1L
   5 0.6Dead+0.6Wind_Long1R
   6 0.6Dead+0.6Wind_Right2+0.6Wind_Suction
   7 0.6Dead+0.6Wind_Pressure+0.6Wind_Long2L
   8 Dead+0.6Wind_Right2+0.6Wind_Suction

BUILDING BRACING REACTIONS

Wall Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1								(h)
F_SW	A	2,3	6.8	8.9	0.2	0.2			(b)
R_EW	4								(h)
B_SW	E	3,2	16.1	8.9	0.3	0.2			

(b)Wind bent in bay, base above finish floor
(h)Rigid frame at endwall

PRELIMINARY ONLY

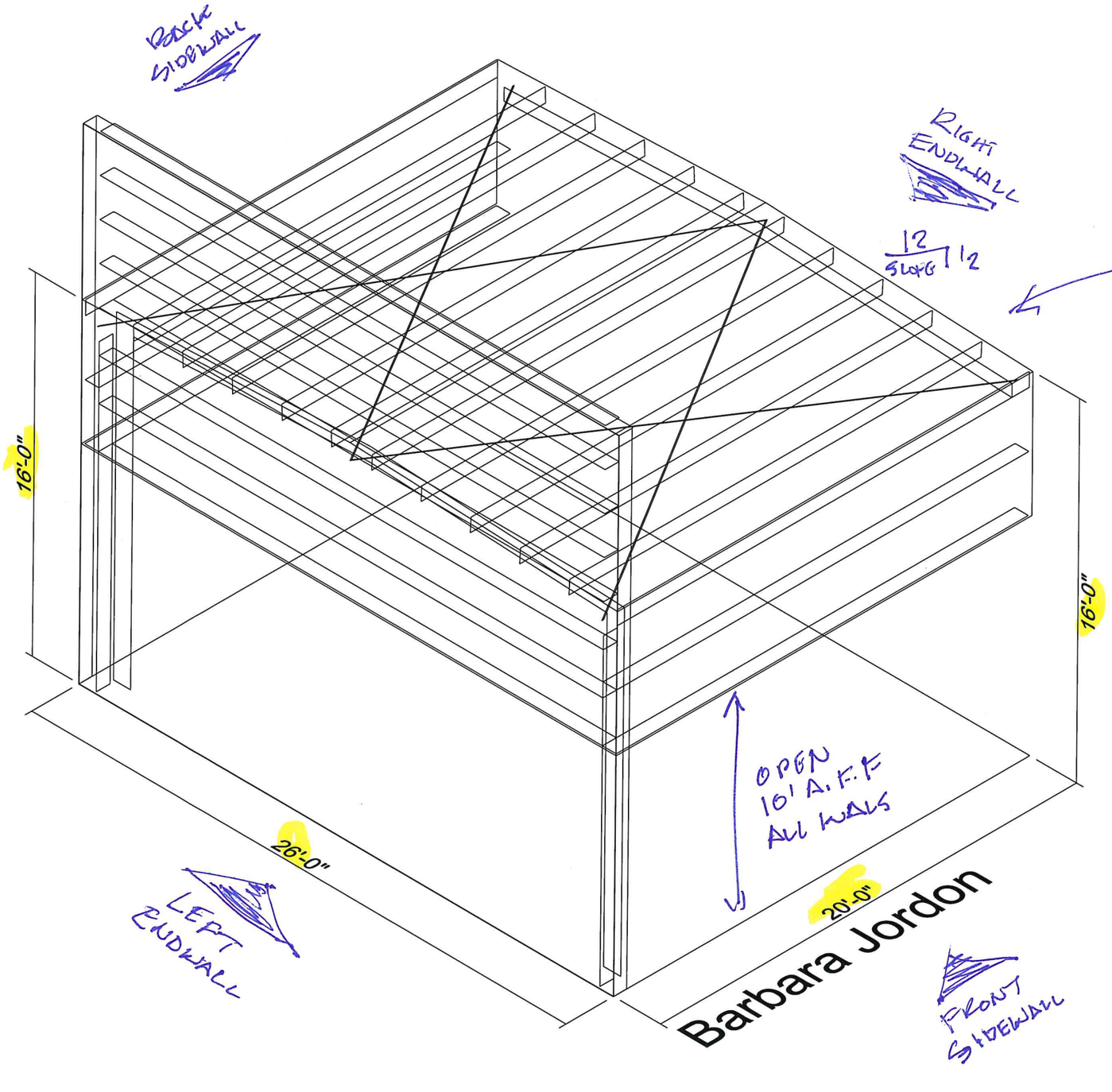
SEALING OF THIS DRAWING DOES NOT IMPLY OR CONSTITUTE THAT RIGID GLOBAL ENGINEER IS THE ENGINEER OF RECORD OR THE DESIGN PROFESSIONAL FOR THIS PROJECT. ONLY THE DESIGN OF THE METAL BUILDING SYSTEM AS FURNISHED BY RIGID IS INCLUDED. FOUNDATION ANALYSIS, ELECTRICAL, AND MECHANICAL SYSTEMS, AND/OR OTHER PARTS SUPPLIED BY ANYONE OTHER THAN RIGID ARE SPECIFICALLY EXCLUDED. NO INSPECTION OR SUPERVISION IS IMPLIED.

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
16933 Aldine Westfield
Houston, Tx. 77073
Phone . (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING A
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SALES NO.	JOB NO. / SCALE N.T.S. / DWG NO. XXX OF XXX / ISSUE A

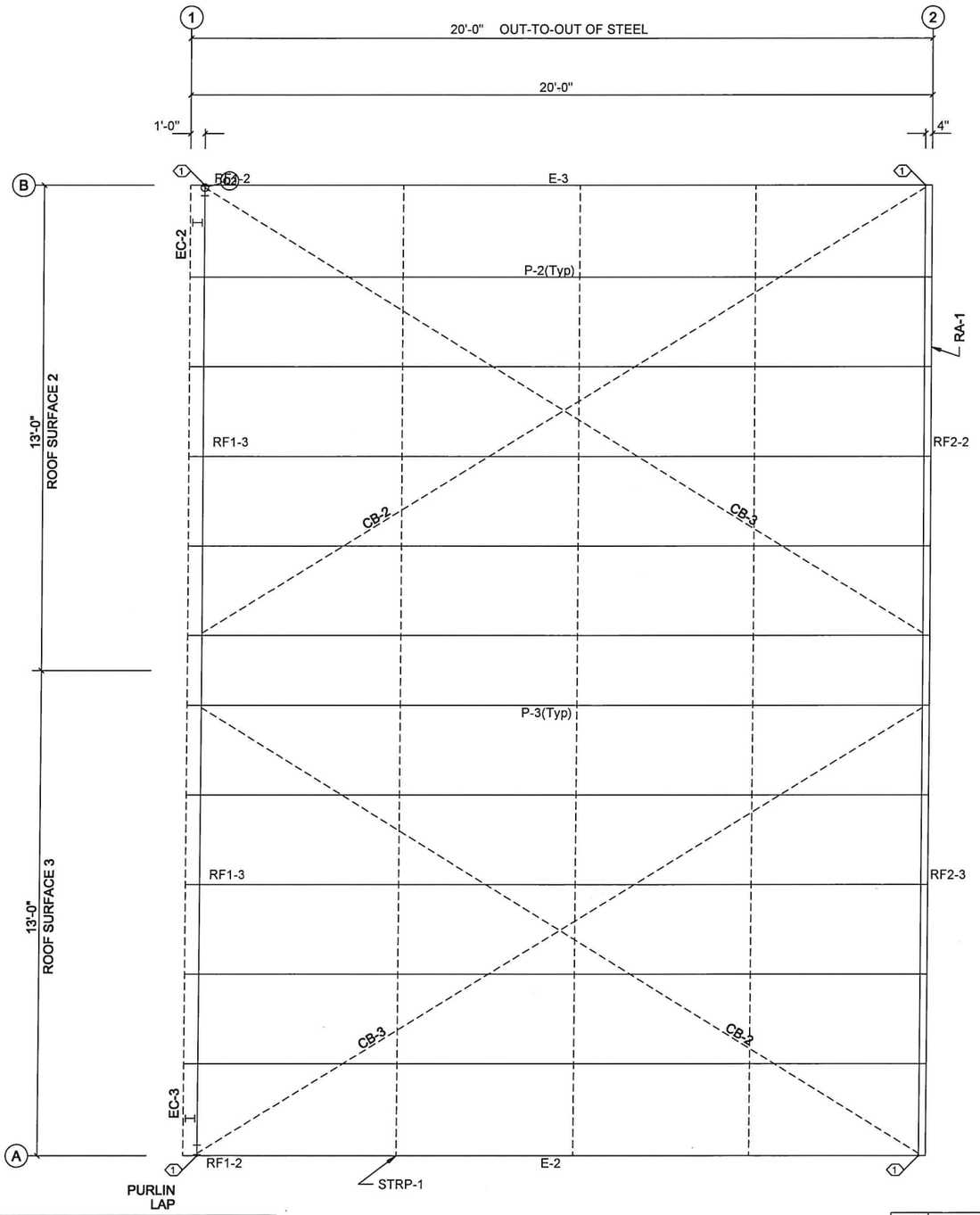
BLDG "B"
ENTRY CANOPY



Barbara Jordon

PRELIMINARY ONLY

SPECIAL BOLTS ROOF PLAN					
ID	QUAN	TYPE	DIA	LENGTH	WASH
1	4	A307	1/2"	1 1/4"	0



IMPORTANT NOTES:

High R-value roof insulation systems require two layers of insulation. The sag straps that prevent purlin roll may conflict with faced roof insulation between purlins. Rigid Global Buildings recommends an unfaced layer between the purlins that can be cut around the required framing.

ROOF FRAMING PLAN

PRELIMINARY ONLY

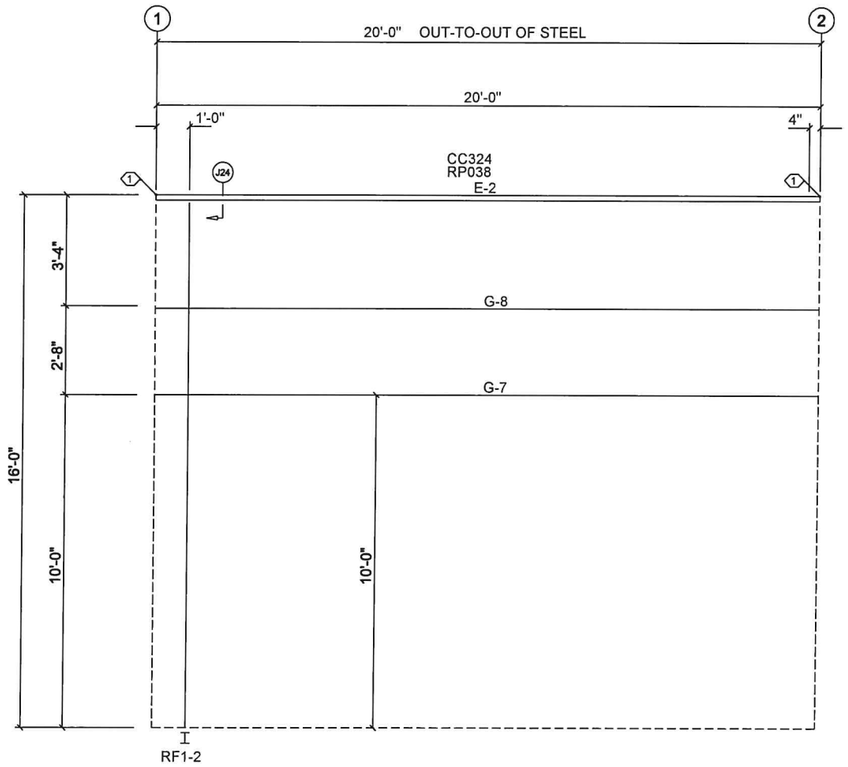
Roof

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

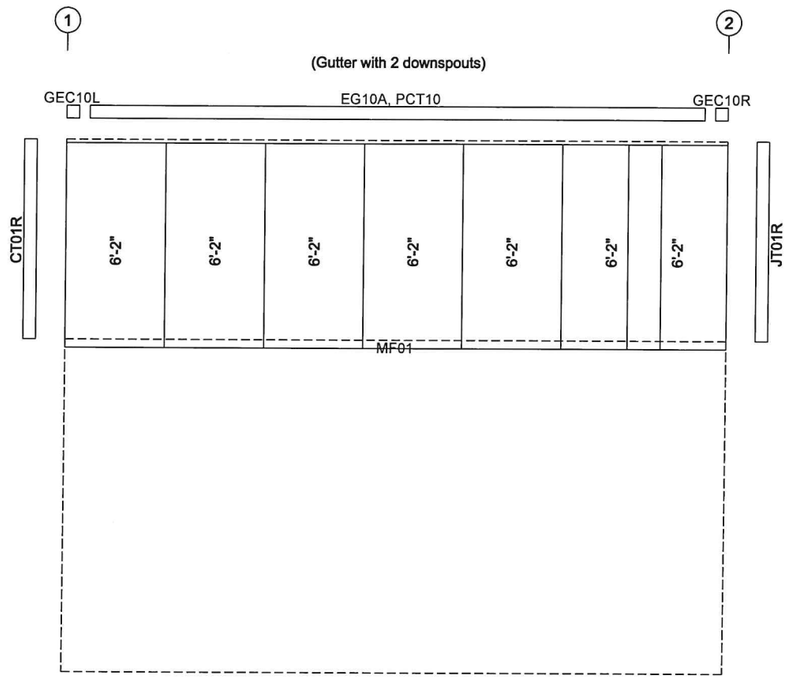
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ROOF FRAMING				
CUSTOMER	TBD				
END USER	Barbara Jordon Youth Park Center				
END USE	Recreation	BUILDING	B		
STREET	8702 Nobel Street				
CITY ST ZIP	Needville, TX 77461				
JOB NO.	SCALE: N.T.S.	DWG NO. XXX OF XXX	ISSUE A		

SPECIAL BOLTS					
ID	QUAN	TYPE	DIA	LENGTH	WASH
1	4	A307	1/2"	1 1/4"	0



SIDEWALL FRAMING: FRAME LINE A



SIDEWALL SHEETING & TRIM: FRAME LINE A

26 Ga. PR - S2000 Standard

PRELIMINARY ONLY

Front Sidewall

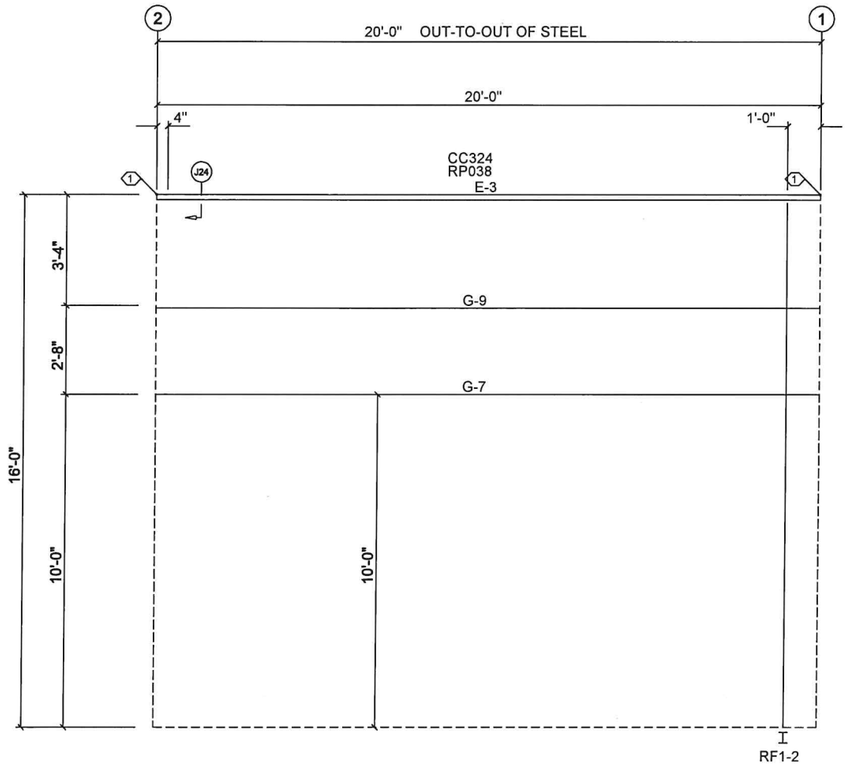
SEALING OF THIS DRAWING DOES NOT IMPLY OR CONSTITUTE THAT RIGID GLOBAL ENGINEER IS THE ENGINEER OF RECORD OR THE DESIGN PROFESSIONAL FOR THIS PROJECT. ONLY THE DESIGN OF THE METAL BUILDING SYSTEM AS FURNISHED BY RIGID IS INCLUDED. FOUNDATION ANALYSIS, ELECTRICAL, AND MECHANICAL SYSTEMS, AND/OR OTHER PARTS SUPPLIED BY ANYONE OTHER THAN RIGID ARE SPECIFICALLY EXCLUDED. NO INSPECTION OR SUPERVISION IS IMPLIED.

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

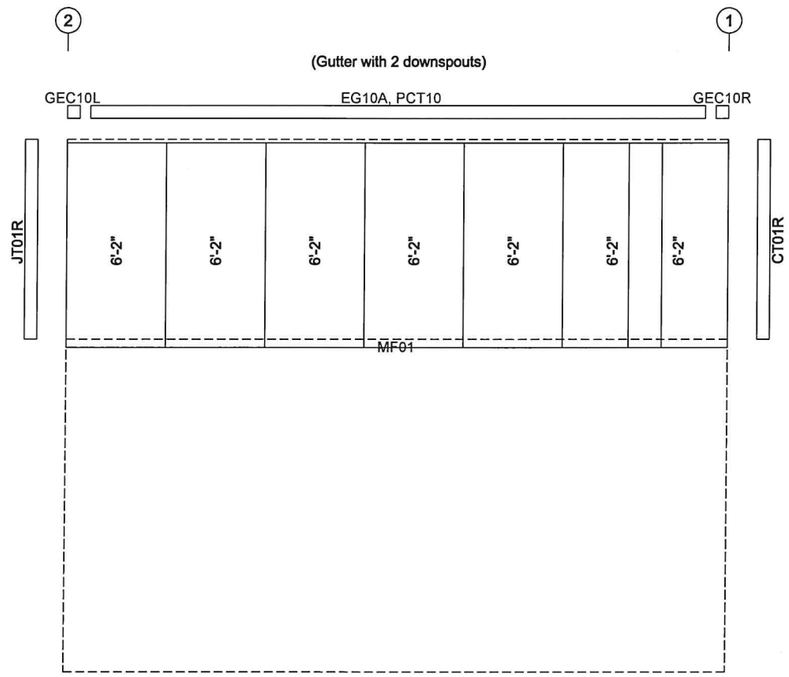
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	SIDEWALL FRAMING
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING: B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
	N.T.S. / XXX OF XXX / A

SPECIAL BOLTS					
ID	QUAN	TYPE	DIA	LENGTH	WASH
1	4	A307	1/2"	1 1/4"	0



SIDEWALL FRAMING: FRAME LINE B



SIDEWALL SHEETING & TRIM: FRAME LINE B

26 Ga. PR - S2000 Standard

PRELIMINARY ONLY

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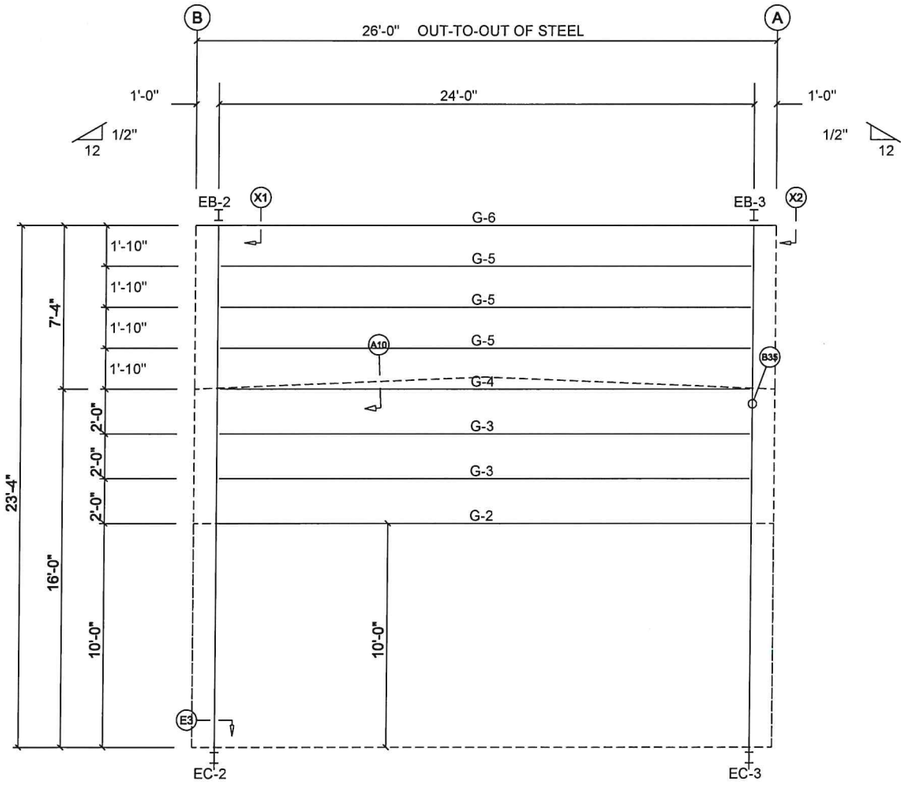
BACK SIDEWALL

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

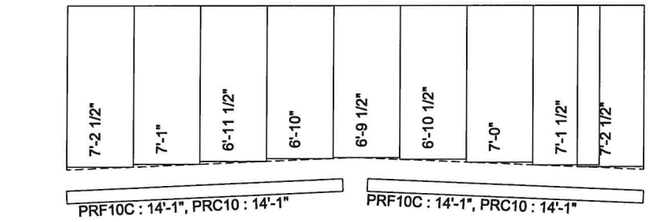
RIGID GLOBAL BUILDINGS
16933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	SIDEWALL FRAMING			
CUSTOMER	TBD			
END USER	Barbara Jordon Youth Park Center			
END USE	Recreation	BUILDING	B	
STREET	8702 Nobel Street			
CITY ST ZIP	Needville, TX 77461			
PROJECT NO	SCALE: N.T.S.	DWG NO: XXX OF XXX	REV: A	

BOLT TABLE FRAME LINE 1				
LOCATION	QUAN	TYPE	DIA	LENGTH
Columns/Raf	2	A325	1/2"	1 1/4"
EB-2	4	A325	3/4"	1 1/2"
EB-3	4	A325	3/4"	1 1/2"

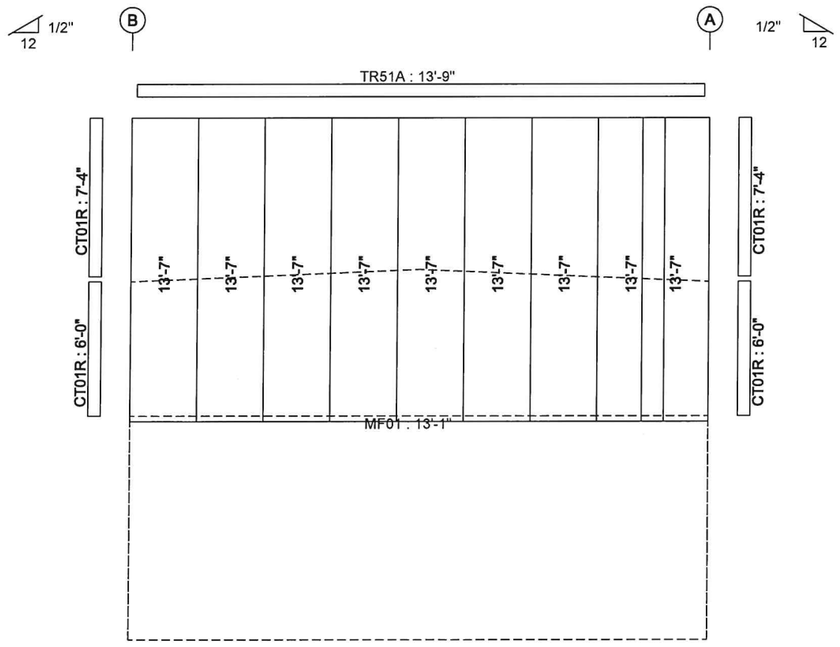


ENDWALL FRAMING: FRAME LINE 1



PARAPET BACK SHEETING & TRIM: LINE 1

PANELS: 26 Ga. PR - Glvm.Plus



ENDWALL SHEETING & TRIM: FRAME LINE 1

PANELS: 26 Ga. PR - S2000 Standard

LEFT ENDWALL

PRELIMINARY ONLY

NOTE:
FIELD CUT PANEL TO SUIT ROOF SLOPE:

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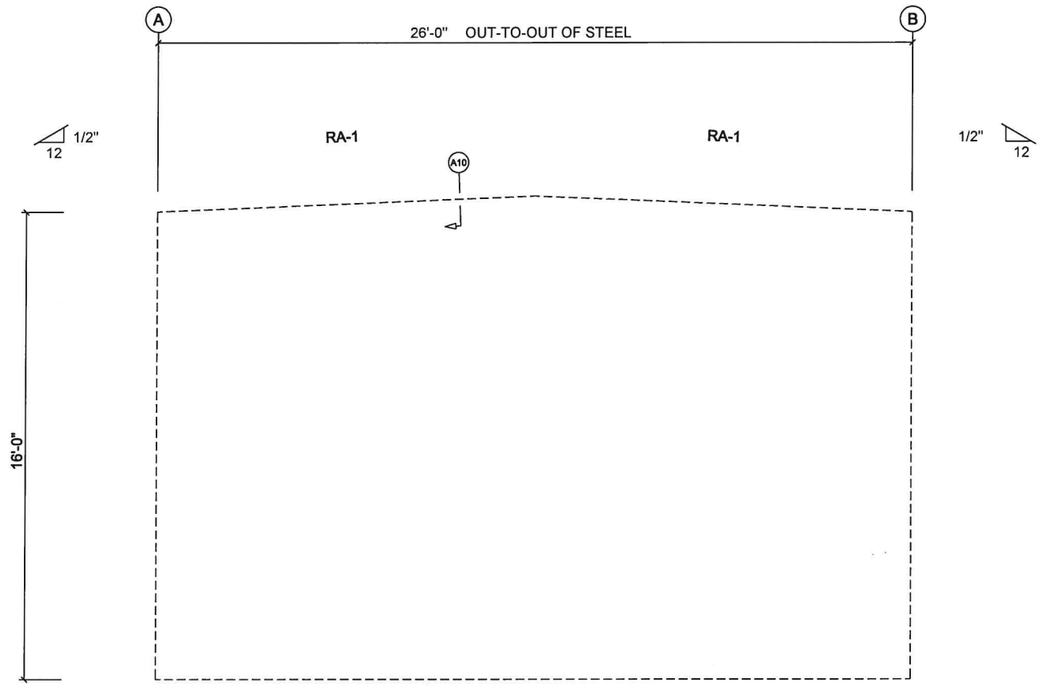
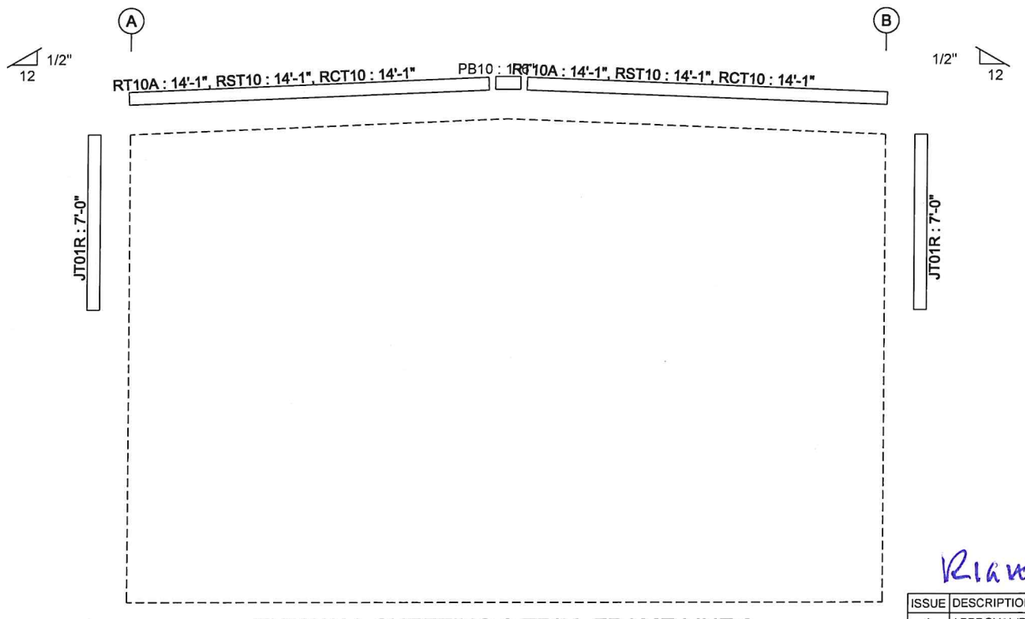
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ENDWALL FRAMING
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING: B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
JOB NO.	SCALE: N.T.S. / DWG NO. XXX OF XXX / ISSUE A



ENDWALL FRAMING: FRAME LINE 2



ENDWALL SHEETING & TRIM: FRAME LINE 2

NOTE:
FIELD CUT PANEL TO SUIT ROOF SLOPE:

PRELIMINARY ONLY

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RIGHT ENDWALL

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

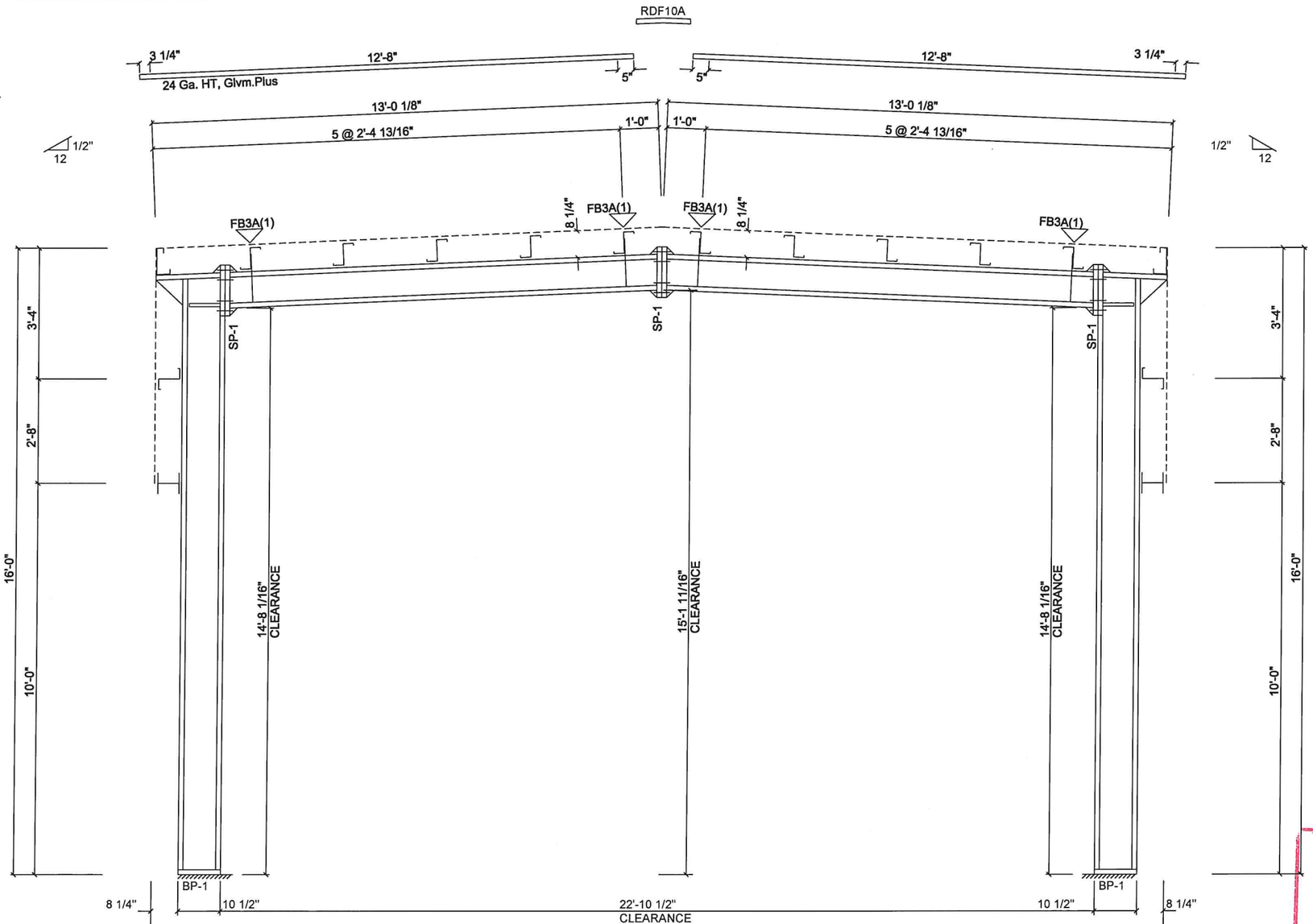
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ENDWALL FRAMING		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	B
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
DATE NO.	JOB NO.	SCALE N.T.S.	SHT. NO. XXX OF XXX ISSUE A

SPLICE PLATE & BOLT TABLE									
Mark	Qty Top	Bot	Int	Type	Dia	Length	Width	Thick	Length
SP-1	4	4	0	A325	0.625	2.00	6"	1/2"	1'-2 3/4"

BASE PLATE TABLE			
Col Mark	Plate Size Width	Thick	Length
BP-1	8"	1/2"	11 1/2"

FBXXA(1)=FLANGE BRACE AT ONE SIDE ONLY
FBXXA(2)=FLANGE BRACE AT BOTH SIDES
A - L2x2x14



PRELIMINARY ONLY

GENERAL NOTES:

CONSTRUCTION NOTES FOR THE RIGID FRAMES.
1. ALL PRIMARY STRUCTURAL STEEL SHALL BE FABRICATED FROM 50 OR 55 KSI STEEL.
2. ALL FIELD CONNECTIONS OF PRIMARY FRAMING MEMBERS SHALL BE BOLTED. WITH A325 H. S. BOLTS AND INSTALLED BY THE 'TURN OF THE NUT' METHOD.
3. ALL FIELD CONNECTIONS OF SECONDARY FRAMING SHALL BE BOLTED WITH A307 MACHINE BOLTS.
4. WELDING PROCESSES USED BY MANUFACTURER ARE IN ACCORDANCE WITH SEC. 1.3 OF AWS D 1.1.
5. A325 High Strength bolt shall be tightened with one washer. Refer to General Notes 1.5 and 1.6 on cover sheet for tightening methods and installation inspections.

RIGID FRAME ELEVATION: FRAME LINE 1

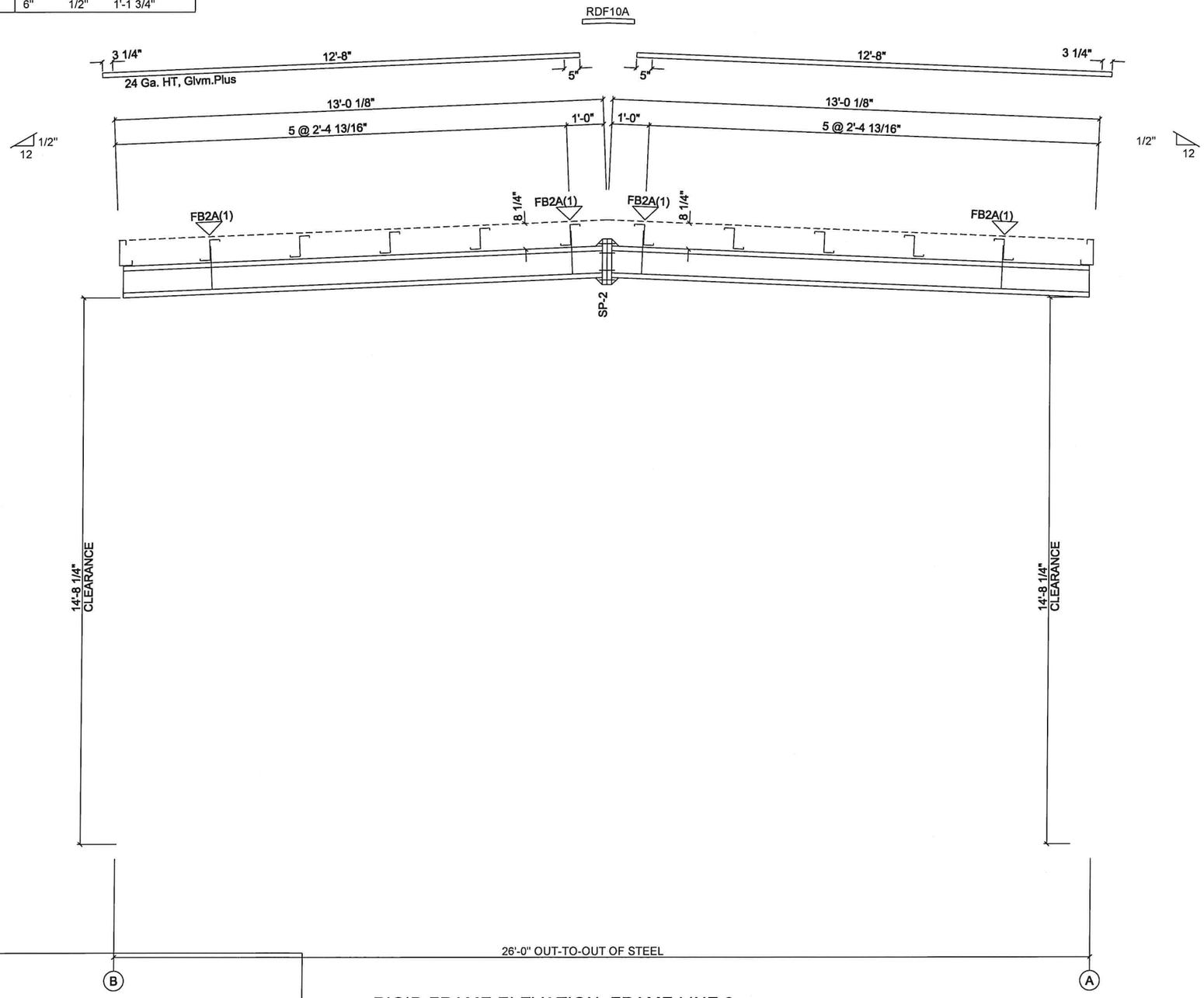
ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	RIGID FRAME ELEVATION
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING: B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
DRW. No.	XXX OF XXX
ISSUE	A

SPLICE PLATE & BOLT TABLE									
Mark	Qty Top	Bot	Int	Type	Dia	Length	Width	Thick	Length
SP-1	2	1	0	A325	0.625	1.00	"	"	7"
SP-2	4	4	0	A325	0.625	2.00	6"	1/2"	1'-1 3/4"

FBXXA(1)=FLANGE BRACE AT ONE SIDE ONLY
FBXXA(2)=FLANGE BRACE AT BOTH SIDES
A - L2x2x14



RIGID FRAME ELEVATION: FRAME LINE 2

GENERAL NOTES:

CONSTRUCTION NOTES FOR THE RIGID FRAMES.

1. ALL PRIMARY STRUCTURAL STEEL SHALL BE FABRICATED FROM 50 OR 55 KSI STEEL.
2. ALL FIELD CONNECTIONS OF PRIMARY FRAMING MEMBERS SHALL BE BOLTED. WITH A325 H. S. BOLTS AND INSTALLED BY THE 'TURN OF THE NUT' METHOD.
3. ALL FIELD CONNECTIONS OF SECONDARY FRAMING SHALL BE BOLTED WITH A307 MACHINE BOLTS.
4. WELDING PROCESSES USED BY MANUFACTURER ARE IN ACCORDANCE WITH SEC. 1.3 OF AWS D 1.1.
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A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
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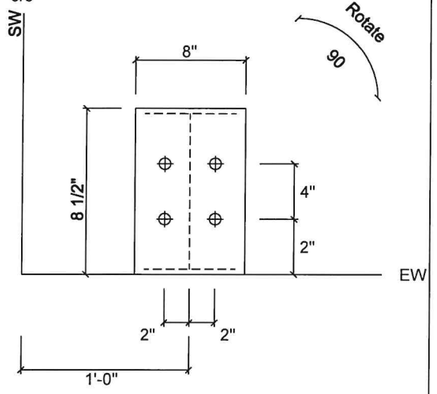
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

PRELIMINARY ONLY

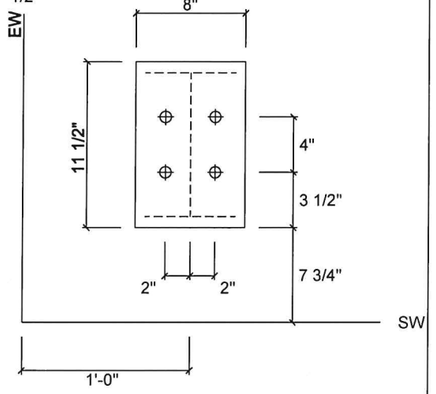
DESCRIPTION	RIGID FRAME ELEVATION
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING: B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE: N.T.S.	DWG NO: XXX OF XXX / ISSUE: A

Dia= 3/4"
Thk= 3/8"



DETAIL A

Dia= 3/4"
Thk= 1/2"



DETAIL B

NOT FOR CONSTRUCTION

PRELIMINARY ONLY

GENERAL NOTES:

1. THE ANCHOR BOLT DETAILS SHOWN ON THIS DRAWING LOCATE THE ANCHOR BOLTS IN REFERENCE TO BOTH THE BUILDING STEEL LINE AND THE OUTSIDE OF RIGID'S SUGGESTED PANEL RECESS OF 1-1/2".
2. THE ANCHOR BOLT SETTING PLAN LOCATES ANCHOR BOLTS IN REFERENCE TO THE OUTSIDE OF THE PANEL RECESS SHOWN. IF THE ACTUAL PANEL RECESS IS DIFFERENT FROM WHAT IS SHOWN ON THE ANCHOR BOLT SETTING PLAN, THEN ALL REFERENCE DIMENSIONS FROM THE OUTSIDE OF THE PANEL RECESS MUST BE DETERMINED BY THE CUSTOMER.
3. BOTTOM OF ALL BASE PLATES ARE AT THE SAME ELEVATION. (UNLESS NOTED)

NOTE:

ONLY ANCHOR BOLTS SETTING PLAN ISSUED & STAMPED "FOR CONSTRUCTION" SHALL BE USED IN SETTING ANCHOR BOLTS. 'RIGID GLOBAL BUILDINGS' SHALL NOT BE RESPONSIBLE FOR ERROR OR DISCREPANCY IF THE DRAWING USED IS NOT VALID FOR CONSTRUCTION.

ANCHOR BOLT DETAIL

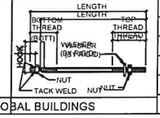
QTY.	SYMBOL	DIA.	LENGTH	THREAD	BOTTOM THREAD	PROJ.
0	✦	1/2"	0'-0"	2"	1 1/2"	1"
0	⊕	5/8"	1'-0"	2"	1 1/2"	2"
0	⊕	3/4"	2'-0"	3 1/2"	2"	2 1/2"
0	⊕	7/8"	2'-6"	4"	2"	2 3/4"
0	⊕	1"	3'-0"			
0	⊕	1 1/8"	3'-6"			
0	⊕	1 1/4"	4'-0"			

ANCHOR BOLT PROJECTION "PROJ." IS MEASURED FROM BOTTOM OF BASE PLATE

LENGTH OF "PROJ." SHOWN FOR ONE NUT + ONE WASHER

4"ANCHOR BOLTS NOT BY RIGID GLOBAL BUILDINGS

DETAIL



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RIGID GLOBAL BUILDINGS
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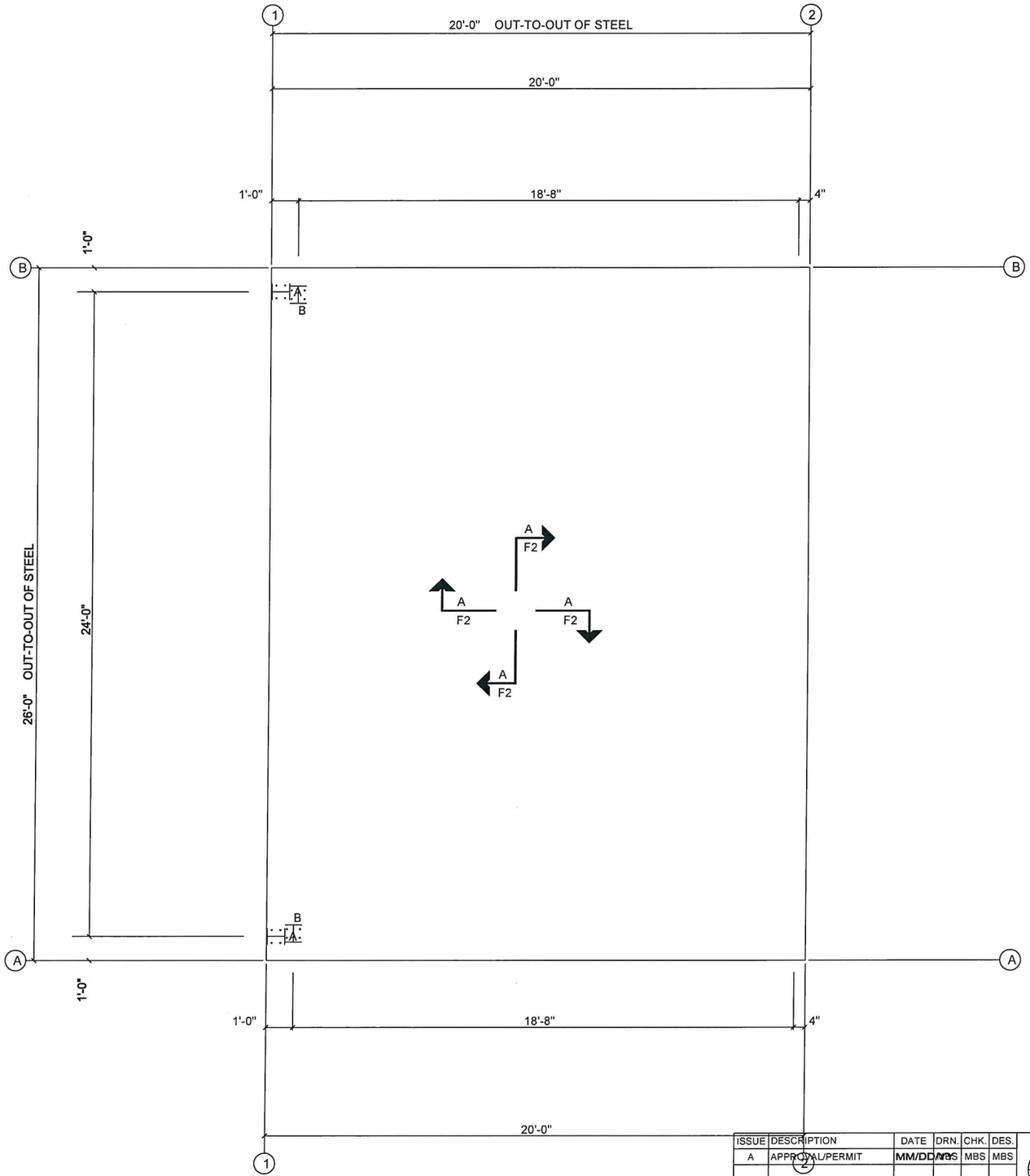
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT DETAILS		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	B
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
DRAWN	SCALE: N.T.S.	SHEET NO. XXX OF XXX	ISSUE A

⊕ Dia= 3/4"



COLUMN LAYOUT PLAN

NOTE: All Base Plates @ 100'-0" (U.N.)

NOT FOR CONSTRUCTION

PRELIMINARY ONLY

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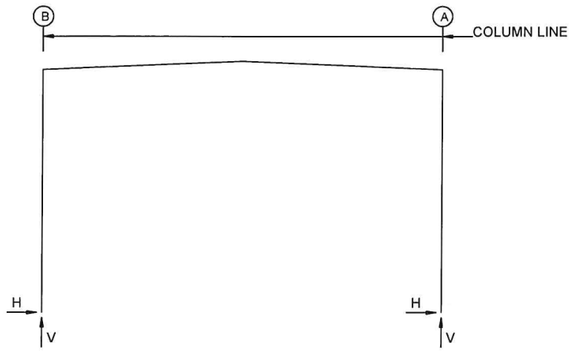
ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MS	MBS	MBS

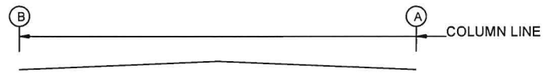
RIGID GLOBAL BUILDINGS
16933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	COLUMN LAYOUT PLAN
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING / B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
SHT. NO.	XXX OF XXX
ISSUE	A

FRAME LINES: 1



FRAME LINES: 2



RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	-----Dead---- Horiz	Vert	-----Live---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert
1	B	0.1	0.7	0.5	2.5	-3.0	-6.3	2.0	-1.8	-3.6	-4.6	1.4	-0.1
1	A	-0.1	0.7	-0.5	2.5	-2.0	-1.8	3.0	-6.3	-1.4	-0.1	3.6	-4.6

Frame Line	Column Line	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert
1	B	1.0	-4.6	0.9	-3.5	0.0	0.0	0.0	0.0
1	A	-0.9	-3.5	-1.0	-4.6	0.0	0.0	0.0	0.0

NOTES FOR REACTIONS

1. All loading conditions are examined and only maximum/minimum H or V and the corresponding H or V are reported.
2. Positive reactions are as shown in the sketch. Foundation loads are in opposite directions.
3. Bracing reactions are in the plane of the brace with the H pointing away from the braced bay. The vertical reaction is downward.
4. Building reactions are based on the following building data:

Width (ft)	=	26.0
Length (ft)	=	20.0
Eave Height (ft)	=	16.0/ 16.0
Roof Slope (rise/12)	=	0.5/ 0.5
Dead Load (psf)	=	2.5
Collateral Load (psf)	=	0.0
Roof Live Load(psf)	=	20.0
Frame Live Load		
Min(psf)	=	18.6
Max(psf)	=	19.0
Wind Speed (mph)	=	138.0
Wind Code	=	IBC 15
Exposure	=	C
Closed/Open	=	C
Importance Wind	=	1.00
Importance Seismic	=	1.00
Seismic Zone	=	A
Seismic Coeff (Fa*Ss)	=	0.11

5. Loading conditions are:
   1 Dead+Collateral+Live
   2 Dead+Collateral+0.75Live+0.45Wind_Left1
   3 Dead+Collateral+0.75Live+0.45Wind_Right1
   4 0.6Dead+0.6Wind_Left1
   5 0.6Dead+0.6Wind_Right1
   6 0.6Dead+0.6Wind_Left2
   7 0.6Dead+0.6Wind_Right2
   8 0.6Dead+0.6Wind_Long1R
   9 0.6Dead+0.6Wind_Long2R
   10 0.6Dead+0.6Wind_Right2+0.6Wind_Suction
   11 0.6Dead+0.6Wind_Pressure+0.6Wind_Long2L
   12 Dead+0.6Wind_Right2+0.6Wind_Suction

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1	B	3	1.4	1.7	6	-2.1	-2.3	4	0.750	8.000	11.50	0.500	0.0
		1	0.6	3.2	4	-1.8	-3.4						
1	A	7	2.1	-2.3	2	-1.4	1.7	4	0.750	8.000	11.50	0.500	0.0
		1	-0.6	3.2	5	1.8	-3.4						

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz
1	B	0.2	-1.1	1.7
1	A	0.2	-1.1	1.7

ENDWALL COLUMN: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1	B	10	1.0	0.1	11	-0.6	0.1	4	0.750	8.000	8.500	0.375	0.0
		12	1.0	0.2									
1	A	10	1.0	0.1	11	-0.6	0.1	4	0.750	8.000	8.500	0.375	0.0
		12	1.0	0.2									

BUILDING BRACING REACTIONS

Wall Loc	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1							(h)
F_SW	A					1825	626	
R_EW	2							(h)
B_SW	B					1825	626	

(h)Rigid frame at endwall

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
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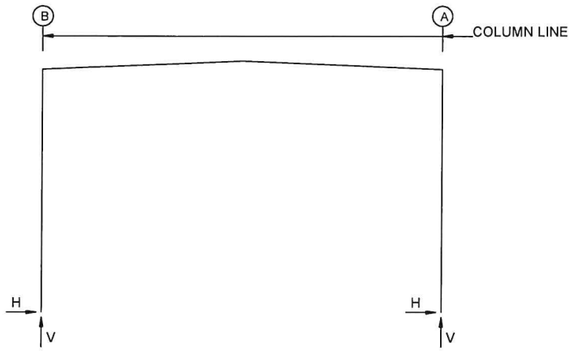
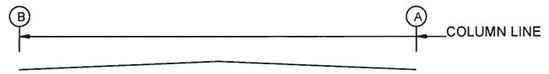
RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS
CUSTOMER	TBD
END USER	Barbara Jordon Youth Park Center
END USE	Recreation / BUILDING B
STREET	8702 Nobel Street
CITY ST ZIP	Needville, TX 77461
SCALE	N.T.S.
SHEET NO.	XXX OF XXX
ISSUE	A

FRAME LINES: 1



FRAME LINES: 2



RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	-----Dead---- Horiz	Vert	-----Live---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert
1	B	0.1	0.7	0.5	2.5	-3.0	-6.3	2.0	-1.8	-3.6	-4.6	1.4	-0.1
1	A	-0.1	0.7	-0.5	2.5	-2.0	-1.8	3.0	-6.3	-1.4	-0.1	3.6	-4.6

Frame Line	Column Line	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert
1	B	1.0	-4.6	0.9	-3.5	0.0	0.0	0.0	0.0
1	A	-0.9	-3.5	-1.0	-4.6	0.0	0.0	0.0	0.0

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)
1	B	3	1.4	1.7	6	-2.1	-2.3	4	0.750	8.000	11.50	0.500	0.0
		1	0.6	3.2	4	-1.8	-3.4						
1	A	7	2.1	-2.3	2	-1.4	1.7	4	0.750	8.000	11.50	0.500	0.0
		1	-0.6	3.2	5	1.8	-3.4						

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Column_Reactions(k) Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Dia	Base_Plate(in) Width	Length	Thick	Grout (in)

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS			
CUSTOMER	TBD			
END USER	Barbara Jordon Youth Park Center			
END USE	Recreation	BUILDING	B	
STREET	8702 Nobel Street			
CITY ST ZIP	Needville, TX 77461			
DATE/DD	JOB NO.	SCALE: N.T.S.	DWG NO. XXX OF XXX	SHT A

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz
1	B	0.2	-1.1	1.7
1	A	0.2	-1.1	1.7

ENDWALL COLUMN: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

		Column_Reactions(k)						Bolt(in)		Base_Plate(in)			Grout
Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Qty	Dia	Width	Length	Thick	(in)
1	B	10	1.0	0.1	11	-0.6	0.1	4	0.750	8.000	8.500	0.375	0.0
		12	1.0	0.2									
1	A	10	1.0	0.1	11	-0.6	0.1	4	0.750	8.000	8.500	0.375	0.0
		12	1.0	0.2									

BUILDING BRACING REACTIONS

Wall Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1								(h)
F_SW	A						1825	626	
R_EW	2								(h)
B_SW	B						1825	626	

(h)Rigid frame at endwall

NOTES FOR REACTIONS

1. All loading conditions are examined and only maximum/minimum H or V and the corresponding H or V are reported.
2. Positive reactions are as shown in the sketch. Foundation loads are in opposite directions.
3. Bracing reactions are in the plane of the brace with the H pointing away from the braced bay. The vertical reaction is downward.
4. Building reactions are based on the following building data:

Width (ft)	=	26.0
Length (ft)	=	20.0
Eave Height (ft)	=	16.0/ 16.0
Roof Slope (rise/12)	=	0.5/ 0.5
Dead Load (psf)	=	2.5
Collateral Load (psf)	=	0.0
Roof Live Load(psf)	=	20.0
Frame Live Load		
Min(psf)	=	18.6
Max(psf)	=	19.0
Wind Speed (mph)	=	138.0
Wind Code	=	IBC 15
Exposure	=	C
Closed/Open	=	C
Importance Wind	=	1.00
Importance Seismic	=	1.00
Seismic Zone	=	A
Seismic Coeff (Fa*Ss)	=	0.11

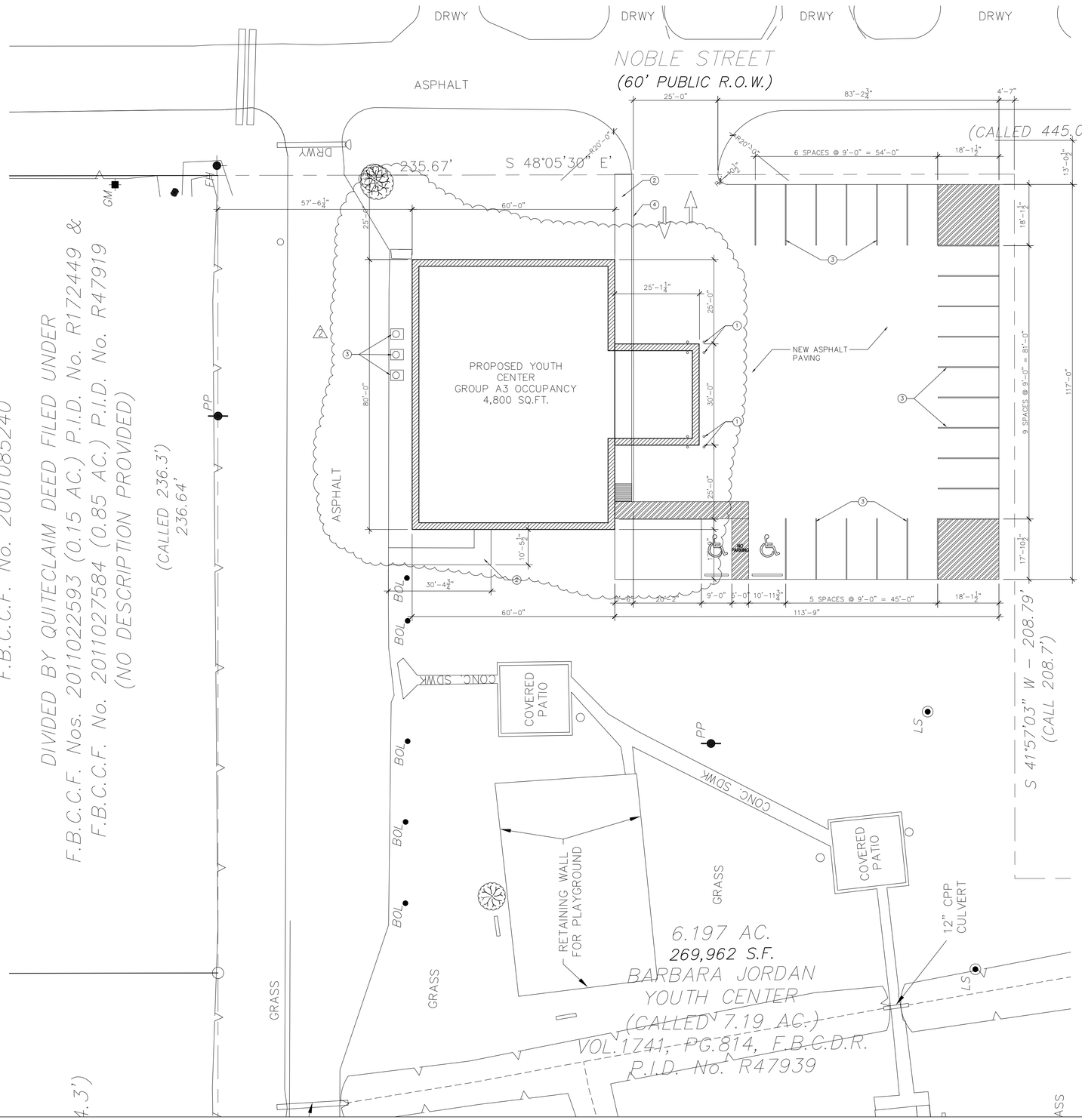
5. Loading conditions are:
   1 Dead+Collateral+Live
   2 Dead+Collateral+0.75Live+0.45Wind_Left1
   3 Dead+Collateral+0.75Live+0.45Wind_Right1
   4 0.6Dead+0.6Wind_Left1
   5 0.6Dead+0.6Wind_Right1
   6 0.6Dead+0.6Wind_Left2
   7 0.6Dead+0.6Wind_Right2
   8 0.6Dead+0.6Wind_Long1R
   9 0.6Dead+0.6Wind_Long2R
   10 0.6Dead+0.6Wind_Right2+0.6Wind_Suction
   11 0.6Dead+0.6Wind_Pressure+0.6Wind_Long2L
   12 Dead+0.6Wind_Right2+0.6Wind_Suction

PRELIMINARY ONLY

ISSUE	DESCRIPTION	DATE	DRN.	CHK.	DES.
A	APPROVAL/PERMIT	MM/DD/YY	MBS	MBS	MBS

RIGID GLOBAL BUILDINGS
18933 Aldine Westfield
Houston, Tx. 77073
Phone : (281) 443-9065
Fax : (281) 443-9064

DESCRIPTION	ANCHOR BOLT REACTIONS		
CUSTOMER	TBD		
END USER	Barbara Jordon Youth Park Center		
END USE	Recreation	BUILDING	B
STREET	8702 Nobel Street		
CITY ST ZIP	Needville, TX 77461		
CAD FILE NO.	JOB NO.	SCALE N.T.S.	DWG NO. XXX OF XXX / REV A



ARCHITECTURAL OVERALL SITE PLAN

SCALE: 1/16"=1'-0"

4

FLOOR PLAN GENERAL NOTES

A. ALL UNMARKED PARTITIONS ARE TYPE A6. ALL COLUMN FURRING TO BE PARTITION TYPE F3 UNLESS NOTED OTHERWISE.

B. ALL WINDOW AND DOOR PLAN OPENINGS ARE DIMENSIONED ON AREA PLANS.

C. FOR FIRE AND LIFE SAFETY PLANS, REFER TO A-003 DRAWING.

D. ROOF PLAN SHOWS FOR REFERENCE ONLY, REFER TO ROOF PLAN FOR NOTES AND DIMENSIONS.

E. REFER TO SHEET A-201 FOR EXTERIOR ELEVATIONS, A-301 FOR BUILDING SECTIONS AND SHEETS A-311 & A-312 FOR WALL SECTIONS.

F. REFER TO SHEET A-601 FOR ALL PARTITION DETAILS AND SHEET A-611 FOR ALL DOORS AND WINDOW DETAILS.

G. INSTALL APPROPRIATE MANUFACTURED EXPANSION JOINT COVERS AT ALL VISIBLE BUILDING EXPANSION JOINTS. TOP OF COVER OF FLOOR EXPANSION JOINT COVERS TO BE FLUSH WITH TOP OF FINISHED FLOOR.

H. ALL PARTITION DIMENSIONS ARE TAKEN FROM THE CENTERLINE OF COLUMNS AND TO THE DRYWALL FACE.

I. INSTALL BLOCKING AS REQUIRED TO SUPPORT WALL MOUNTED DEVICES.

J. AT ALL SPANDREL GLASS LOCATIONS, FACE OF INTERIOR WALL TO BE CONTINUOUS WITH ADJACENT WALL.

K. GENERAL DIMENSIONS PROVIDED ON FLOOR PLANS AND AREA PLANS DO NOT REFLECT THE ROUGH OPENING DIMENSIONS REQUIRED FOR COORDINATION WITH MASONRY JOINT COURSING. CONTRACTOR IS TO PROVIDE ROUGH OPENING FRAMING DIMENSIONS CONSISTENT WITH ENLARGED ARCHITECTURAL PLAN/SECTION DETAILS (SHEET A-501), AND DOOR SCHEDULE/DETAILS (SHEET A-611). CONTRACTOR TO SUBMIT RFI (REQUEST FOR INFORMATION) FOR ANY ROUGH OPENING DIMENSIONS NOT GIVEN IN DETAILS FOR CLARIFICATION REQUIRED.

L. THE CONSTRUCTION DOCUMENTS ARE STRICTLY A GRAPHIC REPRESENTATION AND ARE NOT TO BE SCALED. WRITTEN DIMENSIONS SHALL ALWAYS GOVERN, AND SCALE DETAILS SHALL GOVERN OVER SMALL SCALE PLANS. IF A DISCREPANCY IS FOUND TO EXIST BETWEEN SCALED AND WRITTEN DIMENSIONS OR BETWEEN LARGE SCALE DETAILS AND SMALL SCALE PLANS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.

M. ALL WORK SHALL BE IN COMPLIANCE WITH ALL LOCAL BUILDING CODES AND ORDINANCES, AND THE REGULATIONS OF ALL FEDERAL, STATE, AND MUNICIPAL AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS.

N. THE CONTRACTOR SHALL VISIT THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND CORRELATE PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING CONDITIONS INCLUDING UTILITIES, SANITARY, AND SEWER. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND DRAWING INDICATIONS. ALL DIMENSIONS TO EXISTING SITE ELEMENTS ARE TO BE FILED VERIFIED. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD DIMENSIONS AND DRAWING DIMENSIONS.

KEY NOTES

SYMBOL	DESCRIPTION
1	8" DIA. PAINTED STEEL BOLLARD
2	5'-0" WIDE CONC. SIDEWALK
3	EXTERIOR TRAFFIC PAINT STRIPING
4	6" CONC. CURB
5	MECHANICAL CONDENSING UNITS, RE: MECHANICAL FOR ADDITIONAL INFORMATION
6	
7	
8	
9	

FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1 X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME / 101	ROOM NAME ROOM NUMBER
	NEW DOOR WITH DOOR TAG REF DOOR SCHED
	NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS
A	COLUMN GRID DESIGNATIONS

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CONSULTANTS

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YOUTH CENTER
8705 PARK STREET
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Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

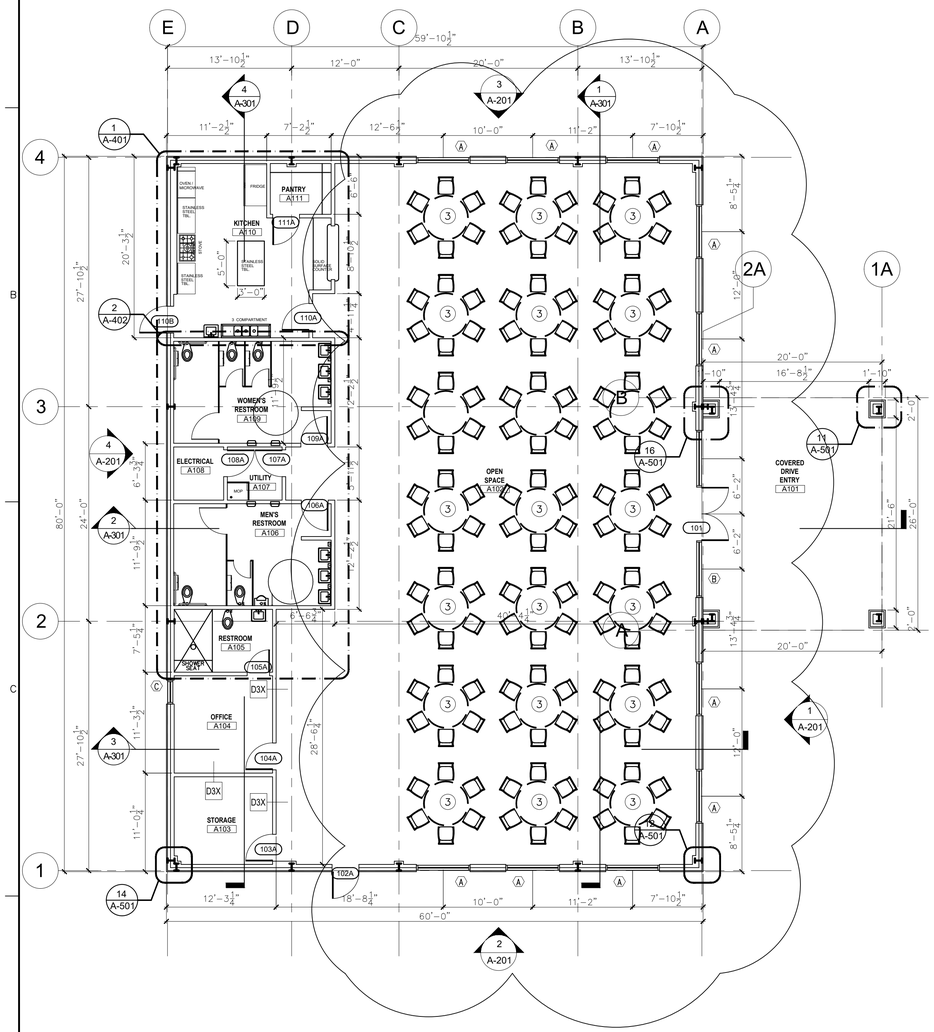
Revisions:

DESCRIPTION	
100% REVIEW SET	06/30/2023
1 COUNTY COMMENTS	04/16/2024
2 COUNTY COMMENTS	10/04/2024

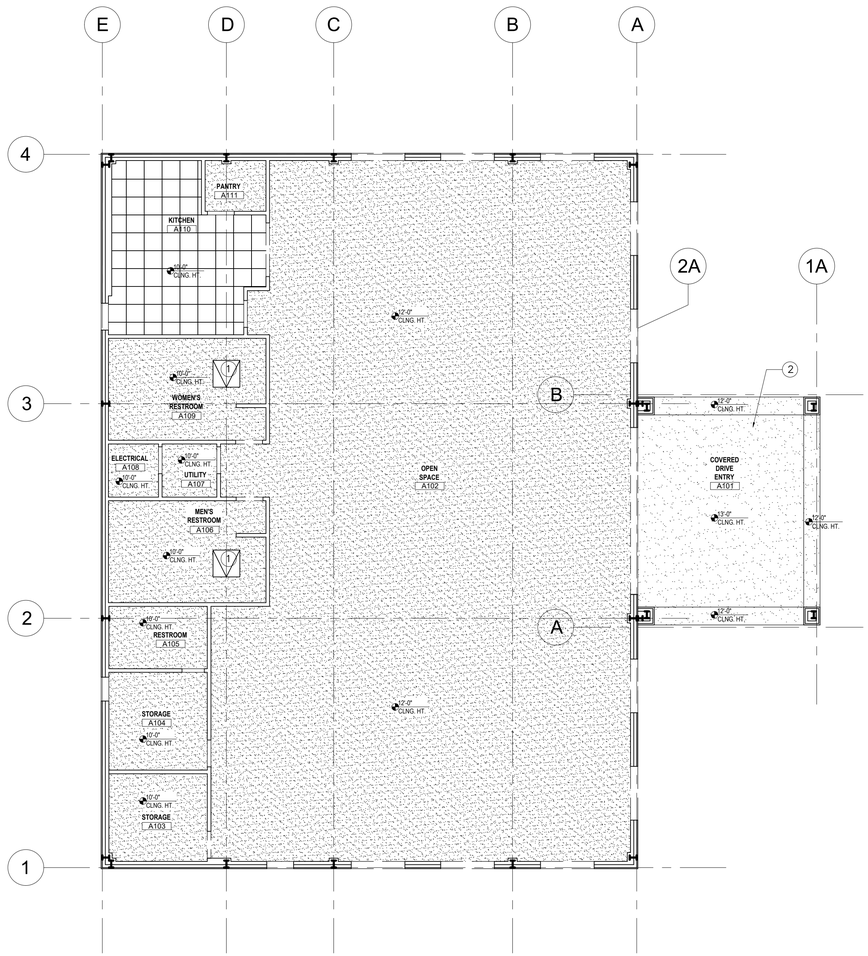
Drawing Name

ARCHITECTURAL OVERALL SITE PLAN

AS-100



ARCHITECTURAL OVERALL FIRST FLOOR PLAN SCALE: 1/8"=1'-0" 8



ARCHITECTURAL OVERALL FIRST FLOOR RCP SCALE: 1/8"=1'-0" 4

TRUE NORTH

PLAN NORTH

FLOOR PLAN GENERAL NOTES

A. ALL UNMARKED PARTITIONS ARE TYPE A6. ALL COLUMN FURRING TO BE PARTITION TYPE F3 UNLESS NOTED OTHERWISE.

B. ALL WINDOW AND DOOR PLAN OPENINGS ARE DIMENSIONED ON AREA PLANS.

C. FOR FIRE AND LIFE SAFETY PLANS, REFER TO A-003 DRAWING.

D. ROOF PLAN SHOWS FOR REFERENCE ONLY, REFER TO ROOF PLAN FOR NOTES AND DIMENSIONS.

E. REFER TO SHEET A-201 FOR EXTERIOR ELEVATIONS, A-301 FOR BUILDING SECTIONS AND SHEETS A-311 & A-312 FOR WALL SECTIONS.

F. REFER TO SHEET A-601 FOR ALL PARTITION DETAILS AND SHEET A-611 FOR ALL DOORS AND WINDOW DETAILS.

G. INSTALL APPROPRIATE MANUFACTURED EXPANSION JOINT COVERS AT ALL VISIBLE BUILDING EXPANSION JOINTS. TOP OF COVER OF FLOOR EXPANSION JOINT COVERS TO BE FLUSH WITH TOP OF FINISHED FLOOR.

H. ALL PARTITION DIMENSIONS ARE TAKEN FROM THE CENTERLINE OF COLUMNS AND TO THE DRYWALL FACE.

I. INSTALL BLOCKING AS REQUIRED TO SUPPORT WALL MOUNTED DEVICES.

J. AT ALL SPANDREL GLASS LOCATIONS, FACE OF INTERIOR WALL TO BE CONTINUOUS WITH ADJACENT WALL.

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L. THE CONSTRUCTION DOCUMENTS ARE STRICTLY A GRAPHIC REPRESENTATION AND ARE NOT TO BE SCALED. WRITTEN DIMENSIONS SHALL ALWAYS GOVERN, AND SCALE DETAILS SHALL GOVERN OVER SMALL SCALE PLANS. IF A DISCREPANCY IS FOUND TO EXIST BETWEEN SCALED AND WRITTEN DIMENSIONS OR BETWEEN LARGE SCALE DETAILS AND SMALL SCALE PLANS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.

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N. THE CONTRACTOR SHALL VISIT THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND CORRELATE PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING CONDITIONS INCLUDING UTILITIES, SANITARY, AND SEWER. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND DRAWING INDICATIONS. ALL DIMENSIONS TO EXISTING SITE ELEMENTS ARE TO BE FILED VERIFIED. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD DIMENSIONS AND DRAWING DIMENSIONS.

KEY NOTES

SYMBOL	DESCRIPTION
1	3'X3' CEILING ACCESS PANEL
2	PLASTER SOFFIT
3	
4	

FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1 X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME 101	ROOM NAME ROOM NUMBER
	ACOUSTICAL LAY-IN CEILING
	GYP. BOARD CEILING
X	NEW DOOR WITH DOOR TAG REF DOOR SCHED
X	NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS
A	COLUMN GRID DESIGNATIONS

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Porter, TX 77365

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YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

REGISTERED ARCHITECT KNOWLES J. CHANEY 21011 STATE OF TEXAS 2/29/2024

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

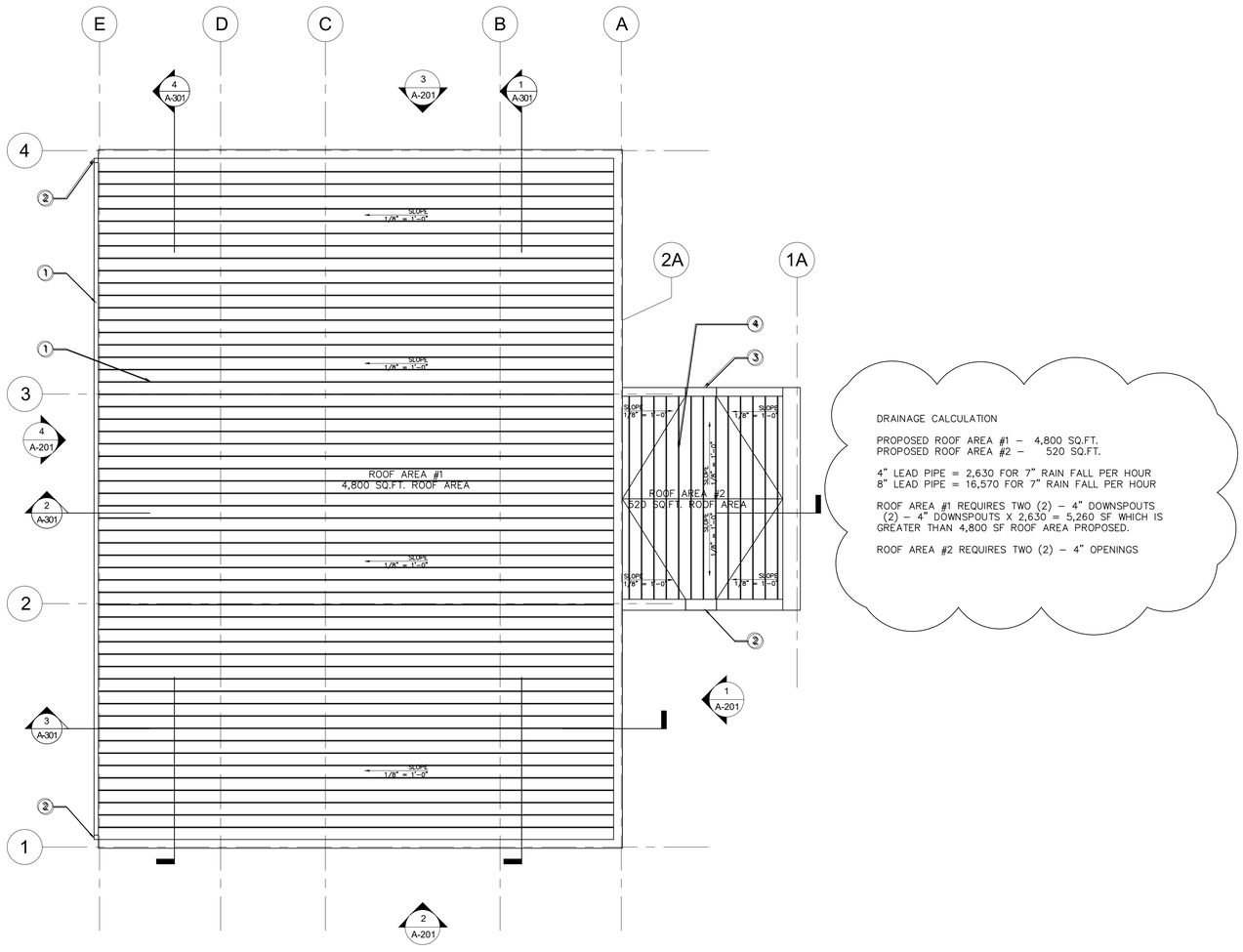
Revisions:

DESCRIPTION
ISSUE FOR BID AND CONSTRUCTION 01/5/2024

Drawing Name

OVERALL FLOOR PLAN AND REFLECTED CEILING PLAN

A-101



DRAINAGE CALCULATION

PROPOSED ROOF AREA #1 – 4,800 SQ.FT.
PROPOSED ROOF AREA #2 – 520 SQ.FT.

4" LEAD PIPE = 2,630 FOR 7" RAIN FALL PER HOUR
8" LEAD PIPE = 16,570 FOR 7" RAIN FALL PER HOUR

ROOF AREA #1 REQUIRES TWO (2) – 4" DOWNSPOUTS
(2) – 4" DOWNSPOUTS X 2,630 = 5,260 SF WHICH IS GREATER THAN 4,800 SF ROOF AREA PROPOSED.

ROOF AREA #2 REQUIRES TWO (2) – 4" OPENINGS

TRUE NORTH

PLAN NORTH

ROOF PLAN GENERAL NOTES

A. REFER TO SECTION 07540 OF THE PROJECT MANUAL FOR ROOF SYSTEM REQUIREMENTS.

B. INSTALL ROOF SYSTEM COMPONENTS IN STRICT ACCORDANCE MANUFACTURER'S REQUIREMENTS.

C. ALL COMPONENTS INTENDED FOR USE IN THE ROOF SYSTEM SHALL BE APPROVED BY MEMBRANE MANUFACTURER.

D. CRICKETS & SADDLES – WHERE INDICATED PROVIDE TAPERED, FACTORY–CUT, PRE PACKAGED ASSEMBLIES OF SAME MATERIAL AS UNDERLYING INSULATION. PROVIDE SLOPES REQUIRED LIMITING PONDING OF WATER TO NO MORE THAN 24 HOURS.

E. BITUMEN/ADHESIVE ENVELOPES AND/OR METAL STOPS ARE REQUIRED AT ALL PERIMETERS AND ROOF PENETRATIONS.

F. DO NOT ALLOW ROOFING WORK TO STAIN ROOF TOP PIPE, CONDUIT, BUILDING STRUCTURE, AND/OR BUILDING ENVELOPE.

G. DO NOT ALLOW ROOFING DEBRIS TO ENTER DRAIN SYSTEM. INSPECT ROOF AND VERIFY UNRESTRICTED DRAINAGE EACH DAY AND END OF WORK.

H. VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS OF ROOF AREAS, LOCATIONS OF ROOFTOP EQUIPMENT, AND INCIDENTAL ITEMS OF WORK. THE DRAWINGS ARE DIAGRAMMATIC AND INDICTED DESIGN INTENT AND NOT EXACT QUANTITIES.

I. THE ABSENCE OF INCREMENTAL ITEMS OF WORK ON THE CONTRACT DOCUMENTS DOES NOT ALLEVIATE THE CONTRACTOR OF RESPONSIBILITY OF PROVIDING ALL WORK REQUIRED TO PROPERLY ROOF, FLASH, AND MAKE WATERPROOF ALL ITEMS THAT CAN BE REASONABLY INFERRED AS BEING PART OF THE WORK.

J. REFER TO MANUFACTURER'S RECOMMENDED DETAILS OR NRCA STANDARD DETAILS, WHICH EVER IS MOST STRINGENT, FOR CONDITIONS NOT DETAILED.

K. ROOFING MATERIAL S BOTH STORED AND IN PLACE SHALL BE PROTECTION FROM WEATHER INCLUDING WIND AND MOISTURE. PROVIDE CUT OFFS ETC AT THE END OF EACH DAYS WORK. WET OR OTHERWISE COMPROMISED ROOF MATERIALS SHALL BE REMOVED FROM THE SITE AND REPLACED AT CONTRACTORS EXPENSE.

L. ROOF SLOPES SHOWN ON THE CONTRACT DOCUMENTS INDICATED DESIGN INTENT. PROVIDE ROOF SLOPES REQUIRED LIMITING PONDING OF WATER TO NO MORE THAN 24 HOURS.

M. METAL FLASHINGS – PROVIDE CONCEALED (INTERNAL) SPLICE PLATES TYPICAL AT ALL METAL FLASHINGS AND COPINGS EXPOSED TO PUBLIC VIEW.

N. AT PERIMETER OF ALL ROOF PROVIDE FACTORY FABRICATED, CONTINUOUS 24" WIDE TAPERED PERLITE EDGE STRIP BETWEEN THERMAL INSULATION AND RETRO BOARD. PROVIDE MIN. ½"/FOOT SLOPE.

O. AT ALL ROOF TOP EQUIPMENT PROVIDE FACTORY PAINTED FINISH AT EXPOSED SURFACES. WHERE FACTORY FINISH IS NOT AVAILABLE FIELD PAINT IN COLOR AS SELECTED BY ARCHITECT.

KEY NOTES

SYMBOL	DESCRIPTION
1	PRE–FINISHED METAL GUTTER
2	PRE–FINISHED METAL DOWNSPOUT
3	THRU WALL SCUPPER
4	R–PANEL ROOFING SYSTEM, RE: SPECIFICATIONS FOR ADDITIONAL INFORMATION
5	
6	
7	
8	
9	

FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1 X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME 101	ROOM NAME ROOM NUMBER
X	NEW DOOR WITH DOOR TAG REF DOOR SCHED
X	NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS
A	COLUMN GRID DESIGNATIONS

VCS architects

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Porter, TX 77365

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8705 PARK STREET
NEEDVILLE, TEXAS 77461

REGISTERED ARCHITECT
STATE OF TEXAS
21011
2/29/2024

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
ISSUE FOR BID AND CONSTRUCTION	01/5/2024

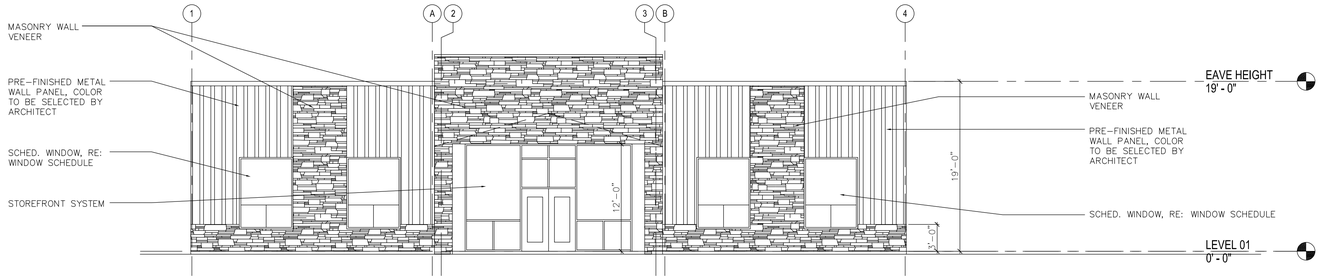
Drawing Name

OVERALL ROOF PLAN

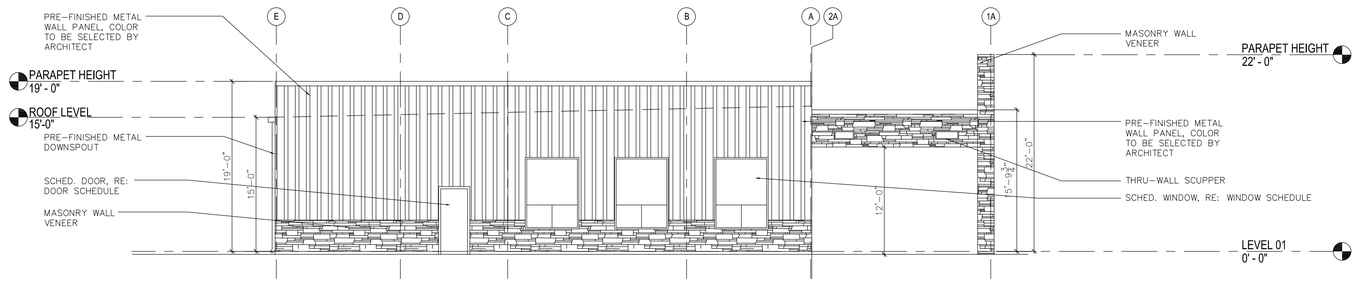
A-102

ARCHITECTURAL OVERALL ROOF PLAN

SCALE: 1/8"=1'–0"



EXTERIOR ELEVATION — SCALE: 1/8"=1'-0" — 1



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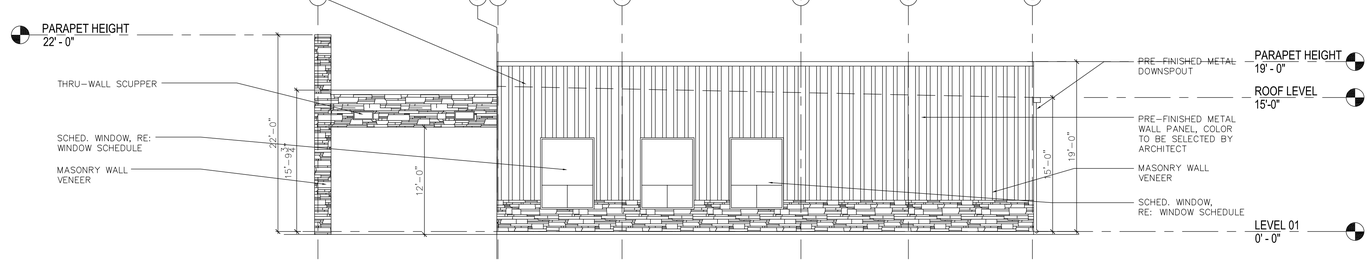
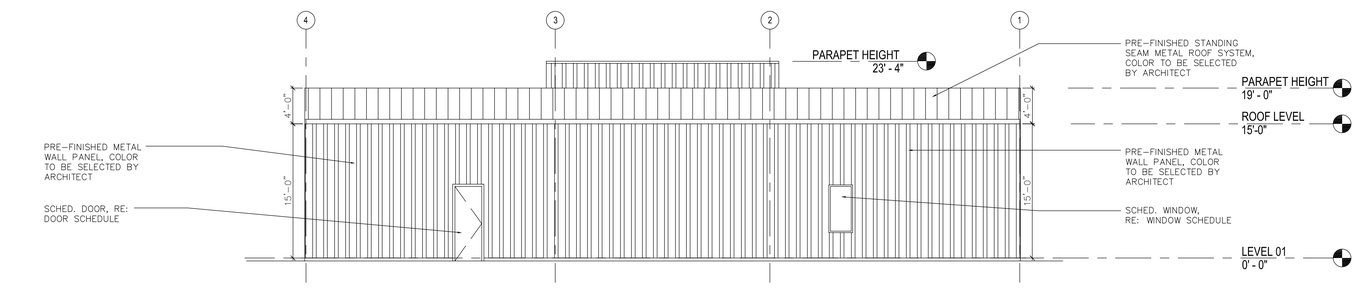


EXTERIOR ELEVATION — SCALE: 1/8"=1'-0" — 3



EXTERIOR ELEVATION — SCALE: 1/8"=1'-0" — 4

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REGISTERED ARCHITECT ANDRE J. CHACHERE 21011 STATE OF TEXAS
2/29/2024

Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

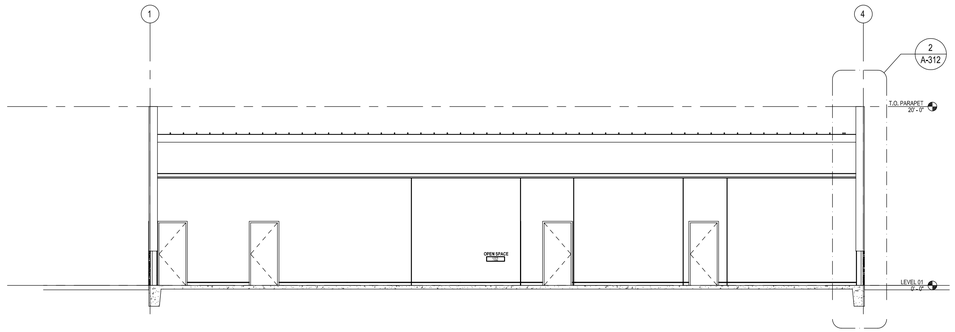
Revisions:

DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

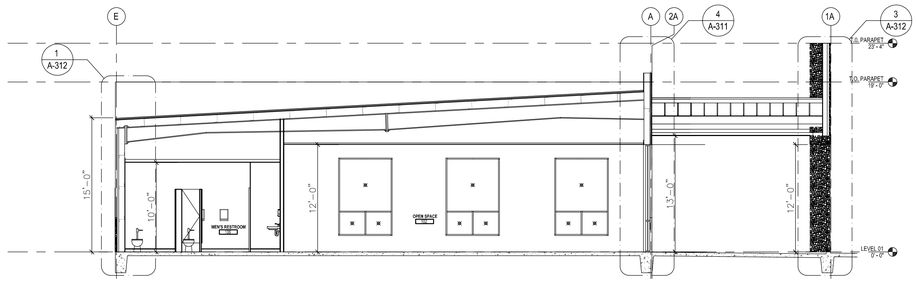
Drawing Name

EXTERIOR ELEVATIONS

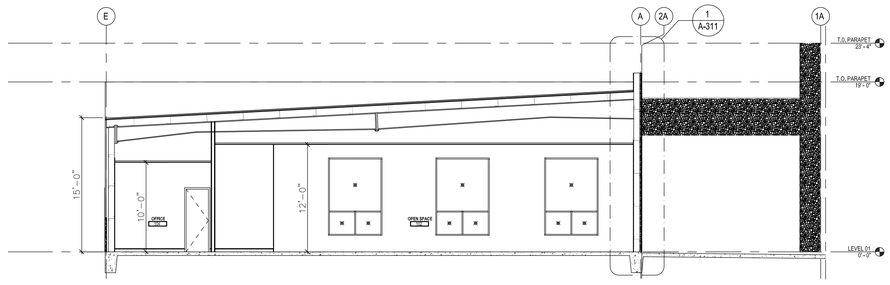
A-201



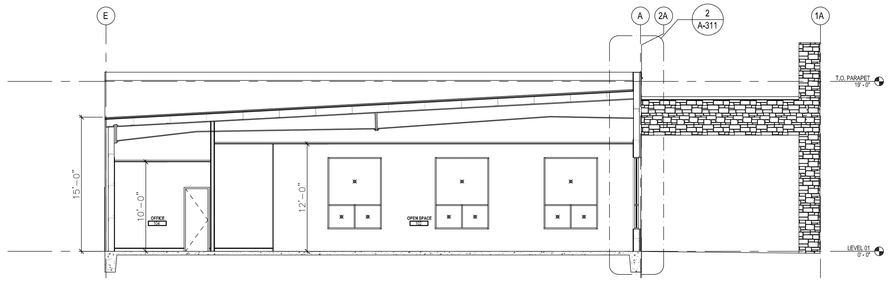
BUILDING SECTION — SCALE: 1/8"=1'-0" — 1



BUILDING SECTION — SCALE: 1/8"=1'-0" — 2



BUILDING SECTION — SCALE: 1/8"=1'-0" — 3



BUILDING SECTION — SCALE: 1/8"=1'-0" — 4

VCS architects
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Porter, TX 77365

CONSULTANTS

BARBARA JORDAN PARK
YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

REGISTERED ARCHITECT
ANDRE CHANCHEVRE
21011
STATE OF TEXAS
2/29/2024

Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

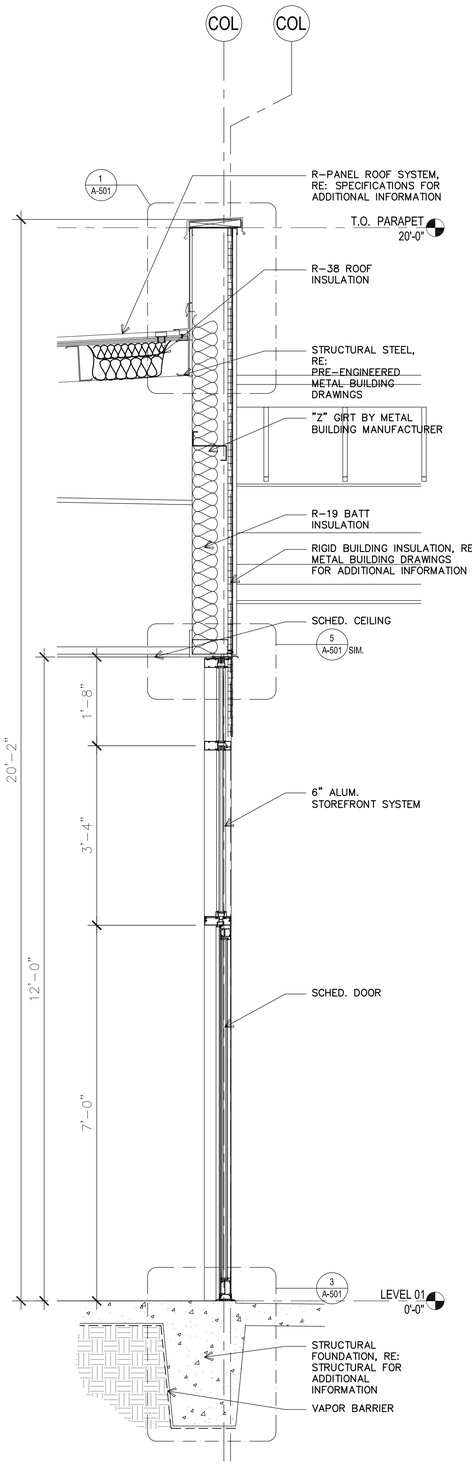
Revisions:

DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

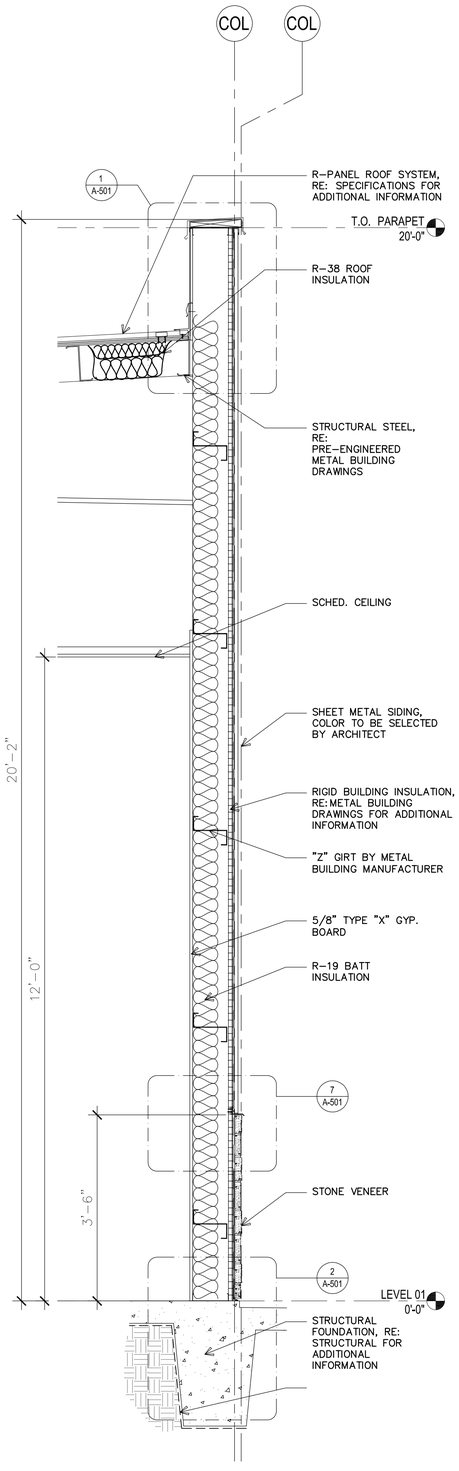
Drawing Name

BUILDING SECTIONS

A-301



WALL SECTION SCALE: 3/4"=1'-0" 4



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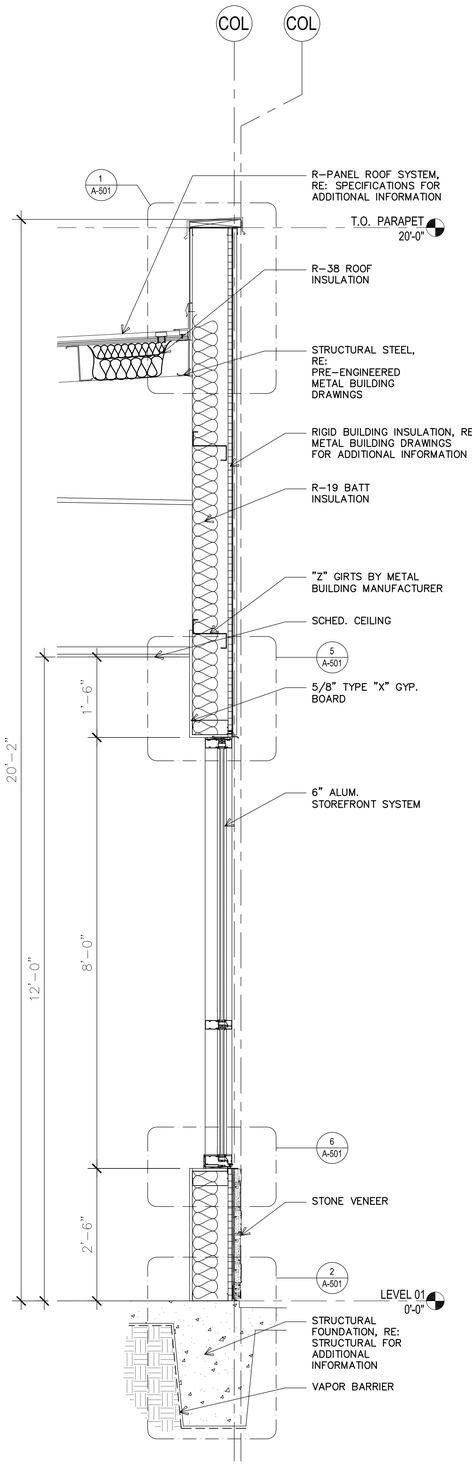
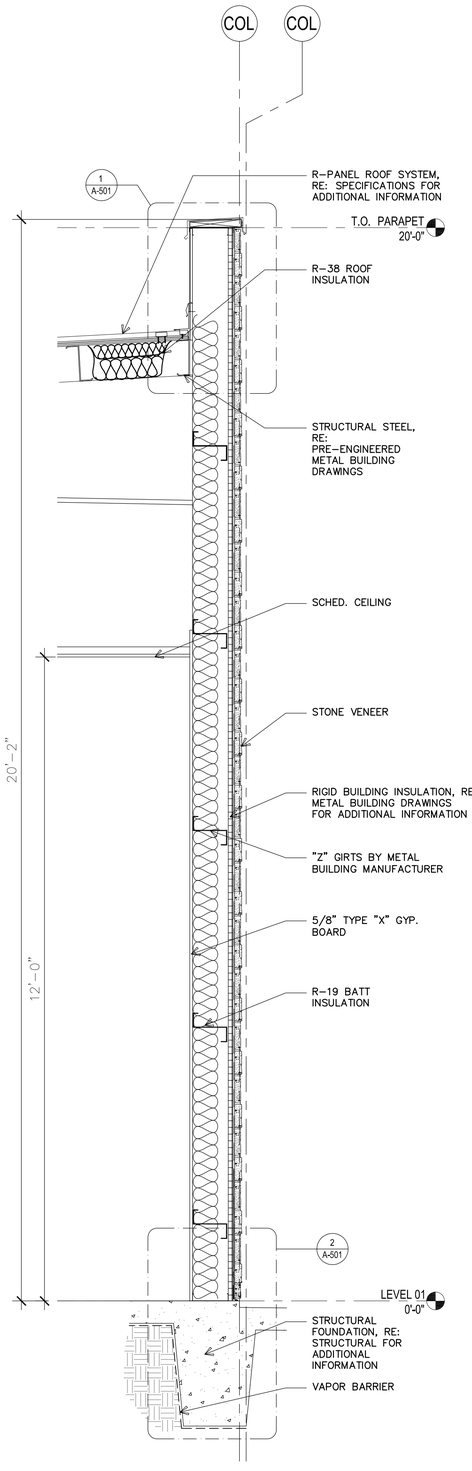


WALL SECTION SCALE: 3/4"=1'-0" 2



WALL SECTION SCALE: 3/4"=1'-0" 1

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2/29/2024

Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

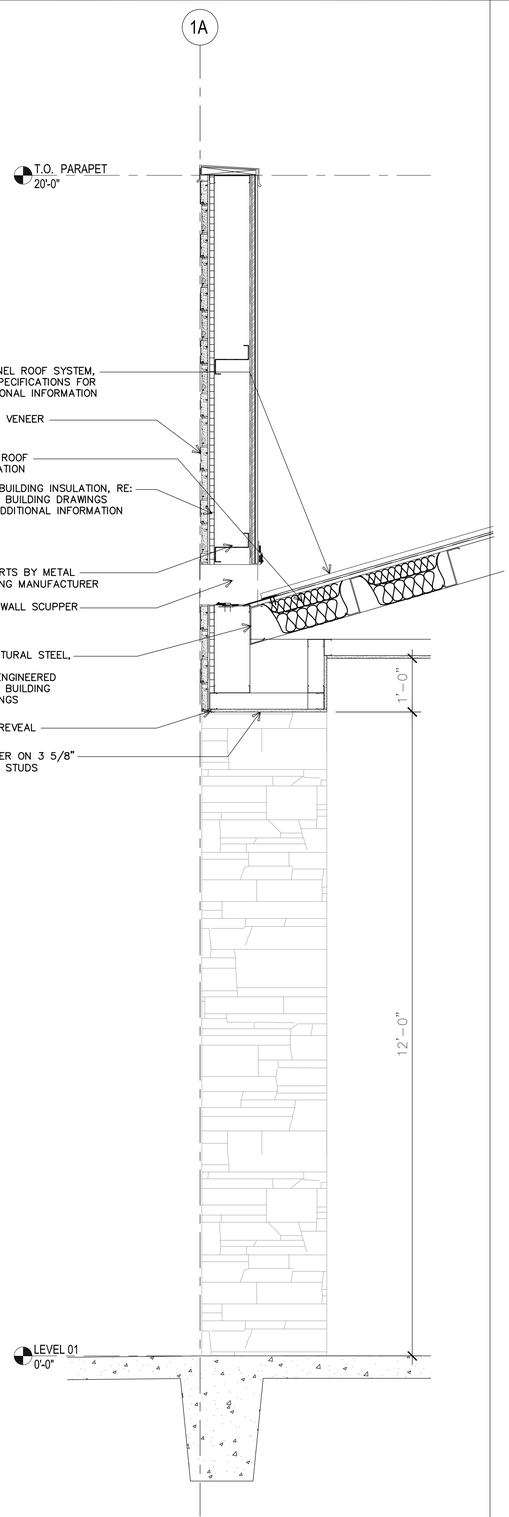
Revisions:

DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

Drawing Name

WALL SECTIONS

A-311



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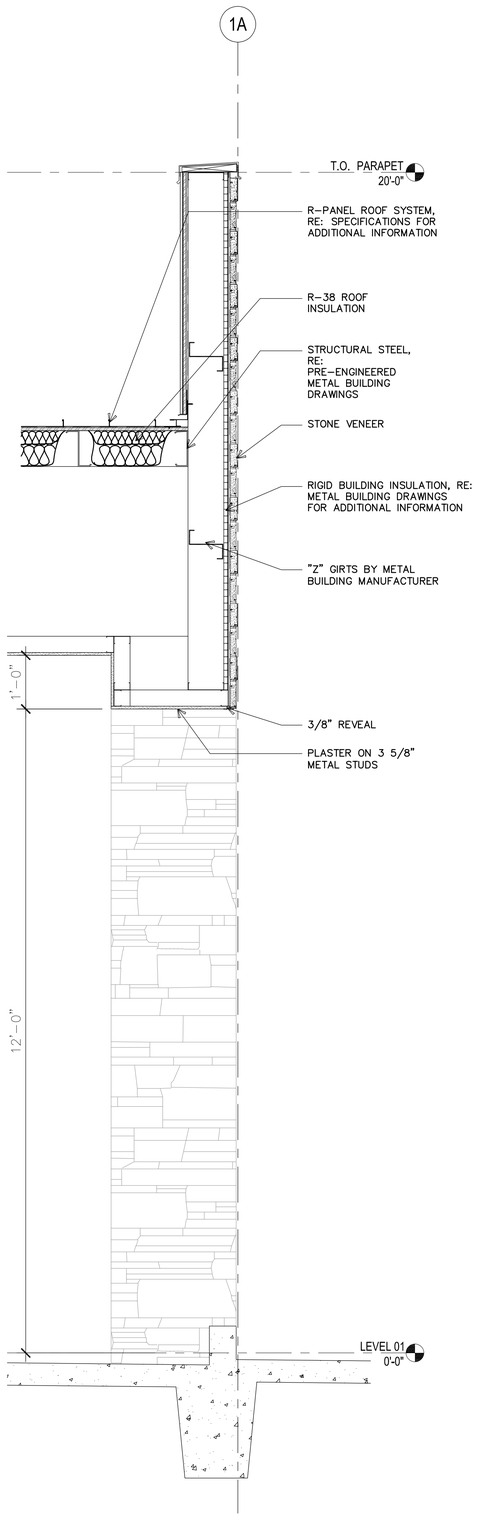
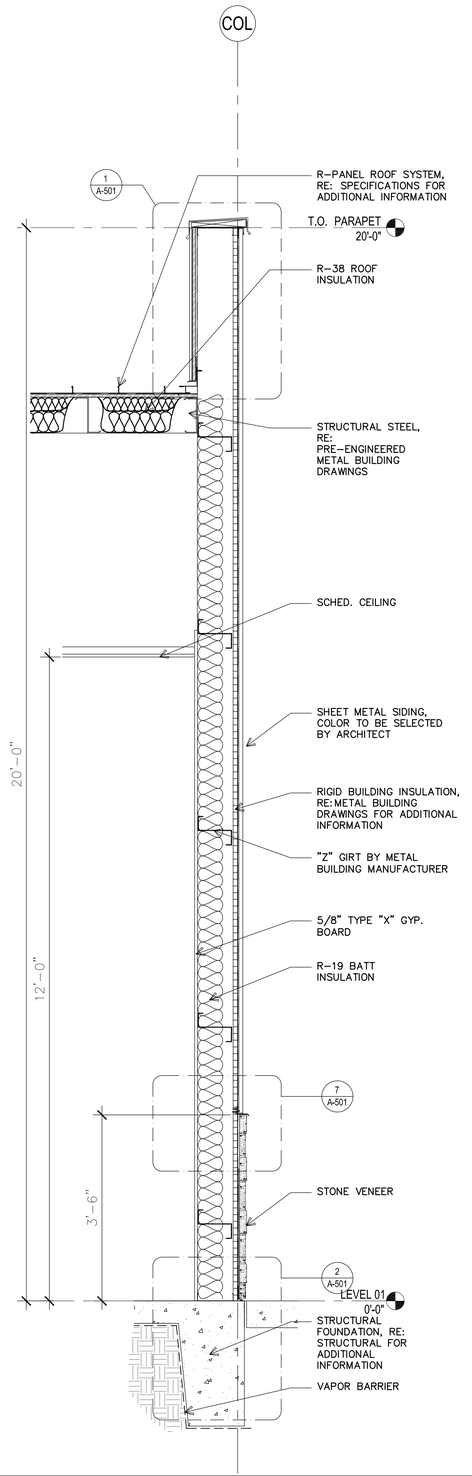


WALL SECTION SCALE: 3/4"=1'-0" 3



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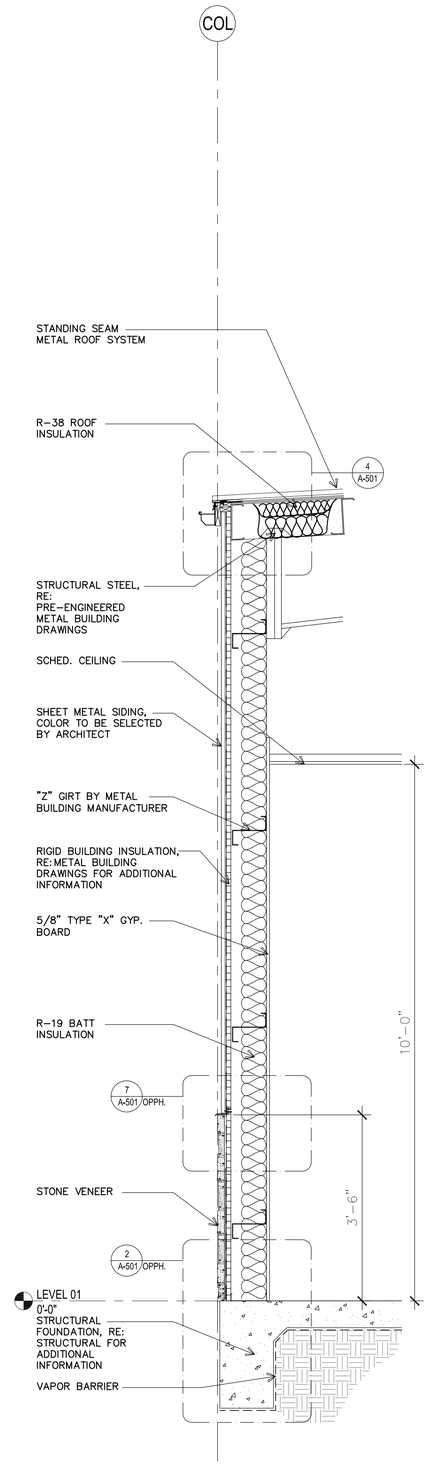

WALL SECTION SCALE: 3/4"=1'-0" 1

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2/29/2024

Drawing Date: 01/05/2024
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Scale: AS NOTED

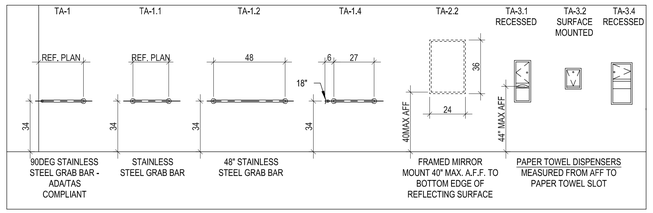
Revisions:

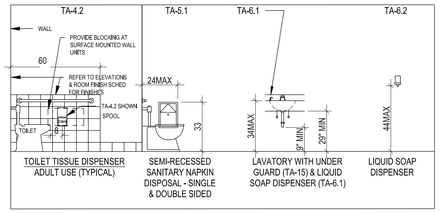
DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

Drawing Name

WALL SECTIONS

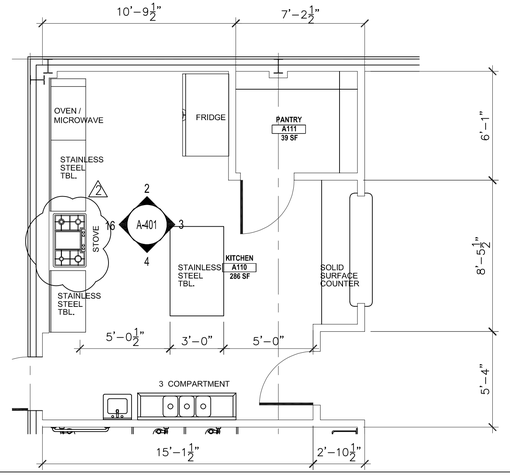
A-312





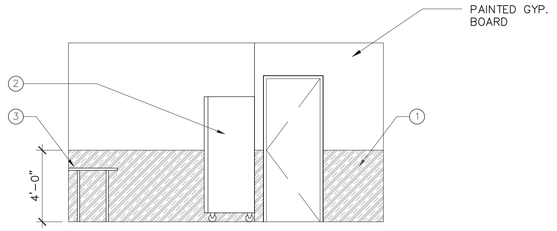
TYPICAL MOUNTING HEIGHTS

SCALE: 1/4"=1'-0" | 12



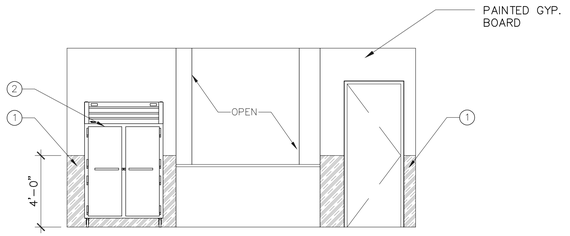
ENLARGED KITCHEN PLAN

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



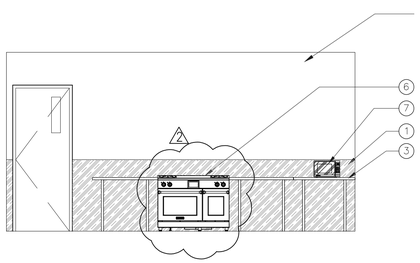
KITCHEN ELEVATION

SCALE: 1/4"=1'-0" | 2



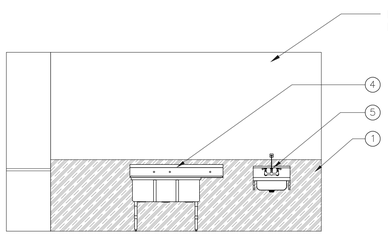
KITCHEN ELEVATION

SCALE: 1/4"=1'-0" | 3



KITCHEN ELEVATION

SCALE: 1/4"=1'-0" | 16



KITCHEN ELEVATION

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

FLOOR PLAN GENERAL NOTES

A. ALL UNMARKED PARTITIONS ARE TYPE A6. ALL COLUMN FURRING TO BE PARTITION TYPE F3 UNLESS NOTED OTHERWISE.

B. ALL WINDOW AND DOOR PLAN OPENINGS ARE DIMENSIONED ON AREA PLANS.

C. FOR FIRE AND LIFE SAFETY PLANS, REFER TO A-003 DRAWING.

D. ROOF PLAN SHOWS FOR REFERENCE ONLY, REFER TO ROOF PLAN FOR NOTES AND DIMENSIONS.

E. REFER TO SHEET A-201 FOR EXTERIOR ELEVATIONS, A-301 FOR BUILDING SECTIONS AND SHEETS A-311 & A-312 FOR WALL SECTIONS.

F. REFER TO SHEET A-601 FOR ALL PARTITION DETAILS AND SHEET A-611 FOR ALL DOORS AND WINDOW DETAILS.

G. INSTALL APPROPRIATE MANUFACTURED EXPANSION JOINT COVERS AT ALL VISIBLE BUILDING EXPANSION JOINTS. TOP OF COVER OF FLOOR EXPANSION JOINT COVERS TO BE FLUSH WITH TOP OF FINISHED FLOOR.

H. ALL PARTITION DIMENSIONS ARE TAKEN FROM THE CENTERLINE OF COLUMNS AND TO THE DRYWALL FACE.

I. INSTALL BLOCKING AS REQUIRED TO SUPPORT WALL MOUNTED DEVICES.

J. AT ALL SPANDREL GLASS LOCATIONS, FACE OF INTERIOR WALL TO BE CONTINUOUS WITH ADJACENT WALL.

K. GENERAL DIMENSIONS PROVIDED ON FLOOR PLANS AND AREA PLANS DO NOT REFLECT THE ROUGH OPENING DIMENSIONS REQUIRED FOR COORDINATION WITH MASONRY JOINT COURSING. CONTRACTOR IS TO PROVIDE ROUGH OPENING FRAMING DIMENSIONS CONSISTENT WITH ENLARGED ARCHITECTURAL PLAN/SECTION DETAILS (SHEET A-501), AND DOOR SCHEDULE/DETAILS (SHEET A-611). CONTRACTOR TO SUBMIT RFI (REQUEST FOR INFORMATION) FOR ANY ROUGH OPENING DIMENSIONS NOT GIVEN IN DETAILS FOR CLARIFICATION REQUIRED.

L. THE CONSTRUCTION DOCUMENTS ARE STRICTLY A GRAPHIC REPRESENTATION AND ARE NOT TO BE SCALED. WRITTEN DIMENSIONS SHALL ALWAYS GOVERN, AND SCALE DETAILS SHALL GOVERN OVER SMALL SCALE PLANS. IF A DISCREPANCY IS FOUND TO EXIST BETWEEN SCALED AND WRITTEN DIMENSIONS OR BETWEEN LARGE SCALE DETAILS AND SMALL SCALE PLANS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.

M. ALL WORK SHALL BE IN COMPLIANCE WITH ALL LOCAL BUILDING CODES AND ORDINANCES, AND THE REGULATIONS OF ALL FEDERAL, STATE, AND MUNICIPAL AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS.

N. THE CONTRACTOR SHALL VISIT THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND CORRELATE PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING CONDITIONS INCLUDING UTILITIES, SANITARY, AND SEWER. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND DRAWING INDICATIONS. ALL DIMENSIONS TO EXISTING SITE ELEMENTS ARE TO BE FILED VERIFIED. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD DIMENSIONS AND DRAWING DIMENSIONS.

KEY NOTES

SYMBOL	DESCRIPTION
1	FRP UP TO 48" A.F.F.
2	REFRIGERATOR
3	STAINLESS STEEL TABLE
4	3 COMPARTMENT SINK
5	HAND SINK
6	4 BURNER STOVE AND OVEN
7	MICROWAVE OVEN
8	
9	
10	
11	
12	
13	

FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME / 101	ROOM NAME ROOM NUMBER
	NEW DOOR WITH DOOR TAG REF DOOR SCHED
	NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS
A	COLUMN GRID DESIGNATIONS

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08-06-2024

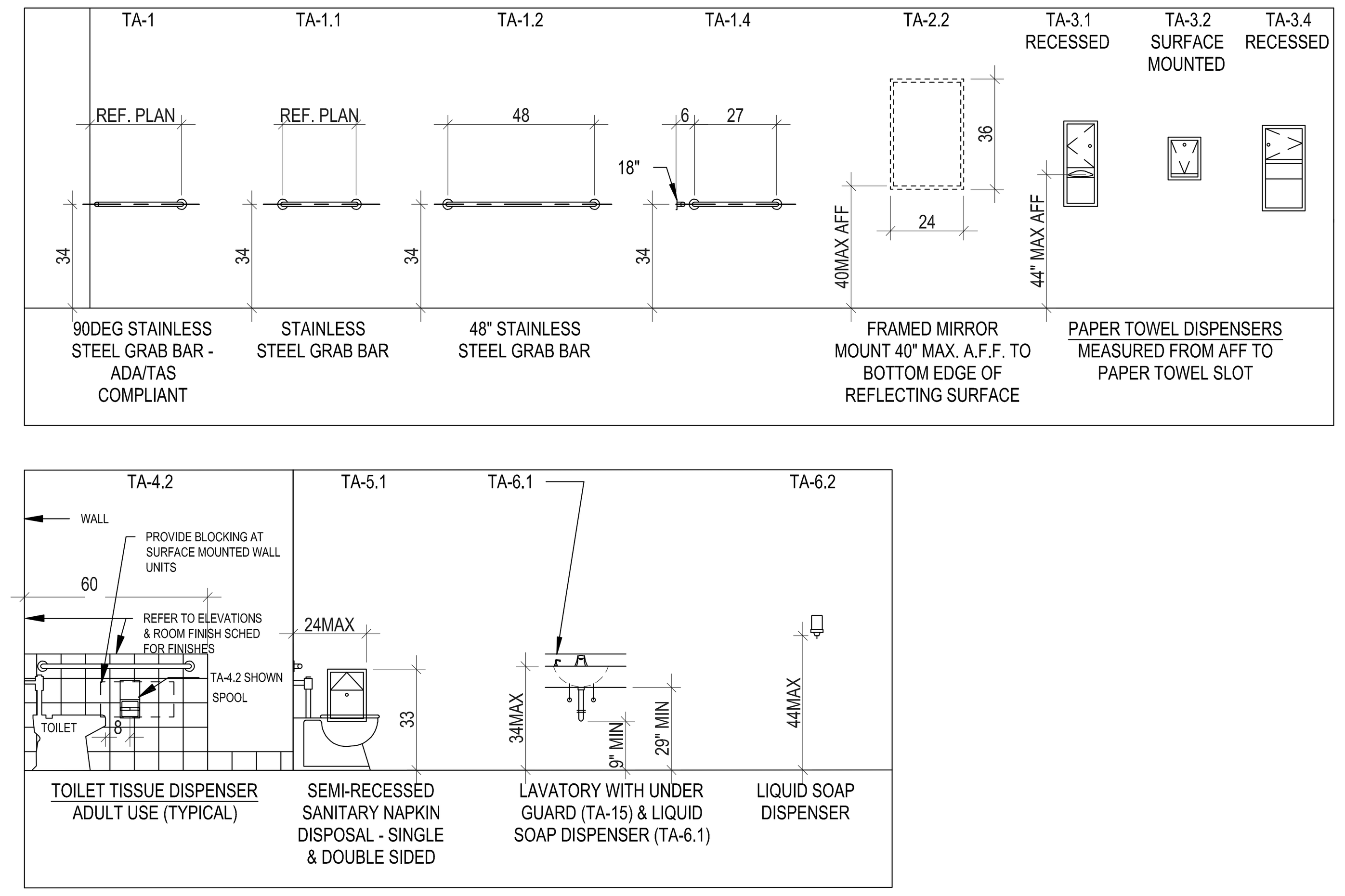
Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

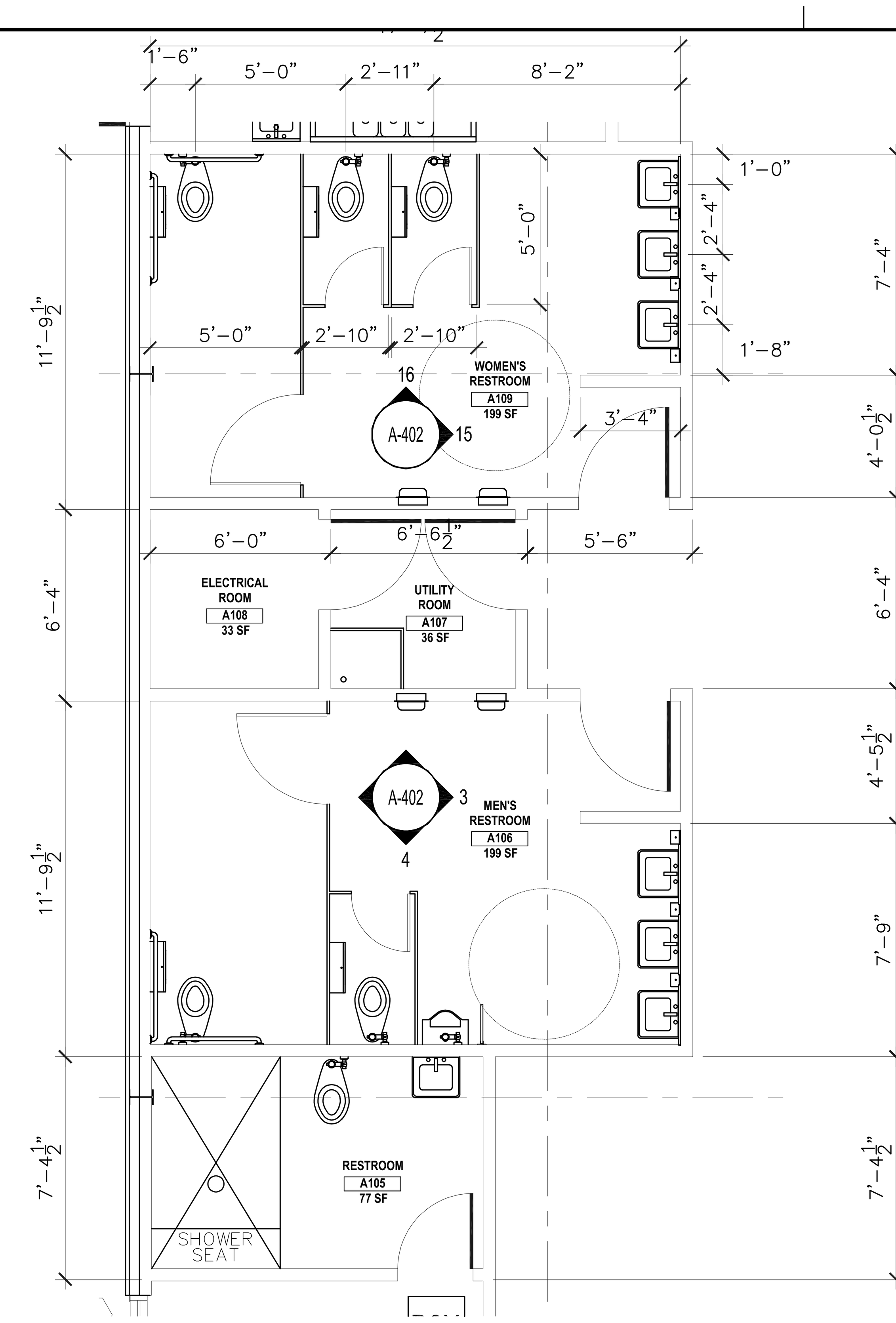
	DESCRIPTION	
	ISSUE FOR BID & CONSTRUCTION	01/05/2024
2	PERMIT COMMENTS	08/06/2024

Drawing Name
ENLARGED KITCHEN PLAN & ELEVATIONS

A-401



TYPICAL MOUNTING HEIGHTS — SCALE: 1/4"=1'-0" — 12



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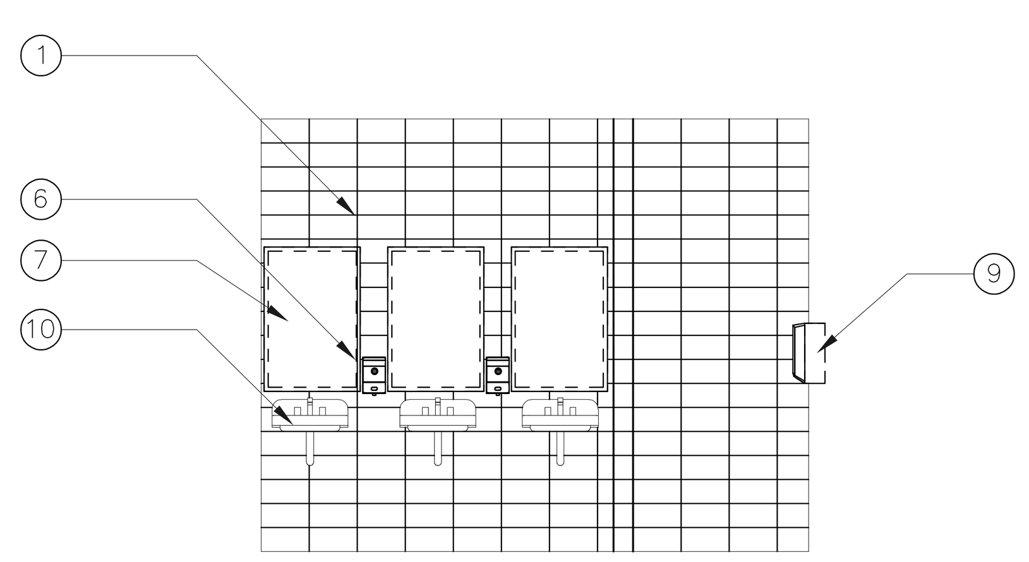

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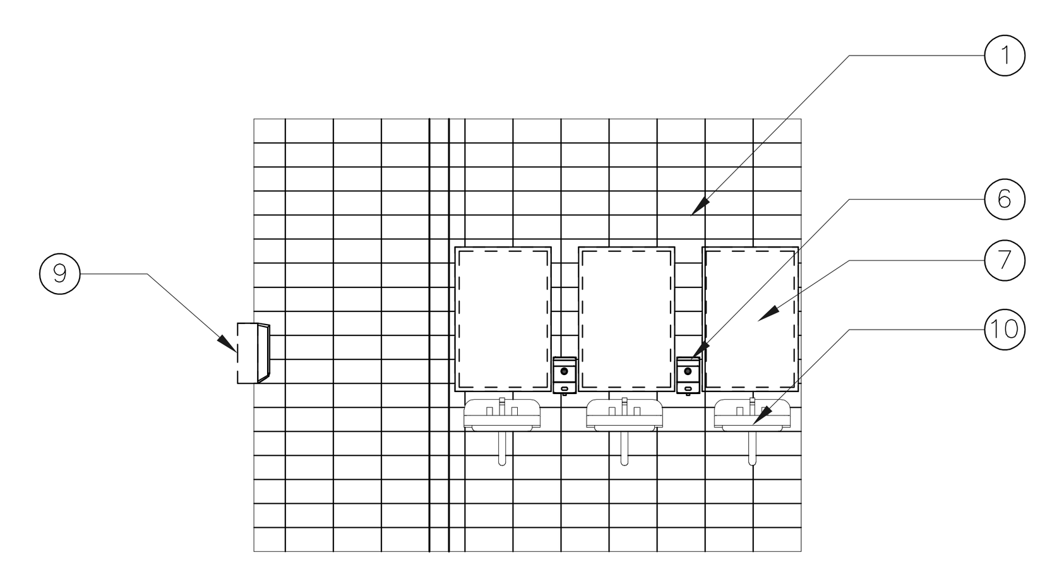
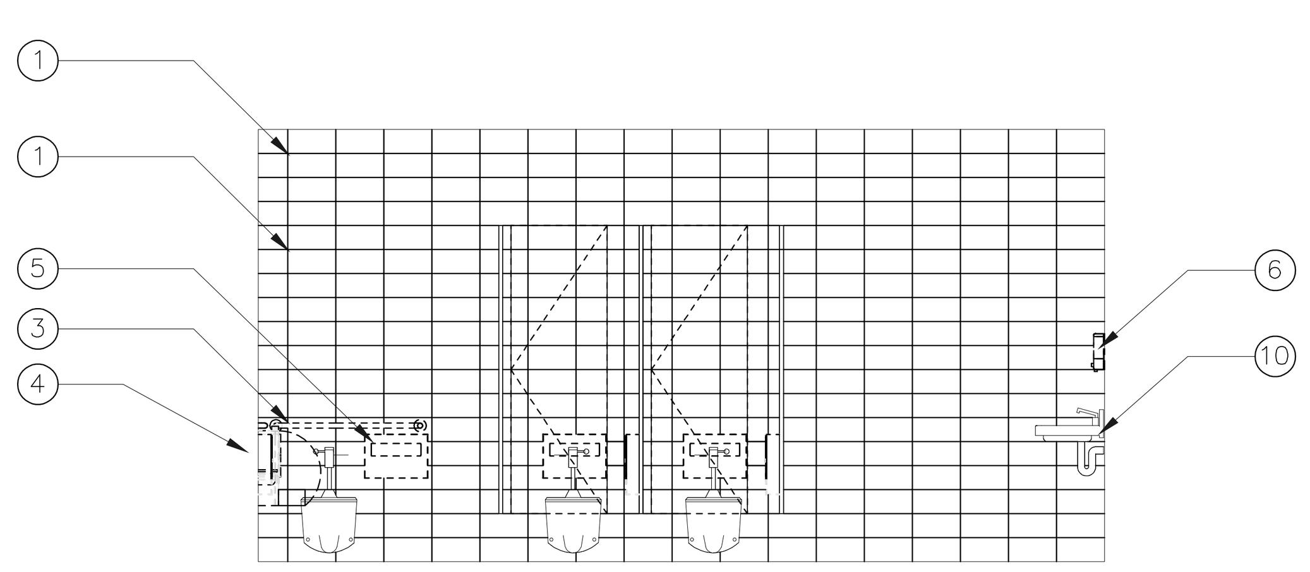
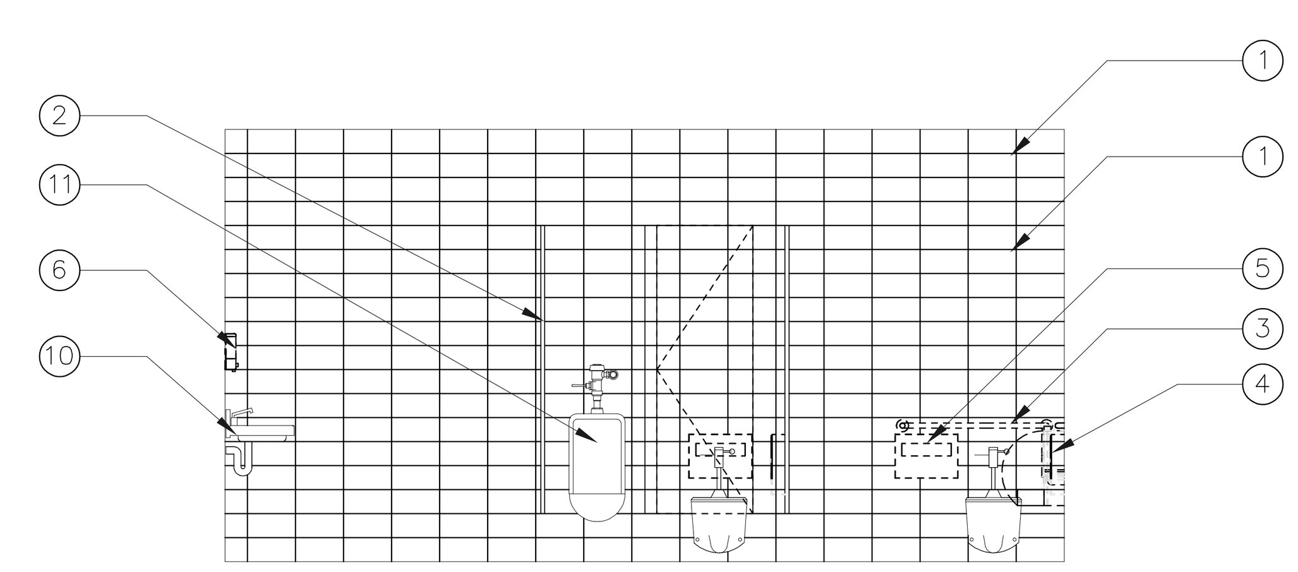


RESTROOM ELEVATION — SCALE: 1/4"=1'-0" — 3



RESTROOM ELEVATION — SCALE: 1/4"=1'-0" — 16



RESTROOM ELEVATION — SCALE: 1/4"=1'-0" — 4

FLOOR PLAN GENERAL NOTES

A. ALL UNMARKED PARTITIONS ARE TYPE A6. ALL COLUMN FURRING TO BE PARTITION TYPE F3 UNLESS NOTED OTHERWISE.

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KEY NOTES

SYMBOL	DESCRIPTION
1	CERAMIC WALL TILE
2	FLOOR MOUNTED TOILET PARTITION
3	ADA COMPLIANT 36" GRAB BARS
4	TOILET TISSUE DISPENSER
5	SANITARY NAPKIN DISPENSER
6	SOAP DISPENSER
7	MIRROR
8	HANDICAP ACCESSIBLE SHOWER W/NEW HC ACCESSIBLE FIXTURES, RE: PLUMB FOR NEW FIXTURES
9	PAPER TOWEL DISPENSER
10	ADA COMPLIANT HAND SINK
11	URINAL
12	
13	

FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 / A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME / 101	ROOM NAME ROOM NUMBER

NEW DOOR WITH DOOR TAG REF DOOR SCHED

NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS

A — COLUMN GRID DESIGNATIONS

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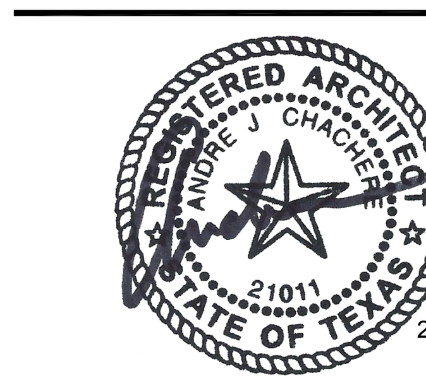

2/29/2024

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Checked By: DDV
Scale: AS NOTED

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DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

Drawing Name

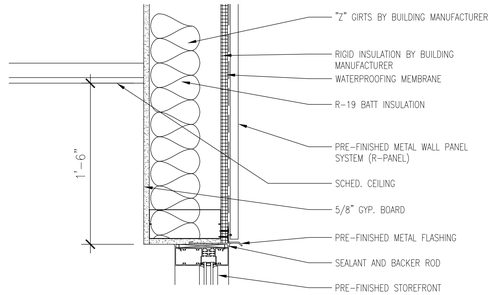
ENLARGED RESTROOM PLANS & ELEVATIONS

A-402

A

DETAIL SCALE: 1 1/2"=1'-0" 13

DETAIL SCALE: 1 1/2"=1'-0" 9



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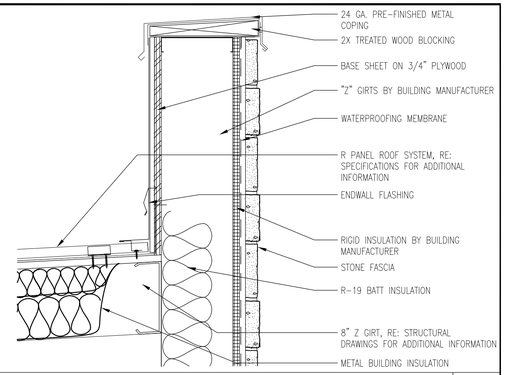

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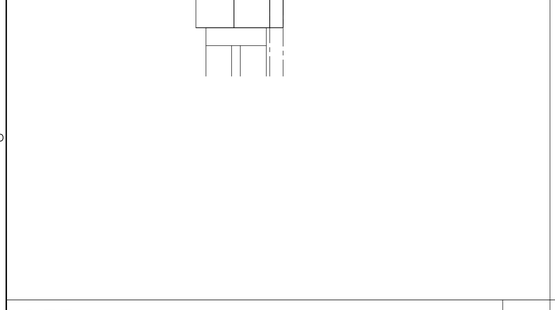

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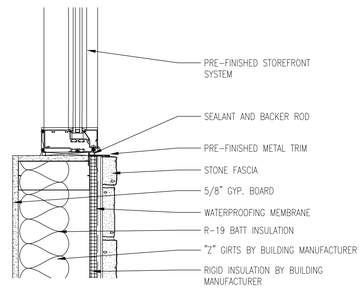

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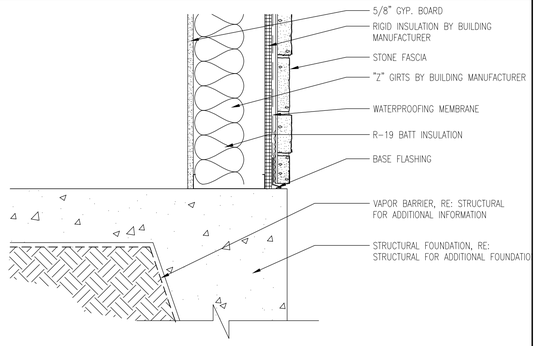

DETAIL SCALE: 1 1/2"=1'-0" 2

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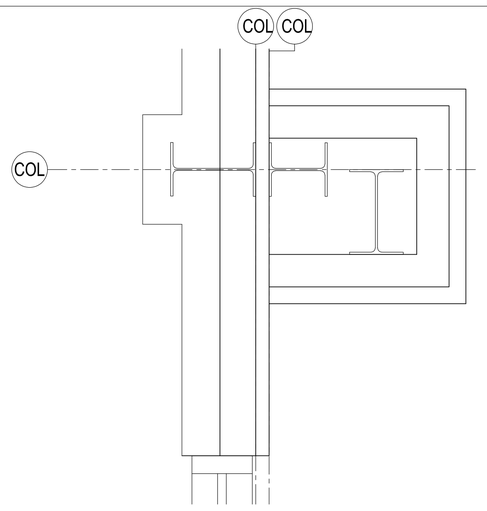

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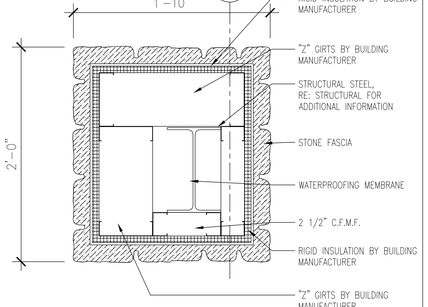

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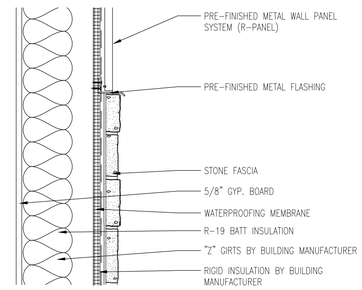

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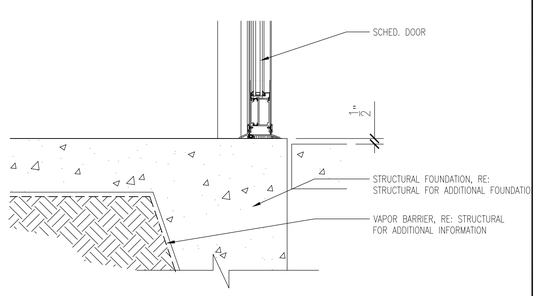

DETAIL SCALE: 1 1/2"=1'-0" 3

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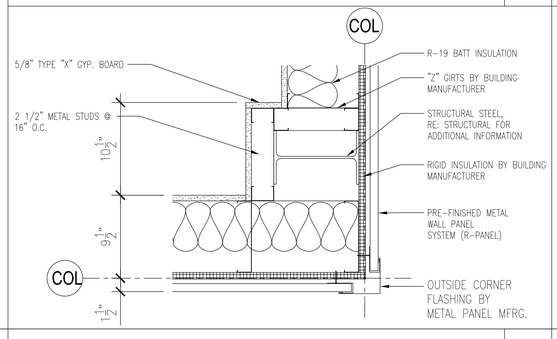

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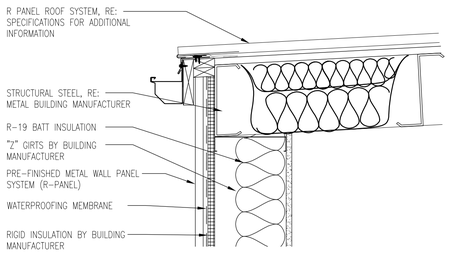
DETAIL SCALE: 1 1/2"=1'-0" 8



DETAIL SCALE: 1 1/2"=1'-0" 4

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2/29/2024

Drawing Date: 01/05/2024
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

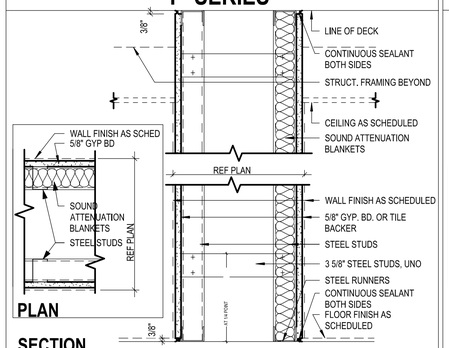
DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

Drawing Name

EXTERIOR DETAILS

A-501

'P' SERIES



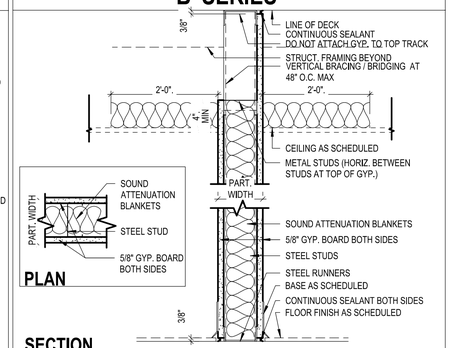
PLAN

SECTION

TYPE	STUD	PART. WIDTH	MAX. HEIGHT 25 GA.	MAX. HEIGHT 20 GA.	1 HOUR DESIGN NO.	DESIGN STC MIN STC	DESIGN STC INSUL	EST STC W/O INSUL
P1	1 5/8"	RE:PLAN	6'- 11"	8'- 5"	UL-U420	50	3 1/2"	-
P2	2 1/2"	RE:PLAN	9'- 7"	11'- 7"	UL-U493	50	3 1/2"	-
P3	3 5/8"	RE:PLAN	12'- 4"	15'- 5"	UL-U493	50	3 1/2"	-
P4	4"	RE:PLAN	13'- 0"	16'- 8"	UL-U493	50	3 1/2"	-
P6	6"	RE:PLAN	15'- 9"*	22'- 11"	UL-U493	50	3 1/2"	-

LIMITING HEIGHTS BASED ON SSMA / SFIA ; L/240; 5 PSF
*ADD WEB STIFFENERS

'B' SERIES



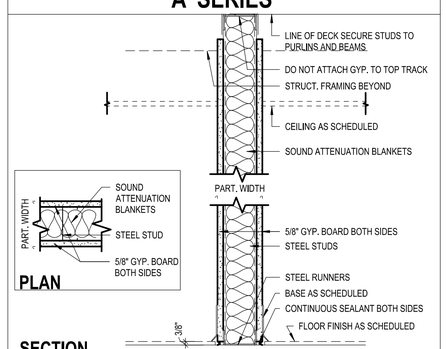
PLAN

SECTION

TYPE	STUD	PART. WIDTH	MAX. HEIGHT 25 GA.	MAX. HEIGHT 20 GA.	DESIGN NO.	DESIGN STC MIN STC	DESIGN STC INSUL	EST STC W/O INSUL
B1	1 5/8"	2 7/8"	6'- 11"	8'- 2"	N / A	-	1 1/2"	-
B2	2 1/2"	3 3/4"	9'- 7"	11'- 3"	N / A	-	2 1/2"	-
B3	3 5/8"	4 7/8"	12'- 4"	14'- 11"	N / A	-	3 1/2"	-
B4	4"	5 1/4"	13'- 0"	16'- 2"	N / A	-	3 1/2"	-
B6	6"	7 1/4"	15'- 9"*	21'- 7"	N / A	-	3 1/2"	-
B8	8"	9 1/4"	-	-	N / A	-	3 1/2"	-

LIMITING HEIGHTS BASED ON SSMA/SFIA; L/240; 5 PSF
*ADD WEB STIFFENERS

'A' SERIES



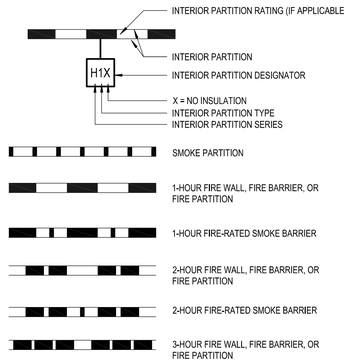
PLAN

SECTION

TYPE	STUD	PART. WIDTH	MAX. HEIGHT 25 GA.	MAX. HEIGHT 20 GA.	1 HOUR DESIGN NO.	DESIGN STC MIN STC	DESIGN STC INSUL	EST STC W/O INSUL
A1	1 5/8"	2 7/8"	8'- 4"	9'- 2"	GA-WP 1340	40	1 1/2"	35
A2	2 1/2"	3 3/4"	11'- 3"	12'- 1"	UL-U494	40	2 1/2"	40
A3	3 5/8"	4 7/8"	14'- 4"	15'- 8"		40	3 1/2"	40
A4	4"	5 1/4"	15'- 4"	17'- 6"	UL-U465	40	3 1/2"	40
A6	6"	7 1/4"	19'- 9"	23'- 2"		40	3 1/2"	40
A8	8"	9 1/4"	-	-	UL-U465	-	3 1/2"	-

LIMITING HEIGHTS BASED ON ASTM; L/240; 5 PSF

PARTITION GRAPHIC LEGEND



SPECIAL GRAPHIC LEGEND

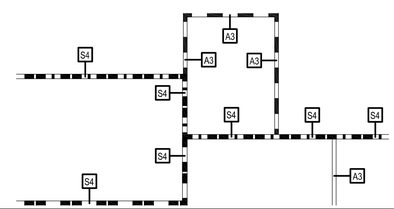
LEAD LINED, THICKNESS INDICATED ON PLANS (IN CONJUNCTION WITH PARTITION TYPE)

RADIO FREQUENCY (RF) SHIELDING (IN CONJUNCTION WITH PARTITION TYPE)

PARTITION NOTES

1. THE LOCATIONS OF FIRE, SMOKE, OR FIRE/SMOKE PARTITIONS ARE INDICATED ON THE FLOOR PLANS BY LINE SYMBOLS IN THE CENTER OF THE PARTITIONS. AT THESE LOCATIONS, THE UL DESIGN ASSEMBLY LISTED WITH THE PARTITION TYPE SHALL BE COMPLIED WITH, INCLUDING FIRESTOPPING SEALANT AT THE PERIMETER OF THE PARTITION. WHERE THE PARTITION TYPE IS NOT INDICATED ON THE FLOOR PLAN AS BEING A FIRE, SMOKE, OR FIRE/SMOKE PARTITION, THE CONSTRUCTION SHALL BE IDENTICAL, EXCEPT THAT ACOUSTICAL SEALANT SHALL BE USED IN LIEU OF FIRESTOPPING SEALANT AT THE PERIMETER OF THE PARTITION.
2. ALL NEW INTERIOR PARTITIONS SHOWN ON THE FLOOR PLANS ARE TYPE 'A3', UNLESS NOTED OTHERWISE.
3. PARTITION TYPE REFERENCES ARE INDICATED ON THE FLOOR PLANS.
4. PARTITION TYPES DO NOT DETERMINE EXTERIOR WALL CONSTRUCTION. REFER TO WALL SECTIONS FOR EXTERIOR WALL CONSTRUCTION.
5. ALL PARTITIONS THAT EXTEND FROM FLOOR TO THE UNDERSIDE OF DECK ABOVE SHALL HAVE THEIR PERIMETER AND ALL PENETRATIONS SEALED SMOKETIGHT WITH ACOUSTICAL SEALANT OR FIRESTOPPING SEALANT, AS APPLICABLE.
6. ALL FIRE, SMOKE, OR FIRE/SMOKE PARTITIONS SHALL HAVE ALL CONTROL JOINTS AND EXPANSION JOINTS IN PARTITIONS CONSTRUCTED IN A MANNER SO AS TO NOT VIOLATE THE RATING, USING CONTINUOUS FIRESTOPPING MATERIAL WITHIN THE JOINT. OTHER UNRATED PARTITIONS SHALL HAVE ALL CONTROL JOINTS AND EXPANSION JOINTS IN PARTITIONS, CONSTRUCTED IN A MANNER TO RESIST SOUND TRANSMISSION, USING FIRE RESISTANT SOUND ATTENUATION BLANKET MATERIAL WITHIN THE JOINT.
7. WHERE CERAMIC TILE, PORCELAIN PAVERS, QUARRY TILE, TERRAZZO OR CEMENT ARE INDICATED TO BE APPLIED TO PARTITIONS AS A BASE OR WALL FINISH SURFACE, REPLACE THE GWB WITH 5/8" TILE BACKER BOARD THAT HAS BEEN TESTED AND CERTIFIED TO BE EQUIVALENT IN FIRE RATING TO THE GWB WHICH THEY REPLACE. THE SCHEDULED FIRE RATING OF ANY PARTITION SHALL NOT BE VIOLATED BY THE APPLICATION OF ANY FINISHES. ALSO USE L/360 DEFLECTION CRITERIA AND 20 GAUGE MINIMUM FRAMING AT THESE LOCATIONS.
8. FLOOR TO FLOOR DIMENSIONS MAY VARY. REFER TO BUILDING SECTIONS, WALL SECTIONS, AND OTHER CONTRACT DRAWINGS FOR DETERMINING FLOOR TO FLOOR DIMENSIONS.
9. CEILING HEIGHTS MAY VARY ON EITHER OR BOTH SIDES OF THE PARTITION. REFER TO FLOOR PLANS, REFLECTED CEILING PLANS AND CEILING DETAILS FOR CEILING HEIGHTS.
10. METAL STUDS SHALL BE SPACED AT 16" O.C. MAXIMUM, UNLESS NOTED OTHERWISE. LIGHT GAUGE METAL FRAMING STUDS SPACED AT 16" O.C. MAXIMUM SHALL BE USED WHERE SPECIFIED OR DETAILED. RESILIENT CHANNELS AND FURRING CHANNELS SPACED 24" O.C. VERTICALLY MAX. 4" MAX FROM TOP AND BOTTOM ENDS.
11. ALL STEEL STUDS ARE CONTINUOUS FROM FLOOR TRACK TO BOTTOM OF DECK ABOVE, UNLESS NOTED OTHERWISE, ALLOW FOR DEFLECTION WITH TOP TRACK ASSEMBLY.
12. COLD FORMED METAL FRAMING SHALL BE USED IN LIEU OF STEEL STUDS WHERE REQUIRED TO MAINTAIN STUD WIDTH INDICATED ON THE DRAWINGS.
13. ALL GYPSUM BOARD IS TO BE 5/8" THICK UNLESS NOTED OTHERWISE.
14. PARTITION TYPE REFERENCES DO NOT INCLUDE THE APPLIED FINISHES INDICATED BY THE ROOM FINISH REFERENCE AND ROOM FINISH SCHEDULE.
15. REFER TO PARTITION DETAILS, DOOR INFORMATION, AND DOOR DETAILS FOR FRAMING AND ANCHORAGE AT DOORS.
16. INSTALL DOUBLE 20 GA. STUDS AT ALL OPENINGS, HEADS, SILLS, JAMBS UNLESS NOTED OTHERWISE AT MINIMUM.
17. WHERE ITEMS RECESSED IN THE WALLS OF FIRE RATED PARTITIONS, PROVIDE ADDITIONAL GYPSUM BOARD, FIREPROOFING, OF FIRESTOPPING AROUND THE RECESSED PORTION OF ITEM, IN THICKNESS AND CONSTRUCTION AS REQUIRED TO NOT VIOLATE THE FIRE RATING OF THE PARTITION.
18. PARTITION CONDITIONS. AT ALL CONDITIONS WHERE FIRE RATED PARTITIONS ABUT OR ATTACH TO FIREPROOFED STRUCTURAL MEMBERS, THE FIRE RATING OF THE FIREPROOFED STRUCTURAL MEMBER AND THE FIRE RATING OF THE PARTITION SHALL NOT BE VIOLATED.
19. REFER TO SYMBOLS ON PLAN FOR FLOOR PLAN INDICATION OF CHANGES IN PARTITION TYPE.
20. ALL JOINTS IN GYPSUM BOARD SURFACES TO BE TAPED AND FLOATED, INCLUDING RATED PARTITIONS, UNRATED PARTITIONS, EXPOSED SURFACES, CONCEALED SURFACES, AND SURFACES ABOVE THE CEILINGS.
21. ALL SOUND ATTENUATION BLANKETS SHALL BE CONTINUOUS FOR THE FULL HEIGHT OF PARTITION AND FULL WIDTH OF THE PARTITION, UNLESS OTHERWISE NOTED.
22. PARTITION TYPES AND DETAILS SHOWN HEREIN ARE TYPICAL. WHERE PARTITION TYPES OR DETAILS VARY ONLY SLIGHTLY FROM THE TYPICAL, THE ABBREVIATION "SIM" SHALL BE USED ADJACENT TO THE PARTITION TYPE REFERENCE OR DETAIL REFERENCE. PARTITIONS OR DETAILS NOT SIMILAR SHALL BE CONSTRUCTED IN A LOGICAL MANNER USING THE PRINCIPLES EVIDENT IN THE TYPICAL PARTITION TYPES AND DETAILS, AND IN ACCORDANCE WITH SPECIFICATION SECTIONS.
23. STC RATING SHOWN IN PARTITION TABLES ARE TAKEN FROM MANUF. PRODUCT LITERATURE. ADDITIONAL STC INFORMATION IS AVAILABLE THROUGH ADDITIONAL RESOURCES.
24. ALL FIRE, SMOKE OR FIRE SMOKE PARTITIONS SHALL HAVE MECH. AND ELEC. DEVICES SEALED WITH PUTTY PACKS OR CONSTRUCTED IN A MANNER SO AS NOT TO VIOLATE THE RATING. OTHER UNRATED PARTITIONS SHALL HAVE MECH. AND ELEC. DEVICES SEALED WITH PUTTY PACKS FOR WALLS THAT EXCEED STC 45.

PARTITION PRIORITY LEGEND



VER 1.04 12/19/2012

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REGISTERED ARCHITECT ANDREW J. CHACHERE 21011 STATE OF TEXAS
2/29/2024

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Checked By: DDV
Scale: AS NOTED

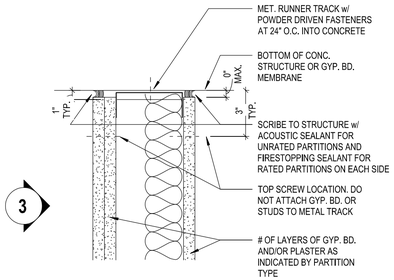
Revisions:

DESCRIPTION	
ISSUE FOR BID & CONSTRUCTION	01/05/2024

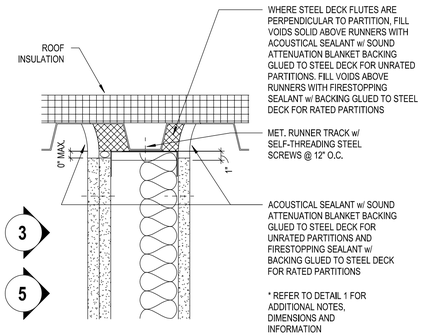
Drawing Name

ARCHITECTURAL PARTITION SCHEDULE AND DETAILS

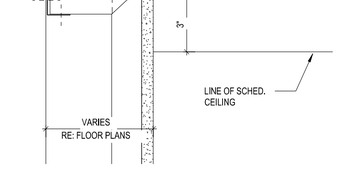
A-601



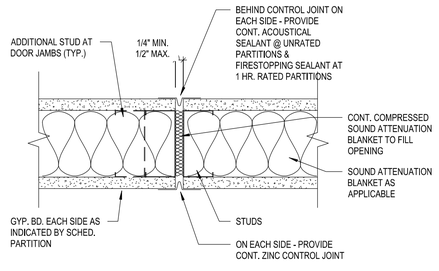
24 TOP ANCHORAGE OF PARTITION TO CONC. STRUCTURE
SCALE: 3" = 1'-0"



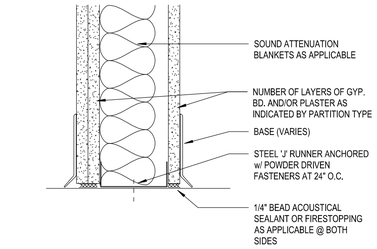
19 TOP ANCHORAGE OF PARTITION TO MET. DECK
SCALE: 3" = 1'-0"



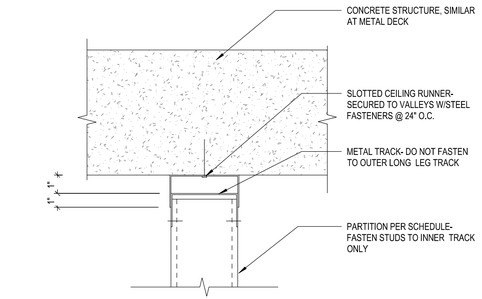
23 TOP ANCHORAGE OF FURRED WALL
SCALE: 3" = 1'-0"



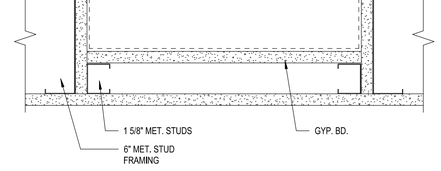
17 WALL CONTROL JOINT (UNRATED & 1 HR FIRE RATED)
SCALE: 3" = 1'-0"



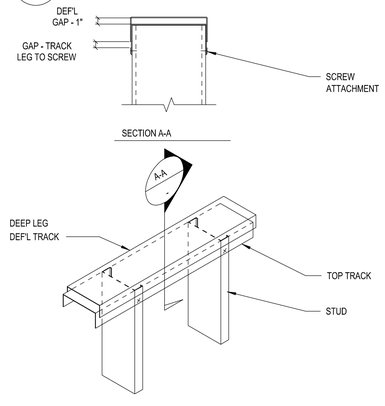
11 FLOOR ANCHORAGE OF PARTITION
SCALE: 3" = 1'-0"



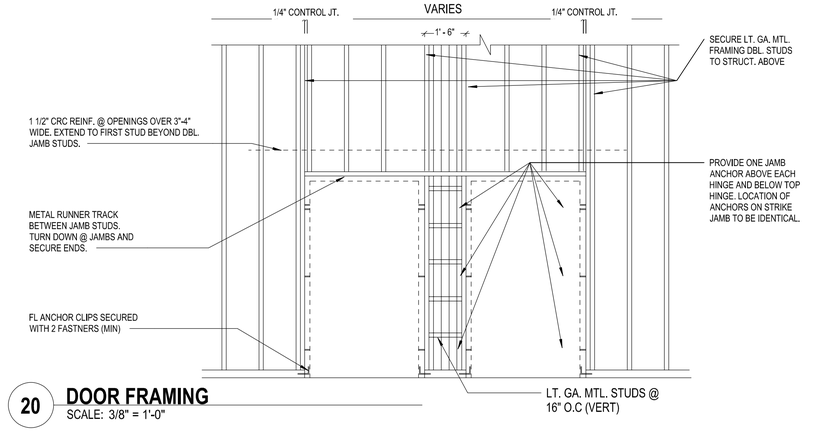
6 DEFLECTION HEAD AT METAL STUDS
SCALE: 3" = 1'-0"



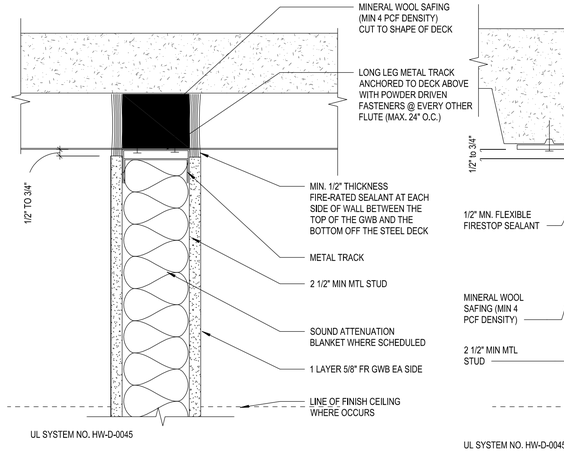
8 RECESSED ITEM AT RATED WALL
SCALE: 3" = 1'-0"



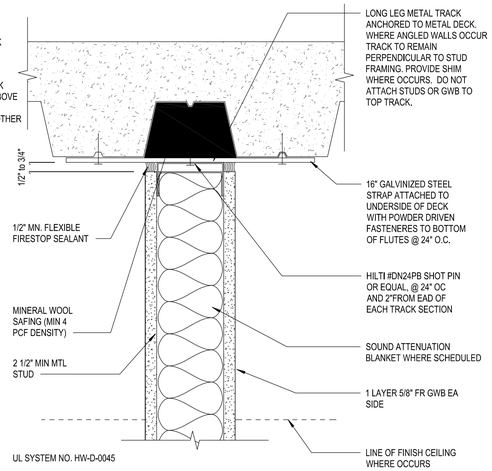
12 DEFLECTION HEAD - TYPICAL
SCALE: 1/2" = 1'-0"



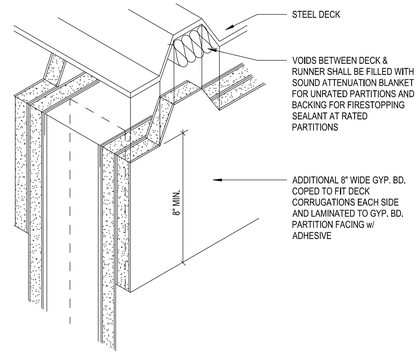
20 DOOR FRAMING
SCALE: 3/8" = 1'-0"



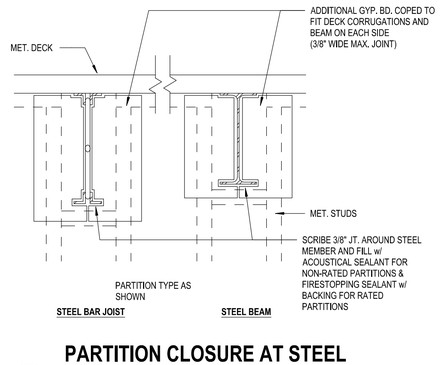
3 1-HR OR 2-HR ASSEMBLY T.O. WALL PERP. TO DECK
SCALE: 3" = 1'-0"



1 1-HR OR 2-HR ASSEMBLY T.O. WALL PARALLEL TO DECK
SCALE: 3" = 1'-0"



2 UPPER PARTITION DETAIL
SCALE: N.T.S



5 PARTITION CLOSURE AT STEEL STRUCT
SCALE: 1 1/2" = 1'-0"

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REGISTERED ARCHITECT ANDRE T. CHACHERE 21011 STATE OF TEXAS
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Revisions:

DESCRIPTION	
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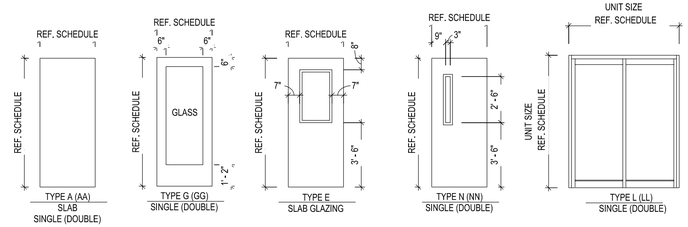
Drawing Name

ARCHITECTURAL WALL PARTITION DETAILS

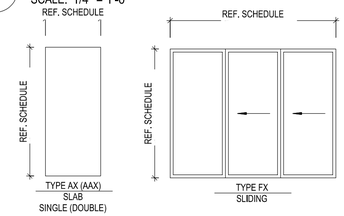
A-602

ARCHITECTURAL - DOOR SCHEDULE

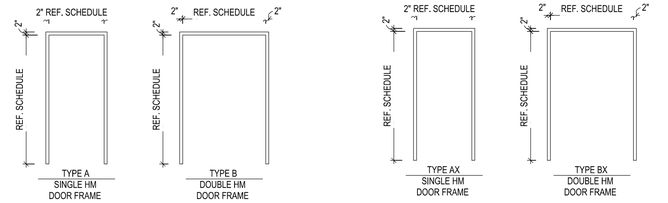
Door Number	Door Type	From Room: Room Name	From Room: Room #	Door: Pair Width (If Applicable)	Door: Overall Width	Door: Height	Door: Thickness	Door: Material	Door: Finish	Fire Rating	Hardware Set	Frame: Type	Frame: Material	Frame: Jamb	Frame: Head	Comments
101	L	COVERED DRIVE ENTRY	A101	X	6' - 0"	7' - 0"	0' - 1 3/4"	ALUM	ALUM	--		BX	ALUM			
102A	N	OPEN SPACE	A102		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
103A	A	STORAGE	A103		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
104A	A	OFFICE	A104		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
105A	A	RESTROOM	A105		2'-6"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
106A	A	MEN'S RESTROOM	A106		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
107A	A	UTILITY ROOM	A107		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
108A	A	ELECTRICAL ROOM	A108		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
109A	A	WOMEN'S RESTROOM	A109		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
110A	A	KITCHEN	A110		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
110B	A	KITCHEN	A110		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			
111A	N	PANTRY	A111		3' - 0"	7' - 0"	0' - 1 3/4"	SCW	PLM-1	--		A	HM			



4 INTERIOR DOOR TYPES
SCALE: 1/4" = 1'-0"

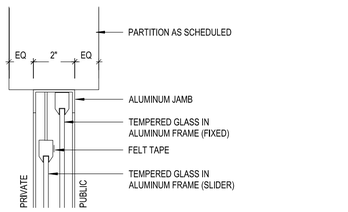


3 EXTERIOR DOOR TYPES
SCALE: 1/4" = 1'-0"

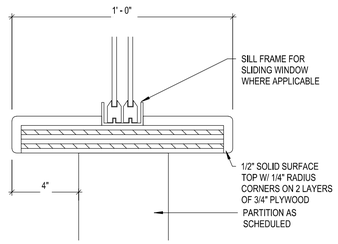


2 INTERIOR DOOR FRAME TYPES
SCALE: 1/4" = 1'-0"

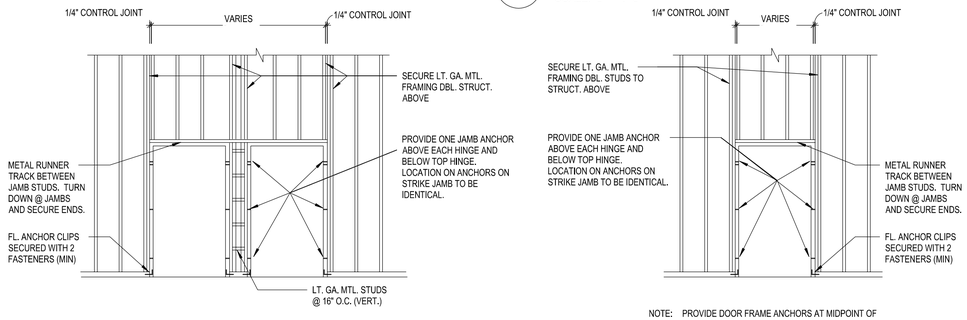
1 EXTERIOR DOOR FRAME TYPES
SCALE: 1/4" = 1'-0"



7 SLIDING WINDOW JAMB
SCALE: 3" = 1'-0"

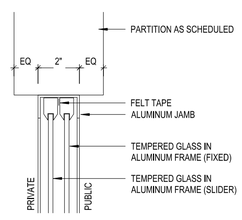


5 SLIDING WINDOW SILL
SCALE: 3" = 1'-0"

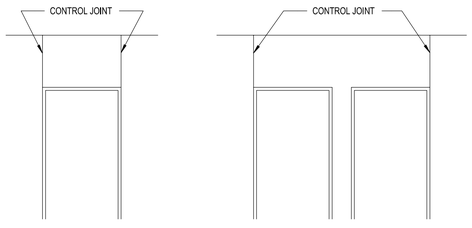


NOTE: PROVIDE DOOR FRAME ANCHORS AT MIDPOINT OF HEAD FOR FRAMES W/ PAIRS OF DOORS.

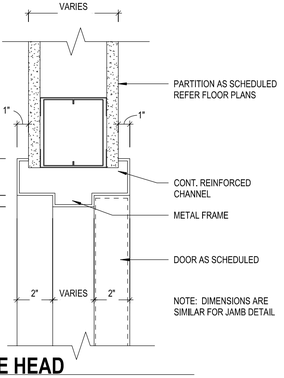
10 DOOR FRAMING ELEVATIONS
SCALE: 1/4" = 1'-0"



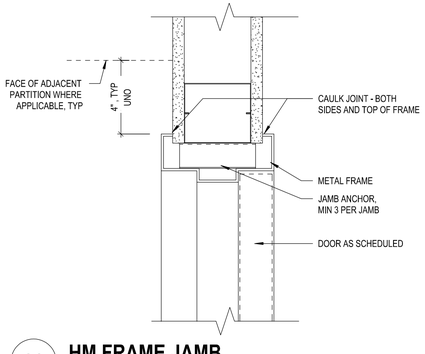
6 SLIDING WINDOW HEAD
SCALE: 3" = 1'-0"



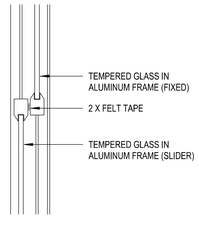
9 DOOR CONTROL JOINT ELEVATIONS
SCALE: 1/4" = 1'-0"



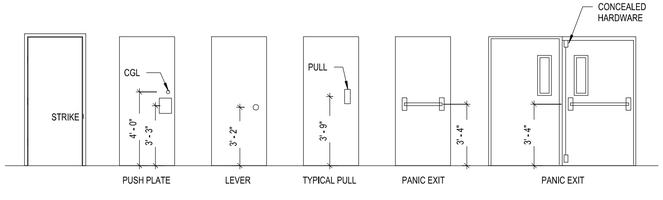
18 HM FRAME HEAD
SCALE: 3" = 1'-0"



14 HM FRAME JAMB
SCALE: 3" = 1'-0"



12 SLIDING WINDOW INTERMEDIATE JAMB
SCALE: 3" = 1'-0"



11 HARDWARE MOUNTING HEIGHTS
SCALE: 1/4" = 1'-0"

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2/29/2024

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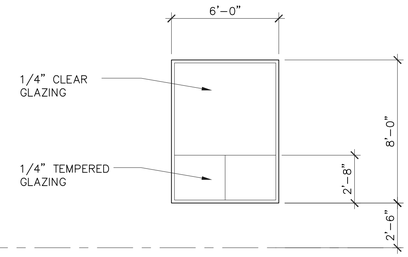
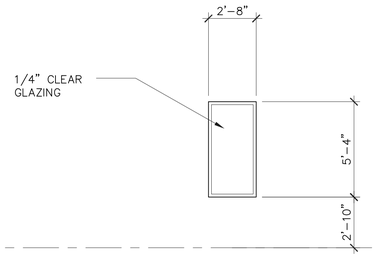
ARCHITECTURAL DOOR SCHEDULE / FRAME ELEVATIONS & DETAILS

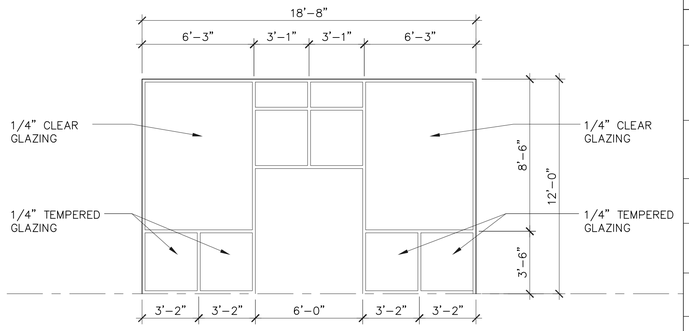
A-611



WINDOW TYPE "A" SCALE: 1/4"=1'-0" 16



WINDOW TYPE "B" SCALE: 1/4"=1'-0" 8



WINDOW TYPE "C" SCALE: 1/4"=1'-0" 4

FLOOR PLAN GENERAL NOTES

A. ALL UNMARKED PARTITIONS ARE TYPE A6. ALL COLUMN FURRING TO BE PARTITION TYPE F3 UNLESS NOTED OTHERWISE.

B. ALL WINDOW AND DOOR PLAN OPENINGS ARE DIMENSIONED ON AREA PLANS.

C. FOR FIRE AND LIFE SAFETY PLANS, REFER TO A-003 DRAWING.

D. ROOF PLAN SHOWS FOR REFERENCE ONLY, REFER TO ROOF PLAN FOR NOTES AND DIMENSIONS.

E. REFER TO SHEET A-201 FOR EXTERIOR ELEVATIONS, A-301 FOR BUILDING SECTIONS AND SHEETS A-311 & A-312 FOR WALL SECTIONS.

F. REFER TO SHEET A-601 FOR ALL PARTITION DETAILS AND SHEET A-611 FOR ALL DOORS AND WINDOW DETAILS.

G. INSTALL APPROPRIATE MANUFACTURED EXPANSION JOINT COVERS AT ALL VISIBLE BUILDING EXPANSION JOINTS. TOP OF COVER OF FLOOR EXPANSION JOINT COVERS TO BE FLUSH WITH TOP OF FINISHED FLOOR.

H. ALL PARTITION DIMENSIONS ARE TAKEN FROM THE CENTERLINE OF COLUMNS AND TO THE DRYWALL FACE.

I. INSTALL BLOCKING AS REQUIRED TO SUPPORT WALL MOUNTED DEVICES.

J. AT ALL SPANDREL GLASS LOCATIONS, FACE OF INTERIOR WALL TO BE CONTINUOUS WITH ADJACENT WALL.

K. GENERAL DIMENSIONS PROVIDED ON FLOOR PLANS AND AREA PLANS DO NOT REFLECT THE ROUGH OPENING DIMENSIONS REQUIRED FOR COORDINATION WITH MASONRY JOINT COURSING. CONTRACTOR IS TO PROVIDE ROUGH OPENING FRAMING DIMENSIONS CONSISTENT WITH ENLARGED ARCHITECTURAL PLAN/SECTION DETAILS (SHEET A-501), AND DOOR SCHEDULE/DETAILS (SHEET A-611). CONTRACTOR TO SUBMIT RFI (REQUEST FOR INFORMATION) FOR ANY ROUGH OPENING DIMENSIONS NOT GIVEN IN DETAILS FOR CLARIFICATION REQUIRED.

L. THE CONSTRUCTION DOCUMENTS ARE STRICTLY A GRAPHIC REPRESENTATION AND ARE NOT TO BE SCALED. WRITTEN DIMENSIONS SHALL ALWAYS GOVERN, AND SCALE DETAILS SHALL GOVERN OVER SMALL SCALE PLANS. IF A DISCREPANCY IS FOUND TO EXIST BETWEEN SCALED AND WRITTEN DIMENSIONS OR BETWEEN LARGE SCALE DETAILS AND SMALL SCALE PLANS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.

M. ALL WORK SHALL BE IN COMPLIANCE WITH ALL LOCAL BUILDING CODES AND ORDINANCES, AND THE REGULATIONS OF ALL FEDERAL, STATE, AND MUNICIPAL AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS.

N. THE CONTRACTOR SHALL VISIT THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND CORRELATE PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING CONDITIONS INCLUDING UTILITIES, SANITARY, AND SEWER. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND DRAWING INDICATIONS. ALL DIMENSIONS TO EXISTING SITE ELEMENTS ARE TO BE FILED VERIFIED. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN FIELD DIMENSIONS AND DRAWING DIMENSIONS.

KEY NOTES

SYMBOL	DESCRIPTION
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FLOOR PLAN LEGEND

SYMBOL	DESCRIPTION
A1X	PARTITION TAG REFER TO PARTITION SCHEDULE
1 / A-301	BUILDING SECTION TAG WALL SECTION TAG
1 / A-201	EXTERIOR ELEVATION TAG
1 A-211	INTERIOR ELEVATION TAG
1 / A-431	PLAN REFERENCE TAG
ROOM NAME 101	ROOM NAME ROOM NUMBER
	NEW DOOR WITH DOOR TAG REF DOOR SCHED
	NEW WINDOW WITH WINDOW MARK REF GLAZING ELEVATIONS
A	COLUMN GRID DESIGNATIONS

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WINDOW SCHEDULE

A-621

INTERIORS - ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR FINISH	BASE FINISH	MILLWORK			WALL FINISH	CEILING FINISH	CEILING HT.	COMMENTS
				LOWER	COUNTER	UPPER				
A101	COVERED DRIVE ENTRY	CONC	--	-	-	-	--	PLASTER	12'-0"	
A102	OPEN SPACE	TIL-3	RB	-	-	-	PNT-1	GYP. BD.	12'-0"	
A103	STORAGE	TIL-3	RB	-	-	-	PNT-1	GYP. BD.	10'-0"	
A104	OFFICE	CPT-1	RB	-	-	-	PNT-1	GYP. BD.	10'-0"	
A105	RESTROOM	CT-2	CT	PLM-1	PLM-1	-	CT/PNT-1	GYP. BD.	10'-0"	CT TO 48" A.F.F. GYP. BOARD TO BE MOISTURE RESISTANT
A106	MEN'S RESTROOM	CT-2	CT	PLM-1	PLM-1	-	CT/PNT-1	GYP. BD.	10'-0"	CT TO 48" A.F.F. GYP. BOARD TO BE MOISTURE RESISTANT
A107	UTILITY ROOM	S CONC	RB	-	-	-	FRP/PNT-1	GYP. BD.	10'-0"	FRP TO 48" A.F.F. GYP. BOARD TO BE MOISTURE RESISTANT
A108	ELECTRICAL ROOM	S CONC	RB	-	-	-	PNT-1	GYP. BD.	10'-0"	
A109	WOMEN'S RESTROOM	CT-2	CT	PLM-1	PLM-1	-	CT/PNT-1	GYP. BD.	10'-0"	FRP TO 48" A.F.F. GYP. BOARD TO BE MOISTURE RESISTANT
A110	KITCHEN	TIL-2	RB	MSS-1	MSS-1	MSS-1	SS/PNT-1	ACT-2	10'-0"	SS TO 48" A.F.F. GYP. BOARD TO BE MOISTURE RESISTANT , FLOOR TILE TO BE SLIP RESISTANT
A111	PANTRY	TIL-2	RB	-	-	-	PNT-1	GYP. BD.	10'-0"	FLOOR TILE TO BE SLIP RESISTANT

INTERIORS - FINISH SCHEDULE

COUNT	ITEM CODE	ITEM DESIGNATION	MANUFACTURER	MODEL	COLOR	COLOR NUMBER	FINISH, TEXTURE, PATTERN, SIZE	COMMENTS
1	ACT-1	Acoustical Ceiling Grid & Tile						
1	ACT-2	Aluminum - Modular						
1	AWP-1	Acoustical Wall Paneling						
1	CPB-1	Carpet - Broadroom						
1	CPT-1	Carpet - Modular						
1	DCT-1	Decorative Ceilling Grid & Tile						
1	DWP-1	Decorative Wall Paneling						
1	EPX-1	Poured Epoxy						
1	EXP	Exposed Deck / Structure						
1	FLM-1	Film - Applied						
1	FRP-1							
1	GLZ-1	Glazing						
1	GWB-1	Gypsum Wallboard						
1	INT-1	Integral Base						
1	LMF-1	Resilient Modular - Lineoleum						
1	LSF-1	Resilient Sheet - Lineoleum						
1	MSS-1	Stainless Steel						
1	MTL-1	Metal						
1	PLM-1	Plastic Laminate						
1	PLS-1	Plaster - Decorative						
1	PNT-1	Paint						
1	RAF-1	Raised Access Floor						
1	RMF-1	Resilient Modular - Rubber						
1	RSF-1	Resilient Sheet - Rubber						
1	RSS-1	Resilient Stair System						
1	RWB-1	Resilient Base						
1	SDT-1	Static Dissapative Tile						
1	SEC-1	Concrete - Sealed						
1	SSM-1	Surfacing						
1	STC-1	Concrete - Stained						
1	STN-1	Natural Stone - Modular						
1	TEX-1	Textiles						
2	TIL-1	Tile						
1	TIL-2	Slip Resistant Tile					4"X4" Slip Resistant Tile	
1	TIL-3	Slip Resistant Tile					12"X24" Slip Resistant Tile	
1	VCT-1	Vinyl Composition Tile						
1	VSF-1	Resilient Sheet - Vinyl						
1	WCG-1	Corner Guard						
1	WCV-1	Veneer - Composite						
1	WDV-1	Veneer- Wood Veneer						
1	WOS-1	Walk-Off System						
1	WPP-1	Wall Protection						
1	WWB-1	Wood Base						

INTERIOR FINISH GENERAL NOTES

1. NO SUBSTITUTIONS OF FINISHES ARE ALLOWED WITHOUT APPROVAL OF ARCHITECT.
2. SUBMIT (3) SAMPLES OF EACH FINISH AS SPECIFIED ON APPROPRIATE SUBSTRATE TO ARCHITECT FOR APPROVAL PRIOR TO ORDERING.
3. FLAME SPREAD AND SMOKE DEVELOPMENT RATINGS FOR INTERIOR FINISHES ARE TO BE IN ACCORDANCE WITH APPLICABLE CODES.
4. FLOOR TRANSITIONS SHALL OCCUR AT CENTERLINE OF DOOR IN CLOSED POSITION, UNO.
5. PROVIDE TRANSITION STRIP BETWEEN SCHEDULED CARPET, RESILIENT FLOORING, STONE FLOORING, AND TILE AS REQUIRED; UNO, REFER TO SECTION 096500, COLOR TO MATCH CARPET,
6. FLOORING TRANSITIONS SHALL BE COMPLETELY FLUSH, FIELD VERIFY FLOOR SLAB AND NOTIFY ARCHITECT OF AREAS TO BE LEVELED BEFORE COMMENCING WORK. PROVIDE ADEQUATE FLOOR LEVELING MATERIAL TO MAINTAIN CONSISTENT LEVEL FLOOR SURFACE BETWEEN DIFFERENT FLOORING FINISH MATERIALS. NOTIFY ARCHITECT IMMEDIATELY IF EXCESSIVE FLOOR FLOAT IS REQUIRED.
7. TYPICAL FLOOR BASE SHALL BE RB-1, UNO. PROVIDE STRAIGHT BASE AT CARPET AND COVED BASE AT OTHER HARD FLOOR MATERIALS.
8. REFER TO REFLECTED CEILING PLANS FOR CEILING FINISH INFORMATION.
9. REFER TO INTERIOR ELEVATIONS FOR ADDITIONAL FINISH REQUIREMENTS, INCLUDING DIMENSIONS AND EXTENT OF SPECIAL WALL FINISHES.
10. GYPSUM BOARD PARTITIONS SHALL BE FLOATED OUT TO MAINTAIN A SMOOTH, EVEN, CONSISTENT APPEARANCE IN ACCORDANCE WITH SPECIFICATION SECTION 092900. NOTICEABLE JOINTS OR TAPE LINES IN GYPSUM BOARD PARTITIONS WILL NOT BE ACCEPTABLE. REFER TO FINISH SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL WALL FINISH INFO.
11. PAINTED WALLS SHALL HAVE AN EVEN DEPTH OF COLOR AND REFLECTANCE. IF A PORTION OF A WALL IS REPAINTED AND AN EVEN FINISH IS NOT ACHIEVED, THE ENTIRE WALL SHALL BE REPAINTED.
12. ACCESS PANELS, ELECTRICAL PANELS, AND OTHER UNFINISHED OR PRIME COATED ITEMS SHALL BE PAINTED TO MATCH THE WALL OR CEILING.
13. TYPICAL WINDOW COVERING AT ALL PERIMETER WINDOW WALLS ARE BUILDING PROVIDED MINI-BLINDS, UNLESS NOTED OTHERWISE. GC TO PROTECT FROM DAMAGE THROUGHOUT THE DURATION OF CONSTRUCTION. PRIOR TO TENANT MOVE-IN, MINI-BLINDS ARE TO BE CLEANED AND REINSTALLED.
14. ELECTRICAL COMMUNICATION DEVICES AND COVER PLATES SHALL BE WHITE, UNO.
15. WALLS SHALL RECEIVE [PT-1] AND RB-1, TYPICAL, UNO. ALLOW FOR PRIMER AND TWO TOPCOATS FOR PAINT APPLICATION OVER GYPSUM BOARD WITH [EGGSHELL] [SEMIGLOSS] FINISH.
16. WHEN A CEILING RECEIVES A COLOR OTHER THAN THE STANDARD, PAINT CEILING MOUNTED DEVICES TO MATCH, INCLUDING DIFFUSERS.
17. ACCESS PANELS, ELECTRICAL PANELS, AND OTHER UNFINISHED OR PRIME COATED ITEMS SHALL BE PAINTED TO MATCH THE WALL OR CEILING IN WHICH IT IS INSTALLED.
18. ACCENT PAINT SHALL EXTEND HORIZONTALLY FROM INSIDE CORNER TO INSIDE CORNER ALONG WALL. CONTINUE ACCENT PAINT ACROSS FURR-DOWNS AND BULKHEADS ONLY IF THEY ARE IN THE SAME PLANE AS THE ACCENT WALL.
19. CAULKING AND SEALANT SHALL MATCH SURFACE TO WHICH IT IS APPLIED, UNO. SUBMIT COLOR CHART FOR ARCHITECT'S SELECTION. WHERE TWO DIFFERENT MATERIALS/COLORS ALIGN IN THE SAME PLANE, MATCH THE DARKER COLOR.
20. PAINT HOLLOW METAL DOORS SAME COLOR AS FRAME, TYPICAL, UNO. HOLLOW METAL FRAMES SHALL BE SEMI-GLOSS.
21. PAINTED METAL RAILINGS SHALL HAVE PRIMER AND TWO COATS OF EPOXY PAINT WITH POLYURETHANE TOPCOAT.
22. SCHEDULED FLOOR FINISH TO RUN CONTINUOUSLY UNDERNEATH MILLWORK, UNO.

INTERIOR FINISH LEGEND

EXP. EXPOSED CEILING
SC - SEALED CONCRETE
GYP. BD. - 5/8" GYPSUM BOARD. CLASS B
ACT-1 - ACOUSTICAL CEILING TILE. CLASS A
ARMSTRONG CLEAN ROOM VL
ACT-2 - CLEANABLE ACOUSTICAL CEILING TILE. CLASS A
ARMSTRONG CLEAN ROOM VL
CT-1 - 4"X4" CERAMIC WALL TILE. GRADE I
CT-2 - 2"X2" CERAMIC FLOOR TILE. GRADE I
TIL-2 - 4"X4" SLIP RESISTANT CERAMIC FLOOR TILE. GRADE I
TIL-3 - 12"X24" SLIP RESISTANT CERAMIC FLOOR TILE. GRADE I

PNT - 1 EPOXY PAINT - COLOR AS SELECTED. CLASS II
PAINT TO BE 40% LRV OR GREATER
RM - RUBBER BASE BY OWNER. CLASS II
DOOR - STEEL INSULATED
FRP - FIBERGLASS REINFORCED PANEL
FRP TO BE 40% LRV OR GREATER

INTERIOR FINISH LEGEND

SYMBOL	DESCRIPTION
	CPT-1 = CARPET TILE
	WD-1 = HARDWOOD
	RS-1 = RESILIENT FLOORING

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ARCHITECTURAL FINISH SCHEDULE AND DETAILS

A-681

MECHANICAL GENERAL NOTES

1. SEE ARCHITECTURAL PLANS FOR TYPE OF CEILING AND LOCATIONS OF WALL MOUNTED DEVICES.
2. DO NOT OPERATE AIR HANDLERS OR EXHAUST FANS UNTIL ALL INTERIOR CLEANING AND PAINTING IS COMPLETE. THE CLEANING OF FOULED COILS OR FAN ASSEMBLIES DUE TO PAINT OR CONSTRUCTION DEBRIS WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.
3. RECTANGULAR DUCT SIZES INDICATED ARE ACTUAL SHEET METAL DIMENSIONS IN INCHES ALL ROUND DUCT SIZES INDICATE NET FREE INSIDE DIAMETER AND DO NOT ACCOUNT FOR ANY INSULATION. ROUND DUCTS ARE EXTERNALLY INSULATED.
4. SCHEDULED MANUFACTURERS ARE BASIS OF DESIGN. ACCEPTABLE MANUFACTURERS AREA TRANE, CARRIER AND JCI.
5. MAJOR EQUIPMENT SHOWN ON THE PLANS AND ELEVATIONS ILLUSTRATE THE GENERAL ARRANGEMENT AND SPACE ALLOCATION. VERIFY THE SPACE REQUIREMENTS FOR EACH SYSTEM COMPONENT USING MANUFACTURER CERTIFIED SHOP DRAWINGS AND MAKE THE NECESSARY ADJUSTMENTS IN EQUIPMENT PLACEMENT AND CONNECTIONS IN ORDER TO ACCOMMODATE THE EXACT EQUIPMENT TO BE INSTALLED IN COORDINATION WITH ARCHITECTURAL SPACES.
6. SUPPORTS, ANCHOR BOLTS, HANGERS FOR ALL EQUIPMENT AND OTHER MISCELLANEOUS STEEL BRACING, SUPPORTS, AND REINFORCING STEEL REQUIRED TO SUPPORT EQUIPMENT SHALL BE FURNISHED AS PART OF THE SCOPE OF WORK OF DIVISION 23.
7. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND AUTHORITIES HAVING JURISDICTION.
8. FLEX DUCTS ARE SAME SIZE AS DIFFUSER NECK.
9. SEAL ALL PENETRATIONS OF FLOORS, SMOKE WALLS, FIRE WALLS, AND EXTERIOR WALLS.
10. DO NOT RUN DUCT OR PIPE OVER ELECTRICAL PANELS COORDINATE LOCATION OF DUCTS AND EQUIPMENT IN MECHANICAL ROOMS WITH THE ELECTRICAL AND PLUMBING CONTRACTOR BEFORE ANY INSTALLATION.
11. ALL DUCT RUN-OUTS TO SUPPLY AND EXHAUST, DIFFUSERS AND REGISTERS, SHALL HAVE MANUAL BALANCING DAMPERS. PROVIDE YOUNG REGULATORS WITH REMOTE ADJUSTMENT WHERE CEILING IS INACCESSIBLE.
12. ALL DUCTWORK SHALL BE INSTALLED AND MANUFACTURED IN ACCORDANCE WITH LATEST SMACNA STANDARDS.
13. SECURE ALL PERMITS AND PROVIDE ANY REQUIRED TEMPORARY UTILITIES.
14. PROVIDE AUTOMATIC AIR VENTS ON ALL HIGH POINTS OF PIPING SYSTEMS AND DRAIN VALVED CONNECTIONS AT ALL LOW POINTS OF PIPING SYSTEMS.
15. ALL FLEXIBLE DUCT SHALL BE UL 181, CLASS 1 AIR DUCT BLACK LINER. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 6'-0". PROVIDE RIGID ROUND INSULATED AIR DUCT RUNOUT AS REQUIRED. FLEXIBLE DUCT SHALL HAVE THE EQUIVALENT OF ONLY TWO 90 DEG. ELBOWS MAXIMUM.
16. THE AIR QUANTITIES SHOWN ON THE DRAWINGS FOR INDIVIDUAL OUTLETS MAY BE CHANGED TO OBTAIN UNIFORM TEMPERATURE WITHIN EACH ZONE, BUT THE TOTAL AIR QUANTITY SHOWN FOR EACH ZONE MUST BE OBTAINED.
17. INSTALL SMOKE DETECTOR FOR ALL UNITS WITH CAPACITY OF 2000 CFM AND HIGHER AS REQUIRED BY CODE. CONNECT SMOKE DETECTOR TO FIRE ALARM. FIRE ALARM CONTRACTOR TO FURNISH AND TERMINATE.
18. ALL SUPPLY & RETURN AIR DUCTS LOCATED IN UNCONDITIONED ATTICS, OUTSIDE THE ENVELOPE, OR OUTSIDE THE BUILDING SHALL BE INSULATED USING R-8 INSULATION. EXTERNALLY INSULATED DUCT SHALL BE R-8 (INSTALLED) OR MINIMUM REQUIRED BY CURRENT LOCAL CITY CODE.
19. ALL SUPPLY AND RETURN DUCTS LOCATED IN A CONDITIONED SPACE OR INSIDE THE ENVELOPE SHALL BE INSULATED USING MINIMUM R-5.6 INSULATION (INSTALLED R-VALUE). EXTERNALLY INSULATED DUCT SHALL BE R-5.6 OR MINIMUM REQUIRED BY CURRENT ENERGY CODE.
20. PROVIDED RECORD DRAWINGS OF THE ACTUAL INSTALLATION TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER. RECORD DRAWINGS SHALL INCLUDE AS A MINIMUM THE LOCATION AND PERFORMANCE DATA ON EACH PIECE OF EQUIPMENT, GENERAL CONFIGURATION OF DUCT AND PIPE DISTRIBUTION SYSTEM INCLUDING SIZES, AND THE TERMINAL AIR OR WATER DESIGN FLOW RATES.
21. PROVIDE OPERATING AND MAINTENANCE MANUALS TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER. THESE MANUALS SHALL BE IN ACCORDANCE WITH INDUSTRY-ACCEPTED STANDARDS, AND SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING:
    (A) SUBMITTAL DATA STATING EQUIPMENT SIZE AND SELECTED OPTIONS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.
    (B) OPERATION MANUALS AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE, EXCEPT EQUIPMENT NOT FURNISHED AS PART OF THE PROJECT. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED.
    (C) NAMES AND ADDRESSES OF AT LEAST ONE SERVICE AGENCY.
    (D) HVAC CONTROLS SYSTEM MAINTENANCE AND CALIBRATION INFORMATION, INCLUDING WIRING DIAGRAMS, SCHEMATICS, AND CONTROL SEQUENCE DESCRIPTIONS. DESIRED OR FIELD-DETERMINED SET-POINTS SHALL BE PERMANENTLY RECORDED ON CONTROL DRAWINGS AT CONTROL DEVICES OR, FOR DIGITAL CONTROL SYSTEMS, IN PROGRAMMING COMMENTS.
    (E) A COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE, INCLUDING SUGGESTED SET-POINTS.
22. DUCTWORK THAT IS DESIGNED TO OPERATE AT STATIC PRESSURES IN EXCESS OF 3 IN.W.C. SHALL BE LEAK TESTED ACCORDING TO INDUSTRY-ACCEPTED TEST PROCEDURES. REPRESENTATIVE SECTIONS TOTALING NO LESS THAN 25% OF THE TOTAL INSTALLED DUCT AREA FOR THE DESIGNATED PRESSURE CLASS SHALL BE TESTED. DUCT SYSTEMS WITH PRESSURE RATINGS IN EXCESS OF 3 IN. W.C. SHALL BE IDENTIFIED ON THE DRAWINGS. THE MAXIMUM PERMITTED DUCT LEAKAGE SHALL BE NO MORE THAN 1% OF THE TOTAL AIRFLOW IN THE SECTION TESTED OR AS REQUIRED BY CURRENT LOCAL CITY CODE.
23. DUCTWORK AND PLENUMS SHALL BE SEALED IN ACCORDANCE WITH THE MECHANICAL CODE AND SMACNA METHOD AND LOCAL CITY CODE. SEAL ALL LONGITUDINAL AND TRAVERSE JOINTS.
24. ALL HVAC SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS. A WRITTEN BALANCE REPORT SHALL BE PROVIDED TO THE OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
25. HVAC CONTROL SYSTEMS SHALL BE TESTED TO ENSURE THAT CONTROL ELEMENTS ARE CALIBRATED, ADJUSTED, AND PROPER WORKING CONDITION AS REQUIRED BY LOCAL CITY CODE.
26. PROVIDE WIRELESS, INTERNET CAPABLE 7-DAY PROGRAMMABLE THERMOSTAT.
27. ALL CONDENSATE DRAIN PIPES SHALL BE INSULATED WITH 1" THICK ARMA-FLEX INSULATION.

MECHANICAL LEGEND

	FLEXIBLE DUCT TO CEILING DIFFUSER
	SIDEWALL SUPPLY/RETURN/EXHAUST REGISTER
	CEILING SUPPLY AIR DEVICE (4-WAY THROW)
	CEILING RETURN AIR DEVICE W/RETURN AIR BOOT
	CEILING RETURN AIR DEVICE
	CEILING EXHAUST AIR DEVICE
VD	MANUAL VOLUME DAMPER
	MITERED 90° ELBOW W/TURNING VANES
VD	BRANCH DUCT TAP (WITH VOLUME DAMPER)
	DUCT SPLIT W/ TURNING VANES
	SPIN-IN TAP
	BELLMOUTH FITTING
AD	ACCESS DOOR
	TRANSITION IN DUCT (FLAT ON BOTTOM)
	SUPPLY AIR DUCT UP (PLAN)
	RETURN AIR OR EXHAUST DUCT UP (PLAN)
	SUPPLY AIR DUCT DOWN (PLAN)
	RETURN AIR OR EXHAUST DUCT DOWN (PLAN)
	PIPE DOWN
	PIPE UP
	TEE
TS	TEMPERATURE SENSOR
TCH	TEMPERATURE, CO2, HUMIDITY SENSOR
T	THERMOSTAT
TH	COMBO THERMOSTAT AND HUMIDITY
SD	SMOKE DETECTOR
CD	CONDENSATE DRAIN LINE
F	FIRE DAMPER
M	MOTORIZED DAMPER
DP	DIFFERENTIAL PRESSURE SENSOR
	DUCTWORK TO BE DEMOLISHED
O/A	OUTSIDE AIR
R/A	RETURN AIR
S/A	SUPPLY AIR
E/A	EXHAUST AIR
(D)	EXISTING TO BE DEMOLISHED
(E)	EXISTING TO REMAIN
(N)	NEW
RE:1/M101	REFER TO DETAIL #1 ON SHEET M101

(NOTE: ALL ITEMS NOT NECESSARILY USED)

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DESCRIPTION	
ISSUE FOR CONSTRUCTION & BID	02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
02/20/24

Drawing Name

MECHANICAL
SYMBOLS &
LEGENDS

M001

FAN COIL UNIT SCHEDULE (SPLIT-DX WITH ELECTRIC HEATING)

MARK	AIRFLOW (CFM)	OUTSIDE AIR FLOW (CFM)	CONFIGURATION	FAN		DIRECT EXPANSION COIL					EA DB TEMP. (F)	LA DB TEMP. (F)	IN-DOOR UNIT ELEC. DATA			IN-DOOR UNIT MAKE	OUT-DOOR UNIT ELECTRICAL DATA					OUT-DOOR UNIT MAKE	REMARKS
				E.S.P. (IN. WG.)	MOTOR (HP)	MAX FACE VEL. (FPM)	TOT. CAPACITY (MBh)	SEN. CAPACITY (MBh)	EAT DB/WB (°F)	MAX LAT DB (°F)			VOLTAGE	MCA	MOCP		TONNAGE	AMBIENT (°F)	MCA	MOCP	VOLTAGE		
FCU-1 & CU-1	2,000	685	HORIZONTAL	0.75	2	257	67,190	54,299	79.4/65.4	56	45	55	208/3/60	48	50	TRANE - TWE07243BAA	7.5	105	23	30	208/3/60	TRANE - TTA07243DAA	ALL
FCU-2 & CU-2	2,000	685	HORIZONTAL	0.75	2	257	67,190	54,299	79.4/65.6	56	45	55	208/3/60	48	50	TRANE - TWE07243BAA	6.0	105	23	30	208/3/60	TRANE - TTA07243DAA	ALL
FCU-3 & CU-3	1,000	550	HORIZONTAL	0.75	2	-	20,000	14,300	79.4/65.6	56	45	55	208/3/60	30	35	TRANE - TEM6A0C36H31	3.0	105	12	20	208/3/60	TRANE - 4TTA4036A3000A	ALL

REMARKS:

1. INSTALL AUXILIARY DRAIN PAN UNDER UNIT.
2. INSTALL WATER SENSING DEVICE IN PRIMARY DRAIN PAN. WATER SENSING DEVICE SHALL SHUT UNIT DOWN UPON DETECTION OF WATER.
3. PROVIDE FILTER SECTION WITH MINIMUM MERV-8 FILTERS.
4. PROVIDE MATCHING CONDENSING UNIT AS INDICATED.
5. PROVIDE IN-DOOR UNIT WITH SINGLE POINT POWER CONNECTION.
6. UNIT EER MUST COMPLY WITH LATEST IEC REQUIREMENTS.
7. MANUFACTURES SHALL CONFIRM ALL REFRIGERANT LINES, SIZES INDICATED AND SUBMIT A PART OF EQUIPMENT SUBMITTAL.
8. UNITS REFRIGERANT SHALL BE R-410A.
9. PROVIDE RAWAL APR CONTROL VALVE INSTALLED BY THE CONTRACTOR.
10. PROVIDE DIRECT DRIVE TYPE FANS AND WITH ECM MOTOR.
11. INSTALL MOTORIZED DAMPER WHERE SHOWN ON PLANS AND INTERLOCK WITH FCU. REFERENCE OUTSIDE AIR SEQUENCE OF OPERATIONS.
12. PROVIDE UNIT WITH STAINLESS STEEL DRAIN PAN.
13. PROVIDE LOW LEAKAGE ENTHALPY ECONOMIZER.
14. PROVIDE ADAPTIVE SUBCOOL AND COOL HUMIDITY CONTROL.
15. BASIS OF DESIGN: TRANE, CARRIER, YORK.

* FOR INFORMATION ABOUT THE SPECIFIED UNIT ABOVE PLEASE CONTACT: NICK DEL VILLAR AT HUNTON TRANE FOR ENGINEERING SALES ASSISTANCE (832)731-6289

DIFFUSER NECK-DUCT SIZE SCHEDULE

DIFFUSER NECK AND BRANCH DUCT SIZE	SUPPLY AIR (CFM)
6"Ø	0 - 100
8"Ø	101 - 200
10"Ø	201 - 300
12"Ø	301 - 400
14"Ø	401 - 500

FAN SCHEDULE

MARK	SERVING	AIR VOLUME CFM	FAN TYPE	DRIVE TYPE	ESP INCH WG	FAN SPEED RPM	MOTOR			MANUFACTURER & MODEL	LOCATION	REMARKS
							HP(W)	V/P/Hz	RPM			
EF-1	RR	150	CEILING	DIRECT	0.25	900	16W	115/1/60	900	GREENHECK-SP-A90	CEILING	4, 5, 6
EF-2	RR	150	CEILING	DIRECT	0.25	900	16W	115/1/60	900	GREENHECK-SP-A90	CEILING	4, 5, 6
EF-3	RR	75	CEILING	DIRECT	0.25	900	16W	115/1/60	900	GREENHECK-SP-A90	CEILING	4, 5, 6
EF-4	JANITORS	75	CEILING	DIRECT	0.25	900	16W	115/1/60	900	GREENHECK-SP-A90	CEILING	4, 5, 6

REMARK:

1. PROVIDE IN-LINE WITH NECESSARY ACCESSORIES FOR SUSPENDING UNIT FROM STRUCTURE.
2. PROVIDE IN-LINE FAN WITH 1" THICK INSULATION.
3. INTERLOCK FAN WITH T-STAT TO ENGAGE FAN UPON TEMPERATURE REACHING 80°F.
4. FAN SHALL BE SUITABLE FOR CEILING MOUNTING.
5. PROVIDE ROUND EXHAUST ROOF CAP.
6. INTERLOCK FAN WITH LIGHT SWITCH.

AIR OUTLET SCHEDULE

MARK	MAKE	TYPE	MODEL	FACE SIZE	NECK/DUCT SIZE	NUMBER OF SLOTS (#)	SLOT WIDTH (IN)	MATERIAL	FINISH	MOUNTING	REMARKS
A	TITUS	SUPPLY	OMNI-AA	24x24	NOTE 2	N/A	N/A	ALUMINUM	OFF WHITE	CEILING	1, 3
B	TITUS	RETURN	50F	24x24	NOTE 2	N/A	N/A	ALUMINUM	OFF WHITE	CEILING	1, 3

REMARKS:

1. REFER TO PLANS FOR AIR FLOW RATE
2. REFER TO DIFFUSER NECK-DUCT SIZE SCHEDULE FOR TAKE OFF BRANCH SIZES UNLESS OTHERWISE SPECIFIED ON PLANS
3. COORDINATE CEILING TYPE WITH ARCHITECTURAL PLANS PRIOR TO ORDERING DIFFUSER/GRILLES

OUTDOOR AIR BASED ON TABLE 402.1, 2012 UNIFORM MECHANICAL CODE

OCCUPANCY CATEGORY	AREA (FT²)	NUMBER OF PEOPLE	PEOPLE OUTDOOR AIR RATE (CFM/PERSON)	AREA OUTDOOR AIR RATE (CFM/FT²)	TOTAL (CFM/PERSON)	TOTAL (CFM/FT²)
MULTIPURPOSE ASSEMBLY	3363	70	5.00	0.06	350	201.8
OFFICE SPACE	228	3	5.00	0.06	15	13.7
KITCHEN (COOKING)	285	4	7.50	0.12	30	34.2
TOTALS REQUIRED =					395	249.7
	TOTAL REQUIRED PER CFM/PERSON + CFM/FT² =					644.7
	TOTAL OUTSIDE AIR SUPPLIED =					790.0

OUTDOOR AIR CALCULATION BASED ON TABLE 402.1, 2012 UNIFORM MECHANICAL CODE

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Revisions:

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1	ISSUE FOR CONSTRUCTION & BID	02/17/2024
1	CITY COMMENTS	02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
10/21/24

Drawing Name

MECHANICAL SCHEDULES

M002

DUCTWORK

J. ALL DUCTWORK SHALL BE CONSTRUCTED OF NEW LOCK FORMING QUALITY GALVANIZED SHEET METAL IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. DUCTWORK UPSTREAM OF VAV BOXES SHALL BE CONSTRUCTED TO THE 2" W.G. PRESSURE CLASSIFICATION. DUCTWORK DOWNSTREAM OF BOXES SHALL BE CONSTRUCTED TO THE 1" W.G. PRESSURE CLASSIFICATION. SUPPLY DUCT SYSTEMS WITHOUT VAV BOXES SHALL BE CONSTRUCTED TO THE 2" W.G. PRESSURE CLASSIFICATION. EXHAUST SYSTEMS LESS THAN 1,000 CFM SHALL BE CONSTRUCTED TO THE 1" W.G. PRESSURE CLASSIFICATION. EXHAUST SYSTEMS ABOVE 1,000 CFM SHALL BE CONSTRUCTED TO THE 2" PRESSURE CLASSIFICATION. RETURN AIR DUCTWORK SHALL BE CONSTRUCTED TO THE 2" PRESSURE CLASSIFICATION. ALL LONGITUDINAL SEAMS AND TRANSVERSE JOINTS SHALL BE SEALED PER SMACNA DUCT SEALING REQUIREMENTS SEAL CLASS "B". SEAL WITH A WATER BASED ADHESIVE SEALER DESIGNED FOR MEDIUM VELOCITY DUCT SYSTEMS. SEALER SHALL BE HARDCAST, INC., "IRON GRIP WATER BASE DUCT SEALANT #601." DUCTWORK SHALL BE HUNG AS HIGH AS POSSIBLE FROM THE BUILDING STRUCTURE WITH HANGER ASSEMBLIES IN ACCORDANCE WITH "SMACNA" REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE ADDITIONAL RISES, DROPS, AND OFFSETS IN DUCTWORK AS REQUIRED. IF AFTER INSTALLED, NEW DUCTWORK IS FOUND TO BE IN CONFLICT WITH ARCHITECTURAL, STRUCTURAL, OR MEP ELEMENTS WHICH ARE EITHER EXISTING OR SHOWN ON THE CONTRACT DOCUMENTS, THE DUCTWORK SHALL BE RELOCATED WITHOUT ADDITIONAL COST TO THE OWNER.

K. ALL INSULATION SHALL HAVE A COMPOSITE (INSULATION, JACKET OR FACING, AND ADHESIVE USED TO ADHERE FACING OR JACKET TO INSULATION) FIRE AMD SMOKE HAZARD RATING (AS TESTED BY PROCEDURE ASTM E84, NFPA 225, AND UL 273) NOT EXCEEDING A FLAME SPREAD RATING OF 25 AND A SMOKE DEVELOPED RATING OF 50.

L. ALL NEW SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH 2" THICK DUCT WRAP, 3/4 LB/CU.FT. INSULATION. INSULATION SHALL HAVE A FACTORY APPLIED FOIL-SKRIM-KRAFT FACING CONSISTING OF 0.35 MIL. ALUMINUM FOIL REINFORCED WITH GLASS YARN MESH AND LAMINATED TO 40 POUND CHEMICAL TREATED, FIRE RESISTANT KRAFT. OVERLAP ALL SEAMS, STAGGER LONGITUDINAL SEAMS. SEAL SEAMS WITH 4" WIDE PRESSURE SENSITIVE TAPE AND OUTWARD CLINCHING STAPLES. USE SPEED CLIP PINS ADHERED TO DUCT SURFACES OVER 18" IN WIDTH ON 16" ENTERS AND MAX. 3" FROM INSULATION SEAMS. APPLY BRUSH ON VAPOR RETARDANT MASTIC OVER TAPE EDGES, PINS, AND TEARS IN THE FOIL VAPOR BARRIER.

M. ROUND FLEXIBLE DUCT SHALL HAVE 1" THICK, 1-1/2 LB/CU.FT. DENSITY FIBERGLASS INSULATION, VINYL VAPOR BARRIER. MINIMUM LENGTH 4'-0"; MAXIMUM LENGTH 6'-0". IF EXTENSION IS REQUIRED, USE ROUND SHEET METAL DUCT THAT IS EXTERNALLY INSULATED WITH 1" THICK, 1-1/2 LB/CU.FT. FIBERGLASS INSULATION AND FOIL-SKRIM-KRAFT VAPOR BARRIER. SECURE FLEXIBLE DUCT TO SPIN-IN AND AIR DEVICE NECK WITH CORROSION RESISTANT METAL CLAMPS AND SEAL VAPOR BARRIER AS DESCRIBED ABOVE IN NOTE 3. SUSPEND FLEX DUCT FROMSTRUCTURE AT DUCT CONNECTION AND EVERY 4 FEET; DO NOT ALLOW IT TO REST ON CEILING WHERE FLEXIBLE DUCT PENETRATES A WALL THAT EXTENDS TO STRUCTURE, PROVIDE INSULATED RIGID DUCT EXTENDING 12" ON EITHER SIDE OF THE PARTITION.

N. FLEXIBLE DUCT SHALL BE USED WHERE FLEXIBLE DUCT CONNECTIONS ARE SHOWN ON THE DRAWINGS TO AIR DISTRIBUTION DEVICES AND TERMINAL UNITS. MAXIMUM LENGTH SHALL BE 6'-0" FOR AIR DISTRIBUTION DEVICE CONNECTIONS. WHERE LONGER RUNS ARE REQUIRED, PROVIDE RIGID ROUND DUCTWORK. FLEXIBLE DUCTS SHALL BE SUPPORTED IN SUCH A MANNER TO PREVENT SAGS AND KINKS. BENDS IN ANY LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED A TOTAL TURNING OF 900. EXTEND INSULATION AND OUTER JACKET OVER THE SECURED CLAMP AND TAPE DOWN TO THE SLEEVE/COLLAR TO MAINTAIN VAPOR BARRIER INTEGRITY. "R-VALUE" OF 8 MUST BE MAINTAINED THROUGH INSTALLATION. INSULATION ON FLEXIBLE DUCT SHALL NOT BE COMPRESSED. IF IT COMPLIES WITH THESE SPECIFICATIONS, FLEXIBLE DUCTWORK EQUAL TO FLEXMASTER TYPE 8M OR THERMAFLEX M-KE WILL BE ACCEPTABLE.

O. FLEXIBLE DUCTWORK SHALL NOT BE USED IN AREAS OF EXPOSED CEILINGS.

P. IN AREAS OF EXPOSED STRUCTURE USE LINED INSULATION PER THE BUILDING STANDARDS. RETURN AIR BOOTS SHALL ALSO USE BUILDING STANDARD LINED INSULATION.

Q. ALL EXPOSED ROUND DUCT SHALL BE AP SPIRAFLEX INTERNALLY LINED DUCTWORK WITH ELASTOMERIC DUCT LINER.

R. DUCTWORK LOCATED OUTDOORS EXPOSED TO ELEMENTS SHALL HAVE THERMAL INSULATION EQUAL TO ARMACELL "ARMATUFF". INSULATION SHALL BE FUNGI, MOLD AND BACTERIA RESISTANT, CHEMICAL RESISTANT, UV RESISTANT. WATER VAPOR PERMIABILITY OF .05, AND THERMAL CONDUCTIVITY OF .256. PROVIDE MANUFACTURER'S INSTALLATION ACCESSORIES AND REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.

DX SPLIT SYSTEM AIR-HANDLING UNITS

A. RELATED DOCUMENTS

13. THE REQUIREMENTS OF THE GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, DIVISION AND DRAWINGS APPLY TO ALL WORK HEREIN.

B. QUALITY ASSURANCE

1. MANUFACTURERS SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING ROOFTOP UNITS WHICH MAY BE INCORPORATED IN THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1.1. DAIKIN.
1.2. TRANE.
1.3. AAON.
1.4. CARRIER

C. GENERAL

1. UNITS SHALL BE FACTORY-ASSEMBLED AND TESTED, DESIGNED FOR ROOF OR SLAB INSTALLATION. CAPACITIES AND ELECTRIC CHARACTERISTICS ARE SCHEDULED ON THE DRAWINGS.

D. CASING:

1. MANUFACTURER'S STANDARD CASING CONSTRUCTION, HAVING CORROSION PROTECTION COATING, AND EXTERIOR FINISH.

2. CASING SHALL HAVE REMOVABLE PANELS OR ACCESS DOORS FOR INSPECTION AND ACCESS TO INTERNAL PARTS AND FILTERS. PROVIDE WITH 2" THICK THERMAL INSULATION.

E. KNOCKOUTS FOR ELECTRICAL AND PIPING CONNECTIONS.

1. INTERIOR CONDENSATE DRAIN CONNECTION AND LIFTING LUGS. IF EXTERIOR DRAIN, DRAIN MUST PENETRATE CURB AND CONTINUE AS DETAILED AND SHOWN ON PLAN.

F. ROOF CURB

1. FURNISH ONE COMPLETE INSULATED FINAL FILTER ROOF CURB FOR EACH PACKAGED UNIT, DESIGNED FOR WEATHERPROOF INSTALLATION. KCC INTERNATIONAL MODEL KCC-OA OR APPROVED EQUAL. CURB SHALL BE FURNISHED APPROVED BY UNIT MANUFACTURER. ROOF CURB SHALL BE EQUIPPED TO ACCOMMODATE ALL TYPES OF ROOFING SYSTEMS. REFER TO UNIT SCHEDULE FOR FINAL FILTER TYPE.

2. SUPPLY AND RETURN DUCT SHALL CONNECT THROUGH THE CURBED OPENING WITH FLEXIBLE CONNECTIONS TO THE BOTTOM OF THE AC UNIT, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.

3. CURB SHALL COMPLY WITH NATIONAL ROOFING CONTRACTORS ASSOCIATION REQUIREMENTS.

4. SLOPE OF ROOF CURB SHALL MATCH ROOF SLOPE TO PROVIDE FOR LEVEL SUPPORT OF PACKAGED UNIT.

5. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF CURB, SUPPLY AND RETURN DUCTS, AND WEATHERPROOFING OF THE ENTIRE INSTALLATION.

G. EVAPORATOR FANS:

1. FORWARD-CURVED, CENTRIFUGAL, DIRECT OR BELT-DRIVEN FANS WITH ADJUSTABLE SHEAVES (ON BELT-DRIVEN FANS) AND 100,000 HOUR LIFE PERMANENTLY LUBRICATED MOTOR BEARINGS. PROVIDE STEEL FANS WITH CORROSION RESISTANT FINISH. AFTER BALANCING (OR TO ACHIEVE BALANCE) REPLACE ADJUSTABLE SHEAVE WITH THE PROPER COMBINATION OF FIXED SHEAVES NEEDED TO ACHIEVE THE REQUIRED AIR FLOW AMOUNTS. REFER TO AHU SCHEDULE ON DRAWINGS FOR ADDITIONAL FAN REQUIREMENTS. FAN REQUIREMENTS ON SCHEDULE GOVERN.

H. CONDENSER FANS:

1. PROPELLER-TYPE, DIRECT-DRIVEN FANS WITH PERMANENTLY LUBRICATED MOTOR BEARINGS.

I. COILS:

1. ALUMINUM FIN AND COPPER TUBE TYPE. FINS SHALL HAVE COLLARS DRAWN, BELLED AND FIRMLY BONDED TO THE TUBES BY MEANS OF MECHANICAL EXPANSION OF THE TUBES. NO SOLDERING OR TINNING SHALL BE USE IN THE BONDING PROCESS. COILS SHALL HAVE A GALVANIZED STEEL OR STAINLESS STEEL CASING. COILS SHALL BE MOUNTED IN THE COIL CASING WITH SAME END CONNECTIONS ACCESSIBLE FOR SERVICE. COIL SECTION SHALL BE COMPLETELY INSULATED.

J. REFRIGERANT COOLING COILS

1. HAVE AN EQUALIZING TYPE VERTICAL DISTRIBUTOR TO ENSURE EACH COIL CIRCUIT RECEIVES THE SAME AMOUNT OF REFRIGERANT. COILS SHALL BE PROOF (450 PSIG) AND LEAK (300 PSIG) TESTED WITH AIR PRESSURE UNDER WATER, THEN CLEANED, DEHYDRATED, AND SEALED WITH A HOLDING CHARGE OF NITROGEN.

K. REFRIGERATION SYSTEM:

1. EACH SCROLL COMPRESSOR SHALL BE FITTED WITH CRANKCASE HEATER, VIBRATION ISOLATORS, REFRIGERANT DRYER, EXTERNAL CONNECTIONS FOR EXTERNAL OIL LEVEL CONTROL IF MULTIPLE COMPRESSORS ARE REQUIRED. MOTOR WINDING PROTECTION, HIGH AND LOW PRESSURE CUTOUTS, PLUS ANY OTHER PROTECTIVE OR OPERATING DEVICE OR FITTING REQUIRED AND PROVIDED AS STANDARD BY THE COMPRESSOR MANUFACTURER. COMPRESSORS SHALL BE DESIGNED FOR CONTINUOUS OR CYCLING OPERATION AT THE SPECIFIED DESIGN CONDITIONS WITHOUT DETRIMENTAL EFFECT. REFER TO SCHEDULE ON DRAWINGS FOR ADDITIONAL COMPRESSOR REQUIREMENTS. REQUIREMENTS ON DRAWINGS GOVERN.

2. COMPRESSOR(S) SHALL BE MOUNTED IN AN ISOLATED COMPARTMENT TO PERMIT OPERATION OF THE UNIT WITHOUT AFFECTING CONDENSER AIR FLOW WHEN THE COMPRESSOR COMPARTMENT IS OPEN.

3. COMPRESSOR(S) SHALL BE ISOLATED FROM THE BASE PAN AND SUPPLY AIR TO AVOID ANY TRANSMISSION OF NOISE FROM THE COMPRESSOR INTO THE BUILDING AREA.

4. SYSTEM SHALL BE EQUIPPED WITH THERMOSTATIC EXPANSION VALVE TYPE REFRIGERANT FLOW CONTROL.

5. SYSTEM SHALL BE EQUIPPED WITH AUTOMATIC RESET LOW PRESSURE AND MANUAL RESET HIGH PRESSURE REFRIGERANT CONTROLS.

6. UNIT SHALL BE EQUIPPED WITH REFRIGERANT LIQUID LINE FILTER DRIERS.

L. HEATING ELEMENTS:

1. OPEN COIL OF RESISTANCE WIRE, 80 PERCENT NICKEL AND 20 PERCENT CHROMIUM, SUPPORTED AND INSULTED BY FLOATING CERAMIC BUSHINGS. RECESS BUSHINGS INTO CASING OPENING AND FASTEN TO SUPPORTING BRACKETS. MOUNTED IN GALVANIZED-STEEL FRAME.

2. OVER-TEMPERATURE PROTECTION SERVICEABLE VIA A REMOVABLE ACCESS PANEL, WITHOUT REMOVING THE HEATER FROM THE UNIT, UTILIZING DISK-TYPE, AUTOMATIC RESET, THERMAL CUT-OUT SAFETY DEVICES FOR PRIMARY PROTECTION AND LOAD CARRYING, MANUAL RESET OR MANUALLY REPLACEABLE THERMAL CUT-OUTS, FACTORY WIRED IN SERIES WITH EACH HEATER STAGE, FOR SECONDARY PROTECTION. PROVIDE AN AIRFLOW SWITCH, CONSISTING OF A DIAPHRAGM OPERATED DIFFERENTIAL PRESSURE SWITCH TO PREVENT HEATER FROM OPERATING WHEN THERE IS NO AIR FLOW IN THE SYSTEM.

3. CONTROL PANEL MOUNTED ON UNIT, WHICH MEANS OF SAFETY DISCONNECT AND STAGE OVER CURRENT PROTECTION, INCLUDING A MAGNETIC CONTACTOR, [TOGGLE SWITCHES; ONE PER STEP, WITH A STEP CONTROLLER] [SILICON-CONTROLLED RECTIFIER (SCR) WITH 4-20 MA OR 0-10 VOLT INPUT] AND A TIME-DELAY RELAY.

M. FILTER SECTION:

1. STANDARD FILTER SECTION SHALL CONSIST OF FACTORY INSTALLED LOW VELOCITY, DISPOSABLE 2" THICK, 30% EFFICIENT, PLEATED GLASS FIBER FILTER.

2. PROVIDE FINAL FILTER AS SPECIFIED IN SCHEDULE IF APPLICABLE.

N. ELECTRICAL REQUIREMENTS:

1. ALL UNIT POWER WIRING SHALL ENTER UNIT CABINET AT A SINGLE LOCATION. INCLUDE FACTORY MOUNTED DISCONNECT SWITCH AND UNIT POWERED CONVENIENCE OUTLET WITH FACTORY INSTALLED INTERNAL WIRING.

O. MOTORS:

1. COMPRESSOR MOTOR SHALL BE COOLED BY SUCTION GAS PASSING THROUGH MOTOR WINDING AND SHALL HAVE LINE BREAK THERMAL AND CURRENT OVERLOAD PROTECTION.

2. OUTDOOR TOTALLY ENCLOSED MOTOR SHALL HAVE PERMANENTLY LUBRICATED BEARINGS, AND INHERENT AUTOMATIC RESET THERMAL OVERLOAD PROTECTION.

P. COMPRESSOR CYCLE DELAY:

1. COMPRESSOR SHALL BE PREVENTED FROM RESTARTING FOR A MINIMUM OF 5 MINUTES AFTER SHUTDOWN.

Q. THERMOSTAT:

1. CAPABLE OF USING DELUXE FULL-FEATURED ELECTRONIC THERMOSTAT.

FANS

A. SCOPE

13. PROVIDE FAN UNIT INCLUDING, THE FURNISHING AND INSTALLATION OF CONTROLS, ELECTRONIC VARIABLE SPEED DRIVES, MOTORS AND CONTROLLERS, NOISE AND VIBRATION ISOLATION AS REQUIRED BY LOCAL, STATE, AND OTHER APPLICABLE CODES.

B. QUALITY ASSURANCE

1. MANUFACTURERS: IF THEY COMPLY WITH THESE SPECIFICATIONS AND REQUIREMENTS, PRODUCTS:

1.1. GREENEHCK
1.2. COCK
1.3. ACME
1.4. TWIN CITY FANS
1.5. APPROVED EQUAL

C. GENERAL REQUIREMENTS

1. SHEAVES: VARIABLE PITCH MOTOR SHEAVES SHALL BE FURNISHED FROM THE FACTORY ON ALL BELT DRIVEN EQUIPMENT. AFTER THE PROPER SPEED HAS BEEN DETERMINED AND ALL BALANCING IS COMPLETED AND ACCEPTED, VARIABLE SHEAVES SHALL BE REPLACED WITH FIXED SHEAVES. FAN SHEAVES SHALL BE OF THE NON-ADJUSTABLE TYPE.

1.1. THE MOTOR SHEAVES SHALL BE BROWNING TYPE LVP OR MVP CAST IRON ADJUSTABLE TYPE WITH DOUBLE LOCKING FEATURES.
1.2. SHEAVES SHALL BE ADJUSTABLE AS CLOSE TO 10% ABOVE AND BELOW THE RATED FAN SELECTION RPM AS POSSIBLE.
1.3. FAN SHEAVES SHALL BE OF THE NON-ADJUSTABLE TYPE WITH REMOVABLE MACHINED BUSHINGS AND SHALL BE MACHINED ON ALL SURFACES.
1.4. SHEAVES SHALL BE CAST IRON.

2. DRIVES: FAN DRIVES SHALL BE SELECTED WITH A MINIMUM BELT HORSEPOWER CAPACITY OF 150% OF THE MOTOR NAMEPLATE HORSEPOWER. BELT RATINGS SHALL BE IN ACCORDANCE WITH "ENGINEERING STANDARDS FOR MULTIPLE V-BELT DRIVES". FOR ALL EXHAUST FANS REQUIRING 1-1/2 HP OR LARGER MOTORS, THE FAN DRIVE SELECTION CALCULATIONS SHALL BE SUBMITTED WITH THE FAN SUBMITTAL FOR REVIEW.

3. BELTS: BELTS SHALL BE STANDARD V-GROOVED TYPE SUITABLE FOR THE SERVICE INTENDED.

4. SPEED CONTROLLERS: ALL DIRECT DRIVE FANS, EXCEPT THOSE WITH ECM MOTORS, SHALL BE FURNISHED WITH A SOLID STATE SPEED CONTROLLER UNLESS OTHERWISE NOTED. SOLID STATE SPEED CONTROLLERS SHALL BE MOUNTED ABOVE THE CEILING ADJACENT TO THE FAN BEING SERVED WHEN A SPECIFIC LOCATION IS NOT SHOWN..

D. EQUIPMENT

4. SMOKE EXHAUST UTILITY VENT SET FANS

1.1 FANS SHALL BE BELT DRIVEN UTILITY VENT SET TYPE, SINGLE WIDTH, SINGLE INLET, WITH BACKWARD INCLINED NON-OVERLOADING FAN WHEEL. THE HOUSING SHALL BE CONSTRUCTED OF HEAVY GAUGE PAINTED STEEL WITH LOCK FORMED SEAMS. MOTOR HOUSING SHALL BE FOR OUTDOOR APPLICATION. MOTORS SHALL BE HEAVY DUTY, BALL BEARING TYPE, PREMIUM EFFICIENCY. FAN SHAFT SHALL BE GROUND AND POLISHED SOLID STEEL MOUNTED IN HEAVY DUTY, PERMANENTLY SEALED, PILLOW BLOCK BALL BEARINGS. FAN PULLEYS SHALL BE THE ADJUSTABLE TYPE. FAN SHALL BE RATED FOR HIGH TEMPERATURE SMOKE EXHAUST APPLICATION.

1.2 ACCESSORIES SHALL INCLUDE WEATHER PROOF HOUSING, BIRDSCREEN ON FAN DISCHARGE.

1.3 FAN SHALL BE MOUNTED ON THYCURB ROOF SUPPORTS WITH HOUSED SPRING ISOLATORS.

1.4 WHEN INSTALLING UTILITY STYLE FAN SETS, PAY CLOSE ATTENTION TO POTENTIAL PROBLEMS WITH SO CALLED "SYSTEM EFFECTS" ASSOCIATED WITH THE PLACEMENT OF TURNS AND OFFSETS OF DUCTWORK TOO CLOSE TO THE INLET OF THE FAN. EACH FAN SHALL HAVE A STRAIGHT SECTION OF DUCT OF A MINIMUM LENGTH EQUAL TO THREE (3) DIAMETERS OF THE INLET DUCT. SHOULD THIS CONDITION NOT BE POSSIBLE TO ACHIEVE DUE TO FIELD RESTRAINTS, CONTACT THE ENGINEER IMMEDIATELY FOR ASSISTANCE IN THE RESOLUTION OF THE MATTER. COSTS INCURRED BECAUSE OF A FAILURE TO DO SO IN A TIMELY MANNER WILL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR.

1. CABINET DIRECT DRIVE EXHAUST FANS

1.1 FANS SHALL BE CENTRIFUGAL DIRECT DRIVEN TYPE. FAN HOUSING SHALL BE GALVANIZED STEEL. FAN WHEEL SHALL BE FORWARD CURVED CENTRIFUGAL TYPE. MOTOR SHALL BE MOUNTED ON VIBRATION ISOLATORS. OUTLET DUCT COLLAR SHALL INCLUDE AN INTEGRAL BACK DRAFT DAMPER WHEN SCHEDULED.

1.2 ACCESSORIES SHALL INCLUDE AN INTERNAL DISCONNECT SWITCH AND A SOLID STATE SPEED CONTROLLER.

A. INSTALLATION

1. ALL FANS MOUNTED ON ROOF CURBS SHALL BE SECURELY ATTACHED TO THE ROOF CURB WITH APPROPRIATE FASTENERS LOCATED 8 INCHES ON CENTER WITH A MINIMUM OF TWO FASTENERS PER SIDE. THE ROOF CURB SHALL BE SECURELY ATTACHED TO THE BUILDING STRUCTURE.

2. FURNISH AND COORDINATE ALL ROOF MOUNTED FAN CURB OPENINGS PRIOR TO ROOFING INSTALLATIONS.

3. ALL FANS WITH 2000 CFM OR GREATER AIRFLOW SHALL HAVE A FIRESTAT WITH MANUAL RESET SET TO OPEN AT 50 DEGREES ABOVE MAXIMUM SYSTEM OPERATING TEMPERATURE AND SHUT DOWN THE FAN. FIRESTAT SHALL BE FURNISHED AND INSTALLED BY MECHANICAL CONTRCTOR WITH WIRING BY ELECTRICAL CONTRACTOR.

4. WHEN INSTALLING UTILITY STYLE FAN SETS, PAY CLOSE ATTENTION TO POTENTIAL PROBLEMS WITH SO CALLED "SYSTEM EFFECTS" ASSOCIATED WITH THE PLACEMENT OF TURNS AND OFFSETS OF DUCTWORK TOO CLOSE TO THE INLET OF THE FAN. EACH FAN SHALL HAVE A STRAIGHT SECTION OF DUCT OF A MINIMUM LENGTH EQUAL TO THREE (3) DIAMETERS OF THE INLET DUCT. SHOULD THIS CONDITION NOT BE POSSIBLE TO ACHIEVE DUE TO FIELD RESTRAINTS, CONTACT THE ENGINEER IMMEDIATELY FOR ASSISTANCE IN THE RESOLUTION OF THE MATTER. COSTS INCURRED BECAUSE OF A FAILURE TO DO SO IN A TIMELY MANNER WILL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR.

AIR DISTRIBUTION DEVICES AND DAMPERS

A. SCOPE

1. GENERAL: FURNISH AND INSTALL AIR DISTRIBUTION DEVICES AS SHOWN, SCHEDULED, SPECIFIED, AND REQUIRED. DEVICES SHALL BE COMPLETE WITH ALL REQUIRED MOUNTING ACCESSORIES FOR INSTALLATION IN THE ACTUAL CONSTRUCTION AT THE INSTALLATION LOCATION.QUALITY ASSURANCE

B. QUALITY ASSURANCE

1. MANUFACTURERS: IF THEY COMPLY WITH THESE SPECIFICATIONS AND REQUIREMENTS, PRODUCTS OF THE FOLLOWING MANUFACTURERS WILL BE ACCEPTABLE:

1.1 NAILOR
1.2 KRUEGER
1.3 METALAIRE
1.4 TITUS
1.5 PRICE
1.6 RUSKIN

C. PRODUCTS

1. GENERAL: PROVIDE AIR DISTRIBUTION DEVICES OF THE SIZE, SHAPE, AND TYPE CONSTRUCTED OF MATERIALS AND COMPONENTS AND WITH FINISHES AS SPECIFIED, SCHEDULED, AND SHOWN. GRILLES, REGISTERS, AND CEILING DIFFUSERS SHALL BE PROVIDED WITH NEOPRENE OR SOFT FELT GASKETS. IF A MANUFACTURER OTHER THAN THE ONE SCHEDULED IS USED, THE SIZES SHOWN ON THE DRAWINGS SHALL BE CHECKED FOR PERFORMANCE, NOISE LEVEL, FACE VELOCITY, THROW, PRESSURE DROP, ETC., BEFORE THE SUBMITTAL IS MADE. SELECTIONS SHALL MEET THE MANUFACTURER'S OWN PUBLISHED DATA FOR THE ABOVE PERFORMANCE CRITERIA. THE THROW SHALL BE SUCH THAT THE VELOCITY AT THE END OF THE THROW IN THE FIVE FOOT OCCUPANCY ZONE WILL BE NOT MORE THAN 50 FPM NOR LESS THAN 25 FPM. NOISE LEVELS SHALL NOT EXCEED THOSE PUBLISHED IN THE ASHRAE APPLICATIONS HANDBOOK FOR THE TYPE OF SPACE BEING SERVED (NC LEVEL) EXCEPT NONE SHALL EXCEED NC 35.

2. SURFACE COMPATIBILITY: AIR DISTRIBUTION DEVICES SHALL HAVE FRAMES FULLY COMPATIBLE WITH THE CEILING, WALL, AND FLOOR SURFACES IN WHICH THEY ARE INSTALLED AND SHALL BE PROVIDED WITH ALL REQUIRED MOUNTING ACCESSORIES FOR INSTALLATION IN THE ACTUAL CONSTRUCTION AT THE INSTALLATION LOCATION. PROVIDE CONCEALED FASTENING ON ALL SURFACES..

3. FINISHES: ALL CEILING AND WALL MOUNTED AIR DEVICES SHALL HAVE CORROSION RESISTANT TREATED SURFACES AND BE PAINTED WHITE OR OFF-WHITE WITH BAKED ENAMEL UNLESS SPECIFIED OTHERWISE AND ALL AIR DEVICES SHALL BE THE SAME COLOR. WHERE THE FACTORY FINISH ON ALL DEVICES IS NOT THE SAME AS DETERMINED BY THE ARCHITECT/ENGINEER, THE DIVISION 15 CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FIELD PAINTING OF ALL AIR DEVICES BY THE DIVISION 9 CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH DIVISION 9 FIELD PAINTING OF WHITE OR OFF-WHITE AIR DEVICES. SPECIAL COLOR PAINTING OF AIR DEVICES SHALL BE THE RESPONSIBILITY OF THE DIVISION 9 CONTRACTOR. THE ARCHITECT/ENGINEER'S DECISION ON WHITE COLOR COMPATIBILITY IS FINAL. THE INTERIOR OF ALL PERFORATED PLATE DIFFUSERS SHALL BE PAINTED FLAT BLACK. ALL STEEL COMPONENTS SHALL BE FULLY PHOSPHATIZED PRIOR TO PAINTING AND THERE SHALL BE NO UNPAINTED STEEL PARTS.

4. CEILING DIFFUSERS: PROVIDE OPPOSED BLADE VOLUME CONTROL DAMPERS WITH SUPPLY AIR DIFFUSERS WHERE DIFFUSERS ARE INSTALLED ABOVE INACCESSIBLE CEILINGS AND WHERE SCHEDULED. WHERE APPLICABLE, PROVIDE ADAPTERS WITH DIFFUSERS TO PERMIT CONNECTION TO ROUND SUPPLY DUCT. PERFORATED PLATE SUPPLY AIR DIFFUSERS SHALL HAVE PATTERN CONTROL BLADES INSTALLED IN THE DIFFUSER NECK UNLESS NOTED OTHERWISE. PATTERN CONTROLLERS ATTACHED TO THE PERFORATED PLATE ARE NOT ACCEPTABLE. PROVIDE CONCEALED FASTENING ON ALL CEILING DIFFUSERS. DEVICE NECK SIZE SHALL BE AS SHOWN ON THE DRAWINGS.

5. REGISTERS AND GRILLES: PROVIDE REGISTERS WHICH CONTAIN A KEY-OPERATED OPPOSED BLADE DAMPER OPERABLE FROM THE FACE SIDE WHERE REGISTERS ARE DUCTED AND INSTALLED IN INACCESSIBLE SURFACES. SUPPLY AIR REGISTERS SHALL BE OF THE DOUBLE DEFLECTION TYPE. RETURN AIR GRILLES AND REGISTERS SHALL HAVE FIXED FACE BLADES AND MATCH THE FACE OF THE SUPPLY AIR CEILING DIFFUSERS, UNLESS OTHERWISE INDICATED. PROVIDE CONCEALED FASTENING FOR ALL REGISTERS AND GRILLES.

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No.: F-11984 email:info@btemep.com
tel: 832.413.5390

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
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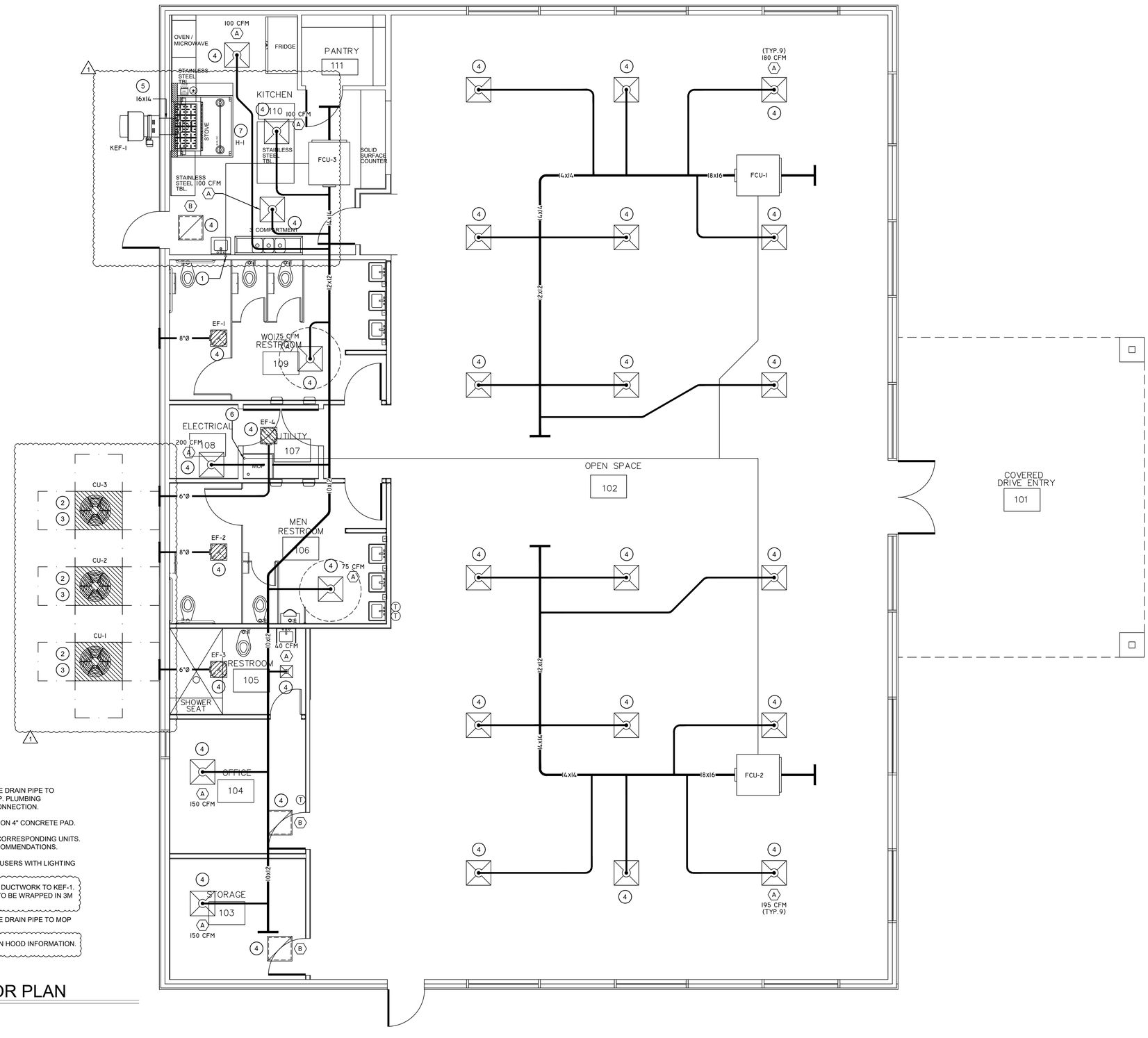
STATE OF TEXAS
SONIYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
02/20/24

Drawing Name

MECHANICAL
SPECIFICATIONS

M003



KEYED NOTE:

1. ROUTE 3/4" FULL SIZED CONDENSATE DRAIN PIPE TO LAVATORY AND CONNECT TO P-TRAP. PLUMBING CONTRACTOR SHALL MAKE FINAL CONNECTION.
2. CONDENSING UNIT TO BE MOUNTED ON 4" CONCRETE PAD.
3. ROUTE REFRIGERANT LINES UP TO CORRESPONDING UNITS. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
4. COORDINATE LOCATION OF AIR DIFFUSERS WITH LIGHTING PLAN AND ARCHITECT.
5. ROUTE 16x14 KITCHEN EXHAUST AIR DUCTWORK TO KEF-1. KITCHEN EXHAUST AIR DUCTWORK TO BE WRAPPED IN 3M FIRE WRAP.
6. ROUTE 3/4" FULL SIZED CONDENSATE DRAIN PIPE TO MOP SINK BELOW.
7. REFER TO SHEET M3.03 FOR KITCHEN HOOD INFORMATION.

1 MECHANICAL FLOOR PLAN

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

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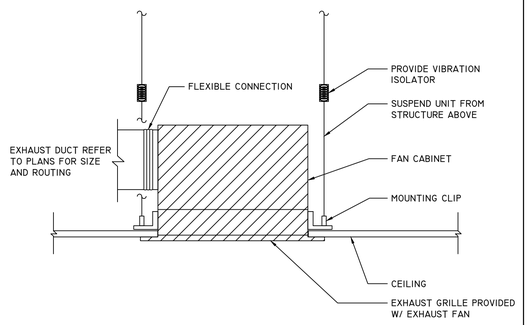
MECHANICAL
FLOOR PLAN

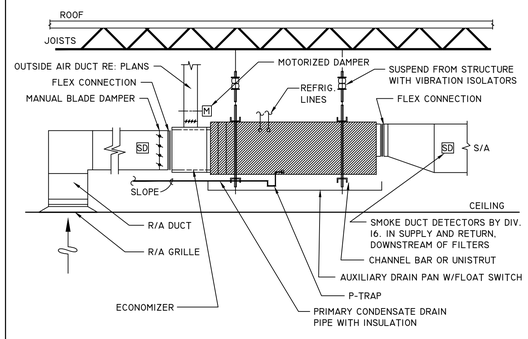
M201



NOTE:

PROVIDE FAN U.L RADIATION DAMPER FOR FIRE RATED CEILING.

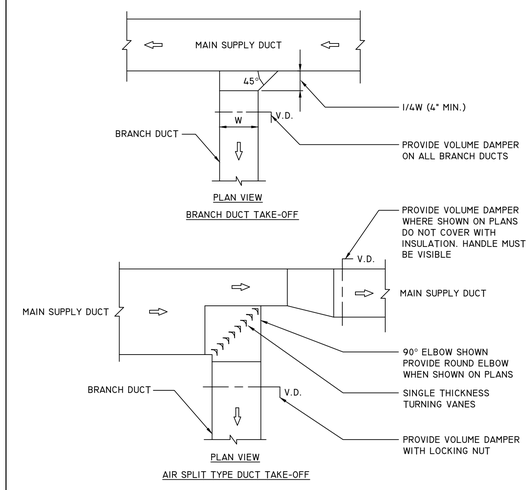
CEILING MOUNTED EXHAUST FAN DETAIL | NOT TO SCALE | 6



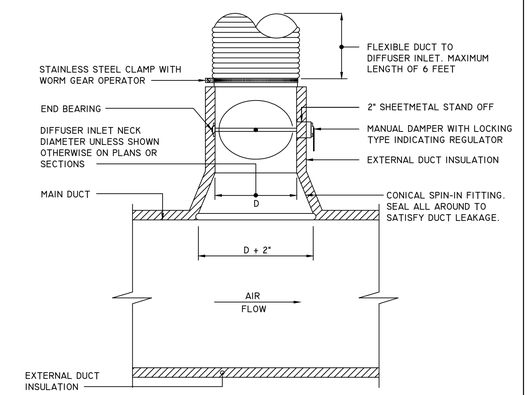
NOTE:

DRAIN PAN, SUPPORTS, PIPING ETC., SHALL NOT BLOCK ACCESS TO FILTERS OR UNIT ACCESS PANELS. SEE FLOOR PLAN FOR DUCT SIZE. ALL REF. PIPE SHALL BE ROUTED BELOW ROOF JOIST WITH PIPE HANGERS OR PIPE SUPPORTS.

TYPICAL HORIZONTAL FAN COIL UNIT DETAIL | NOT TO SCALE | 4



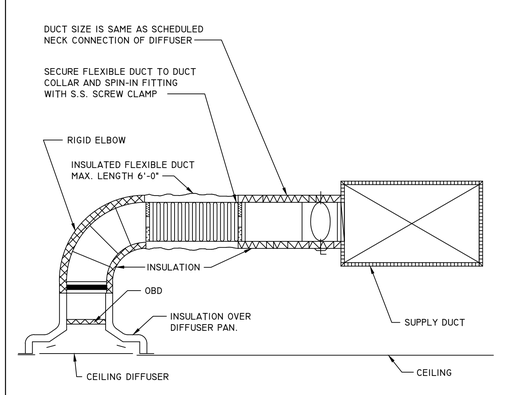
BRANCH DUCT DETAIL | NOT TO SCALE | 2



NOTES:

1. USE THIS DETAIL FOR EXTERNALLY INSULATED DUCTWORK.
2. EXTEND ROUND SHEETMETAL DUCTWORK AND ASSOCIATED DUCT INSULATION FROM MAIN DUCT, SO FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5 FEET.

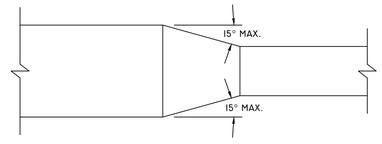
SPIN FITTING DETAIL | NOT TO SCALE | 5



NOTE:

THE FLANGED BELLMOUTH FITTING MUST BE PROVIDED, WHERE HEIGHT OF DUCT SHOWN ON PLANS CAN ACCOMMODATE THE FITTING. ONLY WHERE THE DUCT HEIGHT DOES NOT ALLOW THE INSTALLATION OF BELLMOUTH FITTING, PROVIDE STRAIGHT FITTING. FLEX DUCT MAY BE LOCATED IN RISER OR HORIZONTAL RUN.

CEILING DIFFUSER CONNECTION DETAIL | NOT TO SCALE | 3



DUCT TRANSITION DETIAL | NOT TO SCALE | 1

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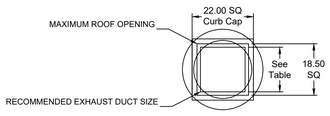
MECHANICAL DETAILS

M301

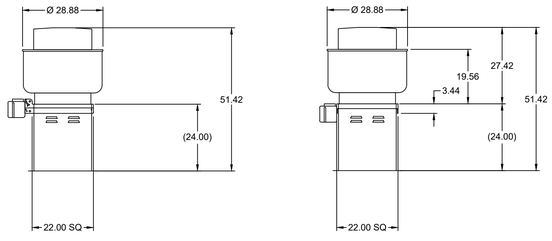
Direct Drive Upblast Centrifugal Roof Exhaust Fan

MARK INFORMATION		FAN INFORMATION						MOTOR INFORMATION				
QTY	MARK	MODEL	VOLUME (CFM)	TOTAL EXTERNAL SP (IN WG)	FAN RPM	OPERATING POWER (HP)	WEIGHT (LB.)	SIZE (HP)	V/C/P	ENCLOSURE	MOTOR RPM	WINDINGS
1	KITCHEN EXHAUST	CUE-WALL-140HP-VG	1,125	1.25	1,836	0.51	91	0.75	115/60/1	OP	2200	1

KITCHEN EXHAUST : SELECTED OPTIONS AND ACCESSORIES
UL/cUL 705 Listed - Supplement SC - "Power Ventilators for Restaurant Exh. Appliances" (Formerly UL 762)
Switch, NEMA-3R, Toggle,
High Wind Rated (+/- 150 PSF Rating)
Florida Product Approval #FL13225.1 & Miami-Dade NOA #22-0606.03
Hinge, Factory Installed
High Temp Curb Seal Rated for Continuous Duty at 1500 F (Factory Attached)
Grease Trap (PN 475538)
Birdscreen: Stainless Steel, nom. 85% Free Area
Aluminum Wheel Material
Conduit Chase Qty 1

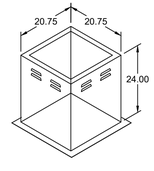


DUCT TYPE	SIZE
STANDARD	16 SQ
FIRE-WRAPPED	12 SQ



DUCT DIMENSIONS ARE LARGEST POSSIBLE DUCT TO FIT THROUGH CURB.
CONSULT SYSTEM DESIGN ENGINEER FOR RECOMMENDED DUCT SIZE.

OVERALL HEIGHT MAY BE GREATER DEPENDING ON
MOTOR, ADAPTER, AND/OR HINGE BASE.



KITCHEN EXHAUST

PROJECT
10/10/2024

MARK

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Drawing Name

1 MECHANICAL DETAILS

M302

HOOD INFORMATION

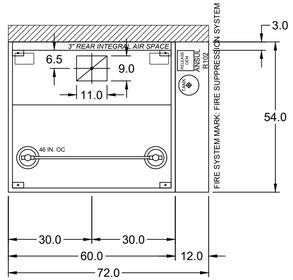
HOOD NO.	MARK	MODEL	HOOD DIMENSIONS (IN.)			HOOD CONSTR.	COOKING LOAD / DUTY RATING	EXHAUST						SUPPLY		HANGING WEIGHT LBS.	SECTION LOCATION
			LENGTH	WIDTH	HEIGHT			TOTAL CFM	COLLAR(S)					MUA CFM	AC CFM		
									WIDTH	LENGTH	DIA.	CFM	S.P.				
1	HOOD	GHEW-60-S	60	54	24	430 SS WHERE EXPOSED	HEAVY	1125	9	11		1125	0.454			342	SINGLE

HOOD INFORMATION

HOOD NO.	MARK	LIGHTING DETAILS			GREASE FILTRATION DETAILS				UTILITY CABINET(S)				
		FIXTURE TYPE BULB / LAMP INFO	QTY	FOOT CANDLES	TYPE / MODEL MATERIAL	QTY	SIZE (IN.)		LOCATION	FIRE SYSTEM		CONTROLS	
							L	H		TYPE	SIZE	MODEL	INTERFACE
1	HOOD	ROUND LED	2	72.3	BAFFLE STAINLESS STEEL	0	16	20	RIGHT	ANSUL R102	3		
						3	20						

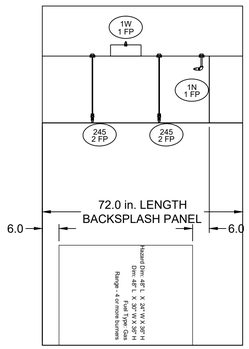
HOOD OPTIONS

- UL 710 LISTED W/ OUT EXHAUST FIRE DAMPER - UL #MH11726
- BACK INTEGRAL AIR SPACE - 3 IN WIDE
- 18 IN HIGH CEILING ENCLOSURES - FRONT LEFT RIGHT - FIELD INSTALLED
- FACTORY MOUNTED EXHAUST COLLAR(S)
- EXHAUST AIR BALANCING BAFFLE(S) - (EABB)
- FILTER REMOVAL TOOL INCLUDED - QTY 1
- BACKSPLASH 80.00 IN HIGH 72.00 IN LONG
- PERFORMANCE ENHANCING LIP (PEL) TECHNOLOGY
- STANDING SEAM CONSTRUCTION FOR SUPERIOR STRENGTH

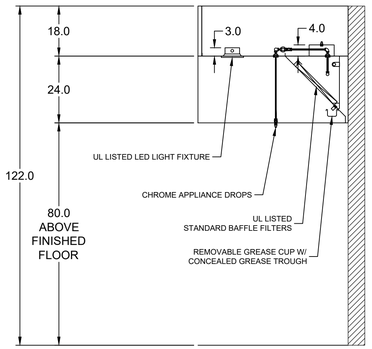


MARK: HOOD - SECTION 1
PLAN VIEW

Fire (piping/drops/nozzles/etc.) subject to change. As built's can be provided at time of order and included with product shipment

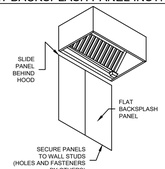


MARK: HOOD - SECTION 1
ELEVATION VIEW



MARK: HOOD
SECTION VIEW

FLAT BACKSPLASH PANEL INST. DETAIL

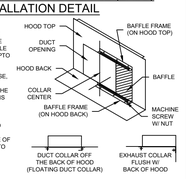


EXHAUST AIR BALANCING BAFFLE (EABB) INSTALLATION DETAIL

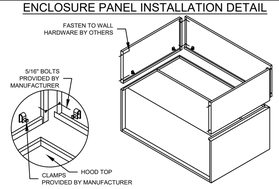
NOTES:
THE EABB IS DESIGNED TO BALANCE THE AIR VOLUME BETWEEN MULTIPLE HOODS ON THE SAME FAN. THE BAFFLE HAS THE CAPACITY TO CLOSE OFF UPTO 50% OF THE EXHAUST COLLAR.

IF DUCT COLLARS ARE SHIPPED LOOSE, THE EABB WILL BE SIZED TO THE EXHAUST COLLAR(S) SPECIFIED ON THE HOOD EQUIPMENT SCHEDULE. EABB IS TO BE INSTALLED AFTER THE DUCT COLLAR IS WELDED TO THE HOOD.

ASSEMBLE BOTH BAFFLE FRAMES TO THE BAFFLE IN THE OPEN POSITION. LINE UP EDGE OF BAFFLE WITH EDGE OF OPENING, PLUG WELD THE FRAMES TO THE HOOD TOP OR BACK.



ENCLOSURE PANEL INSTALLATION DETAIL



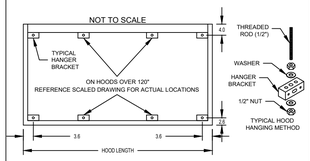
HOOD HANGING HEIGHT FOR FIRE SYSTEMS

VERIFICATION OF HOOD HANGING HEIGHT ABOVE FINISHED FLOOR (A.F.F.) IS REQUIRED FOR CORRECT PLACEMENT OF FIRE SYSTEM NOZZLES.

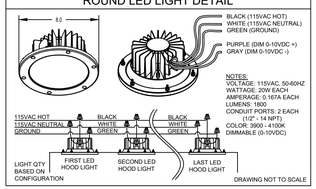
☐ RECOMMENDED HANGING HEIGHT = 80" FROM FINISHED FLOOR TO LOWER FRONT EDGE OF HOOD.

☐ OTHER HANGING HEIGHT = _____" FROM FINISHED FLOOR TO LOWER EDGE OF HOOD.

HOOD HANGER BRACKET DETAIL



ROUND LED LIGHT DETAIL



HOOD

MARK	PROJECT
	10/10/2024

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1 MECHANICAL DETAILS

M303

FIRE SYSTEM INFORMATION

MARK	MODEL	LOCATION	FLOW POINTS		SUPPLY LINE	DETECTION	MARK(S) PROTECTED BY FIRE SYSTEM
			HOODS	PCU			
FIRE SUPPRESSION SYSTEM	ANSUL R-102 WET CHEMICAL	CABINET – RIGHT END OF HOOD	6 UTILIZED 11 AVAILABLE		CONTINUOUS	FUSIBLE LINK	HOOD SECTION 1

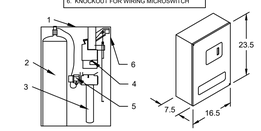
FIRE SYSTEM OPTIONS AND ACCESSORIES

FULL INSTALLATION (INCLUDES PRE-PIPED HOOD(S) WITH DETECTION AND FACTORY COORDINATED INSTALL)
CHROME SLEEVES FOR FACTORY PROVIDED APPLIANCES DROPS - INCLUDED
METAL BLOW-OFF CAPS - INCLUDED
GAS VALVE - INCLUDED - MECHANICAL SHUTOFF VALVE, 2", (ANSUL) - PART# 468817
HOOD SUPPRESSION TANK - INCLUDED - 3 GAL. - [(1) 3.0 TANK(S)]
REMOTE PULL STATION - STANDARD - FIELD INSTALLATION AT SINGLE POINT OF EGRESS

ANSUL R102 (WET CHEMICAL) FIRE PROTECTION SYSTEM - MODEL FSSC

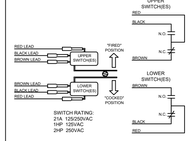
CONTROL PANEL

1. STAINLESS STEEL ENCLOSURE
2. AGENT STORAGE TANK
3. EXPELLENT GAS CARTRIDGE
4. ANSUL AUTOMAN RELEASE
5. REGULATOR
6. KNOCKOUT FOR WIRING MICROSWITCH



NOT TO SCALE

WIRING DIAGRAM FOR MICRO SWITCHES

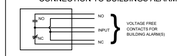


NOTE: IF ELECTRIC RELEASE, BOTH UPPER SWITCHES WILL BE USED FOR ACTUATING ADDITIONAL AUTOMANS (THEY WILL BE WIRED TO EACH OTHER AND TO THE BROWN WIRE ON THE ELECTRIC SOLENOID). THEREFORE, USE ONE OF THE UN-UTILIZED LOWER SWITCHES TO WIRE BACK TO CONTROL PANEL (DO NOT USE EITHER OF THE UPPER SWITCHES).

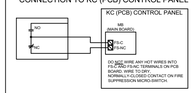
IF USING LOWER SWITCHES TO WIRE BACK TO CONTROL PANEL, NORMALLY-CLOSED WILL BE BLACK LEAD, AND NORMALLY-OPEN WILL BE BROWN LEAD.

DPDT SWITCHES PROVIDED BY MANUFACTURER MAY BE WIRED PER TYPICAL EXAMPLES SHOWN. VERIFY WITH LOCAL CODES AND EQUIPMENT SUPPLIED AS THE CONNECTION NEEDED FOR YOUR INSTALLATION.

CONNECTION TO BUILDINGS ALARM



CONNECTION TO KC (PCB) CONTROL PANEL



NOTES:
1. ——— DENOTES FIELD INSTALLATION.
2. ——— DENOTES FACTORY INSTALLATION.

NOTES:

WET CHEMICAL FIRE PROTECTION SYSTEM TO BE ANSUL R-102, DESIGNED IN COMPLIANCE WITH UL 300 REQUIREMENTS.
-VERIFICATION OF ALL COOKING EQUIPMENT MAKE, MODEL AND LOCATION REQUIRED FOR ALL FIRE PROTECTION SYSTEMS.
-ALL FIRE SYSTEM PIPING IS STANDARDLY TO THE RIGHT END OF THE HOOD UNLESS A WALL IS LOCATED ON THE RIGHT END.
-ANSUL AUTOMAN RELEASE TO BE LOCATED WITHIN 60" OF HOOD.

THE BASIC FIRE SYSTEM WILL INCLUDE THE FOLLOWING:
-GAS SHUT-OFF VALVE, IF REQUIRED, TO BE SUPPLIED BY MANUFACTURER (UP TO 2" DIAMETER AS STANDARD), AND INSTALLED BY A LICENSED PLUMBER.
-MICRO SWITCH TO BE SUPPLIED BY MANUFACTURER FOR CONNECTION TO, BUT NOT LIMITED TO, BUILDING ALARM SYSTEM(S), EXHAUST AND SUPPLY FANS AND ELECTRICAL POWER SHUT DOWN. FIELD WIRING AND CONNECTIONS TO BE PERFORMED BY A LICENSED ELECTRICIAN.

THE BASIC FIRE SYSTEM DOES NOT INCLUDE THE FOLLOWING:
-FULL DUMP TEST OTHER THAN WHT IS SPECIFIED PER THE INSTALLATION MANUAL, OR TO SATISFY A STATE OR LOCAL CODE. PERMIT AND TESTING FEES ARE NOT INCLUDED UNLESS NOTED UNDER THE EQUIPMENT SCHEDULE FOR THE FIRE SYSTEM.
-MORE THEN TWO TRIPS TO THE JOBSITE OR SPECIAL TRANSPORTATION, OR OVERNIGHT LODGING REQUIREMENTS IN REMOTE AREAS. NORMAL TRAVEL DISTANCE IS FIRST 50 MI. (80.5 KM) FROM OFFICE.
- SPECIAL CLASSES OR ADDITIONAL LABOR FOR ACCESS TO SECURITY SENSITIVE AREAS.
-INSTALLATION OF GAS SHUT-OFF VALVE.
-SPECIAL DRAWINGS REQUIRED TO SATISFY STATE OR LOCAL CODE. PLAN EXAMINATION FEES, PE OR FS APPROVAL STAMP.
-UNION LABOR, GOVERNMENT LABOR, OR PREVAILING WAGES REQUIRED FOR FINAL FIELD HOOK-UP.
-ANY AND ALL ELECTRICAL COMPONENTS/CONNECTIONS REQUIRED TO SHUT DOWN FANS, SHUT OFF DEVICE FOR ELECTRIC COOKING EQUIPMENT (SHUNT TRIP BREAKER), OR ACTIVATE AN ALARM SYSTEM, ETC.
-ANY DISMANTLING OR REASSEMBLY REQUIRED TO GAIN ACCESS TO THE FIRE SUPPRESSION PIPING LOCATED ON THE TOP OF THE HOOD.
-ROUGH-IN HIDDEN CONDUIT FOR REMOTE PULL STATION OR GAS VALVE (FLUSH MOUNTED PULL STATION).
-INSTALLATION OF MORE THAN (1) REMOTE PULL STATIONS OR DISTANCES GREATER THAN 20 FT (6.1M.).
-PARTS OR LABOR REQUIRED TO CORRECT PIPING DUE TO COOKING EQUIPMENT CHANGES OR DEVIATION FROM PLANS, OR ANY CHARGES FOR MISSING OR ADDITIONAL PARTS OTHER THEN THOSE INDICATED ON THE FIRE SUPPRESSION DETAIL.

PROJECT 10/10/2024

MARK

FIRE SUPPRESSION SYSTEM

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Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

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	ISSUE FOR CONSTRUCTION & BID	02/17/2024
1	CITY COMMENTS	02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
10/21/24

Drawing Name

1 MECHANICAL DETAILS

M304

ELECTRICAL SYMBOLS

(SOME SYMBOLS ARE SHOWN FOR REFERENCE ONLY)

	2X4 RECESSED CEILING FIXTURE
	RECESSED FIXTURE - CEILING (SHADED = FIXTURE WITH INTEGRAL EMERGENCY BATTERY)
	4-FT LIGHT FIXTURE, SURFACE OR RECESSED MOUNTED.
	4 FOOT INDUSTRIAL STRIP LIGHT
	4 FOOT INDUSTRIAL STRIP LIGHT WITH BATTERY PACK ON NIGHT LIGHT OR EMERGENCY CIRCUIT
	8 FOOT INDUSTRIAL STRIP LIGHT
	8 FOOT INDUSTRIAL STRIP LIGHT WITH BATTERY PACK ON NIGHT LIGHT OR EMERGENCY CIRCUIT
	FLUORESCENT OR LED DOWN LIGHT
	WALL WASHER TYPE FIXTURE. DIRECTION AS INDICATED ON MARK-UP
	WALL MOUNTED LIGHT FIXTURE
	WALL SCONCE ON NORMAL SOURCE CIRCUIT. SHADE FOR EMERGENCY CIRCUIT
	CEILING OR WALL MOUNTED EXIT SIGN ◂ INDICATES INTEGRAL EMERGENCY HEAD
	CEILING OR WALL MOUNTED EXIT SIGN. ARROWS INDICATE PATH OF EGRESS.
	NEW EMERGENCY LIGHTING WITH BATTERY BACK-UP. 90 MIN BATTERY (E) = EXISTING
	LANDSCAPE RECESSED GROUND UPLIGHT
	LANDSCAPE BOLLARD LIGHT
	POLE LIGHT, HEADS AS SHOWN; SHADED = ON EMERGENCY CIRCUIT
	TREE UPLIGHTS
	STEP LIGHTS; SHADED = ON EMERGENCY CIRCUIT
$ ^{3} $_A$	SINGLE POLE SWITCH (2-POLE, 3-WAY OR 4-WAY; D=DIMMER 1000W SLIDE TYPE IF NOTED) - 48" AFF TO TOP OF DEVICE BOX - U.O.N.
$_D$	DIMMER SWITCH - 48" T.O.D. U.O.N.
$_{VS}$	VACANCY SENSOR SWITCH 48" AFF TO TOP OF DEVICE BOX - U.O.N.
	LIGHTING OCCUPANCY SENSOR WALL MTD +48" AFF TO TOP OF DEVICE BOX.
OS	CEILING MOUNTED OCCUPANCY SENSOR
VS	CEILING MOUNTED VACANCY SENSOR
DS	CEILING MOUNTED DAYLIGHT SENSOR
SD	CEILING MOUNTED SMOKE DETECTOR
T	THERMOSTAT
C	CEILING MOUNTED CARBON MONOXIDE DETECTOR
HD	CEILING MOUNTED HEAT DETECTOR
TS	TIME SWITCH - 48" AFF TO TOP OF DEVICE BOX - U.O.N.
PC PCH	PHOTOCELL (ADJUSTABLE), ROOF OR WALL MOUNTED, PROVIDE MOUNTING SUPPORT AS REQUIRED
LV	LOW VOLTAGE MULTI-CONDUCTOR CABLE - PLENUM RATED WHERE REQUIRED, NOT INSTALLED IN CONDUIT.
	CONDUIT - CONCEALED IN WALLS OR CEILING IF POSSIBLE, 1/2" WITH (2) #12 THHN/THWN Cu & (1) #12 THHN/THWN Cu GROUND U.O.N.
	CONDUIT - IN OR BELOW FLOOR, 3/4" WITH (2) #12 THHN/THWN Cu & (1) #12 THHN/THWN Cu GROUND U.O.N.
	CONDUIT - EXPOSED, 1/2" WITH (2) #12 THHN/THWN Cu & (1) #12 THHN/THWN Cu GROUND U.O.N.
	TYPE MC CABLE 3/C #12 WITH GND (MINIMUM NUMBER OF CONDUCTOR AND WIRE SIZE)
	TRANSFORMER, 2 WINDING △ - DELTA Y - WYE Y - WYE GROUNDED NEUTRAL
M	UTILITY KWH METER
150/100 (3)	MOLDED CASE CIRCUIT BREAKER, "100" EQUALS TRIP RATING, "3" INDICATES NUMBER OF POLES, "150" EQUALS FRAME SIZE.
100A/3P	ENCLOSED MOLDED CASE CIRCUIT BREAKER, "100" EQUALS TRIP RATING, "3P" INDICATES NUMBER OF POLES.
	DRAWOUT INSULATED CASE OR AIR CIRCUIT BREAKER WITH INDICATIONS ABOVE.
GF TP	EQUIPMENT GROUND FAULT DETECTION WITH TEST/MONITOR PANEL.
100/70 (3)	FUSED SWITCH, CLASS L OR R FUSES AS NOTED. "100" INDICATES SWITCH SIZE, "70" INDICATES FUSE SIZE, "3" INDICATES POLES.

	FLUSH OR SURFACE MOUNTED BRANCH CIRCUIT PANEL
	SWITCHBOARD OR DISTRIBUTION BOARD
	COMBINATION STARTER DISCONNECT SWITCH DISCONNECT SWITCH
F	DISCONNECT SWITCH, MOTOR RATED, "F" INDICATES SWITCH TO BE FURNISHED WITH FUSES, SIZE TO EQUIPMENT NAMEPLATE DATA.
	EMERGENCY POWER OFF (PANIC BUTTON)
M F	AND MOTOR, FURNISHED AND INSTALLED BY OTHERS. 'M' DENOTES HORSEPOWER WHEN KNOWN.
J H	JUNCTION BOX OR OUTLET FOR DIRECT CONNECTION; VERIFY HT. IN FIELD
M/H	MICROWAVE / HOOD CONNECTION ONLY - F&IBO;
R	VERIFY REQUIREMENTS IN FIELD 250 VOLT RECEPTACLE U.O.N. (D = 30 AMP FOR DRYER PLUG
	IN UNIT; R = 50 AMP FOR ELECTRIC RANGE) DUPLEX RECEPTACLE MOUNTED ON CEILING
	QUADRUPLEX RECEPTACLE MOUNTED ON CEILING
	DUPLEX RECEPTACLE MOUNTED ON WALL MINIMUM OF 15 INCHES MEASURED TO THE BOTTOM OF THE RECEPTACLE OUTLET BOX OR RECEPTACLE HOUSING ABOVE FINISHED FLOOR.
	QUADRUPLEX RECEPTACLE MOUNTED ON WALL +15" A.F.F. U.O.N.
	DUPLEX GFCI RECEPTACLE MOUNTED ON WALL +15" A.F.F. U.O.N.
	QUADRUPLEX RECEPTACLE ON A DEDICATED CIRCUIT
	HALF SWITCHED DUPLEX RECEPTACLE
	208V, 60A RECEPTACLE, NEMA CONFIGURATION TO BE VERIFIED WITH OWNER, U.O.N.
	240V, 40A RECEPTACLE, NEMA CONFIGURATION TO BE VERIFIED WITH OWNER, U.O.N.
	208V, 30A RECEPTACLE, NEMA CONFIGURATION TO BE VERIFIED WITH OWNER, U.O.N.
	20A RECEPTACLE, NEMA CONFIGURATION TO BE VERIFIED WITH OWNER, U.O.N.
	480V, 3Ø RECEPTACLE NEMA CONFIGRATION TO BE VERIFIED WITH OWNER, U.O.N.
	DUPLEX GFCI RECEPTACLE ABOVE COUNTER
	CORD DROP RECEPTACLE
	CATV OUTLET
	HOME NETWORK OUTLET FOR TV, PHONE, DATA
	COMBO DUPLEX RECEPTACLE & DUAL USB OUTLET - 15" BOD - UON
	COMBO DUPLEX GFCI RECEPTACLE & DUAL USB OUTLET -15" BOD-UON FOR PENINSULA OR ISLAND COUNTER MOUNT NO MORE THAN 12" BELOW CTR.
	DOOR BELL
	ELEVATOR PIT DUPLEX RECEPTACLE, LIGHT AND SWITCH
	FLUSH FLOOR DUPLEX RECEPTACLE
	FLUSH FLOOR QUADRUPLEX RECEPTACLE
	FLUSH FLOOR TELEPHONE OUTLET
	FLUSH FLOOR COMBINATION TELEPHONE/DATA OUTLET
	FLUSH FLOOR RECEPTACLE AND TELEPHONE BOX
	DATA OUTLET
	TELEPHONE OUTLET +15" AFF UON
	TV/DATA/ TELEPHONE OUTLETS (1-RJ45; 1-RJ11 JACKS) CAT 6 CABLE (4PK) EACH JACK AND 1 "F" CONNECTOR W/ DUAL COAXIAL CABLE TO TERMINATE AT COMMUNICATION BOX (/)-INDICATES ABOVE COUNTER
$ °F T	DOUBLE POLE, SINGLE THROW HORSE POWER RATED SWITCH WITH THERMAL OVERLOAD
SEC	SECURITY CAMERA
WIFI	PROVIDE 1 CAT 6 CABLE WIRELESS INTERNET CONNECTION, VERIFY LOCATION WITH IT CONSULTANT
	FIRE DEPARTMENTS 2-WAY COMMUNICATION HANDSET
WCR	WIRELESS CARD RECEIVER
DH DH	DOOR HOLDER - CONNECT TO LOCAL SMOKE DETECTOR
DS	DUCT SMOKE DETECTOR - F & IBO; CONNECT TO FIRE ALARM PANEL.
FSD	FIRE/SMOKE DAMPER, PROVIDED & INSTALLED BY MECHANICAL CONTRACTOR. PROVIDE 120V 1 PHASE EMERG. CIRCUIT, CONTROL, AND STATUS WIRING TO FACP (LIFE SAFETY SYSTEM.)

MISC.

	KEY NOTE SYMBOL
Y-Xa	FOLLOWING ARE THE SUBSCRIPT RELATED TO LIGHT FIXTURE: Y - PANEL NAME X - CIRCUIT NUMBER a - SWITCHING ZONE
	REVISION REFERENCE SYMBOL - SEE ASSOCIATED REVISION NOTE.
L1	LIGHT FIXTURE TYPE

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AL	ALUMINUM CONDUCTOR OR BUS
AM	AMMETER
ANN	ANNUNCIATING
ART	ARTICLE
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAGE
BD	BOARD
BKBD	BACK BOARD
BKR	BREAKER
BTM	BOTTOM
CAB	CABINET
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CO	CONDUIT ONLY
CU	COPPER CONDUCTOR OR BUS
DD	DUCT DETECTOR
DIA	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DN	DOWN
DS	DISCONNECT SWITCH
(E)	EXISTING
(ER)	EXISTING TO REMAIN
EA	EACH
EC	ELECTRICAL CONTRACTOR
EM	EMERGENCY
EQ	EQUAL
EQUIP	EQUIPMENT
EX	EXPLOSION PROOF
EXH	EXHAUST
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATING PANEL
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FIN	FINISH
FLA	FULL LOAD AMPS
FSD	FIRE SMOKE DAMPER
FUT	FUTURE
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
HGT	HEIGHT
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HW	HOT WATER
IG	ISOLATED GROUND
INCAND	INCANDESCENT
JB	JUNCTION BOX
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KW	KILOWATT
LT	LIGHT
LTG	LIGHTING
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	MILLI CIRCULAR MILS
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUG ONLY
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
N	NORTH
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEUT	NEUTRAL
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OL	OVERLOAD
OCS	OCCUPANCY SENSOR
PB	PULL BOX
PE	PHOTO ELECTRIC CELL
PNL	PANEL
PR	PAIR
QTY	QUANTITY
R	REMOVE OR RELOCATE
REC	RECEPTACLE
RECEPT	RECEPTACLE
REF	REFRIGERATOR; REFERENCE
REQ'D	REQUIRED
RL	RELOCATED
SCHED	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SQ	SQUARE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYS	SYSTEM
TBD	TO BE DETERMINED
TC	TIME CLOCK
TEL	TELEPHONE
TEMP	TEMPORARY; TEMPERATURE
TI	TENANT IMPROVEMENT
TRANS	TRANSFORMER
TTB	TELEPHONE TERMINAL BACKBOARD
TV	TELEVISION
TYP	TYPICAL
UC	UNDER CABINET
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UON	UNLESS OTHERWISE NOTED
V	VOLT
W	WALL MOUNTED; WATT
W/	WITH
W/O	WITH OUT
WP	WEATHER PROOF
XFMR	TRANSFORMER

GENERAL NOTES

1. ALL BATHROOM, OUTDOOR, AND KITCHEN COUNTER RECEPTACLES WITHIN SIX FEET OF A SINK ARE TO BE GFCI PROTECTED.
2. WALL MOUNTED OUTLETS DRAWN IN A LINE, OUT FROM THE WALL, SHALL BE CENTERED ABOVE EACH OTHER, AT SCHEDULED HEIGHTS. MOUNT ALL BOXES ON SAME SIDE OF STUD. USE BAR HANGERS OR SCRAP BLOCKS TO CENTER THE BOXES TO EACH OTHER.
3. ELECTRICAL OUTLETS LOCATED ON OPPOSITE SIDES OF ALL FIRE-RATED WALLS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF AT LEAST 24 INCHES.
4. WHEN KITCHEN OR BATH OUTLETS AT WALLS CANNOT BE MOVED TO THE NEXT STUD BAY, FILL THE STUD BAY (OR PORTION OF) WITH FIRE RETARDANT MATERIAL SATISFACTORY TO LOCAL BUILDING / FIRE INSPECTION.
5. PROVIDE A W.P. RECEPTACLE NO FARTHER THAN 25 FEET FROM ANY OUTDOOR EQUIPMENT. SIMILARLY, PROVIDE A STANDARD RECEPTACLE FOR EQUIPMENT IN ATTICS OR MECHANICAL ROOMS.
6. PROVIDE DISCONNECTING MEANS FOR ALL EQUIPMENT REQUIRING SUCH.
7. OUTLET BOXES LOCATED IN 1 HOUR RATED WALLS AND CEILINGS SHALL BE STEEL OR 1 HOUR FIRE RATED PLASTIC AND SHALL HAVE ANNULAR SPACE SEALED WITH 1 HR RATED FIRE STOPPING. PER NEC 300-21 AND CBC-709, 710.
8. ALL PLASTIC CONDUIT OR CABLE IN 1 HR WALLS SHALL HAVE A F RATING.

LIGHTING:

9. ALL WALL MOUNTED FIXTURES ARE TO BE LOCATED AT HEIGHTS ESTABLISHED BY ARCHITECT. HEIGHTS ARE TO BE SET AFTER SUBMITTALS ARE APPROVED. (FINAL FIXTURES SIZES ARE KNOWN.).

SERVICE & DISTRIBUTION:

10. COORDINATE WITH HVAC, PLUMBING AND SPRINKLER CONTRACTORS: NO PIPING OR DUCTWORK IS TO PASS THROUGH SWITCHGEAR ROOM OR PROTRUDE BELOW THE STRUCTURAL CEILING OVER THE SWITCHGEAR ROOM. REVIEW FINAL "CONSTRUCTION" PLUMBING, SPRINKLER AND HVAC SHOP DRAWINGS. IF SUCH CONFLICTS EXIST, NOTIFY ARCHITECT AT ONCE.
11. CONTRACTOR TO VERIFY ACTUAL AIC RATINGS FOR ALL EQUIPMENT FROM PG&E. SUBMITTING ON EQUIPMENT BELOW ACTUAL RATING DOES NOT RELIEVE CONTRACTOR OF NOTED RESPONSIBILITY.
12. USE C.L. FUSED MAINS. ALL BREAKERS IN SERVICE ROOM EQUIPMENT SHALL BE RATED TO MEET PG&E FAULT CURRENT REQUIREMENTS.
13. PROVIDE A DISCONNECTING MEANS FOR THE GROUNDED CONDUCTOR PER NEC 230 - 75.
14. ELECTRICAL CONTRACTOR (E.C.) TO PROVIDE OWNER WITH ONE SET OF SPARE FUSES FOR EACH SIZE OF FUSE USED IN PROJECT.
15. NO FEEDERS SHALL BE RUN IN SLABS, RACK IN CEILING OF GARAGE AND/OR ABOVE IN ATTIC SPACES.

LIGHTING:

16. ALL LOW VOLTAGE CONTROLS AND CONTROL WIRING SHALL BE PROVIDED BY THE CONTRACTOR THAT FURNISHES THE EQUIPMENT. ALL LINE VOLTAGE WIRING SHALL BE PROVIDED & UNDER THIS CONTRACT.
17. COORDINATE WITH ANY PROJECT DESIGN/BUILD TRADES FOR EXACT DATA AND LOCATION OF ALL EQUIPMENT. PROVIDE LINE VOLTAGE OUTLETS, WIRING AND DISCONNECTING MEANS. ALL OUTDOOR WIRING SHALL BE WEATHERPROOF.
18. STARTERS TO BE FURNISHED AND INSTALLED BY TRADE SUPPLYING MOTOR. CONNECTION BY E.C.
19. FURNISH & INSTALL AN APPROPRIATE DISCONNECT SWITCH FOR ALL EQUIPMENT. USE W.P. OUTDOORS. 120V. REQUIRES A S.P. MOTOR RATED SWITCH. 208V REQUIRE A DISCONNECT SWITCH.

MISC:

20. ALL PENETRATIONS IN FIRE RATED WALLS AND CEILINGS SHALL COMPLY WITH NEC 300-21 AND UBC 709 & 710.
21. ALL MULTIWIRE BRANCH CIRCUITS SHALL COMPLY WITH 2020 NEC SECTION 210.4 FOR SIMULTANEOUS DISCONNECT AND GROUPING OF THESE CIRCUITS.
22. GENERAL USE OUTLET MOUNTING HEIGHTS AREAS SHALL BE NOT LESS THAN 15 INCHES ABOVE FINISHED FLOOR (AFF) TO THE BOTTOM OF THE OUTLET. CONTROL AND SWITCH MOUNTING HEIGHTS SHALL BE NO MORE THAN 48 INCHES TO THE TOP OF THE OUTLET BOX.
23. ALL ELECTRICAL WORK SHALL COMPLY WITH LATEST EDITION OF NEC.
24. LIGHTING FIXTURE IN FIRE RATED CEILING SHALL BE FIRE RATED OR PROVIDED WITH FIRE RATED ENCLOSURE OR FIRE RATED PAD.
25. ELECTRICAL WORK SHALL COMPLY WITH LATEST EDITION OF NATIONAL ELECTRICAL CODE (NEC) AS AMENDED BY LOCAL COUNTY CODES.

ELECTRICAL SHEET INDEX	
SHEET NO.	TITLE
E-001	ELECTRICAL SYMBOL LISTS, NOTES, ABBREVIATIONS AND INDEX
E-002	ELECTRICAL SPECIFICATIONS
E-003	SINGLE LINE DIAGRAM AND PANEL SCHEDULE
E-100	ELECTRICAL SITE PLAN
E-101	ELECTRICAL LIGHTING PLAN
E-102	ELECTRICAL POWER PLAN

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02/20/24

Drawing Name

ELECTRICAL SYMBOL LISTS, NOTES, ABBREVIATIONS AND INDEX

E-001

ELECTRICAL SPECIFICATIONS

GENERAL ELECTRICAL NOTES:

A. BEFORE SUBMITTING A BID, IT WILL BE NECESSARY FOR EACH CONTRACTOR WHOSE WORK IS INVOLVED TO VISIT THE SITE AND ASCERTAIN FOR HIMSELF THE CONDITIONS TO BE MET IN INSTALLING THE WORK AND MAKE PROVISIONS FOR THE CONDITIONS IN HIS FINAL PRICE. FAILURE ON THE PART OF THE CONTRACTOR TO COMPLY WITH THIS REQUIREMENT SHALL NOT BE CONSIDERED JUSTIFICATION FOR THE OMISSION OR FAULTY INSTALLATION OF ANY WORK COVERED BY THE CONTRACT DOCUMENTS.

B. THE CONTRACTOR SHALL SECURE ALL PERMITS, LICENSES AND INSPECTIONS REQUIRED FOR HIS WORK, AND SHALL PAY ALL FEES IN CONNECTION WITH SUCH PERMITS, LICENSES AND INSPECTIONS.

C. WORK SHALL COMPLY WITH THE MOST RECENT VERSION OF ALL APPLICABLE LAWS, RULES, REGULATIONS AND ORDINANCES OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES. IN THE EVENT OF CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND THE LOCAL ENFORCING AUTHORITY, THE LATTER SHALL RULE. ANY MODIFICATION RESULTING THEREFROM SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER. THE CONTRACTOR SHALL REPORT ANY SUCH MODIFICATIONS TO THE ARCHITECT/ENGINEER AND SECURE HIS APPROVAL BEFORE PROCEEDING. SHOULD THE REQUIREMENTS OF THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE CODES, THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE PROVIDED THEY ARE NOT IN CONFLICT WITH THOSE CODES.

D. ALL ITEMS OF EQUIPMENT AND ALL MATERIALS FOR WHICH APPROVAL STANDARDS HAVE BEEN ESTABLISHED BY UNDERWRITERS' LABORATORIES, INC. (UL), FACTORY MUTUAL (FM), CERTIFIED BALLAST MANUFACTURER (CBM), ELECTRICAL TESTING ASSOCIATION (NEMA) SHALL BE SO APPROVED AND SHALL BEAR APPROVAL LABELS.

SUBMITTALS AND SHOP DRAWINGS

A. CONTRACTOR SHALL PROVIDE THE ENGINEER WITH PRODUCT DATA AND SHOP DRAWINGS FOR ALL MATERIALS & EQUIPMENT SPECIFIED BELOW. SUBMITTALS SHALL BE PROVIDED IN AN ELECTRONIC FORMAT. SUBMITTAL DATA SHALL INCLUDE:

1. COVER SHEET WITH NAMES AND ADDRESSES OF PROJECT, ARCHITECT MEP ENGINEER, GENERAL CONTRACTOR & SUB CONTRACTOR.
2. DRAWING REFERENCE NUMBER, PRODUCT NAME AND/OR DESCRIPTION.
3. INDEX OF ALL DATA IN SUBMITTAL.
4. DIMENSIONAL DATA AND SKETCHES SHOWING THAT SUBMITTED EQUIPMENT WILL FIT INTO SPACE AVAILABLE AND WILL HAVE REQUIRED CODE AND MAINTENANCE CLEARANCES.
5. IDENTIFICATION OF EACH ITEM MATCHING THAT INDICATED ON THE DRAWINGS.
6. SUFFICIENT PERFORMANCE DATA, CAPACITY, SOUND DATA, DIAGRAMMATIC DATA AND DESCRIPTIVE INFORMATION TO SHOW ITS COMPLIANCE'S WITH THE CONTRACT DOCUMENTS. OPTIONS OR SPECIAL REQUIREMENTS SHALL BE CLEARLY INDICATED. APPLICABLE INFORMATION SHALL BE CLEARLY INDICATED AND NON APPLICABLE DATA SHALL BE CROSSED OFF.
7. MATERIALS AND EQUIPMENT PURCHASED OR INSTALLED WITHOUT A "NO EXCEPTIONS TAKEN" SHOP DRAWING REVIEW SHALL BE AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND REPLACEMENT OF SUCH MATERIALS WHICH IS JUDGED UN-SATISFACTORY BY THE ENGINEER FOR ANY REASON SHALL BE AT THE EXPENSE OF THE CONTRACTOR.
8. ANY ITEMS KNOWINGLY SUBMITTED THAT DO NOT COMPLY WITH SPECIFICATIONS SHALL BE LISTED WITH EXPLANATION AS TO WHY THEY ARE BEING SUBMITTED.

B. REQUIRED SUBMITTALS / SHOP DRAWINGS:

1. WIRING DEVICES
2. PANELBOARDS
3. DISCONNECT SWITCHES
4. CONDUIT
5. LIGHTING FIXTURES
6. EQUIPMENT ROOM LAYOUT DRAWINGS TO SCALE

CONDUIT

A. ALL CONDUITS SHALL BE CONCEALED IN PIPE CHASES, WALLS, FURRED SPACED, OR ABOVE THE CEILING OF THE BUILDING UNLESS OTHERWISE INDICATED. CONDUIT SHALL NOT BE EMBEDDED IN ANY STRUCTURAL SLAB OR STRUCTURAL MEMBER UNLESS APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.

B. CONDUIT MAY BE RUN EXPOSED IN MECHANICAL ROOMS, DUCT AND PIPING CHASES, BUT ONLY WHERE NECESSARY. ALL EXPOSED CONDUIT SHALL BE RUN IN THE NEATEST, MOST INCONSPICUOUS MANNER, AND PARALLEL OR PERPENDICULAR TO THE BUILDING LINES.

C. ALL CONDUIT AND SURFACE RACEWAYS SHALL BE ADEQUATELY AND PROPERLY SUPPORTED FROM THE BUILDING STRUCTURE BY MEANS RECOMMENDED BY THE MANUFACTURER, OR BY THE USE OF HANGER RODS OR CLAMPS.

D. ALL CONDUITS THROUGHOUT THE BUILDING SHALL BE SUPPORTED 8 FEET ON CENTERS HORIZONTALLY AND SUPPORTED 6 FEET ON CENTERS VERTICALLY.

E. VERTICAL CONDUITS SHALL BE SUPPORTED FROM FLOOR LINES WITH RISER CLAMPS SIZED TO FIT THE CONDUIT AND TO ADEQUATELY ALLOW FOR CONTRACTION. AT THE BASES OF CONDUIT. WHERE REQUIRED FOR PROPER SUPPORT, PROVIDE ANCHOR BASE FITTINGS OR OTHER APPROVED SUPPORTS.

F. CONDUIT SHALL NOT BE SUPPORTED FROM DUCTWORK, PIPING, OR EQUIPMENT.

G. THE LOAD AND SPACING ON EACH HANGER AND/OR INSERT SHALL NOT EXCEED THE SAFE ALLOWABLE LOAD FOR ANY COMPONENT OF THE SUPPORT SYSTEM, INCLUDING THE CONCRETE WHICH HOLDS THE INSERTS. REINFORCEMENT AT INSERTS SHALL BE PROVIDED AS REQUIRED TO DEVELOP THE STRENGTH REQUIRED.

H. ALL CONDUITS NOT EMBEDDED IN CONCRETE OR MASONRY SHALL BE SECURELY AND INDEPENDENTLY SUPPORTED SO THAT NO STRAIN WILL BE TRANSMITTED TO OUTLET BOX AND PULL BOX SUPPORTS, ETC. SUPPORTS SHALL BE RIGID ENOUGH TO PREVENT DISTORTION OF CONDUITS DURING WIRE PULLING.

I. ALL ELECTRICAL CONDUCTORS SHALL BE INSTALLED IN CONDUIT, OR SURFACE METAL RACEWAYS.

J. RIGID STEEL CONDUIT SHALL BE USED WHERE CONDUIT IS UNDERGROUND, IN A CONCRETE SLAB WITH A VAPOR BARRIER, EXPOSED TO THE WEATHER, IN DAMP OR OTHER WET LOCATIONS, WHERE EXPOSED TO VIEW, WHERE SUBJECT TO PHYSICAL DAMAGE, OR IN SIZES GREATER THAN 4" IN DIAMETER.

K. CONDUIT SHALL BE JOINED WITH THREADED COUPLINGS AND SHALL BE SECURED IN CABINETS, OUTLETS, ETC., WITH DOUBLE LOCKNUTS AND SHALL BE PROVIDED WITH INSULATED BUSHINGS AS MANUFACTURED BY MIDWEST, STEEL CITY, OR EFCOR. COUPLINGS, ETC., SHALL BE THREADED.

L. RIGID STEEL CONDUIT SHALL BE HOT DIPPED GALVANIZED INSIDE AND OUT. FULL LENGTHS OF PIPE SHALL HAVE GALVANIZED OR ZINC- COATED THREADS ON BOTH ENDS.

M. RIGID STEEL CONDUIT SHALL BE PITTSBURGH STANDARD, REPUBLIC, ALLIED, TRIANGLE, ROME, SPANG, WESTERN, WHEATLAND, WESTERN TUBE AND CONDUIT, OR YOUNGSTOWN HOT DIPPED GALVANIZED INSIDE AND OUT, NATIONAL "SHERADUCT", WALKER "DUALCOTE", OR GENERAL ELECTRIC (J&L) "WHITE" ZINC METALLIZED INSIDE AND OUT, OR APPROVED EQUAL.

N. EMT MAY BE USED INDOORS WHERE CONCEALED OR EXPOSED ABOVE GRADE, EXCEPT WHERE RIGID STEEL CONDUIT IS REQUIRED. ELECTRICAL METALLIC TUBING SHALL BE MADE OF THIN-WALL STEEL TUBING SHALL BE MADE OF THIN-WALL STEEL TUBING UP TO 4" CONDUIT SIZE, AND SHALL BE GALVANIZED INSIDE AND OUTSIDE.

O. EMT SHALL BE JOINED WITH STEEL SET SCREW TYPE COUPLINGS AND CONDUITS SHALL BE SECURED WITH STEEL SET SCREW TYPE CONNECTORS AT PANELS, JUNCTION BOXES, OUTLETS, ETC. EMT WHICH IS CAST IN CONCRETE SHALL BE JOINED USING CONCRETE TIGHT COMPRESSION FITTINGS. DIE CAST TYPE CONNECTORS ARE NOT ACCEPTABLE.

P. IF IT COMPLIES WITH THESE SPECIFICATIONS, CONDUIT AND CONNECTORS MANUFACTURED BY ONE OF THE FOLLOWING WILL BE ACCEPTABLE: AFC CABLE SYSTEMS, ALLIED, ANAMET, CALCONDUIT, ELECTRI-FLEX, FSR, O-Z/GEDNEY, PLASTI-BOND.

Q. METAL CONDUIT SHALL BE OF AMPLE SIZE TO PERMIT THE EASY INSERTION OR WITHDRAWAL OF CONDUCTORS WITHOUT ABRASION. ALL JOINTS SHALL BE CUT SQUARE, REAMED SMOOTH AND DRAWN UP TIGHT. NO NON-FLEXIBLE METAL CONDUIT SHALL BE SMALLER THAN 1/2"C.

R. SO FAR AS PRACTICABLE, ALL EXPOSED METAL CONDUIT SHALL RUN WITHOUT TRAPS. WHERE TRAPS OR DIPS ARE UNAVOIDABLE, A JUNCTION OR PULL BOX SHALL BE PLACED AT EACH LOW POINT.

S. EACH ENTIRE METAL CONDUIT SYSTEM SHALL BE INSTALLED COMPLETE BEFORE ANY CONDUCTORS ARE DRAWN IN. TO GUARD AGAINST OBSTRUCTIONS AND OMISSIONS, EACH RUN OF CONDUIT SHALL BE FINISHED BEFORE PLASTERING IS INSTALLED. ALL METAL CONDUIT SHALL BE SWABBED AFTER PLASTER IS FINISHED AND DRY.

T. AS SOON AS CONDUIT HAS BEEN PERMANENTLY INSTALLED IN PLACE, CONDUIT SHALL BE CAPPED OR PLUGGED WITH STANDARD ACCESSORIES.

U. CONDUITS USED FOR DATA, PHONE AND PULLSTRINGS SHALL TERMINATE WITH PLASTIC GROMMET INSERTS SO THAT THE CABLE IS NOT DAMAGED BY THE OPEN END OF THE CONDUIT.

V. ALL CONDUITS IN WALLS SHALL BE RUN VERTICALLY. HORIZONTAL RUNS IN WALLS ARE NOT ACCEPTABLE EXCEPT FOR RECEPTACLES UNDER WINDOWS.

FLEXIBLE METAL CONDUIT

A. FLEXIBLE METAL CONDUIT SHALL BE HOT DIPPED GALVANIZED STEEL STRIP, SPIRAL WOUND AND INTERLOCKED, AND SHALL BE PROVIDED WITH INSULATED ANTI SHORT BUSHINGS AT ALL TERMINATIONS.

B. FLEXIBLE METAL CONDUIT SHALL BE SECURED WITH GALVANIZED CONNECTORS SUITABLE FOR CONNECTION TO THE ASSOCIATED BOXES AND CONDUITS. DIE CAST CONNECTORS ARE NOT ACCEPTABLE

C. FLEXIBLE METAL CONDUIT AND LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE SECURED NO LESS THAN EVERY 54" AND WITHIN 12" OF A JUNCTION BOX. IT IS NOT ACCEPTABLE TO LAY CABLES ON CEILING, DUCTWORK, ETC.

D. CONTINUITY OF THE EQUIPMENT GROUND ACROSS FLEXIBLE METAL CONDUIT CONNECTIONS SHALL BE MAINTAINED FOR ALL SYSTEMS THAT ARE OVER 150 VOLTS TO GROUND. THE CONTINUITY SHALL BE MAINTAINED BY INSTALLING A BARE COPPER BONDING CONDUCTOR SIZED IN ACCORDANCE WITH TABLE 250-122 OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE. THE BARE COPPER BONDING CONDUCTOR SHALL BE INSTALLED OUTSIDE THE FLEXIBLE CONDUIT AND SHALL BE CONNECTED ON ONE END OF THE FLEXIBLE CONDUIT BY A SUITABLE BINDING POST AN SIMILARLY CONNECTED ON THE OPPOSITE END WITH ANOTHER SUITABLE BINDING POST.

E. IF IT COMPLIES WITH THESE SPECIFICATIONS, CONDUIT AND CONNECTORS MANUFACTURED BY ONE OF THE FOLLOWING WILL BE ACCEPTABLE: AFC CABLE SYSTEMS, ALLIED, ANAMET, CALCONDUIT, ELECTRI-FLEX, FSR, O-Z/GEDNEY, PLASTI-BOND.

TYPE "MC" ARMORED CABLE

A. ARMORED CABLE USED FOR CONNECTION OF FIXTURE TAILS, SWITCH LEGS AND RECEPTACLES SHALL BE 2-WIRE TYPE, WITH 2- #12 "THHN" SOLID COPPER INSULATED PHASE CONDUCTORS AND A BARE BONDING CONDUCTOR. IF ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION, TYPE "MC" CABLE MAY BE USED IN WALL PARTITIONS (AND FOR SWITCH LEGS) IN FINISHED AREAS ONLY.

B. WHERE PERMITTED BY THE LOCAL AUTHORITY - ARMORED CABLE MAY BE USED INDOORS WHERE CONCEALED ABOVE GRADE, FOR FIXTURE-TAILS OF INDIVIDUAL LIGHTING FIXTURES IN SUSPENDED ACCESSIBLE TYPE CEILINGS. THESE FIXTURE-TAILS SHALL IN LENGTHS NOT TO EXCEED 6 FEET FOR CONNECTION TO THEIR ASSOCIATED LIGHTING JUNCTION BOXES. THE POINT OF CONNECTION OF THE ARMORED CABLE TO THE INDIVIDUAL LIGHTING FIXTURES SHALL NOT BE MORE THAN 3" FROM THE FIXTURE BALLASTS.

C. WHERE PERMITTED BY THE AUTHORITY HAVING JURISDICTION - ARMORED CABLE MAY BE USED INDOORS FOR INDIVIDUAL DROPS TO OUTLETS AND SWITCHES, WHERE CONCEALED IN EXISTING WALLS AND PARTITIONS - PROVIDED THE FOLLOWING CONDITIONS ARE MET:

1. THE CIRCUIT PROVIDING THE POWER FOR THE SWITCH OR OUTLET IS NOT FED FROM THE ESSENTIAL POWER SYSTEM (EXCEPT AS ALLOWED BY THE NATIONAL ELECTRICAL CODE, SECTION 517-30(C)).
2. THE BRANCH CIRCUIT HOMERUN WIRING IS INSTALLED IN THE ACCESSIBLE CEILING PLENUM USING METAL CONDUIT.
3. JUNCTION BOXES ARE LOCATED IN THE ACCESSIBLE CEILING PLENUM ADJACENT TO THE ASSOCIATED WALLS OR PARTITIONS IN WHICH OUTLETS OR SWITCH LEGS ARE INSTALLED.
4. LENGTH OF ARMORED CABLE DROP IS NOT GREATER THAN 12' -0".
5. ARMORED CABLE SHALL NOT BE USED FOR HOMERUN WIRING. HOMERUNS SHALL BE HARD PIPED WITH THE USE OF METAL CONDUIT.

D. ARMORED CABLE SHALL BE PROVIDED WITH INSULATED ANTI-SHORT BUSHINGS AT ALL TERMINATIONS. ARMORED CABLE CONNECTORS SHALL BE STEEL GALVANIZED OR, SUITABLE FOR CONNECTION TO ASSOCIATED BOXES. DIE CAST CONNECTORS ARE NOT ACCEPTABLE.

E. ARMORED CABLE SHALL BE SECURED NO LESS THAN EVERY 54" AND WITHIN 12" OF A JUNCTION BOX. IT IS NOT ACCEPTABLE TO LAY CABLES ON CEILING, DUCTWORK, ETC.

F. IF IT COMPLIES WITH THESE SPECIFICATIONS, ARMORED CABLE AND CONNECTORS MANUFACTURED BY ONE OF THE FOLLOWING WILL BE ACCEPTABLE: AFC CABLE SYSTEMS, ALLIED, ANAMET, CALCONDUIT, ELECTRI-FLEX, FSR, O-Z/GEDNEY, PLASTI-BOND.

OUTLET BOXES

A. REFER TO THE ARCHITECT AND VENDOR'S DRAWINGS FOR EXACT MOUNTING HEIGHT AND LOCATION OF ALL ELECTRICAL/TELEPHONE/DATA DEVICES.

B. ALL METAL OUTLETS AND JUNCTION BOXES, EXCEPT WHERE OTHERWISE SPECIFIED, SHALL BE OF ONE PIECE CONSTRUCTION, AND SHALL BE PROTECTED AGAINST CORROSION BY AN APPROPRIATE GALVANIZING PROCESS.

C. ALL JUNCTION BOXES SHALL BE PROVIDED WITH COVERS OF THE SAME MANUFACTURER AS THE BOXES. THE TYPE OF COVER SELECTED SHALL MEET THE CONDITIONS IMPOSED IN EVERY CASE. ALL SUCH BOXES SHALL BE LEFT IN A NEAT, CLEAN AND WORKMANLIKE MANNER.

D. THE OUTLET BOXES SHALL BE SECURELY ATTACHED TO THE PARTITION STUDS. IT IS NOT ACCEPTABLE TO SECURE OUTLET BOXES ONLY TO DRYWALL PARTITION. SECURE ONE SIDE OF THE BOX TO WALL STUD. THE OTHER SIDE OF EACH BOX SHALL BE SUPPORTED WITH A BRACKET EQUAL TO THE INSIDE DIMENSION OF THE WALL STUD SO WHEN BOTH SIDES OF THE GYP BOARD HAVE BEEN INSTALLED, THE BOX DOES NOT MOVE. PROVIDE APPROPRIATE SUPPORTING DEVICES FOR OUTLET BOXES BY CADDY FASTENERS OR EQUAL AS FOLLOWS:

1. "RB" BOX MOUNTING BRACKETS.
2. SCREW GUN MOUNTING BRACKETS.
3. "H" BOX MOUNTING BRACKETS.

E. OUTLET, SWITCH AND JUNCTION BOXES FOR VARIOUS USES SHALL BE AS MANUFACTURED BY CROUSE-HINDS, FSR, HOFFMAN, HUBBELL, MONOSYSTEMS, O-Z/GEDNEY, PLASTI-BOND, OR AN APPROVED EQUAL.

CONDUCTORS

A. ALL CONDUCTORS FURNISHED AND INSTALLED SHALL COMPLY WITH THE REQUIREMENTS AND LATEST REVISIONS OF THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL ELECTRICAL SAFETY CODE (NESC), STANDARDS OF THE UNDERWRITER'S LABORATORIES (UL), NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA), INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE).

B. ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE SOFT DRAWN, ANNEALED COPPER, HAVING A CONDUCTIVITY OF NOT LESS THAN 98% OF THAT OF PURE COPPER, AND MEETING BEFORE STRANDING, THE REQUIREMENTS OF ASTM B-3, "STANDARD SPECIFICATIONS FOR SOFT OR ANNEALED COPPER WIRE FOR ELECTRICAL PURPOSES", LATEST EDITION.

C. UNLESS OTHERWISE SPECIFIED OR NOTED, ALL CONDUCTORS NO. 10 AND SMALLER SHALL BE SOLID COPPER THWN WITH AN INSULATING OUTER JACKET SUITABLE FOR CONDUCTOR TEMPERATURES OF 75°C, EXCEPT FOR NEC CLASS 1, 2, 3, CONDUCTORS WHICH MAYBE STRANDED IF TERMINATED AS REQUIRED HEREIN.

D. UNLESS OTHERWISE SPECIFIED OR NOTED, ALL CONDUCTORS NO. 8 AND LARGER SHALL BE THWN/THHN, 600 VOLT, STRANDED WITH A THERMOPLASTIC INSULATING COMPOUND AND AN OUTER JACKET (THWN/THHN ONLY) SUITABLE FOR CONDUCTOR TEMPERATURES OF 75°C. OR 90°C., INCLUSIVE. STRANDED WIRE SHALL BE TERMINATED AS SPECIFIED HEREIN.

E. IN THE CEILING AREAS OF EQUIPMENT ROOMS WHERE THE TEMPERATURE MAY EXCEED 102°F. UNDER OPERATING CONDITIONS, HIGHER TEMPERATURE INSULATION SHALL BE USED ON CONDUCTORS. ACCEPTABLE TYPES ARE RHH, THHN, AND XHHW.

F. IF IT COMPLIES WITH THESE SPECIFICATIONS, THE FOLLOWING CONDUCTOR MANUFACTURERS WILL BE ACCEPTABLE: ALPHA WIRE COMPANY, AMERICAN BARE CONDUCTOR, BELDEN INC., ENCORE WIRE CORPORATION, GENERAL CABLE TECHNOLOGIES CORPORATION, SERVICE WIRE CO., SOUTHWIRE COMPANY, WESCO.

G. IF IT COMPLIES WITH THESE SPECIFICATIONS, CABLE LUGS AND TERMINATION FITTINGS MANUFACTURED BY ONE OF THE FOLLOWING WILL BE ACCEPTABLE: BLACKBURN, BURNDY, IDEAL, ILSCO, KEARNEY, MAC, THOMAS & BETTS, SQUARE D, AMP.

H. NO SPLICES OR TAPS SHALL BE MADE IN ANY CONDUCTOR EXCEPT IN OUTLET BOXES, JUNCTION BOXES, SPLICE BOXES, OR OTHER DEVICES AND EQUIPMENT IN EXPOSED AND ACCESSIBLE LOCATIONS APPROVED FOR THE PURPOSE BY THE LATEST EDITION OF THE NEC.

I. ALL NO. 10 AWG AND SMALLER SOLID CONDUCTORS SHALL BE SPLICED WITH PRE-INSULATED SPRING CONNECTORS. ALL NO. 10 AWG AND SMALLER STRANDED CONDUCTORS FOR NEC CLASS 1, 2, 3 WIRING SHALL BE TERMINATED WITH AMP 'PIDG' UL LISTED PREMIUM GRADE INSULATED FORK CONNECTORS, OR APPROVED EQUAL, AND SHALL BE SPLICES IN A JUNCTION BOX WITH AMP "PLASTIC-GRIP" UL LISTED STANDARD GRADE INSULATED BUTT SPLICES, OR APPROVED EQUAL.

J. ALL NO. 8 AWG AND LARGER COPPER CONDUCTORS SHALL BE CONNECTED WITH HIGH CONDUCTIVITY, WROUGHT COPPER, COLOR KEYED COMPRESSION CONNECTORS. COMPRESSION CONNECTORS FOR ALL FEEDERS SHALL BE THOMAS & BETTS SERIES 54200, OR EQUAL, TWO- HOLE CONNECTORS.

K. ALL NO. 8 AWG AND LARGER COPPER CONDUCTORS WHICH ARE TO BE SPLICED OR TAPPED IN WIREWAYS, GUTTERS, OR JUNCTION BOXES SHALL BE SLICED OR TAPPED USING HYDRAULICALLY APPLIED, HIGH CONDUCTIVITY COMPRESSION CONNECTOR, T & B 54700, AND 3-M ELECTRICAL TAPE OR MANUFACTURED CONNECTOR COVERS APPROVED FOR THE PURPOSE.

GROUNDING

A. THE ELECTRICAL DISTRIBUTION SYSTEM SHALL BE GROUNDED IN ACCORDANCE WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE (NEC), AS SHOWN AND SPECIFIED, AND RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PRODUCTS SERVE THE INTENDED FUNCTIONS.

WIRING DEVICES

A. DUPLEX RECEPTACLES SHALL BE LEVITON #16252-I, 20AMP, 125V., 3W. DECORATOR STYLE, "SPECIFICATION GRADE", SIDE WIRED WITH MATCHING COVER PLATE UNLESS OTHERWISE INDICATED. LIGHTING WALL SWITCHES SHALL BE LEVITON #5621 OR #5623 WITH MATCHING COVER PLATES. MOTION SWITCHES SHALL BE PER PLANS WITH MATCHING COVER PLATES. THE COLOR OF PLATES AND WIRING DEVICES SHALL BE AS SELECTED BY ARCHITECT. GFI RECEPTACLES SHALL BE LEVITON #6898-HG, 20A., 125V., 3W. PROVIDE WEATHERPROOF ENCLOSURE FOR RECEPTACLES MOUNTED OUTSIDE.

PANELBOARDS

A. PANELBOARDS SHALL BE GENERAL ELECTRIC TYPE AE OR AQ. OR EQUAL BY SIEMENS OR SQUARE D UNLESS OTHERWISE INDICATED.

DISCONNECT SWITCHES

A. FUSED AND NON-FUSED DISCONNECT SWITCHES SHALL BE GENERAL GENERAL ELECTRIC TYPE THD, HEAVY DUTY OR EQUAL BY SIEMENS OR SQUARE D UNLESS OTHERWISE INDICATED.

TRANSFORMERS

A. TRANSFORMERS SHALL BE GENERAL ELECTRIC TYPE QL RATED FOR 150°C TEMPERATURE RISE OR EQUAL BY SIEMENS OR SQUARE D UNLESS OTHER WISE INDICATED. TRANSFORMERS SHALL BE PROVIDED WITH RUBBER ISOLATION PADS.

B. TRANSFORMERS WINDINGS AND TERMINATIONS SHALL BE COPPER.

LIGHTING

A. LUMINAIRE TYPES AND LAMPING SHALL BE AS LISTED ON THE DRAWINGS. REFER TO LIGHT FIXTURE SCHEDULE FOR ADDITIONAL NOTES AND REQUIREMENTS.

B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

C. NRTL COMPLIANCE: LUMINAIRES FOR HAZARDOUS LOCATIONS SHALL BE LISTED AND LABELED FOR INDICATED CLASS AND DIVISION OF HAZARD BY AN NRTL.

D. FM GLOBAL COMPLIANCE: LUMINAIRES FOR HAZARDOUS LOCATIONS SHALL BE LISTED AND LABELED FOR INDICATED CLASS AND DIVISION OF HAZARD BY FM GLOBAL.

E. UL COMPLIANCE: COMPLY WITH UL 1598. EMERGENCY EGRESS LIGHTING COMPONENTS SHALL COMPLY WITH UL 924.

F. LAMP BASE COMPLYING WITH ANSI C81.61 OR IEC 60061-1.

G. NOMINAL OPERATING VOLTAGE: 12 V DC, 24 V DC, 120 V AC, 240 V AC, 277 V AC, OR 480 V AC; PER DRAWINGS.

H. RECESSED LUMINAIRES: COMPLY WITH NEMA LE 4.

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Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

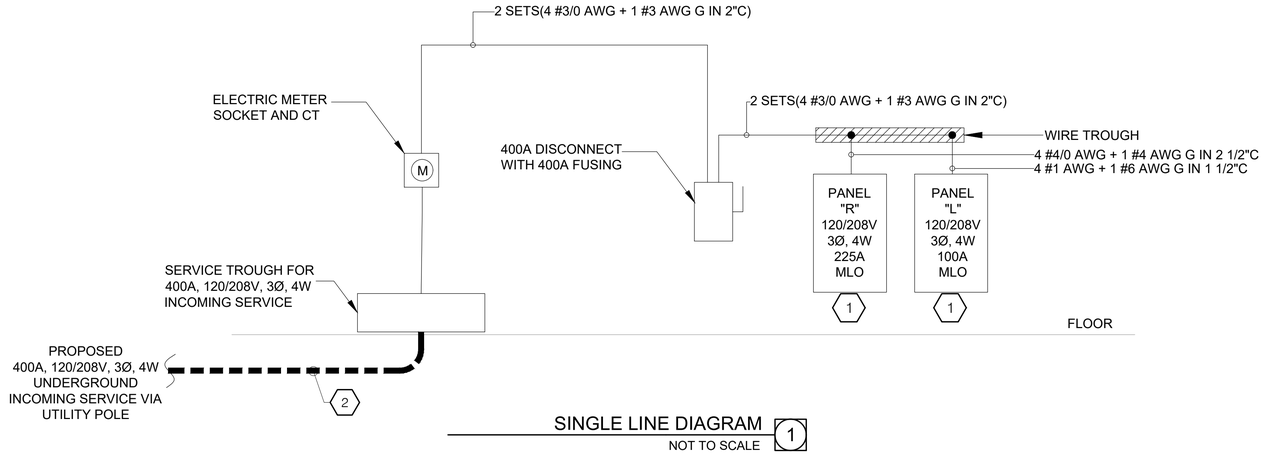
DESCRIPTION
ISSUE FOR CONSTRUCTION & BID 02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
02/20/24

Drawing Name

ELECTRICAL
SPECIFICATIONS

E-002



SINGLE LINE DIAGRAM 1

NOT TO SCALE

PANEL: L
LOCATION: ELECTRICAL 108

PANEL VOLTAGE: 120/208V
PHASE & WIRE: 3PH, 4W
MAIN (AMPS): 100A MLO

AIC RATING: 22K
MOUNTING: SURFACE
NEMA TYPE: 1

CKT NO.	OCD A	OCD P	DESCRIPTION	LOAD (KVA) MISC	HTG	HVAC	REC	LTG	3 PH SEQUENCE A	B	C	LOAD (KVA) MISC	HTG	HVAC	REC	LTG	DESCRIPTION	OCD A	OCD P	CKT NO.
1	20	1	LIGHTING					0.8	1.0							0.2	LIGHTING	20	1	2
3	20	1	LIGHTING					1.2		1.2							SPARE	20	1	4
5	20	1	SPARE								0.0						SPARE	20	1	6
7	20	1	SPARE					0.0	0.0								SPARE	20	1	8
9	20	1	SPARE							0.0							SPARE	20	1	10
11	20	1	SPARE								0.0						SPARE	20	1	12
13			SPACE					0.0	0.0								SPACE			14
15			SPACE							0.0							SPACE			16
17			SPACE								0.0						SPACE			18
19			SPACE					0.0	0.0								SPACE			20
21			SPACE							0.0							SPACE			22
23			SPACE								0.0						SPACE			24
25			SPACE					0.0	0.0								SPACE			26
27			SPACE							0.0							SPACE			28
29			SPACE								0.0						SPACE			30
CONNECTED LOAD (KVA)				0.0	0.0	0.0	0.0	2.0	1.0	1.2	0.0	0.0	0.0	0.0	0.0	0.2				
25% OF LARGEST MOTOR (KVA)																				
TOTAL CONNECTED LOAD (KVA)				0.0	0.0	0.0	0.0	2.2	X= 1ST 10KVA @ 100%, + REMAINDER @ 50% (N.E.C. 220-44)											
DEMAND FACTOR				1.0	1.25	1.0	X	1.25												
TOTAL DEMAND LOAD (KVA)				0.0	0.0	0.0	0.0	2.7									TOTAL DEMAND (KVA)	3		
																	DEMAND CURRENT (AMPS)	7		

NOTES:

PANEL: R
LOCATION: ELECTRICAL 108

PANEL VOLTAGE: 120/208V
PHASE & WIRE: 3PH, 4W
MAIN (AMPS): 225A MLO

AIC RATING: 22K
MOUNTING: SURFACE
NEMA TYPE: 1

CKT NO.	OCD A	OCD P	DESCRIPTION	LOAD (KVA) MISC	HTG	HVAC	REC	LTG	3 PH SEQUENCE A	B	C	LOAD (KVA) MISC	HTG	HVAC	REC	LTG	DESCRIPTION	OCD A	OCD P	CKT NO.
1	20	1	RECEPTACLES OPEN SPACE 102				0.7		1.4							0.7	RECEPTACLES OPEN SPACE 102, STG	20	1	2
3	20	1	RECEPTACLES OPEN SPACE 102				0.5			1.3						0.7	RECEPTACLES OPEN SPACE 102	20	1	4
5	20	1	RECEPTACLES OFFICE 104				0.9				1.6					0.7	RECEPTACLES RESTROOM 105,106	20	1	6
7	20	1	RECEPTACLE ELECTRICAL 108				0.2		0.5							0.4	RECEPTACLES WOMEN RESTROOM 10	20	1	8
9	20	1	RECEPTACLES MICROWAVE				1.2			2.2						1.0	RECEPTACLES REFRIGERATOR	20	1	10
11	20	1	RECEPTACLES KITCHEN 110				0.4				1.1					0.7	RECEPTACLES KITCHEN 110, PANTRY	20	1	12
13	50	2	ELECTRIC STOVE				4.0		4.4							0.4	RECEPTACLES EXTERIOR	20	1	14
15							4.0			4.5						0.5	RECEPTACLES EXTERIOR	20	1	16
17							2.2				4.4					2.2				18
19	30	3	CU-1				2.2		4.4							2.2	CU-2	30	3	20
21							2.2			4.4						2.2				22
23	20	1	EF-1,2,3,4				0.1				1.3					1.2				24
25	20	1	RECEPTACLES STORAGE 103					0.5	1.7							1.2	CU-3	20	3	26
27	20	1	SPARE							1.2						1.2				28
29							4.6				9.2					4.6				30
31	50	3	FCU-1				4.6		9.2							4.6	FCU-2	50	3	32
33							4.6			9.2						4.6				34
35	30	1	KEF-1				1.7				4.5					2.9				36
37	20	1	JUNCTION BOX - KITCHEN HOOD				0.6		3.5							2.9	FCU-3	35	3	38
39			SPACE							2.9						2.9				40
41			SPACE								0.0									42
43			SPACE						0.0											44
45			SPACE							0.0										46
47			SPACE								0.0									48
49			SPACE						0.0											50
51			SPACE							0.0										52
53			SPACE								0.0									54
CONNECTED LOAD (KVA)				0.0	0.0	22.8	12.4	0.0	25.1	25.7	22.1	0.0	0.0	32.5	5.1	0.5				
25% OF LARGEST MOTOR (KVA)																				
TOTAL CONNECTED LOAD (KVA)				0.0	0.0	55.3	17.6	0.0	X= 1ST 10KVA @ 100%, + REMAINDER @ 50% (N.E.C. 220-44)											
DEMAND FACTOR				1.0	1.25	1.0	X	1.25												
TOTAL DEMAND LOAD (KVA)				0.0	0.0	55.3	13.8	0.0									TOTAL DEMAND (KVA)	69		
																	DEMAND CURRENT (AMPS)	192		

NOTES:

PANEL SCHEDULES 2

NOT TO SCALE

COPPER CONDUCTOR MAX DISTANCES FOR FEEDERS,FROM PANEL TO EACH BRANCH CIRCUIT

CONDUCTOR SIZE	GROUNDING SIZE (AWG)		15A/1P BRANCH CIRCUIT	20A/1P BRANCH CIRCUIT	25A/1P BRANCH CIRCUIT	30A/1P BRANCH CIRCUIT	40A/1P BRANCH CIRCUIT	20A/2P BRANCH CIRCUIT	25A/2P BRANCH CIRCUIT	30A/2P BRANCH CIRCUIT	40A/2P BRANCH CIRCUIT	50A/2P BRANCH CIRCUIT	60A/2P BRANCH CIRCUIT	20A/3P BRANCH CIRCUIT	25A/3P BRANCH CIRCUIT	30A/3P BRANCH CIRCUIT	40A/3P BRANCH CIRCUIT	50A/3P BRANCH CIRCUIT	60A/3P BRANCH CIRCUIT
			15 A	20 A	25 A	30 A	40 A	20 A	25 A	30 A	40 A	50 A	60 A	20 A	25 A	30 A	40 A	50 A	60 A
			1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	1 PHASE	3 PHASE	3 PHASE	3 PHASE	3 PHASE	3 PHASE	3 PHASE
			120 V	120 V	120 V	120 V	120 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V	208 V
#12 AWG	#12	MAX DISTANCE	40	30	-	-	-	53	-	-	-	-	-	61	-	-	-	-	-
#10 AWG	#10	MAX DISTANCE	65	48	39	32	-	84	67	56	-	-	-	97	77	65	-	-	-
#8 AWG	#10	MAX DISTANCE	103	77	62	51	39	134	107	89	67	-	-	154	123	103	77	-	-
#6 AWG	#10	MAX DISTANCE	163	122	98	81	61	212	169	141	106	85	-	245	196	163	122	98	-
#4 AWG	#8	MAX DISTANCE	260	195	156	130	97	338	270	225	169	135	113	390	312	260	195	156	130
#2 AWG	#8	MAX DISTANCE	412	309	247	206	155	536	429	357	268	214	179	619	495	413	310	248	206
#1 AWG	#8	MAX DISTANCE	519	390	312	260	195	675	540	450	338	270	225	780	624	520	390	312	260
1/0 AWG	#6	MAX DISTANCE	656	492	393	328	246	852	682	568	426	341	284	984	787	656	492	394	328
2/0 AWG	#6	MAX DISTANCE	827	620	496	414	310	1075	860	717	538	430	358	1242	994	828	621	497	414
3/0 AWG	#6	MAX DISTANCE	1044	783	627	522	392	1358	1086	905	679	543	453	1568	1254	1045	784	627	523
4/0 AWG	#4	MAX DISTANCE	1316	987	789	658	493	1711	1368	1140	855	684	570	1975	1580	1317	988	790	658
250 KCMIL	#4	MAX DISTANCE	1553	1165	932	777	583	2019	1616	1346	1010	808	673	2332	1866	1555	1166	933	777
350 KCMIL	#4	MAX DISTANCE	2180	1635	1308	1090	817	2834	2267	1889	1417	1134	945	3272	2618	2182	1636	1309	1091

$$\textit{MAXIMUM LENGTH OF FEEDER} = \frac{1000 \times Vd \times P}{I \times R \times M}$$

GENERAL NOTES

1. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE FULLY RATED TO WITHSTAND THE MAXIMUM AVAILABLE FAULT CURRENT ESTABLISHED. SERIES RATING IS NOT ACCEPTABLE.
2. VERIFY ALL MODIFICATIONS TO THE ELECTRICAL INSTALLATION THAT AFFECT THE SERVICE MAXIMUM AVAILABLE FAULT CURRENT AND RECALCULATE AS NECESSARY TO ENSURE SERVICE EQUIPMENT RATINGS ARE SUFFICIENT FOR MAXIMUM AVAILABLE FAULT CURRENT OF EQUIPMENT. ADJUST REQUIRED FILED MARKINGS TO REFLECT NEW MAXIMUM AVAILABLE FAULT CURRENT VALUES AND CALCULATIONS.
3. SERVICE EQUIPMENT SHALL BE LEGIBLY MARKED IN FILED WITH MAXIMUM AVAILABLE FAULT CURRENT. MARKINGS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE SURROUNDING ENVIRONMENT AND INCLUDE THE DATE THE FAULT CURRENT CALCULATION WAS PERFORMED.
4. FEEDER LENGTHS SHOWN ON SINGLE LINE DIAGRAM ARE ESTIMATES FOR VOLTAGE DROP CALCULATION PURPOSES ONLY. FEEDER LENGTHS SHOWN ARE NOT FOR PRICING. CONTRACTOR SHALL DETERMINE FEEDER ROUTING AND LENGTHS IN FIELD PRIOR TO BID. PROVIDE EEOR WITH UPDATED LENGTHS ON SINGLE LINE DIAGRAM.
5. FUSES SHALL BE DUAL ELEMENT TIME DELAY AND VERIFIED WITH EQUIPMENT MANUFACTURER(S). PROVIDE FUSE HOLDERS WITH REJECTION CLIPS.
6. NO PIPING, DUCTS, OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION SHALL BE PERMITTED TO BE LOCATED WITHIN THE DEDICATED SPACE ABOVE ANY ELECTRICAL EQUIPMENT.
7. ALL TERMINATIONS AND ENCLOSURES SHALL BE RATED FOR USE WITH 75-DEGREES C CONDUCTORS MINIMUM.
8. THE NEUTRAL BUS SHALL BE THE SAME SIZE AS THE LINE BUS IN ALL SWITCHBOARDS, PANEL BOARDS, AND DISTRIBUTION BOARDS.
9. PROVIDE SHORT CIRCUIT, COORDINATION AND ARC FLASH STUDIES FOR ELECTRICAL GEAR FOR THIS PROJECT.

(#) KEY NOTES:

1. PROVIDE UPDATED TYPE WRITTEN PANEL DIRECTORY AFTER COMPLETION OF PROJECT.
2. SERVICE ENTRANCE CONDUCTOR TO BE COORDINATED WITH POWER COMPANY.

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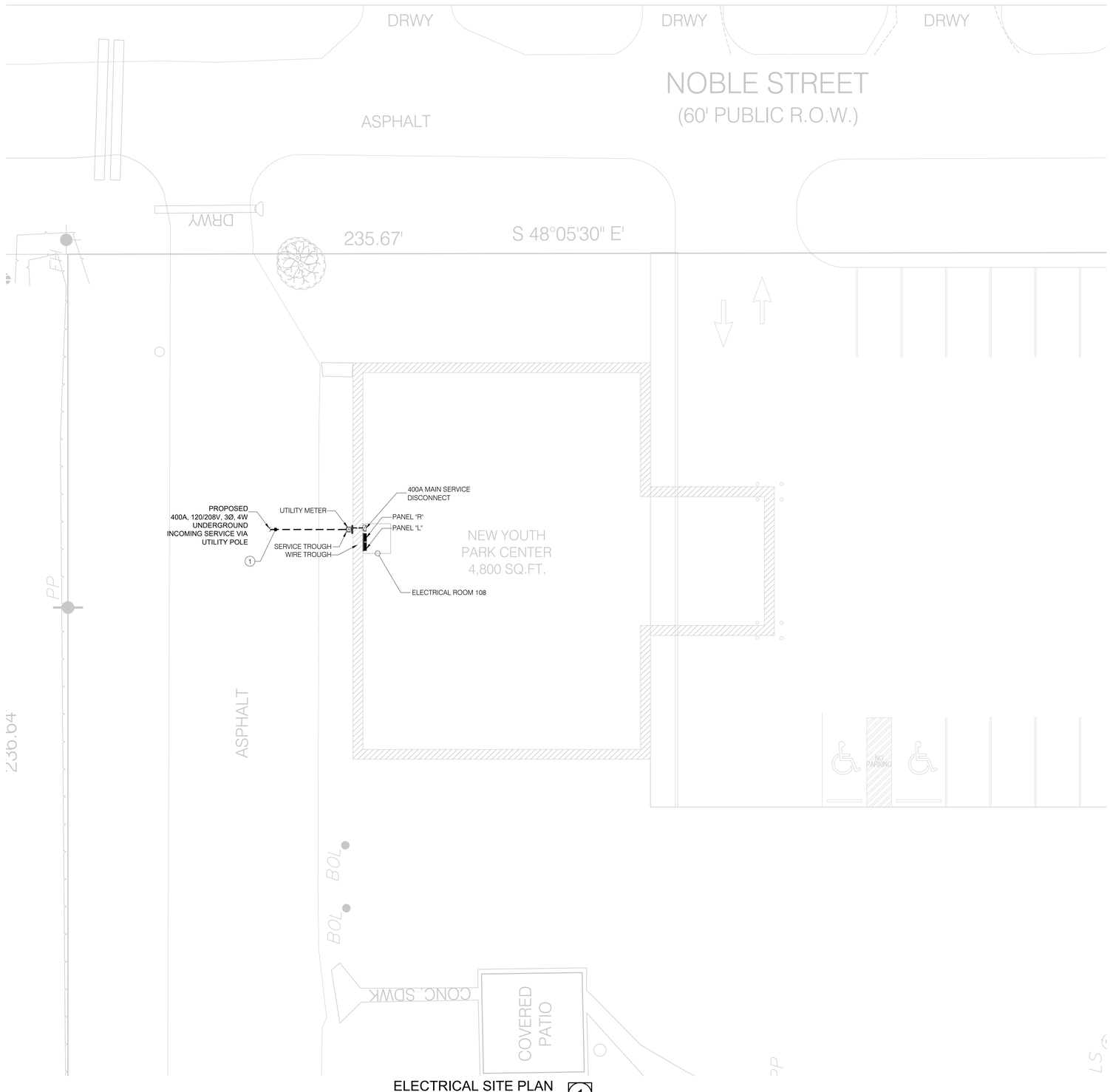
10/21/24

Drawing Name

SINGLE LINE DIAGRAM AND PANEL SCHEDULE

E-003



ELECTRICAL SITE PLAN
3/32" = 1'-0" (1)

GENERAL NOTES

1. ELECTRICAL CONTRACTOR TO SUPPLY OWNER WITH DRAWINGS OF THE AS-BUILT CONDITION OF THE WIRING SYSTEM UPON COMPLETION.
2. ALL CONSTRUCTION OF THIS PROJECT SHALL CONFORM TO ALL LOCAL CODES, ORDINANCES AND CURRENT ELECTRIC & BUILDING CODES.
3. FIELD COORDINATE THE EXACT LOCATION OF UNDERGROUND CONDUITS WITH ALL OTHER UNDERGROUND UTILITIES AND THE SITE CONDITIONS.
4. ALL POWER COMPANY/INCOMING ELECTRIC SERVICE RELATED WORK MUST BE PERFORMED IN ACCORDANCE TO RULES AND REGULATIONS AND PER THEIR REQUIREMENTS. NO CONDUITS AND/OR EQUIPMENT PADS SHALL BE INSTALLED, PRIOR TO THEIR WRITTEN APPROVAL.
5. UTILIZE HAND DIGGING WHERE WORK IS REQUIRED IN THE VICINITY OF KNOWN UNDERGROUND UTILITIES. TAKE ALL NECESSARY PRE-CAUTIONS SO NO EXISTING UTILITIES GET ACCIDENTALLY DAMAGED.
6. ELECTRICAL CONTRACTOR TO COORDINATE WITH CIVIL, ARCHITECT AND STRUCTURAL THE LOCATION OF GROUNDING CONDUCTORS FOR ELECTRICAL SERVICE,

(#) KEY NOTES

1. PROPOSED 400A, 120/208V, 3PHASE, 4 WIRE UNDERGROUND INCOMING SERVICE VIA UTILITY POLE. COORDINATE WITH CIVIL OR POWER COMPANY FOR EXACT ROUTING.

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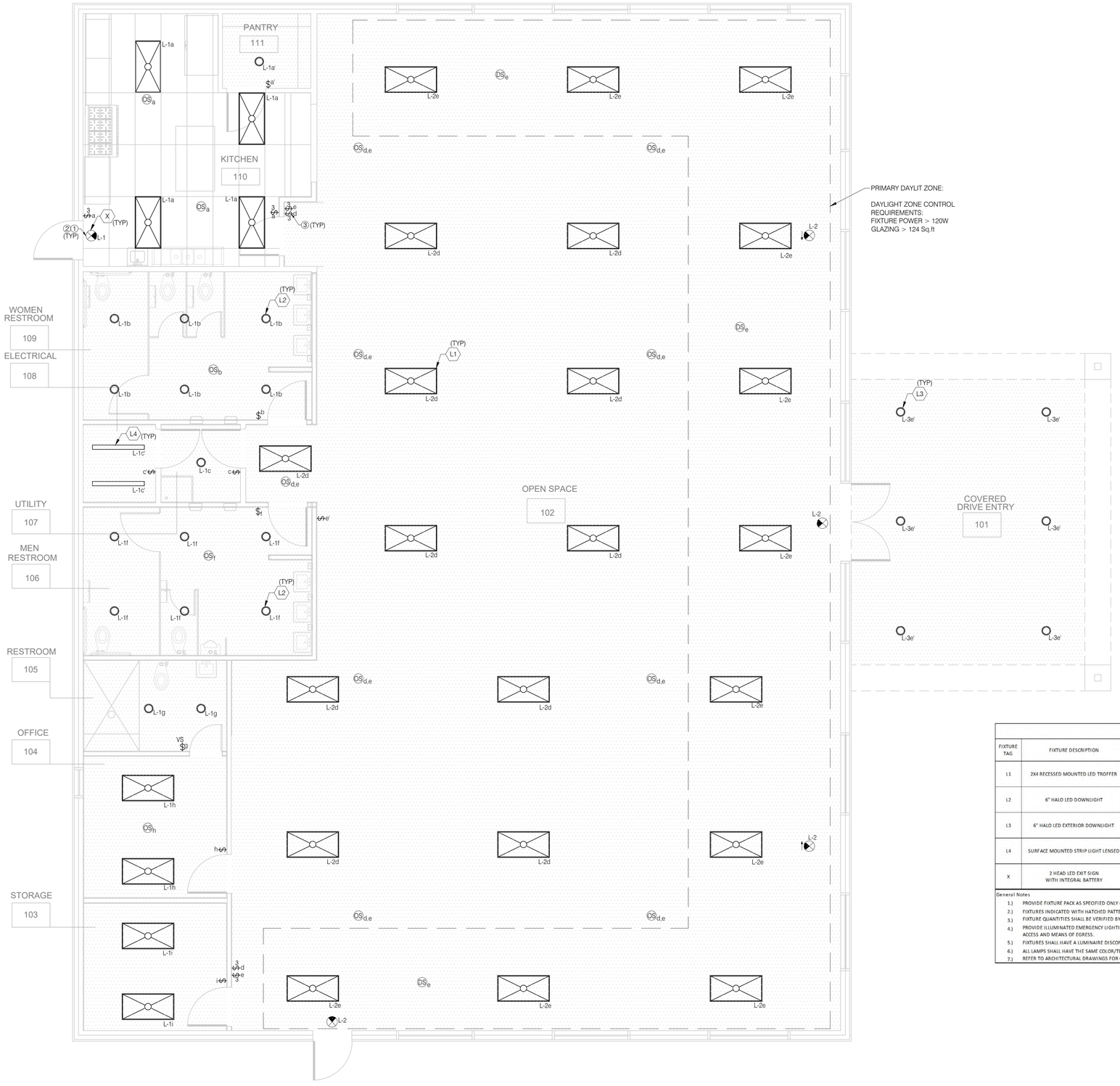
ELECTRICAL SITE PLAN

E-100



ELECTRICAL LIGHTING PLAN 1
1/4" = 1'-0"

GENERAL NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR FULL SCOPE OF WORK. FIELD VERIFY SCOPE IN PRE-BID JOB-WALK.
2. ALL LIGHTING WORK SHALL BE PER LATEST EDITION OF NEC. PROVIDE, INSTALL & CONNECT POWER-PACKS, SWITCHING POWER MODULE & ACCESSORIES WITH REQUIRED J-BOXES, WIRES & RACEWAYS AS REQUIRED FOR A COMPLETE LIGHTING SYSTEM.
3. REFER TO ARCHITECTURAL DRAWINGS FOR RCP PLANS AND FINAL LOCATION & MOUNTING HEIGHTS OF LIGHTING FIXTURES, SWITCHES, OUTLETS.
4. ELECTRICAL CONTRACTOR TO SUPPLY OWNER WITH DRAWINGS OF THE AS-BUILT CONDITION OF THE WIRING SYSTEM UPON COMPLETION.
5. VERIFY THE TYPE OF CEILING SYSTEM WITH GENERAL CONTRACTOR OR CEILING CONTRACTOR. PROVIDE FIXTURES WHICH ARE COMPATIBLE WITH THE CEILING SYSTEM AND INCLUDE ALL REQUIRED MOUNTING ACCESSORIES AND HARDWARE.
6. SUPPORT CEILING MOUNTED LIGHTING FIXTURES DIRECTLY FROM THE BUILDING STRUCTURE. DO NOT SUPPORT FIXTURES FROM PIPING, DUCTWORK OR ANY OTHER EQUIPMENT, OR SOLELY FROM THE SUSPENDED CEILING.
7. CONTRACTOR SHALL PROVIDE ADDITIONAL EXIT SIGN(S) IF REQUIRED BY THE CITY FIRE MARSHALL INSPECTOR AT NO ADDITIONAL COST TO THE OWNER.
8. ALL EXIT SIGNS SHALL BE READILY VISIBLE FROM ANY DIRECTION OF EGRESS TRAVEL.
9. INSTALLATION OF WORK IS IN ACCORDNACE WITH 2020 NEC.

KEY NOTES

1. PROVIDE HOT UNSWITCHED FOR EMERGENCY/EXIT LIGHT. PROVIDE WITH 90 MINUTE EMERGENCY BATTERY PACK. VERIFY EXACT LOCATION WITH ARCHITECT/OWNER.
2. THE BRANCH CIRCUIT FEEDING THE UNIT EMERGENCY LIGHTING FIXTURE SHALL BE THE SAME BRANCH CIRCUIT SERVING THE NORMAL LIGHTING IN THE AREA AND CONNECTED AHEAD OF ANY LOCAL SWITCHES PER NEC 2020 ART.700.12(F)(2)(3).
3. COORDINATE LIGHTING SWITCH LOCATION WITH ARCHITECT.

Light Fixture Schedule

FIXTURE TAG	FIXTURE DESCRIPTION	VOLTAGE	MANUFACTURER & CATALOG NUMBER	LAMP			FIXTURE WATTAGE	MOUNTING	REMARKS
				NUMBER	TYPE	KELVIN TEMPERATURE			
L1	2X4 RECESSED MOUNTED LED TROFFER	120	COLUMBIA LIGHTING LIT24-35MW-G-FSA12125-EU	-	LED	3500K	31	RECESSED/ SURFACE	
L2	6" HALO LED DOWNLIGHT	120	COOPER LIGHTING H750ICAT-ML5612835-695WW	-	LED	3500K	20	RECESSED	
L3	6" HALO LED EXTERIOR DOWNLIGHT	120	COOPER LIGHTING H750T-ML5609835-695WW	-	LED	3500K	20	RECESSED	
L4	SURFACE MOUNTED STRIP LIGHT LENSED	120	SLG LTG TS446G14K	-	LED	3500K	35	SURFACE	
X	2 HEAD LED EXIT SIGN WITH INTEGRAL BATTERY	120	SUNCO LIGHTING EX_2H-RED-6PK	-	LED	--	3.5	CEILING/WALL	

General Notes
1.) PROVIDE FIXTURE PACK AS SPECIFIED ONLY (NO SUBSTITUTIONS UNLESS WRITTEN PRIOR APPROVAL BY ARCHITECT AND/OR ENGINEER.)
2.) FIXTURES INDICATED WITH HATCHED PATTERN OR NOTED AS EGRESS SHALL BE CONNECTED TO EMERGENCY CIRCUIT.
3.) FIXTURE QUANTITIES SHALL BE VERIFIED BY
4.) PROVIDE ILLUMINATED EMERGENCY LIGHTING AND EXIT SIGNS WITH CIRCUITING PER CODE. ALL EXITS SHALL BE MARKED BY APPROVED ILLUMINATED SIGN AND READILY VISIBLE FROM ANY DIRECTION OF EXIT ACCESS AND MEANS OF EGRESS.
5.) FIXTURES SHALL HAVE A LUMINAIRE DISCONNECT PER NEC.
6.) ALL LAMPS SHALL HAVE THE SAME COLOR/TEMPERATURE. VERIFY TEMPERATURE WITH ARCHITECT.
7.) REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES TO DETERMINE GYP BOARD CEILING AND LAY-IN GRID MOUNTING.

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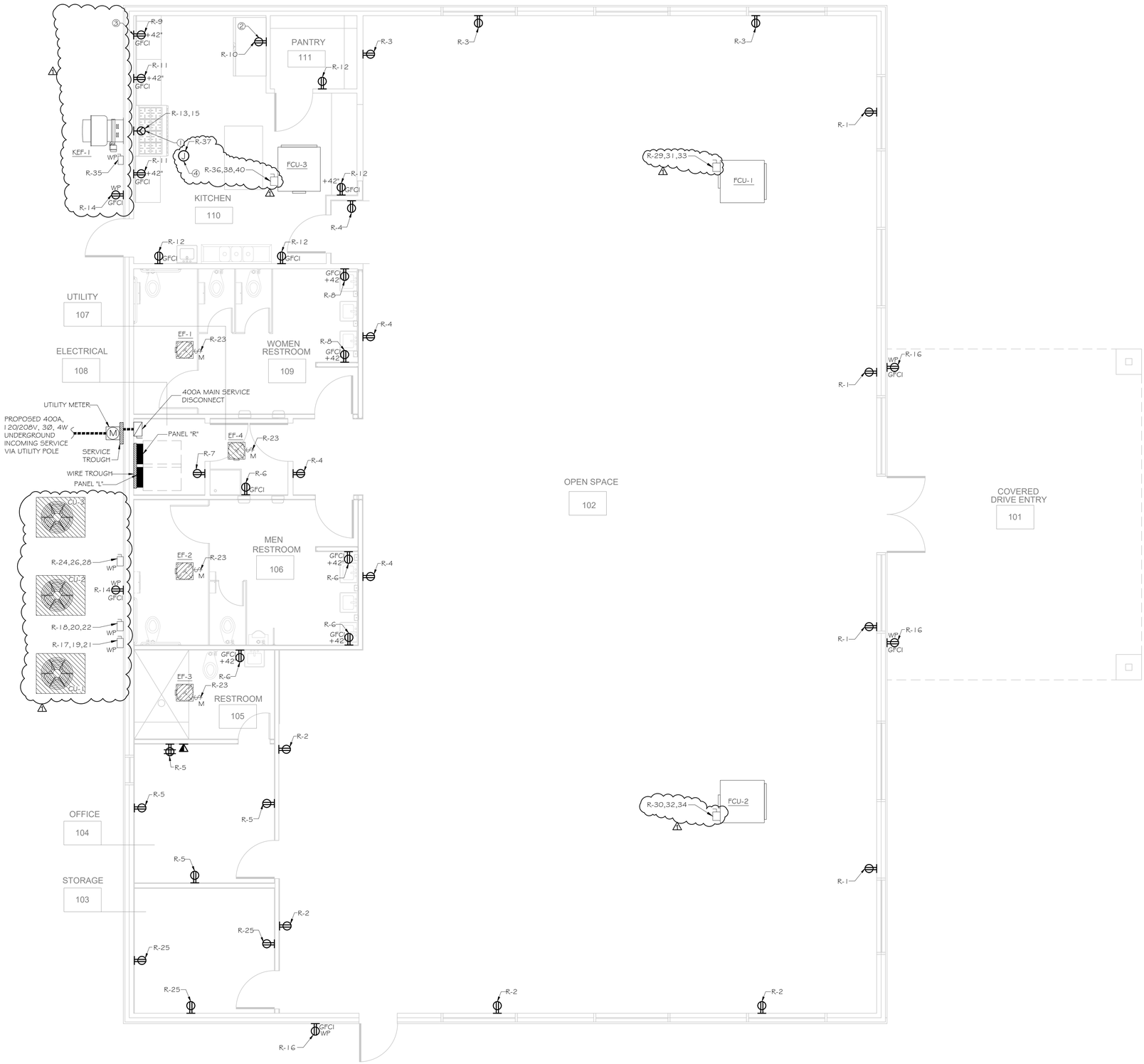
ELECTRICAL
LIGHTING PLAN

E-101



ELECTRICAL POWER PLAN

1/4" = 1'-0"

1

GENERAL NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR FULL SCOPE OF WORK. FIELD VERIFY SCOPE IN PRE-BID JOB-WALK.
2. COORDINATE WITH EQUIPMENT SUPPLIER & INSTALLER FOR FULL ELECTRICAL REQUIREMENTS.
3. INSTALLATION OF WORK IS IN ACCORDANCE WITH 2020 NEC.
4. ALL WIRING TO BE COPPER "THWN," UNLESS OTHERWISE NOTED.
5. ELECTRICAL CONTRACTOR TO SUPPLY OWNER WITH DRAWINGS OF THE AS-BUILT CONDITION OF THE WIRING SYSTEM UPON COMPLETION.
6. ALL ELECTRICAL ROUGH-INS SHOWN ON THIS PLAN PERTAINS ONLY TO THE EQUIPMENT BEING FURNISHED BY VENDOR. ANY ADDITIONAL REQUIREMENTS SHALL BE SPECIFIED BY THE OWNER AND/OR THE GENERAL CONTRACTOR.
7. ALL RECEPTACLE OUTLETS MEASURED TO THE TOP OF THE BOX SHALL BE INSTALLED NOT MORE THAN 48 INCHES NOR LESS THAN 15 INCHES ABOVE THE FLOOR OR WORKING PLATFORM AS MEASURED TO THE BOTTOM OF THE BOX.
8. THE E.C SHALL COMPLY WITH ALL LOCAL COUNTY, STATE AND FEDERAL CODES, ORDINANCES, RULES AND REGULATIONS INCLUDING ALL REQUIREMENTS OF GOVERNING AGENCIES. ELECTRICAL CONTRACTOR SHALL PAY ALL COSTS, ASSOCIATED WITH THE INSTALLATION, INCLUDING BUILDING APPLICATION FEES, ETC.
9. ALL RECEPTACLES MOUNTED BACK TO BACK SHALL BE SEPARATED BY 24" MINIMUM. BOXES SHALL NOT BE MOUNTED IN THE SAME WALL CAVITY.
10. ALL RECEPTACLE MOUNTING HEIGHTS SHALL BE VERIFIED WITH THE OWNER OR THE ARCHITECT PRIOR TO ROUGH IN.

KEY NOTES

1. RECEPTACLE FOR ELECTRIC STOVE. COORDINATE WITH ARCHITECT FOR EXACT LOCATION, NEMA RATING, MOUNTING AND CONNECTION REQUIREMENTS PRIOR TO INSTALLATION.
2. RECEPTACLE FOR REFRIGERATOR. COORDINATE WITH ARCHITECT FOR EXACT LOCATION, NEMA RATING, MOUNTING AND CONNECTION REQUIREMENTS PRIOR TO INSTALLATION.
3. RECEPTACLE FOR MICROWAVE. COORDINATE WITH ARCHITECT FOR EXACT LOCATION, NEMA RATING, MOUNTING AND CONNECTION REQUIREMENTS PRIOR TO INSTALLATION.
4. JUNCTION BOX FOR KITCHEN HOOD. COORDINATE WITH MECHANICAL FOR EXACT LOCATION AND CONNECTION REQUIREMENTS. (1)

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10/21/24

Drawing Name

ELECTRICAL
POWER PLAN

E-102

GENERAL NOTES

1. THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL OFFSETS. INSTALL PIPING AS CLOSE AS POSSIBLE TO LOCATIONS SHOWN. WHERE INTERFERENCE'S WITH COMPONENTS OF OTHER TRADE'S WORK (STRUCTURAL FOUNDATIONS OR OTHER BUILDING ELEMENTS) REQUIRE ROUTINGS AND LOCATIONS THAT VARY FROM THOSE SHOWN, THE CONTRACTOR SHALL OBTAIN PROJECT ENGINEER'S APPROVAL PRIOR TO INSTALLATION. NO ADDITIONAL COST SHALL BE GRANTED FOR THESE CHANGES.
2. BEFORE BEGINNING EXCAVATIONS OR DEMOLITION OF ANY NATURE WHATSOEVER, CONTRACTOR SHALL LOCATE ALL SERVICES AND UTILITIES OCCURRING WITHIN THE BOUNDS OF THE PROJECT. THE CONTRACTOR SHALL THEN PROCEED WITH CAUTION IN HIS WORK SO THAT NO UTILITY OR LINE SERVING AREAS THAT ARE TO REMAIN BE DAMAGED WITH A RESULTANT LOSS OF SERVICE. VERIFY THE SOURCE AND SERVICE OF EACH AND EVERY LINE ENCOUNTERED AND RECORD SERVICE, SIZE AND LOCATION ON RECORD DRAWINGS.
3. ROUGH-IN PLUMBING PIPING USING DIMENSIONS SHOWN ON ARCHITECTURAL DRAWINGS. LOCATION OF ALL PIPING SHALL ALLOW INSTALLATION OF FIXTURES WITHOUT THE NEED TO FURR-OUT WALLS.
4. PROVIDE CLEANOUTS IN EXCESS OF THOSE SHOWN WHICH ARE REQUIRED BY THE PLUMBING CODE.
5. INDIVIDUAL FIXTURE SUPPLY AND DRAIN SERVICES ARE NOT SHOWN DUE TO DRAWING SPACE LIMITATIONS. THIS CONTRACTOR SHALL PROVIDE ALL SERVICES FOR A COMPLETE FIRST CLASS INSTALLATION.
6. FURNISH AND INSTALL ALL NECESSARY VALVES, TRAPS, GAUGES, STRAINERS, UNIONS, ETC. FOR EACH PIECE OF EQUIPMENT HAVING PLUMBING CONNECTIONS TO FACILITATE PROPER FUNCTIONING AND SERVICING.
7. SEAL ALL PENETRATIONS THROUGH RATED WALLS, FLOORS AND CEILINGS WITH A UL LISTED ASSEMBLY TO PROVIDE A RATING EQUAL TO OR GREATER THAN THE RATING OF THE WALL, FLOOR OR CEILING.
8. EACH CONTRACTOR SHALL VISIT THE SITE AND ASCERTAIN FOR HIMSELF THE CONDITIONS TO BE MET THERE IN IMPLEMENTING HIS WORK AND MAKE DUE PROVISIONS FOR THE SAME. IT IS ASSUMED THAT THE CONTRACTOR HAS VISITED THE PREMISES AND THAT HIS COST ESTIMATE COVERS ALL NECESSARY LABOR AND MATERIALS TO PROPERLY ACCOMPLISH HIS WORK. FAILURE ON THE PART OF THE CONTRACTOR TO COMPLY WITH THIS REQUIREMENT SHALL NOT BE CONSIDERED JUSTIFICATION FOR OMISSIONS OR FAULTY WORK OR FOR THE PAYMENT OF ADDITIONAL COMPENSATION.
9. FIELD VERIFY EXISTING AND FUTURE GRADES WITHIN AREAS WHERE WORK IS BEING DONE.
10. VERIFY EXACT LOCATION OF EQUIPMENT PRIOR TO INSTALLATION OF FLOOR DRAINS. RELOCATION DUE TO MISPLACEMENT SHALL BE AT CONTRACTORS EXPENSE.
11. INSULATE PIPING AS FOLLOWS:

    DOMESTIC COLD WATER PIPING:
    INSULATE AND VAPOR SEAL ALL COLD AND SOFTENED WATER PIPE WITH GLASS FIBER PIPE INSULATION. (EXCEPTION : ALL PIPING EXPOSED TO THE EXTERIOR SHALL BE PROVIDED WITH ALUMINUM).

    DOMESTIC HOT WATER PIPING:
    INSULATE ALL HOT WATER PIPE WITH GLASS FIBER PIPE INSULATION WITH FACTORY-APPLIED WHITE JACKET.

    DRAINS:
    INSULATE AND VAPOR SEAL ALL ABOVEGROUND P-TRAPS AND HORIZONTAL DRAIN PIPING RECEIVING CONDENSATE OR ICE MAKER DRAINAGE WITH 1/2" GLASS PER FIBER INSULATION.
    INSULATE AND VAPOR SEAL ROOF DRAIN AND OVERFLOW ROOF DRAIN SUMP, PIPING AND FITTINGS FROM DRAIN TO VERTICAL LEADER WITH 1/2" GLASS FIBER INSULATION.
    A.D.A. ACCESSIBLE LAVATORIES AND SINKS:
    INSULATE ALL EXPOSED DRAIN PIPING AND WATER SUPPLY PIPING BENEATH A.D.A. COMPLIANT LAVATORIES & SINKS WITH FULLY MOLDED CLOSED CELL VINYL INSULATION KIT AS MANUFACTURED BY TRUEBRO, BROCAR OR MCGUIRE.
12. SUPPORT UNBURIED PIPE AS FOLLOWS:

    HORIZONTAL PIPING:
    HUBLESS CAST IRON SOIL PIPING SHALL BE SUPPORTED AT LEAST AT EVERY OTHER JOINT EXCEPT THAT WHEN THE DEVELOPED LENGTH BETWEEN SUPPORTS EXCEEDS FOUR FEET, THEY SHALL BE PROVIDED AT EACH JOINT. SUPPORTS SHALL ALSO BE PROVIDED AT EACH HORIZONTAL BRANCH CONNECTION. SUPPORTS SHALL BE PLACED IMMEDIATELY ADJACENT TO THE COUPLING. SUSPENDED LINES SHALL BE BRACED TO PREVENT HORIZONTAL MOVEMENT.
    COPPER TUBING SHALL BE SUPPORTED AT NOT MORE THAN SIX FOOT INTERVALS FOR PIPING 1-1/2" AND SMALLER AND NINE FOOT INTERVALS FOR PIPING 2" AND LARGER IN DIAMETER.
    HANGERS FOR NON-INSULATED COPPER PIPING SHALL HAVE A COPPER FINISH. IN POTENTIALLY DAMP LOCATIONS, NON-INSULATED COPPER PIPING HANGERS OR SUPPORTS SHALL BE PLASTIC-COATED.
    STEEL PIPING SHALL BE SUPPORTED AT INTERVALS OF NO GREATER THAN 6 FEET FOR 1/2" PIPING, 8 FEET FOR 3/4" & 1" PIPING AND 10 FEET FOR 1-1/4" AND LARGER PIPING.

    VERTICAL PIPING:
    PROVIDE RISER CLAMP AT BASE AND AT EACH FLOOR LEVEL
13. MARKING AND IDENTIFICATION:

    IDENTIFY EACH PIPE WITH LABELING AT THE FOLLOWING LOCATIONS:
    -AT EACH BRANCH TAKE-OFF FROM A MAIN
    -ON EACH SIDE OF A WALL PENETRATION
    -EVERY 20' OF STRAIGHT RUN OF PIPE
    -AT EQUIPMENT CONNECTIONS IF MORE THAN 10' FROM A BRANCH TAKE-OFF

    DOMESTIC HOT WATER:
    INDICATE DELIVERED WATER TEMPERATURE ON DOMESTIC HOT WATER SUPPLY AND RETURN LINES.
    INDICATE FLOW DIRECTION WITH ARROWS ON DOMESTIC HOT WATER SUPPLY AND RETURN LINES.
14. SLEEVES:

    FLOORS: PROVIDE UL FIRE RATED ASSEMBLIES WERE PIPES PENETRATE ABOVE GRADE FLOORS.
    WALLS: PROVIDE UL FIRE RATED ASSEMBLIES WERE PIPES PENETRATE FIRE RATED WALLS.
    WHERE PIPING PASSES THROUGH NON CEILING OR WALL, CLOSE OFF SPACE BETWEEN PIPE OR DUCT AND CONSTRUCTION WITH NORMAL GYPSUM WALLBOARD, REPAIR PLASTER SMOOTHED AND FINISHED TO MATCH REMAINDER OF WALL.
    INSTALL CHROME OR STAINLESS STEEL ESCUTCHEONS WHERE PIPING PASSES THROUGH FINISHED SURFACES.

GAS WATER HEATER SCHEDULE

MARK	MFR	MODEL	CFH	PHASE		TEMP. RISE GPM	TANK CAPACITY GALLONS	LOCATION
GWH-1	AO SMITH	GCRX-55	60,000	1		90° / 65 GPM	55	SEE PLANS

PIPING MATERIALS

1. SANITARY WASTE AND VENT (BELOW SLAB ONLY)
   SCHEDULE 40 PVC, CONFORM TO ASTM D-1785 SOIL AND WASTE VENT PIPING. FITTINGS SHALL BE COMPATIBLE MATERIAL WITH SOLVENT CEMENT TYPE JOINTS.
2. SANITARY WASTE AND VENT: (ABOVE SLAB ONLY)
   PIPE: CAST IRON ASTM A 74, HUBLESS, SERVICE WEIGHT.

   JOINTS: NO HUB, ASTM C 564 NEOPRENE GASKETS AND STANDARD STAINLESS STEEL CLAMP AND SOLID SHIELD ASSEMBLIES CONSTRUCTED OF TYPE 300 SERIES STAINLESS STEEL. CLAMP ASSEMBLIES SHALL CONFORM TO FM 1680 WHERE REQUIRED BY THE ADMINISTRATIVE AUTHORITY.

   FITTINGS: CAST IRON, ASTM A 888 DRAINAGE PATTERN.
3. DOMESTIC WATER:
   TYPE "L" COPPER TUBING WITH WROUGHT COPPER FITTINGS AND 95/5 (TIN/ANTIMONY) SOLDER JOINTS.

PLUMBING LEGEND

DISREGARD LEGEND ITEMS NOT INDICATED ON DRAWINGS

	NEW PLUMBING FIXTURE
SAN / S	SANITARY WASTE
STORM / ST	STORM DRAINAGE LINE
C.D.	CONDENSATE DRAIN LINE
GW	GREASE WASTE
AW	ACID WASTE
V	VENT
FW	FILTER WATER
DCW	DOMESTIC COLD WATER PIPING
DHW	DOMESTIC HOT WATER PIPING
DHWR	DOMESTIC HOT WATER RETURN PIPING
FCO	FLOOR CLEAN OUT
ECO	EXTERIOR CLEANOUT
WCO	WALL CLEANOUT
FD	FLOOR DRAIN
FS	FLOOR SINK
	RISER IDENTIFICATION
	ELBOW UP
	ELBOW DOWN
	BALL VALVE
B.V.	BALANCING VALVE
	GAS VALVE
	GATE VALVE
	CHECK VALVE
	BUTTERFLY VALVE
	SOLENOID VALVE
	CAP AND SEAL
A.F.F.	ABOVE FINISHED FLOOR
TP	AUTOMATIC TRAP PRIMER
BFP	BACKFLOW PREVENTER
VTR	VENT THROUGH ROOF
F.F.L.	FINISHED FLOOR LEVEL
I.L.	INVERT LEVEL

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	SIZE OF CONNECTION TRAP	SS	SV	CW	HW	REMARKS
WC-1	WATER CLOSET (FLOOR MOUNTED) (A.D.A.)	-	4"	2"	1/2"	-	2467.100 AMERICAN STANDARD "CADET", ROUND FRONT BOWL BOWL. 1.1 G.P.F. CADET FLOWISE RIGHT 17-1/2" HEIGHT ELONGATED PRESSURE-ASSISTED TOILET. EVERCLEAN SURFACE INHIBITS THE GROWTH OF STAIN AND ODOR-CAUSING BACTERIA, MOLD, AND MILDEW ON THE SURFACE. AMERICAN STANDARD #5320.110 EVERCLEAN® ROUND FRONT SEAT WITH SLOW CLOSE SNAP-OFF HINGES.
WC-2	WATER CLOSET (FLOOR MOUNTED)	-	4"	2"	1/2"	-	2462.100 AMERICAN STANDARD "CADET", ROUND FRONT BOWL BOWL. 1.1 G.P.F. CADET FLOWISE RIGHT 15" HEIGHT ELONGATED PRESSURE-ASSISTED TOILET. EVERCLEAN SURFACE INHIBITS THE GROWTH OF STAIN AND ODOR-CAUSING BACTERIA, MOLD, AND MILDEW ON THE SURFACE. AMERICAN STANDARD #5320.110 EVERCLEAN® ROUND FRONT SEAT WITH SLOW CLOSE SNAP-OFF HINGES.
U-1	URINAL WALL-HUNG (A.D.A)	-	2"	2"	3/4"	-	K-5016-ET KOHLER "DEXTER", HIGH EFFICIENCY URINAL SYSTEM VITREOUS CHINA, ULTRA HIGH EFFICIENCY, OPERATES IN THE RANGE OF 0.5 GPF, FLUSHING RIM, ELONGATED 14" RIM FROM FINISHED WALL, WASHOUT FLUSH ACTION K-13519 KOHLER 0.5 GPF FLUSH VALVE FOR 3/4" TOP SPUD. 0622 J.R. SMITH, LABOR SAVER® URINAL SUPPORT FLOOR MOUNTED TYPE.
L-1	LAVATORY (WALL MOUNTED) (A.D.A.)	1 1/4"	2"	2"	1/2"	-	0355.012 AMERICAN STANDARD "LUCERNE", WALL HUNG LAVATORY, BARRIER FREE, VITREOUS CHINA, SELF-DRAINING DECK AREA WITH CONTOURED BACK AND SIDE SPLASH SHIELDS, 3 HOLES 4" CENTER. 802-V317E66ABCP CHICAGO FAUCETS, DECK-MOUNTED WITH 4" FIXED CENTERS, CHROME PLATED. INTEGRAL, CAST BRASS SPOUT,4" CENTER-TO-CENTER. 0.5 GPM, VANDAL-PROOF, PRESSURE COMPENSATING, NON-AERATING LAMINAR FLOW OUTLET. 4" METAL, VANDAL-PROOF, WRISTBLADE HANDLES WITH SIXTEEN-POINT, TAPERED BROACH AND SECURED BLUE AND RED INDEX BUTTONS, QUATURN COMPRESSION OPERATING CARTRIDGE, 1/2" NPSM SUPPLY INLETS AND COUPLING NUT FOR 3/8" OR 1/2" FLEXIBLE RISER, ECAST® DESIGN PROVIDES DURABLE BRASS CONSTRUCTION WITH TOTAL LEAD CONTENT EQUAL TO OR LESS THAN 0.25% BY WEIGHTED AVERAGE. LF-170 LEONARD, THERMOSTATIC MIXING VALVE WITH THE OUTLET TEMPERATURE TO BE SET AT 110°F. TMV SHALL COMPLY WITH ASSE 1070. BV02 MCGUIRE, 1/2 IPS X 3/8 OD, QUARTER-TURN BRASS BALL VALVE ANGLE STOP, CHROME PLATED, CONVERTIBLE LOOSE KEY HANDLE. SUPPLY STOP VALVE SHALL BE CERTIFIED BY CSA OR OTHER RECOGNIZED TESTING AUTHORITY AND SHALL BEAR MANUFACTURER AND TESTING MARK. STOP TO BE CERTIFIED TO 200 PSI LINE PRESSURE. 149 MCGUIRE, FLAT GRID STRAINER WITH 4" TAILPIECE. WROUGHT BRASS SINK STRAINER WITH 20 GA TAILPIECE AND BRASS LOCK AND COUPLING NUTS. FITS SINK DEPTH UP TO 3/4". CHROME PLATED. 8872 MCGUIRE, HEAVY CAST BRASS 1 1/4 X 1 1/4 ADJUSTABLE TRAP WITH CLEANOUT PLUG AND 11INCH CENTER TO END. FURNISHED WITH SLIP NUTS, 17 GAUGE SEAMLESS TUBULAR BRASS WALL BEND, AND STEEL SHALLOW FLANGE. 102-EZ-W TRUEBRO, "P" TRAP AND SUPPLY INSULATION KIT. 0700 J.R. SMITH, LAVATORY SUPPORTS WITH CONCEALED ARMS.
MS-1	MOP SINK	3"	2"	2"	3/4"	3/4"	600SM16206 REGENCY SINKS, STAINLESS STEEL MOP SINK. 8344.212 AMERICAN STANDARD, EXPOSED YOKE WALL-MOUNT UTILITY FAUCET TOP BRACE. 6" CAST BRASS SPOUT WITH VACUUM BREAKER. CERAMIC DISC VALVES. INTEGRAL SUPPLY STOPS. METAL LEVER HANDLES. BUCKET HOOK. 3/4" THREADED HOSE END. 1/2" NPT FEMALE INLETS. ROUGH CHROME (004) FINISH
SK-1	3-COMP. SINK	-	-	-	3/4"	3/4"	600S318181BX REGENCY SINKS, STAINLESS STEEL 3-COMPARTMENT SINK WITH (2) DRAINBOARDS. FAUCET HOLES PRE-PUNCHED ON 8" CENTERS B-0133-12WCRBCT T&S BRASS FAUCET, 8" WALL MOUNT MIXING FAUCET WITH POLISHED CHROME PLATED BRASS BODY, ADD-ON FAUCET WITH CERAMIC CARTRIDGE AND LEVER HANDLE, 12" SWING NOZZLE 1.5 GPM AERATOR, 18" RISER, 44" FLEXIBLE STAINLESS STEEL HOSE WITH HEAT RESISTANT HANDLE, 0.65 GPM LOW FLOW SPRAY VALVE, CERAMIC CARTRIDGES WITH CHECK VALVES, LEVER HANDLES 1/2" NPT FEMALE . CERTIFIED TO ASME A112.18.1/CSA B125.1, NSF 61-SECTION 9 AND NSF 372 BV02 MCGUIRE, 1/2 IPS X 3/8 OD, QUARTER-TURN BRASS BALL VALVE ANGLE STOP, CHROME PLATED, CONVERTIBLE LOOSE KEY HANDLE. SUPPLY STOP VALVE SHALL BE CERTIFIED BY CSA OR OTHER RECOGNIZED TESTING AUTHORITY AND SHALL BEAR MANUFACTURER AND TESTING MARK. STOP TO BE CERTIFIED TO 200 PSI LINE PRESSURE. 149 MCGUIRE, FLAT GRID STRAINER WITH 4" TAILPIECE. WROUGHT BRASS SINK STRAINER WITH 20 GA TAILPIECE AND BRASS LOCK AND COUPLING NUTS. FITS SINK DEPTH UP TO 3/4". CHROME PLATED. 8872 MCGUIRE, HEAVY CAST BRASS 1 1/4 X 1 1/4 ADJUSTABLE TRAP WITH CLEANOUT PLUG AND 11INCH CENTER TO END. FURNISHED WITH SLIP NUTS, 17 GAUGE SEAMLESS TUBULAR BRASS WALL BEND, AND STEEL SHALLOW FLANGE.
SH-1	SHOWER TRIM TILED BY OTHERS (A.D.A.)	2"	2"	2"	1/2"	1/2"	SYMMONS VISU-TEMP SHOWER VALVE MODEL NO. 9605-PLR-1.5-CHKS-ADACHS PRESSURE BALANCING MIXING VALVE, ADJUSTABLE STOP SCREW TO LIMIT HANDLE TURN, ADJUST STOP SCREW FOR MAXIMUM 110°F HOT WATER. 48" GRAB/SLIDE BAR FOR HAND SHOWER MOUNTING . PROVIDE W/ FD-1.
HS-1	HAND SINK	1 1/4"	2"	2"	1/2"	1/2"	600HS17SP REGENCY SINKS, STAINLESS STEEL WALL MOUNTED HAND SINKS WITH GOOSENECK FAUCETS & SIDE SPLASHES. LF-170 LEONARD, THERMOSTATIC MIXING VALVE WITH THE OUTLET TEMPERATURE TO BE SET AT 110°F. TMV SHALL COMPLY WITH ASSE 1070. BV02 MCGUIRE, 1/2 IPS X 3/8 OD, QUARTER-TURN BRASS BALL VALVE ANGLE STOP, CHROME PLATED, CONVERTIBLE LOOSE KEY HANDLE. SUPPLY STOP VALVE SHALL BE CERTIFIED BY CSA OR OTHER RECOGNIZED TESTING AUTHORITY AND SHALL BEAR MANUFACTURER AND TESTING MARK. STOP TO BE CERTIFIED TO 200 PSI LINE PRESSURE. 149 MCGUIRE, FLAT GRID STRAINER WITH 4" TAILPIECE. WROUGHT BRASS SINK STRAINER WITH 20 GA TAILPIECE AND BRASS LOCK AND COUPLING NUTS. FITS SINK DEPTH UP TO 3/4". CHROME PLATED. 8872 MCGUIRE, HEAVY CAST BRASS 1 1/4 X 1 1/4 ADJUSTABLE TRAP WITH CLEANOUT PLUG AND 11INCH CENTER TO END. FURNISHED WITH SLIP NUTS, 17 GAUGE SEAMLESS TUBULAR BRASS WALL BEND, AND STEEL SHALLOW FLANGE.
FCO-1	FLOOR CLEANOUT	4"	-	--	--	--	4040 J.R. SMITH, WITH SCREWED PLUG AND FLASHING RING AND COVER PLATE WITH SECURING SCREW. COVER PLATE SHALL BE FLUSH TO FINISH FLOOR, AND SUITABLE FOR FLOOR COVERING INSTALLED.
FD-1	FLOOR DRAIN	4"	2"	--	--	--	2005Y-A. J.R. SMITH, DUCO CAST IRON BODY WITH FLASHING COLLAR AND ADJUSTABLE STRAINER HEAD 6" DIAMETER TYPE "A" NICKEL BRONZE STRAINER. INSTALL COMPLETE WITH PROSET TRAP GUARD, EXCEPT FOR SHOWER DRAIN.

HYDROMECHANICAL GREASE TRAP SIZING CALCULATIONS

NAME	TYPE	SINK QTY.	LxWxD	BOWL QTY.	DIVIDE 231	*.75	
3-COMP SINK	MULTI-COMPARTMENT THREE BOWLS	1	24X18X15	3	19,440	63	
HAND SINK	HAND SINK	1	10x14X5	1	700	2.2	
FLOOR DRAIN	FLOOR	1	N/A	1	N/A	N/A	
TOTALS					20,140	65	/ 2 MIN. = 32 GAL.

PROJECT INFORMATION - PROJECT NAME: BARBARA JORDAN
CONSTRUCTION TYPE: REMODEL/TENANT FINISH
GREASE INTERCEPTOR SCHIER MODEL GB-50 TYPE D
DESCRIPTION: POLYETHYLENE GREASE INTERCEPTOR

HYDROMECHANICAL GREASE TRAP SIZING CALCULATIONS
[LENGTH] X [WIDTH] X [DEPTH] / [231] = GALLONS X [.75 FILL FACTOR] / [DRAIN PERIOD (2 MIN)]

FS-1	FLOOR SINK	SEE PLANS FOR SIZES AND LOCATIONS	3100-NB-12 J.R. SMITH, MEDIUM DUTY NICKEL BRONZE WITH 1/2 GRATE. PROVIDE J.R. SMITH, DEEP SEAL "P" TRAP. PROVIDE ODOR TRAP GUARD AS MANUFACTURED BY PRO-SET SYSTEMS.
ECO-1	EXTERIOR CLEANOUT	SEE PLANS FOR SIZES AND LOCATIONS	4250 J.R. SMITH, ALL EXTERIOR CLEANOUTS SHALL BE SET AT FINISHED GRADE IN 6 INCH THICK CONCRETE PAD FINISHED SMOOTH ON TOP. HOUSING SHALL BE COMPLETELY FREE OF PIPING SO NO LOADING IS TRANSMITTED TO THE PIPE.
GT-1	GREASE TRAP HYRDO MECHANICAL	SEE PLANS FOR SIZES AND LOCATIONS	GB-50 SCHIER GREAT BASIN GREASE INTERCEPTOR SHALL BE LIFETIME GUARANTEED AND MADE IN USA OF SEAMLESS, ROTATIONALLY-MOLDED POLYETHYLENE. INTERCEPTOR SHALL BE FURNISHED FOR ABOVE OR BELOW GRADE INSTALLATION. INTERCEPTOR SHALL BE CERTIFIED TO ASME A112.14.3 (TYPE D) AND CSA B481.1, WITH FIELD ADJUSTABLE RISER SYSTEM, BUILT-IN TEST CAPS AND THREE OUTLET OPTIONS. INTERCEPTOR FLOW RATE SHALL BE 75 GPM. INTERCEPTOR GREASE CAPACITY SHALL BE 861 LBS COVER SHALL PROVIDE WATER/GAS-TIGHT SEAL AND HAVE MINIMUM 16,000 LBS. LOAD CAPACITY. H20 LOAD RATED CAST IRON PICKABLE LIDS PER COH. TYPE D NO FLOW CONTROL ASME A112.14.3 UPC.
SW-1	SAMPLING WELL	SEE PLANS FOR SIZES AND LOCATIONS	SCHIER SV24- SHALL BE LIFETIME GUARANTEED AND MADE IN USA OF SEAMLESS, ROTATIONALLY-MOLDED POLYETHYLENE. SAMPLE WELL SHALL BE FURNISHED FOR ABOVE OR BELOW GRADE INSTALLATION WITH SAFETY STAR REMOVABLE ACCESS BUILT INTO COVER ADAPTER. COVER SHALL PROVIDE WATER/GAS-TIGHT SEAL AND HAVE CAST IRON PICKABLE LID. SAMPLE WELL MEETS (1009.8.2012 UPC) AN APPROVED SAMPLE WELL, CITY OF HOUSTON #516-S OR EQUAL. 4" PLAIN END INLET/OUTLETS UNIT WEIGHT - W/CAST IRON COVER: 110 LBS.; MAXIMUM OPERATING TEMPERATURE: 150° F CONTINUOUS LEVEL INLET AND OUTLET PER COH H20 LOAD RATED CAST IRON PICKABLE LIDS PER COH. SAFETY STAR, REMOVABLE ACCESS BUILT INTO EACH COVER ADAPTER, PREVENTS ACCIDENTAL ENTRY TO TANKS (450 LB RATING) USE FIELD CUT RISERS TO BRING ACCESS TO GRADE PER MANUFACTURES INSTRUCTIONS.

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BARBARA JORDAN PARK
YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

DESCRIPTION	
ISSUE FOR CONSTRUCTION & BID	02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
02/20/24

Drawing Name

PLUMBING SYMBOLS & LEGENDS

P001

BASIC REQUIREMENTS

CODES AND STANDARDS:

A. ALL WORK SHALL COMPLY WITH THE MOST RECENTLY REVISED VERSIONS OF ALL APPLICABLE LAWS, RULES, REGULATIONS AND ORDINANCES OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES AND APPLICABLE UTILITIES. NONE OF THE TERMS OR PROVISIONS OF THIS SPECIFICATION SHALL BE CONSTRUED AS WAIVING ANY PART OF THE RULES, REGULATIONS OR REQUIREMENTS OF THESE AUTHORITIES.

DRAWINGS AND SPECIFICATIONS

A. DRAWINGS: THE DRAWINGS ARE SCHEMATIC IN NATURE AND INDICATE APPROXIMATE LOCATIONS OF THE HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS, FIRE PROTECTION SYSTEMS, PLUMBING EQUIPMENT, FIXTURES AND PIPING SYSTEMS, EXCEPT WHERE SPECIFIC LOCATIONS ARE NOTED AND DIMENSIONED ON THE DRAWINGS. ALL ITEMS ARE SHOWN APPROXIMATELY TO SCALE. THE INTENT IS TO SHOW HOW THESE ITEMS SHALL BE INTEGRATED INTO THE CONSTRUCTION. LOCATE ALL ITEMS BY ON THE JOB MEASUREMENTS AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. COORDINATE WITH OTHER TRADES.

COMPLETENESS OF WORK

A. THE CONTRACT DOCUMENTS DEPICT MECHANICAL AND PLUMBING SYSTEMS WHICH ARE INTENDED TO BE COMPLETE AND FUNCTIONING SYSTEMS. ALL PRODUCTS, MATERIALS, AND LABOR NECESSARY TO RENDER A FULLY FUNCTIONAL SYSTEM TO FULFILL THE DESIGN INTENT SHOWN ON THE DOCUMENTS SHALL BE PROVIDED BY THE CONTRACTOR.

B. CATALOG NUMBERS REFERENCED THROUGHOUT THE DIVISION 15 DRAWINGS AND SPECIFICATIONS ARE INTENDED TO CONVEY A GENERAL UNDERSTANDING OF THE TYPE AND QUALITY OF THE PRODUCT REQUIRED. WHERE WRITTEN DESCRIPTIONS DIFFER FROM INFORMATION CONVEYED BY A CATALOG NUMBER, THE WRITTEN DESCRIPTION SHALL GOVERN. NO EXTRA SHALL BE ALLOWED BECAUSE A CATALOG NUMBER IS FOUND TO BE INCOMPLETE OR OBSOLETE.

COORDINATION

A. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL ITEMS THAT WILL AFFECT THE INSTALLATION OF THE WORK OF THIS DIVISION. THE COORDINATION SHALL INCLUDE, BUT NOT BE LIMITED TO, VOLTAGE, AMPACITY, CAPACITY, ELECTRICAL/PIPING CONNECTIONS, STRUCTURAL SUPPORTS, SPACE REQUIREMENTS, LOCATING DEVICES IN ARCHITECTURAL FINISH ELEMENTS, STAGING THE CONSTRUCTION AND BUILDING REQUIREMENTS, AND SPECIAL CONDITIONS.

B. BY SUBMITTING SHOP DRAWINGS ON THE PROJECT, THIS CONTRACTOR IS INDICATING THAT ALL NECESSARY COORDINATION HAS BEEN COMPLETED AND THAT THE SYSTEMS, PRODUCTS AND EQUIPMENT SUBMITTED CAN BE INSTALLED IN THE BUILDING AND WILL OPERATE AS SPECIFIED AND INTENDED, IN FULL COORDINATION WITH ALL OTHER DISCIPLINES.

EQUIPMENT NOISE AND VIBRATION

A. IT IS THE INTENT TO SPECIFY AND FOR THE CONTRACTOR TO INSTALL SYSTEMS THAT ARE QUIET AND FREE OF VIBRATION. EQUIPMENT SHALL BE BALANCED AND VIBRATION ISOLATED TO MEET THE REQUIREMENTS SPECIFIED HEREIN FOR BOTH THE EQUIPMENT ITSELF AND CONDITIONS WITHIN OCCUPIED SPACES. THIS CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND INSTALLING EQUIPMENT THAT IS QUIET IN OPERATION AS COMPARED TO OTHER AVAILABLE EQUIPMENT OF ITS SIZE, CAPACITY, AND TYPE.

B. EQUIPMENT NOT MEETING THESE REQUIREMENTS SHALL BE CORRECTED BY THE CONTRACTOR TO AN ACCEPTABLE LEVEL BUT WITHIN THE REQUIREMENTS OF THE SPECIFICATIONS AT NO COST TO THE OWNER, ARCHITECT OR ENGINEER.

C. AIR DISTRIBUTION EQUIPMENT SHALL BE SOUND TESTED AT THE DESIGN OPERATING CONDITIONS AND SHALL NOT EXCEED AN NC OF 35 AT RATED CFM.

D. NOISE LEVEL: UNLESS NOTED OTHERWISE HEREIN OR ON THE DRAWINGS, THE NOISE LEVEL IN ALL OCCUPIED SPACES SHALL NOT EXCEED THE "LOWEST VALUE IN THE RANGE" OF THE NOISE CRITERIA CURVES PUBLISHED IN THE CURRENT FUNDAMENTALS EDITION OF THE ASHRAE GUIDE AND DATA BOOK. THE NOISE CRITERIA CURVES SHALL BE BASED ON ANSI STANDARD S1.6-1967 OCTAVE BANDS AND A SOUND PRESSURE LEVEL IN DECIBELS REFERENCED TO 0.002 MICROBARS. SOUND LEVELS IN OCCUPIED SPACES MUST MEET THE DESIGN CRITERIA WITH ALL CONSTRUCTION IN PLACE.

E. VERIFICATION: SHOULD A QUESTION ARISE REGARDING THE ACCEPTABLE LEVEL OF NOISE OR VIBRATION IN A PARTICULAR SPACE OR PIECE OF EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE SERVICES OF AN APPROVED ACOUSTICAL CONSULTANT TO DETERMINE ACTUAL NOISE/VIBRATION CONDITIONS.

WARRANTIES AND GUARANTEES

A. GENERAL: CONTRACTOR SHALL GUARANTEE ALL MATERIAL AND EQUIPMENT INSTALLED BY HIM AGAINST DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF TWELVE (12) MONTHS AFTER FINAL ACCEPTANCE OF THE WORK BY THE OWNER, AND HE SHALL REPAIR OR REPLACE ANY MATERIALS OR EQUIPMENT DEVELOPING SUCH DEFECTS WITHIN THAT TIME, PROMPTLY ON DUE NOTICE GIVEN HIM BY THE OWNER AND AT CONTRACTOR'S SOLE COST AND EXPENSE.

B. EQUIPMENT: ALL EQUIPMENT BEARING A MANUFACTURER'S GUARANTEE SHALL BE CONSTRUED TO HAVE AN EXTENDED GUARANTEE TO THE OWNER BY THE MANUFACTURER. ANY SUCH EQUIPMENT THAT PROVES DEFECTIVE IN MATERIALS OR WORKMANSHIP WITHIN THE GUARANTEE PERIOD IS TO BE REPLACED BY THE CONTRACTOR IN ACCORDANCE WITH THE MANUFACTURER'S GUARANTEE.

GENERAL PLUMBING NOTES:

A. BEFORE SUBMITTING A BID, IT WILL BE NECESSARY FOR EACH CONTRACTOR WHOSE WORK IS INVOLVED TO VISIT THE SITE AND ASCERTAIN FOR HIMSELF THE CONDITIONS TO BE MET IN INSTALLING THE WORK AND MAKE PROVISIONS FOR THE CONDITIONS IN HIS FINAL PRICE. FAILURE ON THE PART OF THE CONTRACTOR TO COMPLY WITH THIS REQUIREMENT SHALL NOT BE CONSIDERED JUSTIFICATION FOR THE OMISSION OR FAULTY INSTALLATION OF ANY WORK COVERED BY THE CONTRACT DOCUMENTS.

B. THIS CONTRACTOR SHALL SECURE ALL PERMITS, LICENSES AND INSPECTIONS REQUIRED FOR HIS WORK, AND SHALL PAY ALL FEES IN CONNECTION WITH SUCH PERMITS, LICENSES AND INSPECTIONS.

C. WORK SHALL COMPLY WITH THE MOST RECENT VERSION OF ALL APPLICABLE LAWS, RULES, REGULATIONS AND ORDINANCES OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES. IN THE EVENT OF CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND THE LOCAL ENFORCING AUTHORITY, THE LATTER SHALL RULE. ANY MODIFICATION RESULTING THEREFROM SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR ARCHITECT/ENGINEER. THE CONTRACTOR SHALL REPORT ANY SUCH MODIFICATIONS TO THE ARCHITECT/ENGINEER AND SECURE HIS APPROVAL BEFORE PROCEEDING. SHOULD THE REQUIREMENTS OF THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE CODES, THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE PROVIDED THEY ARE NOT IN CONFLICT WITH THOSE CODES.

D. ALL ITEMS OF EQUIPMENT AND ALL MATERIALS FOR WHICH, APPROVAL STANDARDS HAVE BEEN ESTABLISHED BY UNDERWRITERS' LABORATORIES, INC. , FACTORY MUTUAL (FM), AMERICAN STANDARD CODES, ASME, AGA, AMCA, ASA, ANSI, ASHRAE, AND ARI SHALL BE SO APPROVED.

E. PENETRATIONS THROUGH FLOORS OR FIRE-RATED CONSTRUCTION SHALL BE FIRESAFED TO COMPLY WITH ASTM E-814 (UL 1479), AND LOCAL CODE REQUIREMENTS.

DOMESTIC WATER PIPING

A. ALL BRANCH WATER PIPING INSIDE THE BUILDING SHALL BE TYPE "L" COPPER TUBING (ASTM B-88) WITH PRESS FITTINGS. COPPER AND COPPER ALLOY FITTINGS SHALL CONFORM TO MATERIAL REQUIREMENTS OF ASME B16.18 OR B16.22. SEALING ELEMENTS SHALL BE EPDM. FITTINGS SHALL BE FROM VIEGA OR APPROVED EQUAL. THE USE OF DRILLED-T CONNECTIONS IS NOT PERMITTED.

B. ALL COPPER WATER PIPING SHALL BE COMPLETELY ISOLATED FROM METAL HANGERS, METAL STUDS OR ANY OTHER ELECTRICALLY CONDUCTIVE BUILDING COMPONENTS. PROVIDE DIELECTRIC UNION AT ALL CONNECTIONS BETWEEN COPPER AND GALVANIZED PIPE.

C. DOMESTIC WATER PIPING SHALL BE HYDROSTATICALLY TESTED AT 1.5 TIMES SYSTEM DESIGN PRESSURE. CONTRACTOR SHALL PROVIDE A COPY OF THE TEST RESULTS TO THE CITY INSPECTOR.

D. UNDER-BUILDING SLAB DOMESTIC WATER PIPING SHALL BE SOFT COPPER ASTM B 88 TYPE "K" WITH NO JOINTS. INSTALL DIELECTRIC FITTINGS IN PIPING AT CONNECTIONS OF DISSIMILAR METAL PIPING AND TUBING.

SANITARY SOIL WASTE AND VENT PIPING - PVC NOT ALLOWED IN PLENUM SPACE

A. WASTE SHALL BE CONSTRUCTED OF SCHEDULE 40 PVC WITH SOCKET FITTINGS AND SOLVENT WELDED CONNECTIONS FOR BELOW-GRADE APPLICATIONS. ABOVE GRADE CONNECTIONS MAY UTILIZE NO-HUB FITTINGS.

B. PVC PIPE SHALL BE AS MANUFACTURED BY CHARLOTTE, HARVEL, JM EAGLE OR ACCEPTED EQUAL.

C. SLOPE ALL WASTE AND VENT PIPING IN ACCORDANCE WITH LOCAL CODES.

D. PROVIDE AND INSTALL ALL CLEANOUTS INDICATED AND AS REQUIRED BY LOCAL CODES.

E. THE WASTE AND VENT SYSTEM SHALL BE TESTED AS REQUIRED BY THE PLUMBING CODES HAVING JURISDICTION.

SANITARY SOIL WASTE AND VENT PIPING - CAST IRON

A. ABOVE GRADE WASTE AND VENT SHALL BE NO-HUB STANDARD WEIGHT CAST IRON PIPE WITH NO-HUB DRAINAGE FITTINGS USING STAINLESS STEEL COUPLINGS THAT MEET ASTM C 1540.

B. CAST IRON PIPE SHALL BE AS MANUFACTURED BY CHARLOTTE, AB&I OR TYLER.

C. SLOPE ALL WASTE AND VENT PIPING IN ACCORDANCE WITH LOCAL CODES.

D. PROVIDE AND INSTALL ALL CLEANOUTS INDICATED AND AS REQUIRED BY LOCAL CODES.

E. THE WASTE AND VENT SYSTEM SHALL BE TESTED AS REQUIRED BY THE PLUMBING CODES HAVING JURISDICTION.

DRAINS AND CLEANOUTS

A. FURNISH AND INSTALL CLEANOUTS AS SHOWN ON THE DRAWINGS AND AS REQUIRED BY LOCAL ORDINANCE. CLEANOUTS SHALL BE MANUFACTURED BY JAY R. SMITH, JOSAM, JONESPEC, WADE, OR ZURN UNLESS NOTED OTHERWISE.

B. CLEANOUTS SHALL BE THE SAME NOMINAL SIZE AS THE PIPE THEY SERVE UP TO FOUR INCHES.

C. CLEANOUTS SHALL HAVE A CAST IRON BODY WITH TAPERED CAST BRASS OR BRONZE PLUG PROVIDING GAS AND WATERTIGHT SEAL.

D. INTERIOR FLOOR CLEANOUTS SHALL HAVE STAINLESS STEEL OR NICKEL BRONZE SCORIATED TOP. PROVIDE CARPET MARKER WHEN INSTALLED IN AREAS TO BE COVERED BY CARPET.

E. EXTERIOR CLEANOUTS AT GRADE SHALL HAVE SCORIATED CAST IRON TOP.

F. WALL CLEANOUTS SHALL BE PROVIDED WITH STAINLESS STEEL ACCESS COVERS OF ADEQUATE SIZE TO ALLOW RODDING OF DRAINAGE SYSTEM. WALL CLEANOUTS INCORPORATING COVER SCREWS THAT EXTEND COMPLETELY THROUGH THE ACCESS PLUG ARE NOT ACCEPTABLE.

G. SET TOP OF FLOOR DRAINS AND FLOOR SINKS TO MEET THE LOW POINT ELEVATION OF FINISHED FLOOR.

H. FINAL MOUNTING OF INTERIOR CLEANOUT TOP OR ACCESS COVER SHALL BE SET FLUSH WITH THE FINISHED FLOOR OR WALL SURFACE. LUBRICATE THREADED CLEANOUT PLUGS WITH MIXTURE OF GRAPHITE AND LINSEED OIL.

I. ENCASE EXTERIOR CLEANOUTS WITHIN 14"X14"X6" THICK REINFORCED CONCRETE PAD. SET TOP FLUSH WITH FINISHED GRADE SURFACE.

J. LOCATE CLEANOUTS WITH REQUIRED CLEARANCE FOR RODDING OF DRAINAGE SYSTEM.

K. ROUND WALL CLEANOUT COVERS SHALL NOT BE LARGER THAN REQUIRED FOR 4 INCH DIA. PIPE. ACCESS PANELS SHALL BE PROVIDED AS APPROVED BY ARCHITECT/ENGINEER FOR LARGER PIPE SIZES.

PIPING INSULATION

A. DOMESTIC WATER (HOT AND HOT WATER RETURN) PIPING, FITTINGS AND VALVES SHALL BE INSULATED WITH NOMINAL 1" WALL THICKNESS FIBERGLASS PIPE INSULATION, WITH A K FACTOR NOT TO EXCEED 0.23 BTU*IN/HR*SF*DEGREE F @ 75 DEGREES F, HAVING FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DENSITY OF 50 OR LESS WHEN TESTED BY ASTM E-84 METHOD. THE INSULATION SHALL INCLUDE AN ALL PURPOSE JACKET, CONSISTING OF HIGH DENSITY, WHITE KRAFT BONDED TO ALUMINUM FOIL AND REINFORCED WITH FIBERGLASS YARN. THE JACKET SHALL INCLUDE A LONGITUDINAL LAP WITH A PRESSURE SENSITIVE TAPE SEAL.

B. INSULATED PIPING SHALL NOT BE EXPOSED AT HANGER AND COME INTO DIRECT CONTACT WITH HANGER WITHOUT INSULATION AND SHIELD AS DESCRIBED BELOW.

C. PROVIDE PROTECTION SHIELDS AT ALL PIPE HANGERS. WHERE PROTECTION SHIELDS ARE USED, PROVIDE AN INSERT BETWEEN THE PIPING AND THE SHIELD 2" LONGER AND WIDER THAN THE SHIELD, HAVING THE SAME THICKNESS AND CONTOUR AS THE ADJOINING INSULATION. INSERTS SHALL BE MINIMUM 8.0# DENSITY, MINIMUM 100 PSI COMPRESSIVE STRENGTH.

D. ACCEPTABLE INSERT MATERIALS ARE:

1. PITTSBURGH-CORNING "FOAMGLAS" CELLULAR GLASS
2. SCHULLER THERMO-12 CALCIUM SILICATE
3. OWENS-CORNING KAYLO AF CALCIUM SILICATE

E. CLOTH TAPE IS NOT ACCEPTABLE FOR USE IN THIS APPLICATION.

DOMESTIC WATER VALVES (COLD AND HOT WATER) BALL VALVES ONLY-GATE VALVES NOT ALLOWED

A. LINE-SHUT OFF VALVES UP TO AND INCLUDING 2" SHALL BE TWO PIECE BRONZE BODY OF ASTM B584 ALLOY 844, ASTM B61 OR ASTM B62, FULL PORT BALL TYPE RATED AT 600 WOG WITH THREADED CONNECTIONS, BLOW-OUT PROOF STEM, PLASTIC COATED LOCKABLE LEVER HANDLE, TEFLON PACKING, 316 STAINLESS STEEL BALL AND STEM. ACCEPTABLE VALVES ARE NIBCO MODEL T-585-70-66-LL-LF OR APPROVED EQUAL MODEL BY CRANE, MILWAUKEE OR APOLLO.

B. LINE SHUT-OFF VALVES 2-1/2" AND LARGER INSTALLED WITHIN SYSTEMS HAVING DESIGN OPERATING PRESSURES BETWEEN 160 AND 250 P.S.I.G. SHALL BE THREADED LUG TYPE DUCTILE IRON BODY BUTTERFLY VALVE WITH EXTENDED NECK, LOCKABLE LEVER HANDLE, 316 STAINLESS STEEL STEM AND DISC, EPDM LINER AND SEAL, SUITABLE FOR BI-DIRECTIONAL FLOW AND DEAD END SERVICE WITH DOWNSTREAM FLANGE REMOVED. ACCEPTABLE VALVES ARE NIBCO MODEL LD-3022, OR APPROVED EQUIVALENT MODEL BY KEYSTONE, JAMESBURY, DEZURIK, MILWAUKEE, CRANE OR APOLLO.

C. DOMESTIC HOT WATER RETURN CIRCUIT BALANCING VALVES 1/2" THROUGH 3" SHALL BE MACHINED BALL TYPE CALIBRATED BALANCING VALVE WITH LEAD FREE ASTM B283-C69300 BRASS BODY/304 STAINLESS STEEL BALL CONSTRUCTION, GLASS AND CARBON FILLED TFE SEAT RINGS, EPDM STEM "O" RING, THREADED NPT INLET/OUTLET CONNECTIONS, 400 PSIG MAXIMUM WORKING PRESSURE AT 250°F. VALVE SHALL HAVE DIFFERENTIAL PRESSURE READ-OUT PORTS ACROSS VALVE SEAT AREA FITTED WITH INTERNAL EPT INSERTS/CHECK VALVES. VALVE BODY SHALL HAVE 1/4" NPT TAPPED DRAIN/PURGE PORT. VALVE SHALL HAVE CALIBRATED NAMEPLATE AND MEMORY STOP FEATURE TO ALLOW VALVE TO BE CLOSED FOR SERVICE AND THEN REOPENED TO SET POINT WITHOUT DISTURBING BALANCE POSITION. VALVE SHALL CONTAIN LESS THAN 0.25% LEAD CONTENT BY WEIGHT ON WETTED SURFACES AND BE DESIGNED FOR POSITIVE SHUT-OFF. VALVES SHALL BE SAME SIZE AS THE PIPE INSTALLED. PROVIDE VALVES AS SCHEDULED ON CONTRACT DRAWINGS MANUFACTURED BY BELL & GOSSETT CIRCUIT SETTER PLUS CB SERIES, OR OWNER APPROVED EQUAL.

E. SPRING LOADED CHECK VALVES, 2" AND SMALLER - SILENT CLOSING, BRONZE, CLASS 125, WITH THREADED CONNECTIONS, BUNA DISC, BRONZE OR STAINLESS STEEL SPRING, MANUFACTURED BY NIBCO MODEL T-480 OR APPROVED EQUIVALENT MODEL BY MILWAUKEE OR CRANE.

PIPE HANGERS AND SUPPORTS

A. ALL PIPE SHALL BE INDEPENDENTLY SUPPORTED FROM THE BUILDING STRUCTURE IN A NEAT AND WORKMANLIKE MANNER AND WHEREVER POSSIBLE, PARALLEL RUNS OF HORIZONTAL PIPING SHALL BE GROUPED TOGETHER ON TRAPEZE TYPE HANGERS. VERTICAL RISERS SHALL BE SUPPORTED AT EACH FLOOR LINE WITH STEEL PIPE CLAMPS. SPACING OF PIPE SUPPORTS SHALL BE IN ACCORDANCE WITH NFPA 13.

B. ALL PIPING SHALL BE PITCHED TO DRAIN IN ACCORDANCE WITH NFPA 13. PROVIDE VALVES WITH HOSE CONNECTIONS AT ALL SYSTEM DRAIN POINTS.

C. IF IT COMPLIES WITH THESE SPECIFICATIONS, HANGERS AND SUPPORTS MANUFACTURED BY ONE OF THE FOLLOWING MANUFACTURERS WILL BE ACCEPTABLE: FEE AND MASON, GRINNELL, ELCEN OR APPROVED EQUAL.

PLUMBING PIPING HANGER SPACING

A. MAXIMUM SPACING BETWEEN PIPING HANGERS SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE:

SIZE OF PIPING	DISTANCE BETWEEN SUPPORTS:
	COPPER
1/2"	5'
3/4"	6'
1"	7'
1-1/4"	8'
1-1/2"	9'
2"	10'

B. PROVIDE ADDITIONAL SUPPORTS TO PREVENT SAGGING OF PIPE

C. SUPPORTS SHALL BE ARRANGED SO AS TO BE NEAR THE WEAKEST POINT OF THE SPAN SUCH AS JOINTS, TURNS AND AT THE BASE OF ALL VERTICAL TO HORIZONTAL OFFSETS AND AT ALL WASTE TRAPS.

D. ALL PIPING SHALL BE RIGIDLY INSTALLED IN ALL CHASES OR WALLS. TEST FOR RIGIDITY SHALL BE THAT THE PIPING IS VIRTUALLY IMMOVABLE BY HAND, SHORT OF DEFORMING THE PIPING.

E. IN NO CASE SHALL ANY PIPING DEPEND ON BLOCKS, BRICKS, STONE, WOOD SLEEPERS OR TIE WIRES FOR ITS FINAL SUPPORT.

F. SUPPORT SYSTEM SHALL BE AS MANUFACTURED BY "HOLDRITE" OR AN APPROVED EQUAL.

ACCESS DOORS

A. ACCESS DOORS SHALL BE PROVIDED FOR ACCESS TO VALVES OR ANY OTHER ITEM WHICH MAY REQUIRE SERVICING OR ADJUSTING AND WHICH IS CONCEALED BEHIND AN INACCESSIBLE SURFACE SUCH AS SPLINED CEILINGS AND PLASTER WALLS OR CEILINGS. ACCESS DOORS SHALL BE AS MANUFACTURED BY MILCOR OR AN APPROVED EQUAL FOR SPECIFIC APPLICATION.

PLUMBING FIXTURES AND TRIM

A. THE FOLLOWING MANUFACTURERS WILL BE ACCEPTABLE:

1. FIXTURES: KOHLER, AMERICAN STANDARD, ELJER, CRANE.
2. CLOSET SEATS: CHURCH, OLSONITE, BENEKE.
3. FAUCETS: CHICAGO, T&S BRASS, ZURN.
4. TRIM (TRAPS, SUPPLIES, STOPS): MCGUIRE, CAMBRIDGE BRASS, BRASSCRAFT.
5. FLUSH VALVES: SLOAN, ZURN, DELANEY.
6. CARRIERS: JAY R. SMITH, MIFAB, WADE, ZURN, JOSAM.
7. STAINLESS STEEL SINKS; JUST, ELKAY.

SYSTEM CLEANING AND PRESSURE TESTING:

A. DOMESTIC WATER PIPING SYSTEM:

1. PROGRESSIVELY FLUSH SYSTEM BY OPENING VALVES BEGINNING AT THE POINT OF WATER ENTRY AND FINISHING AT THE LAST VALVE ON THE RUN(S). STERILIZE SYSTEM IN ACCORDANCE WITH LOCAL WATER DEPARTMENT OR AUTHORITY HAVING JURISDICTION (AHJ).

2. AT A MINIMUM PERFORM THE FOLLOWING:

1. INTRODUCE EPA DOMESTIC WATER SYSTEM APPROVED CHLORINE SOLUTION AT WATER SERVICE ENTRY.
2. FILL LINES SLOWLY UNTIL RESIDUAL TEST AT ENDS OF BRANCHES INDICATE A 50 PPM CONCENTRATION OF CHLORINE.
3. VALVE SYSTEM OFF AND LEAVE STANDING FOR 8 HOURS.
4. TEST RESIDUAL CHLORINE CONCENTRATION AT END OF LINES.
5. IF CONCENTRATION IS LESS THAT 5 PPM, REPEAT STERILIZING PROCESS.
6. DOCUMENT THE STERILIZATION PROCESS FOR REVIEW BY THE AHJ.
7. DO NOT USE THE DOMESTIC WATER SYSTEM PRIOR TO APPROVAL BY THE AHJ.

B. EQUIPMENT:
1. KEEP EQUIPMENT CLEAN AND DRY DURING THE CONSTRUCTION PROCESS.
2. PRIOR TO START UP, INSPECT AND CLEAN ALL INTERIOR EQUIPMENT SURFACES, CLEAN AND REPAIR TORN INSULATION, REMOVE ALL DIRT AND DEBRIS.
3. PROVIDE TEMPORARY FILTER MEDIA AS REQUIRED FOR UNIT OPERATION PRIOR TO FINAL COMMISSIONING.

C. PRESSURE TESTING:
1. DOMESTIC WATER PIPING:
   a. LEAVE ALL JOINTS EXPOSED FOR THE TESTING PROCEDURE.
   b. FLUSH SYSTEM WITH CLEAN WATER.
   c. ALL COILS, VALVES, PUMPS, AND FITTINGS SHALL BE PRESSURE TESTED AT A PRESSURE OF 125 PSI PRESSURE OF THE SYSTEM.
   d. KEEP SYSTEM UNDER TEST PRESSURE FOR A PERIOD OF 4 HOURS.
   e. INSPECT SYSTEM FOR LEAKS. REPAIR LEAKS.
   f. REPEAT PRESSURE TEST UNTIL THERE ARE NO LEAKS.

PLUMBING SUBMITTALS

A. CONTRACTOR SHALL PROVIDE THE ENGINEER WITH PRODUCT DATA AND SHOP DRAWINGS FOR ALL MATERIALS & EQUIPMENT SPECIFIED BELOW. SUBMITTALS SHALL BE PROVIDED IN AN ELECTRONIC FORMAT. SUBMITTAL DATA SHALL INCLUDE:

1. COVER SHEET WITH NAMES AND ADDRESSES OF PROJECT, ARCHITECT MEP ENGINEER, GENERAL CONTRACTOR & SUB CONTRACTOR.
2. DRAWING REFERENCE NUMBER, PRODUCT NAME AND/OR DESCRIPTION.
3. INDEX OF ALL DATA IN SUBMITTAL.
4. DIMENSIONAL DATA AND SKETCHES SHOWING THAT SUBMITTED EQUIPMENT WILL FIT INTO SPACE.
5. IDENTIFICATION OF EACH ITEM MATCHING THAT INDICATED ON THE DRAWINGS.
6. SUFFICIENT PERFORMANCE DATA, CAPACITY, SOUND DATA, DIAGRAMMATIC DATA AND DESCRIPTIVE INFORMATION TO SHOW ITS COMPLIANCE'S WITH THE CONTRACT DOCUMENTS. OPTIONS OR SPECIAL REQUIREMENTS SHALL BE CLEARLY INDICATED. APPLICABLE INFORMATION SHALL BE CLEARLY INDICATED AND NON APPLICABLE DATA SHALL BE CROSSED OFF.

7. MATERIALS AND EQUIPMENT PURCHASED OR INSTALLED WITHOUT A "NO EXCEPTIONS TAKEN" SHOP DRAWING REVIEW SHALL BE AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND AT THE RISK OF THE CONTRACTOR. THE COST OF REMOVAL AND REPLACEMENT OF SUCH MATERIALS WHICH IS JUDGED UN-SATISFACTORY BY THE ENGINEER FOR ANY REASON SHALL BE AT THE EXPENSE OF THE CONTRACTOR.
8. ANY ITEMS KNOWINGLY SUBMITTED THAT DO NOT COMPLY WITH SPECIFICATIONS SHALL BE LISTED WITH EXPLANATION AS TO WHY THEY ARE BEING SUBMITTED.

B. REQUIRED SUBMITTALS / SHOP DRAWINGS:

1. FIXTURES
2. EQUIPMENT
3. WATER HEATERS
4. PIPING
5. HANGERS

VCS architects
19251 PURUS DR.
PORTER, TX 77365

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Mechanical / Electrical / Plumbing Fire Protection Texas Firm Registration No.: F-11984 email:info@btemep.com tel: 832.413.5390

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YOUTH CENTER
8705 PARK STREET
NEEDVILLE, TEXAS 77461

Drawing Date:
Drawn By: SMA
Checked By: DDV
Scale: AS NOTED

Revisions:

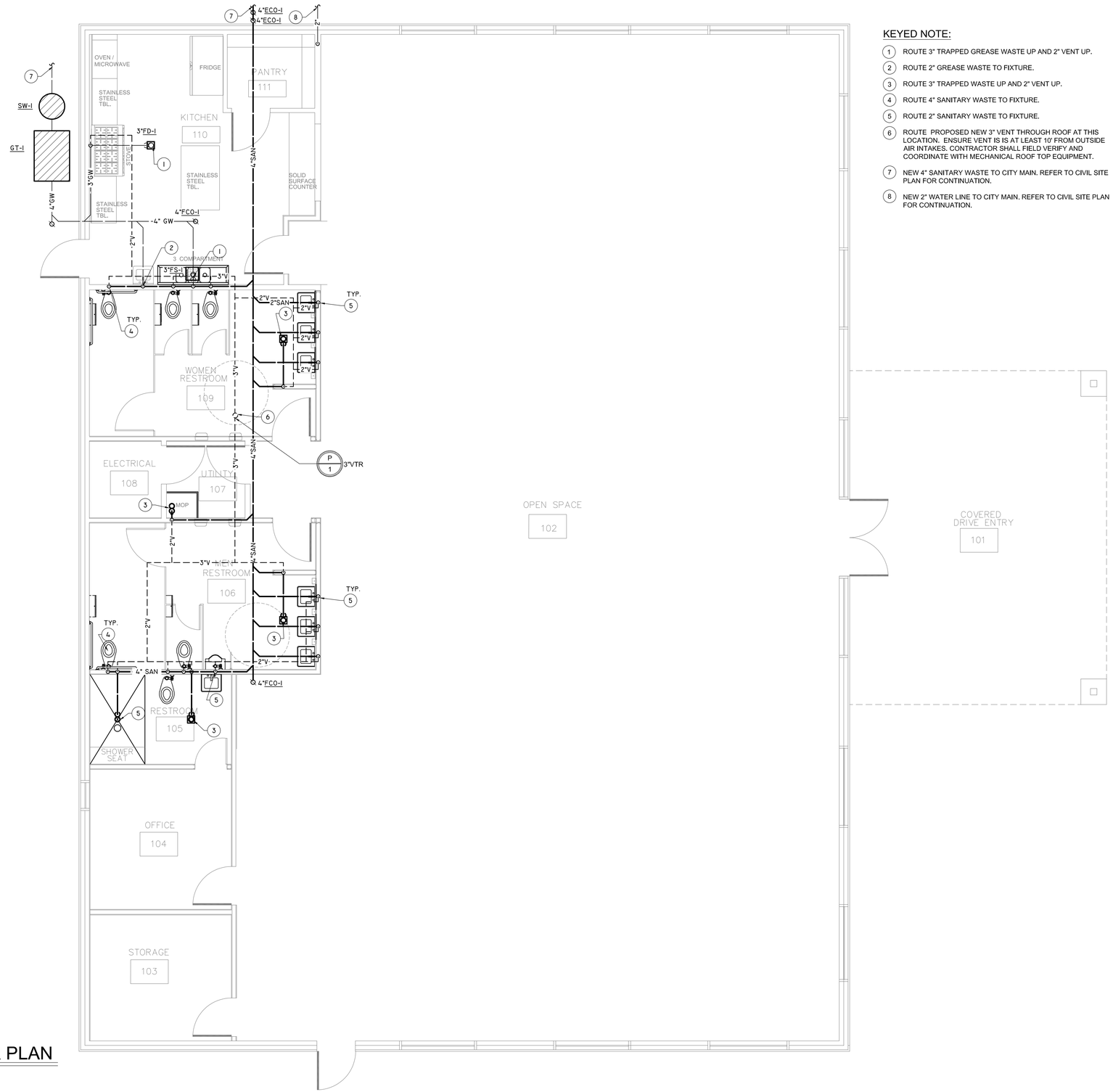
DESCRIPTION	
ISSUE FOR CONSTRUCTION & BID	02/17/2024

STATE OF TEXAS
SONYA J. BUTTS
101008
LICENSED
PROFESSIONAL ENGINEER
02/20/24

Drawing Name

PLUMBING
SPEFICATIONS

P002



KEYED NOTE:

1. ROUTE 3" TRAPPED GREASE WASTE UP AND 2" VENT UP.
2. ROUTE 2" GREASE WASTE TO FIXTURE.
3. ROUTE 3" TRAPPED WASTE UP AND 2" VENT UP.
4. ROUTE 4" SANITARY WASTE TO FIXTURE.
5. ROUTE 2" SANITARY WASTE TO FIXTURE.
6. ROUTE PROPOSED NEW 3" VENT THROUGH ROOF AT THIS LOCATION. ENSURE VENT IS IS AT LEAST 10' FROM OUTSIDE AIR INTAKES. CONTRACTOR SHALL FIELD VERIFY AND COORDINATE WITH MECHANICAL ROOF TOP EQUIPMENT.
7. NEW 4" SANITARY WASTE TO CITY MAIN. REFER TO CIVIL SITE PLAN FOR CONTINUATION.
8. NEW 2" WATER LINE TO CITY MAIN. REFER TO CIVIL SITE PLAN FOR CONTINUATION.

1 PLUMBING SANITARY FLOOR PLAN

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

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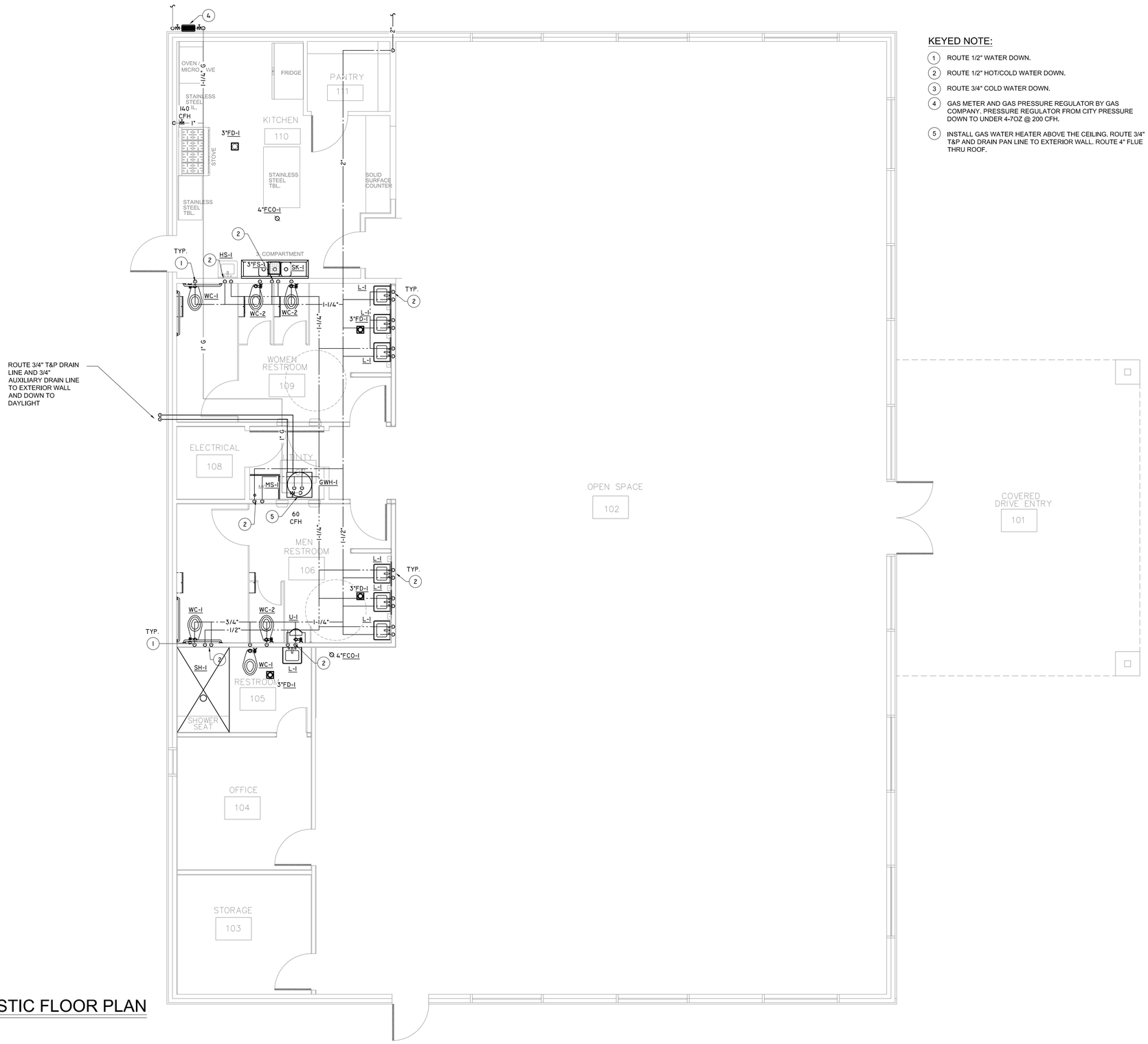
PLUMBING
SANITARY FLOOR
PLAN

P201



KEYED NOTE:

1. ROUTE 1/2" WATER DOWN.
2. ROUTE 1/2" HOT/COLD WATER DOWN.
3. ROUTE 3/4" COLD WATER DOWN.
4. GAS METER AND GAS PRESSURE REGULATOR BY GAS COMPANY. PRESSURE REGULATOR FROM CITY PRESSURE DOWN TO UNDER 4-7OZ @ 200 CFH.
5. INSTALL GAS WATER HEATER ABOVE THE CEILING. ROUTE 3/4" T&P AND DRAIN PAN LINE TO EXTERIOR WALL. ROUTE 4" FLUE THRU ROOF.

1 PLUMBING DOMESTIC FLOOR PLAN

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

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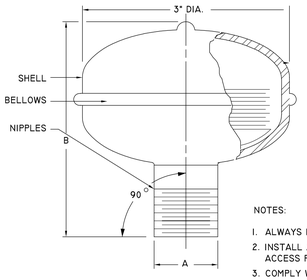
PLUMBING
DOMESTIC FLOOR
PLAN

P202

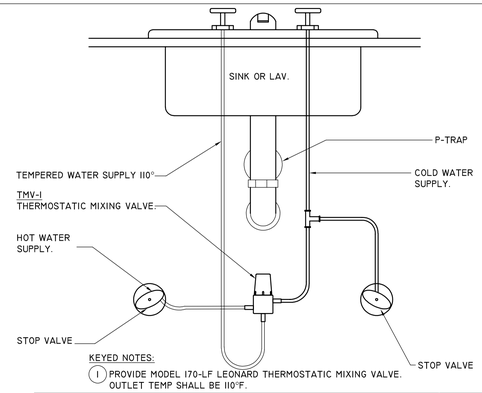


J.R. SMITH FIG. NO	P.D.I. SYMB.	FIXTURE UNIT RATING	A SIZE	B
5005	A	1 - 11	3/4"	4"
5010	B	12 - 32	1"	5"
5020	C	33 - 60	1"	6"
5030	D	61 - 113	1"	7"
5040	E	114 - 154	1"	8"
5050	F	155 - 330	1"	9"

NOTES:

1. ALWAYS INSTALL IN UPRIGHT POSITION
2. INSTALL AT AN ACCESSIBLE LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COMPLY WITH THE LATEST CODE.

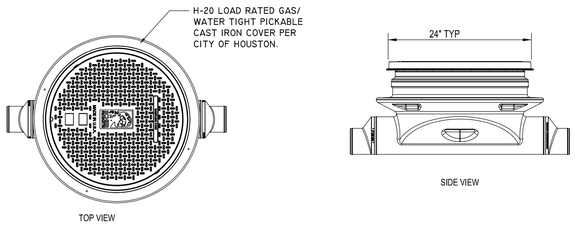
WATER HAMMER ARRESTERS | NOT TO SCALE | 6



THERMOSTATIC MIXING VALVE (TMV-1) | NOT TO SCALE | 3

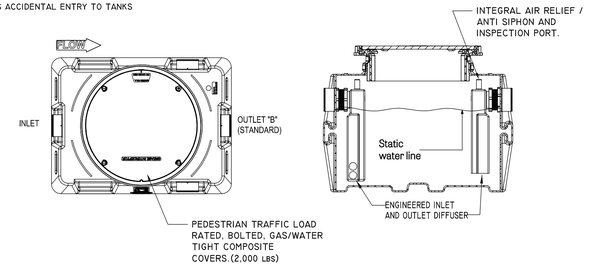
NOTES.

1. SAMPLE WELL MEETS (1009.8.2015 UPC) AN APPROVED SAMPLE WELL, CITY OF HOUSTON #516-S OR EQUAL.
2. 4" & 6" PLAIN END INLET/OUTLETS
3. UNIT WEIGHT - W/CAST IRON COVER: 110 LBS.;
4. MAXIMUM OPERATING TEMPERATURE: 150° F CONTINUOUS
5. LEVEL INLET AND OUTLET PER COH
6. H20 LOAD RATED CAST IRON PICKABLE PER COH.
7. SAFETY STAR®, REMOVABLE ACCESS BUILT INTO EACH COVER ADAPTER. PREVENTS ACCIDENTAL ENTRY TO TANKS (450 LB RATING)
8. USE FIELD CUT RISERS TO BRING ACCESS TO GRADE PER MANUFACTURES INSTRUCTIONS.

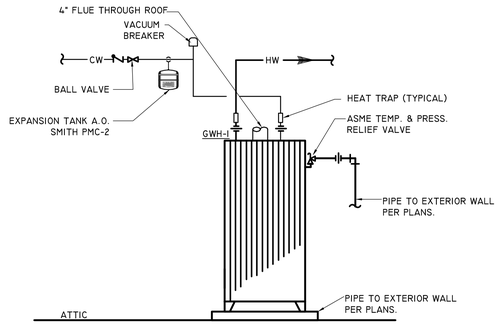


NOTES

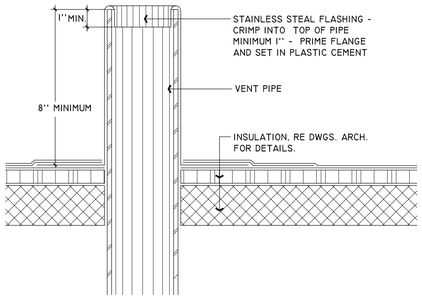
1. VENT REQUIRED DOWNSTREAM OF TRAP PER 2015 UPC.
2. ENGINEERED INLET AND OUTLET DIFFUSERS ARE REMOVABLE TO INSPECT / CLEAN PIPING.
3. INTEGRAL AIR RELIEF / ANTI-SIPHON / SAMPLING ACCESS.
4. ADJUSTABLE COVER ADAPTERS PROVIDE UP TO 4" OF ADDITIONAL HEIGHT.
5. FIXED OUTLET MODELS (-FO) HAVE INLET AND OUTLET PERMANENTLY WELDED AT THE FACTORY IN THE STRAIGHT-THROUGH (B) POSITIONS.
6. FLOW RATES ARE BASED ON 2-MINUTE DRAIN TIME. SAFETY STAR®, ACCESS RESTRICTOR BUILT INTO COVER ADAPTER, PREVENTS ACCIDENTAL ENTRY TO TANKS (450 LB RATING)



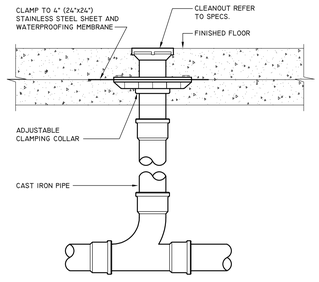
HYDROMECHANICAL GREASE TRAP AND SAMPLE WELL | NOT TO SCALE | 7



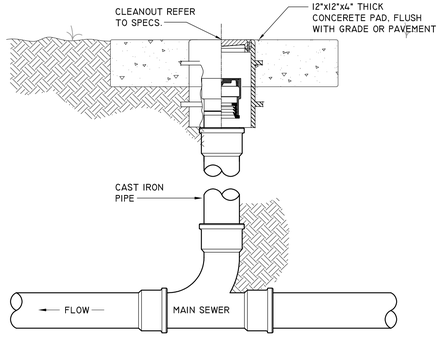
GAS WATER HEATER DETAIL (GWH-1) | NOT TO SCALE | 5



VENT THROUGH ROOF DETAIL | NOT TO SCALE | 2



FLOOR CLEANOUT DETAIL (FCO-1) | NOT TO SCALE | 4



EXTERIOR CLEANOUT DETAIL ECO-1 | NOT TO SCALE | 1

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02/20/24

Drawing Name

PLUMBING DETAILS

P301

GAS DEMAND

SYSTEM DESCRIPTION	SYSTEM TOTAL (CFH)
WATER HEATERS/KITCHEN	200

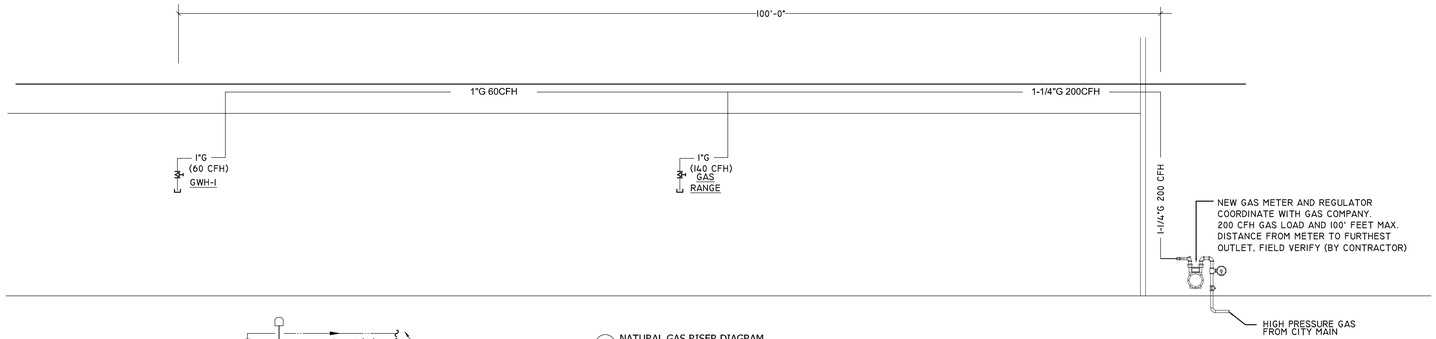
PRESSURE REGULATOR @ METER:
PROPOSED GAS LOAD:
200 CFH TOTAL

TOTAL DEVELOPED LENGTH
(LONGEST RUN = 75'-0" + 30% FITTINGS)
100'-0"

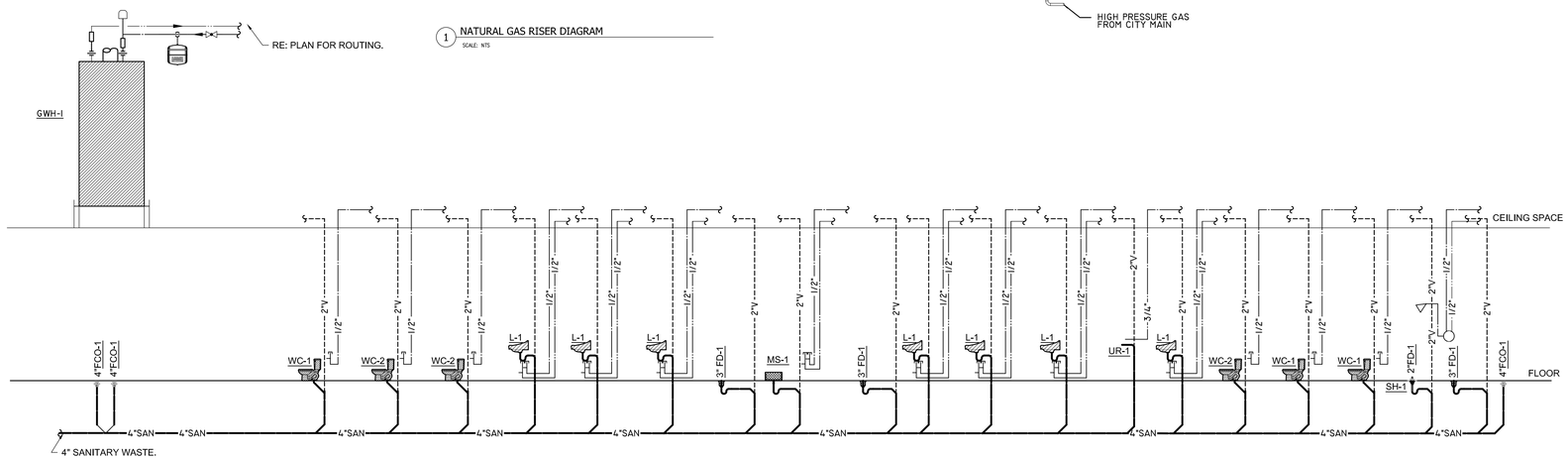
SERVICE PRESSURE
7 OZ

SIZE OF GAS PIPING FROM CITY MAIN TO BUILDING PRESSURE REGULATOR SHALL BE DETERMINED BY THE LOCAL GAS COMPANY

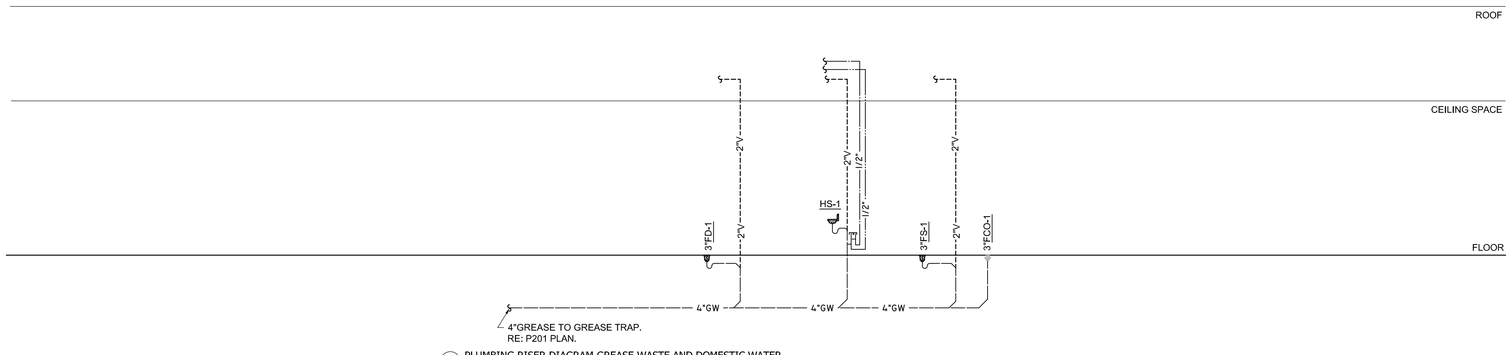
GAS PIPE IS SIZED BASED ON TOTAL DEVELOPED LENGTH



1 NATURAL GAS RISER DIAGRAM
SCALE: NTS



2 PLUMBING RISER DIAGRAM SANITARY & DOMESTIC WATER
SCALE: NTS



3 PLUMBING RISER DIAGRAM GREASE WASTE AND DOMESTIC WATER
SCALE: NTS

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02/20/24

Drawing Name

PLUMBING
RISERS

P401

AVILES
ENGINEERING CORP.

GEOTECHNICAL INVESTIGATION

FORT BEND COUNTY
BARBARA JORDAN PARK EXPANSION
8702 NOBLE STREET
NEEDVILLE, TEXAS

Reported to:
Fort Bend County Precinct 3
Missouri City, Texas

by

Aviles Engineering Corporation
5790 Windfern
Houston, Texas 77041
713-895-7645

REPORT NO. G118-23 (Final)

September 2023

AVILES
ENGINEERING CORP.

September 26, 2023

Ms. Gwendolyn F. Climmons, J.D.
Fort Bend County Park & Recreation Department
Sienna Annex, Suite 149
5855 Sienna Springs Way
Missouri City, Texas 77459

Reference: **Geotechnical Investigation**
Fort Bend County
Barbara Jordan Park Expansion
8702 Noble Street
Needville, Texas
AEC Report No. G118-23 (Final)

Dear Ms. Climmons,

Aviles Engineering Corporation (AEC) is pleased to present this report of the results of our geotechnical investigation for the above referenced project. Project terms and conditions were in accordance with the Agreement for Professional Geotechnical Investigation Services between Fort Bend County (FBC) and AEC, dated July 2023. The project scope of service is in accordance with Purchase Order Number 228276, dated July 18, 2023, based on AEC Proposal G2023-05-05, dated January 16, 2023.

AEC appreciates the opportunity to be of service to you. Please call us if you have any questions or comments concerning this report or when we can be of further assistance.

Respectfully submitted,
Aviles Engineering Corporation
(TBPELS Firm Registration No. F-42)

09/26/2023

Wilber L. Wang, P.E.
Senior Engineer

Damalí F. Peña, E.I.T.
Staff Engineer

Reports Submitted: 1 File (electronic)

Z:\ENGINEERING\REPORTS\2023\G118-23 FORT BEND COUNTY BARBARA JORDAN PARK EXPANSION, NEEDVILLE - FORT BEND COUNTY PRECINCT 3\G118-23.DOCX

AVLES ENGINEERING CORP.

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APPENDICIES

AVILES
ENGINEERING CORP.

GEOTECHNICAL INVESTIGATION

FORT BEND COUNTY
BARBARA JORDAN PARK EXPANSION
8702 NOBLE STREET
NEEDVILLE, TEXAS

1.0 INTRODUCTION

1.1 General

The report submitted herein presents the results of Aviles Engineering Corporation's (AEC) geotechnical investigation for the Fort Bend County (FBC) Precinct 3's proposed Barbara Jordan Park Expansion project, located at 8702 Noble Street, in Needville, Texas (Fort Bend County Key Map No.:683Y). A vicinity map of the project area is presented on Plate A-1, in Appendix A.

Based on drawings (dated March 19, 2023) prepared by VCS architects for the Barbara Jordan Youth Park Center, the proposed improvements include a single-story building with a footprint of approximately 4,800 square feet, plus a concrete parking area.

1.2 Purpose and Scope

The purpose of this geotechnical investigation is to evaluate the subsurface soil and groundwater conditions at the project site and develop geotechnical engineering recommendations for the proposed building and concrete parking area.

The scope of this geotechnical investigation is summarized below:

1. Drilling and sampling four soil borings ranging in depth from 10 to 30 feet below existing grade.
2. Soil laboratory testing on selected soil samples.
3. Engineering analyses and recommendations for the building, including feasible foundation types, bearing depth, allowable bearing capacity, as well as subgrade preparation.
4. Engineering analyses and recommendations for the concrete parking area, including concrete pavement thickness design and subgrade preparation.
5. Construction recommendations for the building foundations, floor slab, and parking area.

2.0 SUBSURFACE EXPLORATION

2.1 Soil Borings

Boring locations were determined in the field using a hand-held GPS device. AEC drilled a total of four soil borings at the site to depths ranging from 10 to 30 feet below existing grade. The total drilling footage was 100 feet. The approximate locations of AEC's borings are presented on the Boring Location Plan on Plate A-2, in Appendix A. The boring locations were not surveyed after completion of drilling, however, AEC was provided with a topographic survey of the project site (dated April 27, 2023) prepared by Rekha Engineering, Inc. Based on the provided topographic survey, AEC estimated ground surface elevations near the boring locations, which are included on AEC's boring logs.

2.2 Drilling and Sampling Methods

The borings were drilled using a buggy-mounted drilling rig and the boreholes were advanced using dry auger method. Undisturbed samples of cohesive soils were obtained from the borings by pushing 3-inch diameter thin-wall, seamless steel Shelby tube samplers in general accordance with ASTM D 1587. Granular soils and some cohesive soils were sampled with a 2-inch split-barrel sampler in accordance with ASTM D 1586. Standard Penetration Test resistance (N) values were recorded for these soils as "Blows per Foot" and are shown on the boring logs. Strength of the cohesive soils was estimated in the field using a hand penetrometer. The undisturbed samples of cohesive soils were extruded mechanically from the core barrels in the field and wrapped in aluminum foil; all samples were sealed in plastic bags to reduce moisture loss and disturbance. The samples were then placed in core boxes and transported to the AEC laboratory for testing and further study. After completion of drilling, the borings were backfilled with bentonite chips.

3.0 LABORATORY TESTING PROGRAM

Soil laboratory testing was performed by AEC personnel. Samples from the borings were examined and classified in the laboratory by a technician under the supervision of a geotechnical engineer. Laboratory tests were performed on selected soil samples to evaluate the engineering properties of the foundation soils in accordance with applicable ASTM Standards. Atterberg limits, moisture contents, percent passing a No. 200 sieve, sieve analysis, and dry unit weight tests were performed on selected samples to establish the index properties and confirm field classification of the subsurface soils. Strength properties of cohesive

soils were determined by means of unconfined compression (UC) and unconsolidated-undrained (UU) triaxial tests performed on undisturbed samples. The laboratory test results are presented on the representative boring logs on Plates A-3 through A-6, in Appendix A. A key to the boring logs, classification of soils for engineering purposes, terms used on boring logs, and reference ASTM Standards for laboratory testing are presented on Plates A-7 through A-10, in Appendix A. Sieve analyses results are presented on Plate A-11 in Appendix A.

4.0 SITE CONDITIONS

4.1 Subsurface Conditions

Details of the soils encountered during drilling are presented in the boring logs on Plates A-3 through A-6, in Appendix A. Soil strata encountered in the borings are summarized below.

Boring	Depth (ft)	Description of Stratum
B-1	0 - 2	Fill: Silty Sand (SM), with crushed limestone and concrete rubble
	2 - 8	Hard, Fat Clay (CH)
	8 - 12	Medium dense, Sandy Silt (ML), with lean clay pockets
	12 - 30	Loose to dense, Poorly Graded Sand with Silt (SP-SM)
B-2	0 - 2	Lean Clay with Sand (CL), with roots
	2 - 8	Hard, Fat Clay with Sand (CH)
	8 - 10	Hard, Lean Clay (CL)
	10 - 18	Loose to medium dense, Silty Sand (SM)
	18 - 30	Loose to dense, Poorly Graded Sand with Silt (SP-SM)
B-3	0 - 2	Fill: Fat Clay with Sand (CH), with gravel and roots
	2 - 6	Hard, Fat Clay with Sand (CH), with ferrous nodules
	6 - 10	Hard, Lean Clay with Sand (CL)
	10 - 14	Medium dense, Silty Sand (SM)
	14 - 16	Very stiff, Sandy Lean Clay (CL)
	16 - 18	Loose, Silty Sand (SM)
	18 - 30	Medium dense to very dense, Poorly Graded Sand with Silt (SP-SM)
B-4	0 - 6	Hard, Fat Clay (CH)
	6 – 10	Stiff to very stiff, Lean Clay with Sand (CL)

Subsurface Soil Properties: The subsurface cohesive soils encountered in the borings have medium to very high plasticity (see "Degree of Plasticity of Cohesive Soils" on Plate A-8, in Appendix A), with liquid limits (LL) ranging from 34 to 79, and plasticity indices (PI) ranging from 18 to 56. The cohesive soils

encountered are classified as “CL” and “CH” type soils in accordance with ASTM D 2487. “CH” soils undergo significant volume changes due to seasonal changes in soil moisture contents. “CL” type soils with lower LL (less than 40) and PI (less than 20) generally do not undergo significant volume changes with changes in moisture content. However, “CL” soils with LL approaching 50 and PI greater than 20 essentially behave as “CH” soils and could undergo significant volume changes.

Groundwater Conditions: Groundwater was not encountered during drilling or after completion of drilling. However, after completion of drilling, Borings B-1 through B-3 caved in to a depth of 28 feet (compared to a total boring depth of 30 feet). The information in this report summarizes conditions found on the date the borings were drilled. However, it should be noted that our groundwater observations are short-term; groundwater depths and subsurface soil moisture contents will vary with environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress.

4.2 Hazardous Materials

No signs of visual staining or odors were encountered during field drilling or during processing of the soil samples in the laboratory. However, AEC notes that the presence of potential hazardous material at other locations within the project area cannot be discounted based upon the very small and limited number of samples taken.

4.3 Subsurface Variations

It should be emphasized that: (i) at any given time, groundwater depths can vary from location to location, and (ii) at any given location, groundwater depths can change with time. Groundwater depths will vary with seasonal rainfall and other climatic/environmental events. Subsurface conditions may vary away from and in between the drilled boring locations.

Clay soils in the Fort Bend County area typically have secondary features such as slickensides, calcareous nodules, and contain sand/silt seams/lenses/layers/pockets. It should be noted that the information in the boring logs is based on 3-inch diameter soil samples. In Borings B-1 through B-3, soil samples were generally continuously obtained at intervals of 2 feet from the ground surface to a depth of 20 feet, and then at intervals of 5 feet thereafter to the boring termination depth of 30 feet. In Boring B-4, soil samples were obtained continuously at intervals of 2 feet from the ground surface to the boring termination depth of 10

feet. A detailed description of the soil secondary features may not have been obtained due to the small sample size and sampling interval between the samples. Therefore, while a boring log shows some soil secondary features, it should not be assumed that the features are absent where not indicated on the boring log.

5.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Based on drawings (dated March 19, 2023) prepared by VCS architects for the Barbara Jordan Youth Park Center, the proposed improvements include a single-story building with a footprint of approximately 4,800 square feet, plus a concrete parking area.

Construction Standards: Where possible, AEC has referenced applicable portions of the Fort Bend County Construction Details (dated March 1, 2022) within this report. In the absence of applicable FBC Construction Details, AEC has referenced City of Houston Standard Construction Specifications (COHSCS). AEC should be notified if different construction standards will be used for this project so that our recommendations can be updated if necessary.

5.1 Demolition of Existing Building

AEC understands that an existing one-story building that is located at the site and overlaps the proposed youth park center building will be first be demolished. AEC notes that foundation information for the existing building was not available at the time this report was prepared.

In general, post-tensioned slabs, spread footings, or drilled-and-underreamed footings are typically used for building foundations in the Greater Houston area. If a post-tensioned slab or spread footings are encountered during demolition, the spread footing/post tensioned grade beam excavations should be backfilled with compacted select clay fill. If drilled footings are encountered during demolition, the drilled footing excavations should be backfilled from the bottom of the excavation to 4 feet below grade with compacted cement-stabilized sand (CSS); compacted select clay fill shall then be used to the ground surface. If drilled footings are encountered, **AEC does not recommend that the underreams be over-excavated or otherwise pulled from the ground**.

Loose soil or concrete still present within the foundation excavations shall be removed prior to backfilling. Select clay fill requirements are presented in Section 5.4.2 of this report. Compacted CSS should be in general accordance with Section 02321 of the 2022 COHSCS.

AEC recommends that the structural engineer design new building foundations to avoid conflicts with existing foundations that will be left in place. AEC also recommends that an Owner's Representative be on site during demolition to ensure that all existing foundations are properly removed and backfilled. Any foundations that are not demolished should be marked or surveyed in the field so that existing foundations that are left in place will not come into conflict with new building foundations.

5.2 Youth Park Center Building

Based on the drawings provided by VCS architects, the proposed youth park center building will have an approximate footprint that is 4,800 square feet. There will be a 30 foot long by 20 foot wide covered drive entry at the front of the building. As noted in Section 2.0 of this report, AEC estimated surface elevations of the borings, which varied from an elevation of +91 to +91.5 feet Mean Sea Level (MSL). A site grading plan was not available at the time this report was prepared. AEC also notes that the finished floor elevation (FFE) of the new building floor slab was also not available at the time this report was prepared.

Soil Conditions and Groundwater: Based on Borings B-1 through B-3, the subsurface soil conditions at the proposed building footprint area generally consist of approximately 6 to 10 feet if hard lean/fat clay (CL/CH) with medium to very high expansive potential at the ground surface, underlain by loose to dense silty sand (SM/SP-SM). As noted in Section 4.1 of this report, groundwater was not encountered in the borings. However, groundwater depths and subsurface soil moisture contents will vary with environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress

Recommended Foundation Type: Based on the soil conditions encountered in Borings B-1 through B-3, AEC recommends that the youth park center building be supported on either: (i) drilled and underreamed footings, founded at 8 feet below existing grade; or (ii) straight sided drilled shafts, with a minimum length of 10 feet (although the shaft length should be determined by the building foundation designer, in accordance with Section 5.2.2 of this report).

5.2.1 Option 1 - Drilled and Underreamed Footings

Footing Depth and Allowable Bearing Capacity: Based on the soil conditions encountered in Borings B-1 through B-3, drilled-and-underreamed footings founded a minimum of 8 feet below existing grade (i.e., a bearing elevation of approximately +83 feet MSL) should be designed for a net allowable bearing capacity of 4,000 psf for sustained loads and 6,000 psf for total loads. Whichever net allowable bearing capacity results in a larger footing diameter should be used for design. The allowable bearing capacities provided include a factor of safety (FS) of 3.0 for sustained loads and a FS of 2.0 for total loads.

Footing Spacing: To reduce stress overlap from adjacent footings and potential construction problems, the minimum edge-to-edge clear spacing between the underreams should not be less than 0.6 times diameter of the larger underream.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each footing should contain reinforcing steel throughout its full length to sustain an uplift load of at least 55d kips, where "d" is the diameter of the shaft in feet.

Footing Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered, we estimate that drilled-and-underreamed footings, designed and constructed as recommended in this report, will experience total settlements on the order of 1 inch.

Drilled-And-Underreamed Footing Construction: Drilled-and-underreamed footings should be constructed in accordance with Section 02465 of the 2022 COHSCS. A qualified geotechnical technician should check each footing excavation prior to placing concrete to insure that:

1) The footing has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report.
2) The column is concentric with drilled footing.
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

Based on the soils encountered in Borings B-1 through B-3, there is a possibility that slickensides, calcareous and ferrous nodules, or pockets/seams of sand/silts within the clay soils may make underreaming (belling) difficult and result in potential sloughing or caving-in of the shaft excavation sidewalls during construction, particularly for underreams over 6 feet in diameter. We recommend that a maximum diameter

ratio of bell to shaft not exceed 2 to 1. If significant sloughing or caving occurs for drilled-and-underreamed shafts, further footing excavation should be stopped, and a reduced bell/shaft ratio or even straight-sided shafts (matching the bell diameter) may be necessary.

Placement of concrete should be accomplished immediately after excavation is completed to reduce potential for sloughing of the foundation soils. Footing excavations should not be left open overnight. No concrete should be placed without the prior approval of the Owner's Representative. Although groundwater was not encountered in the borings during drilling, groundwater level at the site will fluctuate with seasonal rainfall and other climatic events and may be higher at the time of construction. If groundwater is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. New drilled footings should not be excavated within 2 bell diameters or 15 feet, whichever is greater (edge to edge) of an open footing excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled footing to an adjacent unfilled footing.

5.2.2 Option 2 - Straight Sided Drilled Shafts

Drilled Shaft Axial Capacity: AEC performed straight-sided drilled shaft analyses using O'Neill and Reese's method, "Drilled Shaft Design and Construction" (1999). For analysis of the drilled shafts, AEC neglected skin friction beginning from the top of shaft (i.e. starting from the bottom of grade beam) to 5 feet below the top of shaft. Since foundation drawings were not available at the time this report was prepared, AEC conservatively assumed that the building grade beams would be a maximum of 3 feet deep. As a result, AEC neglected drilled shaft capacity to a total of 8 feet (i.e., 3 foot grade beam plus 5 feet below top of shaft).

The total allowable compressive axial capacity of a straight-sided drilled shaft is the sum of the allowable skin friction (obtained by multiplying the shaft perimeter by the allowable unit cumulative skin friction beginning from the bottom of the grade beam plus an additional 5 feet) and the allowable end bearing (obtained by multiplying the shaft cross-sectional area by the allowable unit end bearing at the design depth). AEC used a FS of 2 and 3 for skin friction and end bearing capacities, respectively. Straight sided drilled shaft design curves for axial compression loads (for 24, 36, and 48 inch diameter drilled shafts) are presented on Plate B-1, in Appendix B, respectively. AEC recommends that straight sided drilled shafts be a minimum length of 10 feet (below bottom of grade beam). However, the drilled shaft length should

ultimately be selected by the building foundation designer, based on the capacity curves presented in Plate B-1, in Appendix B.

Drilled Shaft Spacing: To reduce the influence of adjacent drilled shafts and group effects, the minimum center-to-center spacing between adjacent shafts should be at least 2.5 times the diameter of the larger shafts; the minimum edge-to-edge spacing between adjacent shafts should not be less than 3 feet. However, depending on the center to center spacing of the shafts, the individual capacity of the drilled shaft should be multiplied by an efficiency factor, η. For a center-to-center spacing of 2.5D (where D is the diameter of the larger shaft), $\eta = 0.65$, and for a center-to-center spacing of 6D, $\eta = 1.0$. The value of η may be linearly interpolated for intermediate spacing. The minimum spacing must include proper allowances for cantilever tolerance of alignment and possible oversizing of the drilled hole.

Foundation Settlements: Based on the soil conditions encountered and the anticipated structural loads, we estimate that drilled shafts designed and constructed as recommended in this report will experience total settlements on the order of 1 inch.

Drilled Shaft Construction: Drilled shaft foundations should be constructed in accordance with Section 02465 of the 2022 COHSCS.

Based on Borings B-1 through B-3 and anticipating the ultimate length of the drilled shafts, the drilled shaft excavations will likely encounter loose to dense silty sand (SM/SP-SM). Although groundwater was not encountered in our borings during drilling (see Section 4.1 of this report), the groundwater level could be higher at the time of construction and could be encountered during drilled shaft construction. **To maintain integrity of the shaft excavations, AEC recommends the use of temporary steel casing and/or bentonite slurry for drilled shaft construction.** AEC recommends that the project drawings include a note indicating the need for temporary steel casing and/or bentonite slurry to support drilled shaft construction. Casing will be more effective in maintaining the integrity of shaft excavations in granular soils; however, temporary steel casings longer than 10 feet may be difficult to work with, depending on available construction equipment. For slurry methods, AEC recommends that the slurry be introduced beginning from the ground surface at the start of drilling. AEC recommends the use of bentonite slurry for shaft construction; polymer slurry is not recommended. The concrete should be placed using a tremie to displace the lower density slurry. Care must be taken to ensure that tremie is positioned and maintained at the bottom of excavation until a height of 5 feet of concrete has been poured. As more concrete is added, the

tremie should be maintained at a minimum distance of 5 feet below the top of the concrete pour.

New drilled shafts should not be excavated within 5 shaft diameters (edge to edge) or 15 feet, whichever is larger, of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled shaft to an adjacent unfilled shaft.

Placement of concrete should be accomplished as soon as possible after excavation to reduce changes in the state of stress and possible sloughing in the foundation soils. No shafts should be left open overnight or poured without the prior approval of the Owner's Representative.

In addition, each shaft excavation should be inspected by a qualified Owner's Representative prior to placing concrete, to check that the shaft excavation has been constructed to the specified dimensions at the recommended depth and formation, and excessive cuttings and any soft-compressible materials have been removed from the bottom of the excavation.

5.2.3 Building Floor Slab

Building Pad Grading: As noted in Section 5.2 of this report, the FFE of the proposed youth park center building was not available at the time this report was prepared. AEC assumes that the FFE will be raised a minimum of 12 to 24 inches above existing grade, to avoid potential flood conditions.

Estimated Soil Movements: Potential Vertical Rise (PVR) is an estimate of the potential of an expansive soil to swell from its current state. PVR was computed using TxDOT test method Tex-124-E. Based on Borings B-1 through B-3, the top 6 to 10 feet of existing soil within the building footprint is highly expansive. Expansive clays exhibit a potential to shrink and swell with changes in their moisture contents. The changes in the soil moisture content are usually caused by variations in the seasonal amount of rainfall and evaporation rates or other localized factors like the moisture withdrawal by nearby trees. The seasonal moisture active zone generally extends to about 10 feet below ground in the Fort Bend County area, and will be deeper if trees with deep root zones exist adjacent to the structures.

Additional movements can occur in areas if water is allowed to pond during or after construction on soils with high plasticity, or if highly plastic soils are allowed to dry out prior to fill or concrete placement. High

plasticity clay may also experience shrinkage during periods of dry weather as moisture evaporation occurs at the ground surface and the groundwater table drops. The actual PVR of the site will be highly dependent upon the actual PI and moisture regime of the clayey soils at the time of construction. Therefore, uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure is critical to reducing potential shrink-swell movement of the floor slab.

PVR: For the top 10 feet of the existing soils encountered in Borings B-1 through B-3, the PVR of the youth park center building is approximately 3.3 to 4.6 inches based on in-situ moisture conditions. The PVR estimates include the surcharge added from the (assumed) 1 to 2 feet of select clay fill required to raise the existing grade to FFE.

Table 1. Estimated PVR vs. Thickness of Replacement Fill for Youth Park Center Building

Thickness of Replacement Fill Beneath the Existing Ground Surface (ft)	PVR (in), based on Boring B-1(1)	PVR (in), based on Boring B-2(1)	PVR (in), based on Boring B-3(1)
0 (approx. EL = 91.5)	2.9	3.9	3.7
1 (approx. EL = 90.5)	2.9	3.6	3.2
2 (approx. EL = 89.5)	2.9	3.3	2.6
3 (approx. EL = 88.5)	2.3	2.6	1.9
4 (approx. EL = 87.5)	1.6	1.9	1.2
5 (approx. EL = 86.5)	1.2	1.4	0.6
6 (approx. EL = 85.5)	0.7	0.9	<0.5

Note: (1) The PVR estimate includes the surcharge loading of approximately 1 to 2 feet of select clay fill necessary to raise existing grade to a FFE that is 1 to 2 feet higher than existing grade.

Floor Slab: AEC understands that the PVR requirement for buildings is typically considered to be 1 inch. In accordance with Table 1, a minimum of 5 to 6 feet of soil excavation would be required to reduce the PVR of the youth park center building to 1 inch. The PVR calculation includes the fill material required to achieve a FFE that is assumed to be 1 to 2 feet higher than existing grade.

For the youth park center building, AEC recommends the following floor slab options be considered: (i) Option 1 - a structural floor slab supported on drilled and underreamed footings or straight sided drilled shafts with a 8 inch void space between the bottom of the slab and the top of the subgrade soils; (ii) Option 2 - a subgrade supported floor slab, with 5 feet excavation and replacement of existing soils beneath the

slab; or (iii) Option 3 - a subgrade supported floor slab, with treatment of the underlying soils by injecting an ionic soil stabilizer (ISS) to a depth of 8 feet.

5.2.3.1 Option 1 - Structural Floor Slab

The most effective method to mitigate movement of subgrade soils due to shrink-swell cycles of expansive soils is construction of a drilled-footing supported structural floor slab with 8 inch carton forms between the bottom of the slab and the top of the subgrade soil.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should be demolished and removed. After demolition, a minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

The exposed subgrade should then be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with clean onsite clay soils. Afterwards, general clay fill can be placed and compacted to achieve the elevation at the bottom of the carton forms. General clay fill recommendations are presented in Section 5.4.3 of this report.

Grade Beams: We recommend that foundation grade beams be founded at least 24 to 36 inches below FFE. The grade beams should be constructed on 8 inch carton forms. Care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. AEC recommends that Motzblocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. The drilled footings/shafts and beams should be tied together.

Moisture Barrier: To prevent mildew or mold growth on the underside of the structural floor slab, we recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab (on top of the carton forms).

5.2.3.2 Option 2 - Subgrade Supported Floor Slab

In accordance with Table 1 in Section 5.2.3 of this report, approximately 5 to 6 feet of existing soil would have to be removed and replaced with either low-expansive select clay fill or lime-stabilized clay in order to achieve a PVR of 1 inch. However, AEC notes that 4 feet of soil excavation would result in a PVR of 1.2 to 1.9 inches (see Table 1 in Section 5.2.3 of this report), which may be considered acceptable (although this is up to the building floor slab designer). To reduce construction cost, AEC recommends that 4 feet of soil excavation be considered, provided the associated PVR risk of 1.2 to 1.9 inches is acceptable. If the higher PVR risk is not acceptable, then the excavation depth should be a minimum of 5 to 6 feet, instead of the 4 feet suggested by AEC. This option assumes that uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure are maintained adequately, and that any resultant movements can be adequately sustained by the subgrade soils and foundation system.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. A minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

After surface stripping, an additional 3.5 feet [down to an elevation of approximately +87.5 feet MSL (i.e. total depth of 4 feet, which includes the 6 inches of surface removal)] of existing soils at the ground surface should be removed. After the overburden is excavated, the exposed subgrade should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted lime-stabilized soils as necessary. After proof rolling is performed, compacted select clay fill or lime-stabilized soils should then be used to achieve the design FFE of the youth park center building. Lime-stabilized clay and select clay fill recommendations are presented in Sections 5.4.1 and 5.4.2 of this report, respectively.

The Owner should be aware that some risk of floor slab movement is still present if this floor slab option is selected. If conditions which exacerbate moisture variations such as the presence of trees, poor drainage, excessive drying/wetting of subsurface soils, or leaking underground utilities are located nearby, the floor slab total vertical movements and net differential vertical movements could be higher than estimated.

Grade Beams: We recommend that foundation grade beams be founded at least 24 to 36 inches below FFE. The grade beams *can* be constructed on 8 inch carton forms. If carton forms are used (at the discretion of the building foundation designer), care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. If carton forms are used, AEC recommends that Motzblocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. If no carton forms will be used, we recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings/shafts and beams should be tied together.

Floor slabs are typically structurally tied to the grade beams. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.2.3.3 Option 3 - Inject Ionic Soil Stabilizer

Option 3 also includes a subgrade supported floor slab; however, in order to limit the PVR impact on the floor slab, the existing expansive clay soils within the building footprint can be injected with an ISS to a minimum depth of 8 feet (without requiring over-excavation of existing soil, as presented in Option 2 in Section 5.2.3.2 of this report). Injection of a liquid ISS, such as Earthlok Soil Stabilizer (or equivalent product), should be able to reduce the potential of the expansive clay soils to experience shrink and swell movements and therefore prevent the building floor slab from experiencing distress in the future due to movement of expansive soils. However, although research has been conducted to determine the effectiveness of ionic clay soil stabilization, this treatment method has not yet achieved widespread acceptance and no national standard (by the federal government or professional civil engineering body) is currently available. **The effectiveness of injecting liquid ISS in an effort to reduce the expansive potential of clay soils cannot be guaranteed by AEC**, especially in regard to: (i) the ability of the ISS to

render the clay effectively inert; and (ii) for the ISS to adequately penetrate/permeate vertically and horizontally throughout the clay mass. **If the ISS injection treatment method is used, AEC will accept no liability regarding its effectiveness to reduce/prevent shrink and swell movements of expansive clay soils, or on the long-term performance of the building floor slabs (and any floor slab distress that could potentially occur)**.

AEC notes that an injection depth of 8 feet should be able to cover existing expansive clay soils within the moisture active zone; if treatment is effective, then the anticipated PVR of the floor slab should be on the order of 1 inch, or less. AEC suggests that the grid spacing of the injection points be close enough to ensure that the expansive clay soils within the treatment area be adequately treated; some degree of overlap between treated soil columns is recommended. However, the ultimate determination of treatment area, injection spacing, treatment depth, as well as means and methods for liquid ISS injection shall be by the ISS Contractor.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. A minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The exposed subgrade should then be proof-rolled, in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted general fill. After proof-rolling, the ISS can be injected to a minimum depth of 8 feet below grade; the center to center spacing of the ISS injections should be determined by the ISS provider.

Testing: AEC understands that Earthlok requires that geotechnical soil testing be performed after soil stabilization is completed for warranty purposes. AEC recommends that soil borings be performed to a depth of 8 feet within the ISS treated areas. Recommended laboratory tests include, but are not necessarily limited to moisture contents, Atterberg Limits, and swell tests. Frequency of borings and laboratory testing can be determined once the ISS treatment is completed. The additional borings and testing can be performed by either AEC or a Construction Materials Testing (CMT) laboratory, although AEC must be allowed to review the test results if the testing is performed by a different CMT laboratory.

Grade Beams: We recommend that foundation grade beams be founded at least 24 to 36 inches below FFE. We recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings/shafts and beams should be tied together.

Floor slabs are frequently structurally tied to the grade beams, although this will be at the building designer's discretion. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements, and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.3 Parking Area

Based on the drawings prepared by VCS architects, a concrete parking area will be constructed to the east of the proposed youth park center building. Traffic volume and vehicle loads were not available at the time this report was prepared; however, AEC assumes that the site traffic will be light, mostly consisting of passenger vehicles. AEC assumes that the pavement will be placed at or near existing grade. AEC should be notified if the final grade of the various pavements will be more than 6 inches higher than existing grade, so that our recommendations can be updated, if necessary.

The pavement design recommendations developed below are in general accordance with the "AASHTO Guide for Design of Pavement Structures," 1998 edition.

5.3.1 Rigid Pavement

Rigid pavement design is based on the anticipated design number of 18-kip Equivalent Single Axle Loads (ESALs) the pavement is subjected to during its design life. The parameters that were used in computing the rigid pavement section are as follows:

Overall Standard Deviation (S_0)	0.35

Initial Serviceability (P_0)	4.5
Terminal Serviceability (P_t)	2.0
Reliability Level (R)	80%
Overall Drainage Coefficient (C_d)	1.0
Load Transfer Coefficient (J)	3.2
Loss of Support Category (LS)	1.0
Roadbed Soil Resilient Modulus (M_R)	1,500 psi
Elastic Modulus (E_{sb}) of Stabilized Soils	30,000 psi
Composite Effective Modulus of Subgrade Reaction (k)	42 pci
Concrete Compressive Strength (f'_c)	3,500 psi (at 28 days)
Mean Concrete Modulus of Rupture (S'_c)	570 psi (at 28 days)
Concrete Elastic Modulus (E_c)	3.3 x 10^6 psi

AEC should be notified if different parameters are required for concrete pavement design. In accordance with the Concrete Pavement Details of the 2022 FBC Construction Details, **AEC assumes that 3,500 psi (at 28 days) compressive strength concrete will be used for concrete pavement construction. AEC also recommends that the project drawings and specifications require the use of 3,500 psi (at 28 days) concrete.**

AEC selected a 6 inch thick concrete pavement for the parking area. The recommended rigid pavement section is presented on Table 2.

Table 2. Recommended Concrete Pavement Section

Pavement Layer	Parking Area and Driveway
Portland Cement Concrete (in)	6
Stabilized Subgrade (1) (in)	6
Estimated 18-kip ESAL Load Capacity	319,766

Note: (1) Stabilized subgrade recommendations are presented in Section 5.3.2 of this report.

AEC used the DarWIN version 3.0 computer program to perform rigid pavement design. The estimated 18-kip ESAL load capacity for the parking lot pavement is presented in Table 2. The site designer should verify whether the proposed pavement sections will provide enough ESALs for the anticipated amount of site traffic. AEC should be notified if different standards or constants are required for pavement design at the site, so that our recommendations can be updated accordingly.

Concrete Pavement: Portland Cement Concrete (PCC) pavement should be constructed in accordance with Concrete Pavement Details of the 2022 FBC Construction Details.

Reinforcing Steel: Reinforcing steel should be in accordance with Concrete Pavement Details of the 2022 FBC Construction Details. Reinforcing steel is required to control pavement cracks, deflections across pavement joints, and resist warping stresses in rigid pavements. The cross-sectional area of steel (A_s) required per foot of slab width can be calculated in accordance with Equation (1) for both longitudinal and transverse steel.

$$A_s = FLW/(2f_s) \quad \text{.....Equation (1)}$$

where:
- A_s = Required cross-sectional area of reinforcing steel per foot width of pavement (in^2).
- F = Coefficient of resistance between slab and subgrade, F = 1.8 for stabilized soil.
- L = Distance between free transverse joints or between free longitudinal edges (ft).
- W = Weight of pavement slab per foot of width (lbs/ft).
- f_s = Allowable working stress in steel, 0.75 x (yield strength) (psi). i.e., f_s = 45,000 psi for Grade 60 steel.

Based on the Concrete Pavement Details of the 2022 FBC Construction Details, a 6 inch thick concrete pavement should be reinforced with #4 rebar, spaced at 24 inches center to center for both longitudinal and transverse directions. Expansion joints should have a maximum spacing of 60 feet, center to center, for both longitudinal and transverse directions.

5.3.2 Pavement Subgrade Preparation

AEC notes that the soil conditions encountered at the ground surface in Borings B-2 through B-4 generally consist of highly expansive lean/fat clay (CL/CH). AEC recommends that the subgrade beneath the proposed parking area pavement be stabilized to a depth of at least 6 inches. Exposed lean/fat clay (CL/CH) soils shall be stabilized with a minimum of 7 percent hydrated lime (by dry soil weight).

Subgrade Preparation: Pavement clearing and grubbing as well as grading should be performed in general accordance with Sections 02233 and 02315 of the 2022 COHSCS, respectively. Subgrade preparation should extend a minimum of 2 feet beyond the paved area perimeters. Existing pavement and base should be demolished, where present. The top 6 inches of existing soil and any deleterious materials at the ground surface should be removed and wasted. The excavation depth should be increased when inspection indicates

the presence of organics and deleterious materials to greater depths. The exposed soils should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove ant weak, compressible, or other unsuitable materials; such materials should be replaced with compacted general clay fill. General clay fill should be in accordance with Section 5.4.3 of this report.

After proof rolling, scarify the exposed subgrade to a depth of 6 inches and stabilize the exposed lean/fat clay (CL/CH) soils with a minimum of 7 percent hydrated lime (by dry soil weight). The stabilization rates provided should be used for estimating purposes only; the required stabilization rate should be determined by the CMT lab (optimum lime content by pH method, ASTM D 6276, is sufficient) during construction. Stabilization shall be performed in accordance with Section 02336 of the 2022 COHSCS. The stabilized subgrade should be compacted to at least 95 percent of their ASTM D 698 (Standard Proctor) dry density at a moisture content ranging from optimum to 3 percent above optimum.

5.4 Fill Requirements

5.4.1 Lime Stabilized Clay

Soils Stabilized with Hydrated Lime: AEC prefers that lime-stabilized clay be used as structural fill. Either: (i) imported lime-stabilized clay soils (stabilized offsite before delivery to the project site); or (ii) clay soils excavated onsite and treated with hydrated lime can be used. Clay soils excavated onsite should first be stabilized with a minimum of 7 percent hydrated lime (by dry soil weight). The amount of hydrated lime provided in this report is for estimation purposes only. The actual amount of lime required for stabilization should be determined by lime-series curve or pH method in a laboratory prior to construction. Lime stabilization should be done in general accordance with Section 02336 of the 2022 COHSCS. AEC prefers using stabilized soil as structural fill since compacted stabilized soil generally has high strength, low compressibility, and relatively low permeability.

Lifts and Compaction: Lime-stabilized clay fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

Lime-stabilized clay should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

5.4.2 Select Clay Fill

'Select' Fill: It is AEC's experience that 'select' fill material imported from sand and clay pits in the Greater Houston area is generally non-homogenous (i.e. composed of a mixture of sands, silts, and clays, instead of a homogenous sandy clay material) and of poor quality, and either contains too much sand or has large clay clods with high expansive potential. Use of this non-homogenous soil can result in poor long term performance of structures and pavements placed on top of the fill.

Select clay fill (whether imported from offsite or is already onsite) should consist of *uniform*, non-active inorganic lean clays with a PI between 10 and 20 percent, and more than 50 percent passing a No. 200 sieve. Material intended for use as select clay fill shall not have clay clods with PI greater than 20, clay clods greater than 2 inches in diameter, or contain sands/silts with PI less than 10. Sand and clay mixtures/blends are unacceptable for use as select clay fill. Sand/silt with clay clods is unacceptable for use as select clay fill. Mixing sand into clay or mixing clay into sand/silt is also unacceptable for use as select clay fill. **Prior to construction, the Contractor should determine if he or she can obtain qualified select clay fill meeting the above select clay fill criteria. The testing lab shall *reject* any material intended for use as select clay fill that does not meet the PI, sieve, and clay clod requirements above, without exceptions.**

Lifts and Compaction: All material intended for use as select clay fill should be tested prior to use to confirm that it meets select clay fill criteria. The fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

Select clay fill should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

Testing: **If select clay fill will be used, at least one Atterberg Limits and one percent passing a No. 200 sieve test shall be performed for each 5,000 square feet (sf) of placed fill, per lift (with a minimum of**

one set of tests per lift), to determine whether it meets select clay fill requirements. Prior to placement of pavement or concrete, the moisture contents of the top 2 lifts of compacted select clay fill shall be re-tested (if there is an extended period of time between fill placement and concrete placement) to determine if the in-place moisture content of the lifts have been maintained at the required moisture requirements.

5.4.3 General Clay Fill

General clay fill can be used beneath structural floor slabs or for fill areas that will not support proposed (or future) structures or pavements (i.e. for mass site grading). AEC recommends that general clay fill consist of a clean, cohesive soil (USCS Classification "CL" or "CH"). Granular soils (i.e. sands, silts, and gravel; not more than 50 percent retained on No. 200 sieve) should not be used as general clay fill.

General clay fill should be placed in loose lifts not exceeding 8 inches in thickness. The fill should be compacted to 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation

To mitigate site problems that may develop following prolonged periods of rainfall, it is essential to have adequate drainage to maintain a relatively dry and firm surface prior to starting any work at the site. Adequate drainage should be maintained throughout the construction period. Methods for controlling surface runoff and ponding include proper site grading, berm construction around exposed areas, and installation of sump pits with pumps.

6.2 Construction Monitoring

Site preparation (including clearing and proof-rolling), foundation and pavement construction, and subgrade preparation should be monitored by qualified geotechnical professionals to check for compliance with project documents and changed conditions, if encountered. AEC should be allowed to review the design and construction plans and specifications prior to release to check that the geotechnical recommendations and design criteria presented herein are properly interpreted.

7.0 LIMITATIONS

The information contained in this report summarizes conditions found on the date the borings were drilled. The attached boring logs are true representations of the soils encountered at the specific boring locations on the date of drilling. Reasonable variations from the subsurface information presented in this report should be anticipated. AEC should be notified immediately when conditions encountered during construction are significantly different from those presented in this report.

This investigation was performed using the standard level of care and diligence normally practiced by recognized geotechnical engineering firms in this area, presently performing similar services under similar circumstances. This report is intended to be used in its entirety. The report has been prepared exclusively for the project and location described in this report. If pertinent project details change or otherwise differ from those described herein, AEC should be notified immediately and retained to evaluate the effect of the changes on the recommendations presented in this report and revise the recommendations if necessary. The scope of services does not include a fault investigation. The recommendations presented in this report should not be used for other structures located at this site or similar structures located elsewhere, without additional evaluation and/or investigation.

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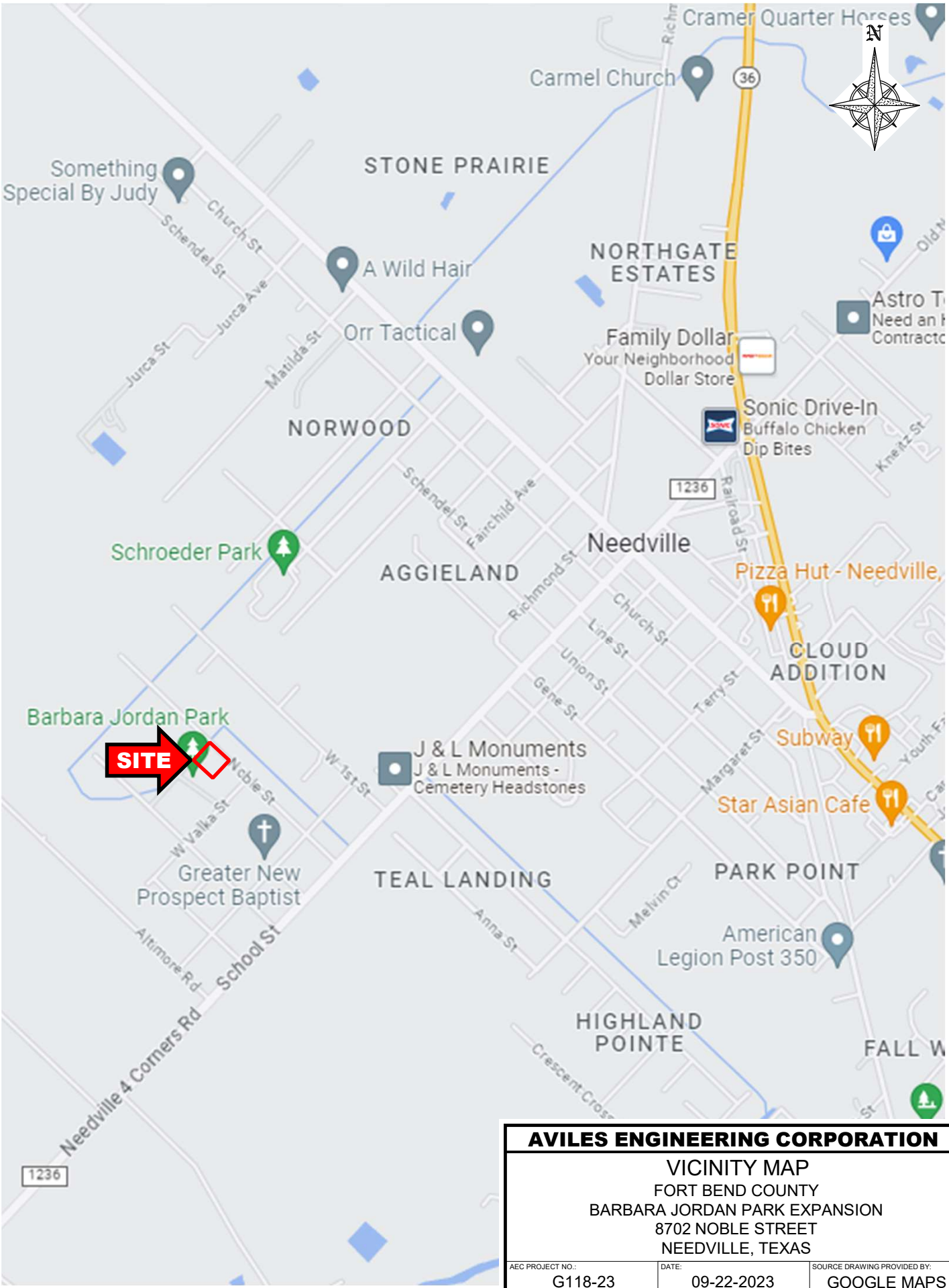
APPENDIX A



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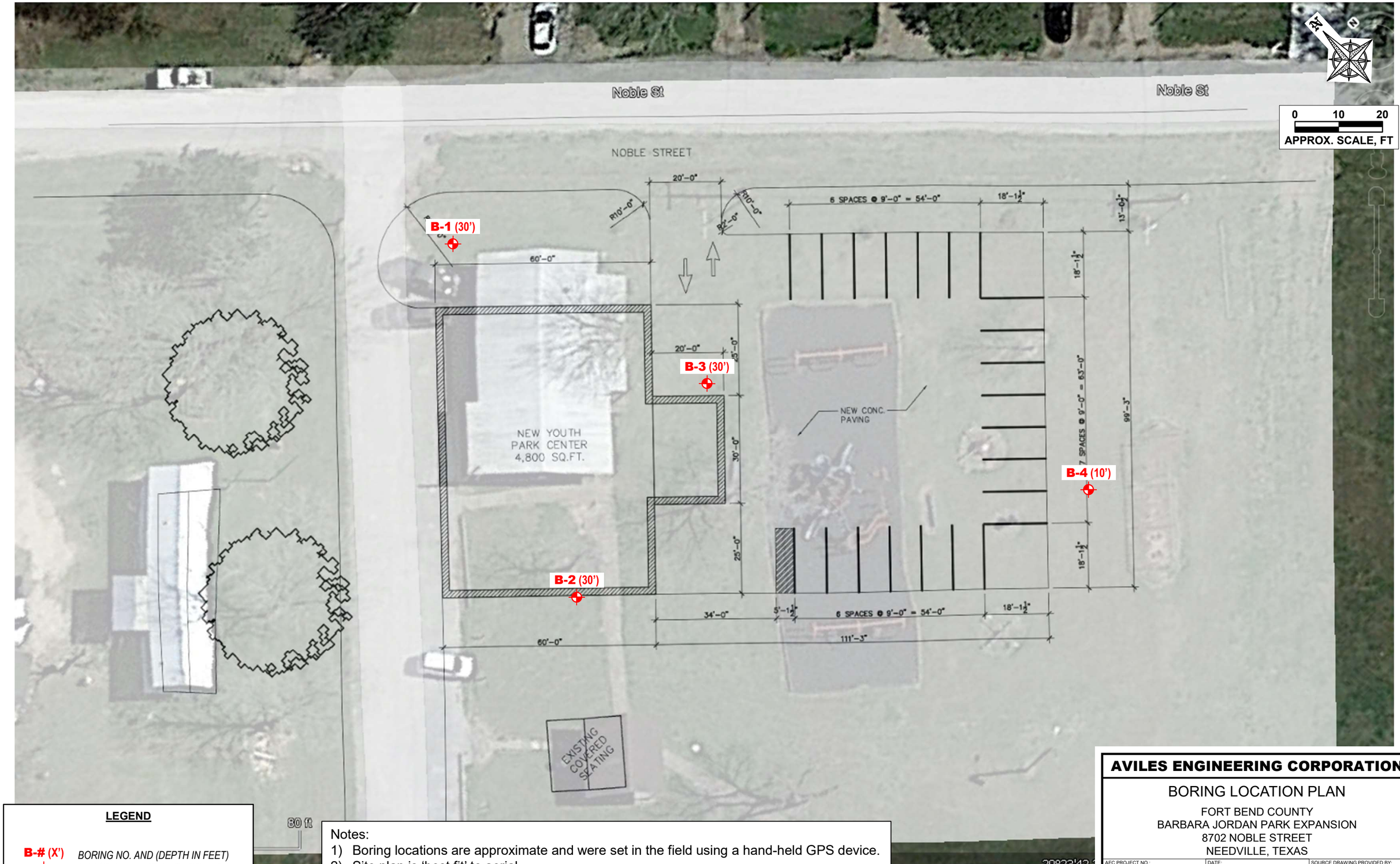
VICINITY MAP

FORT BEND COUNTY
BARBARA JORDAN PARK EXPANSION
8702 NOBLE STREET
NEEDVILLE, TEXAS

AEC PROJECT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G118-23	09-22-2023	GOOGLE MAPS
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
N.T.S.	DFP	PLATE A-1



LEGEND

B-# (X') *BORING NO. AND (DEPTH IN FEET)*
APPROXIMATE BORING LOCATION

Notes:
1) Boring locations are approximate and were set in the field using a hand-held GPS device.
2) Site plan is 'best fit' to aerial.

AVILES ENGINEERING CORPORATION

BORING LOCATION PLAN

FORT BEND COUNTY
BARBARA JORDAN PARK EXPANSION
8702 NOBLE STREET
NEEDVILLE, TEXAS

AEC PROJECT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G118-23	09-25-2023	VCS/GOOGLE
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
1" = 20'	WLW	PLATE A-2

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Fort Bend County Barbara Jordan Park Extension BORING B-1

DATE 08/01/2023 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF (△ Confined Compression, ● Unconfined Compression, ○ Pocket Penetrometer, □ Torvane; 0.5 1 1.5 2)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Approximate Surface Elevation (feet): 91.5								
			Fill: Light gray Silty Sand (SM), with crushed limestone and concrete rubble		8			30			
			Hard, gray Fat Clay (CH)		17	114.5	7.2				
5					19			88	69	20	49
			-reddish brown, with ferrous nodules 6'-8'		14	111.0					
			Medium dense, tan Sandy Silt (ML), with lean clay pockets	14	10						
10				12	14			61			
			Loose to dense, tan Poorly Graded Sand with Silt (SP-SM)	13	10						
15				10	8						
				8	7			11			
20				11	6						
25				36	5						
			-boring cave-in at 28.0 ft after completion of drilling	44	5						
30			Termination Depth = 30 feet								
35											

BORING DRILLED TO **30** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **V&S** DRAFTED BY **LW** LOGGED BY **JH**

PROJECT NO. G118-23

PLATE A-3

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Fort Bend County Barbara Jordan Park Extension BORING B-2

DATE 08/01/2023 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Approximate Surface Elevation (feet): 91.2				△ Confined Compression ● Unconfined Compression ○ Pocket Penetrometer □ Torvane 0.5 1 1.5 2				
			Brown Lean Clay with Sand (CL), with roots		11						
			Hard, gray and tan Fat Clay with Sand (CH)		16			82	72	19	53
5			-with ferrous nodules 4'-8'		16	117.0	4.33				
			-reddish brown and light gray 6'-8'		14						
			Hard, reddish brown Lean Clay (CL)		15			86	37	17	20
10			Loose to medium dense, tan Silty Sand (SM) -with lean clay pockets 10'-12'	14	11						
				12	5						
15			-with lean clay pockets 14'-18'	14	6			48			
				9	7						
			Loose to dense, tan Poorly Graded Sand with Silt (SP-SM)	10	4						
20											
				28	4			7			
25											
			-boring cave-in at 28.0 ft after completion of drilling	37	3						
30			Termination Depth = 30 feet								
35											

BORING DRILLED TO **30** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **V&S** DRAFTED BY **LW** LOGGED BY **JH**

PROJECT NO. G118-23

PLATE A-4

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Fort Bend County Barbara Jordan Park Extension BORING B-3

DATE 08/01/2023 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION Approximate Surface Elevation (feet): 91	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF △ Confined Compression ● Unconfined Compression ○ Pocket Penetrometer □ Torvane 0.5 1 1.5 2	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Fill: grayish brown Fat Clay with Sand (CH), with gravel and roots		19			84	79	23	56
			Hard, brown Fat Clay with Sand (CH), with ferrous nodules		18	111.4	5.17				
5					18						
			Hard, reddish brown Lean Clay with Sand (CL) -with ferrous nodules 6'-8'		11			75	34	16	18
					12	108.1					
10			Medium dense, tan Silty Sand (SM)	25	7						
				19	4						
15			Very stiff, tan Sandy Lean Clay (CL)	18	9			51			
			Loose, tan Silty Sand (SM)	9	4						
			Medium dense to very dense, tan Poorly Graded Sand with Silt (SP-SM)	13	5						
20											
				35	4			6			
25			-boring cave-in at 28.0 ft after completion of drilling								
				60	3						
30			Termination Depth = 30 feet								
35											

BORING DRILLED TO **30** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **V&S** DRAFTED BY **LW** LOGGED BY **JH**

PROJECT NO. G118-23

PLATE A-5

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Fort Bend County Barbara Jordan Park Extension BORING B-4

DATE 08/01/2023 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Approximate Surface Elevation (feet): 91				△ Confined Compression ● Unconfined Compression ○ Pocket Penetrometer □ Torvane 0.5 1 1.5 2				
			Hard, grayish brown Fat Clay (CH)		14			88	71	22	49
			-gray, with ferrous nodules 2'-6'		16	113.9	8.1				
5					16						
			Stiff to very stiff, brown Lean Clay with Sand (CL)		15			79	42	17	25
			-with sand seams 8'-10'		8	98.6					
10			Termination Depth = 10 feet								
15											
20											
25											
30											
35											

BORING DRILLED TO **10** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **V&S** DRAFTED BY **LW** LOGGED BY **JH**

PROJECT NO. G118-23

PLATE A-6

KEY TO SYMBOLS

Symbol Description

Strata symbols

Fill

High plasticity clay

Silt

Poorly graded sand with silt

Low plasticity clay

Silty sand

Misc. Symbols

○ **Pocket Penetrometer**

● **Unconfined Compression**

△ **Confined Compression**

Soil Samplers

Auger

Undisturbed thin wall Shelby tube

Standard penetration test

AYLES ENGINEERING CORP.

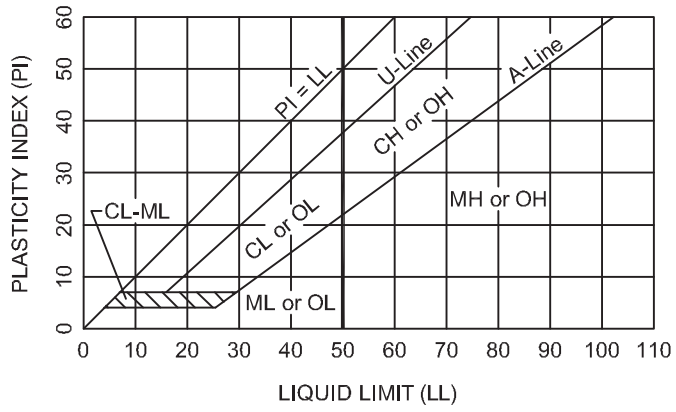
CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation D-2487

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well-graded gravel, well-graded gravel with sand
				GP	Poorly-graded gravel, poorly-graded gravel with sand
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	GM	Silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone on plasticity chart	GC	Clayey gravel, clayey gravel with sand
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well-graded sand, well-graded sand with gravel
				SP	Poorly-graded sand, poorly-graded sand with gravel
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	SM	Silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone on plasticity chart	SC	Clayey sand, clayey sand with gravel
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)		SILTS AND CLAYS (Liquid Limit Less Than 50%)		ML	Silt, silt with sand, silt with gravel, sandy silt, gravelly silt
				CL	Lean clay, lean clay with sand, lean clay with gravel, sandy lean clay, gravelly lean clay
				OL	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt
		SILTS AND CLAYS (Liquid Limit 50% or More)		MH	Elastic silt, elastic silt with sand, sandy elastic silt, gravelly elastic silt
				CH	Fat clay, fat clay with sand, fat clay with gravel, sandy fat clay, gravelly fat clay
				OH	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt

NOTE: Coarse soils between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone of the plasticity chart are to have dual symbols.

PLASTICITY CHART



Equation of A-Line: Horizontal at PI=4 to LL=25.5, then PI=0.73(LL-20)

Equation of U-Line: Vertical at LL=16 to PI=7, then PI=0.9(LL-8)

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree of Plasticity	Plasticity Index
None	0 - 4
Slight	5 - 10
Medium	11 - 20
High	21 - 40
Very High	>40

SOIL SYMBOLS

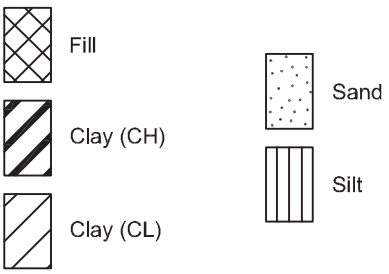


PLATE A-8

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TERMS USED ON BORING LOGS

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

6"	3"	3/4"	#4	#10	#40	#200	
BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002

SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength, Kips per Sq. ft.	SPT Blowcount
Very Soft	less than 0.25	< 2 bpf
Soft	0.25 to 0.50	2-4 bpf
Firm	0.50 to 1.00	4-8 bpf
Stiff	1.00 to 2.00	8-16 bpf
Very Stiff	2.00 to 4.00	16-32 bpf
Hard	greater than 4.00	>32 bpf

RELATIVE DENSITY OF COHESIONLESS SOILS FROM STANDARD PENETRATION TEST

Very Loose	<4 bpf
Loose	5-10 bpf
Medium Dense	11-30 bpf
Dense	31-50 bpf
Very Dense	>50 bpf

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows per Foot	Description
25	25 blows driving sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows driving sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows driving sampler 3 inches, during initial 6-inches seating interval.

NOTE: To avoid change to sampling tools, driving is limited to 50 blows during or after seating interval.

DRY STRENGTH ASTM D2488

None	Dry specimen crumbles into powder with mere pressure of handling
Low	Dry specimen crumbles into powder with some finger pressure
Medium	Dry specimen breaks into pieces or crumbles with considerable pressure
High	Dry specimen cannot be broken with finger pressure, it can be broken between thumb and hard surface
Very High	Dry specimen cannot be broken between thumb and hard surface

MOISTURE CONDITION ASTM D2488

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the easiness of breaking along these planes.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Friable	Crumbly, can be easily crushed with light pressure.
Blocky	Clays that have a block-like or polyhedral structure.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil types.
Interlayered	Soil sample composed of alternating layers of different soil types.
Intermixed	Soil sample composed of pockets of different soil types and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of calcium material.

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ASTM & TXDOT DESIGNATION FOR SOIL LABORATORY TESTS

SOIL TEST	ASTM TEST DESIGNATION	TXDOT TEST DESIGNATION
Unified Soil Classification System	D 2487	Tex-142-E
Moisture Content	D 2216	Tex-103-E
Specific Gravity	D 854	Tex-108-E
Sieve Analysis	D 6913	Tex-110-E (Part 1)
Hydrometer Analysis	D 7928	Tex-110-E (Part 2)
Minus No. 200 Sieve	D 1140	Tex-111-E
Liquid Limit	D 4318	Tex-104-E
Plastic Limit	D 4318	Tex-105-E
Standard Proctor Compaction	D 698	Tex-114-E
Modified Proctor Compaction	D 1557	Tex-113-E
California Bearing Ratio	D 1883	-
Swell	D 4546	-
Consolidation	D 2435	-
Unconfined Compression	D 2166	-
Unconsolidated-Undrained Triaxial	D 2850	Tex-118-E
Consolidated-Undrained Triaxial	D 4767	Tex-131-E
Permeability (constant head)	D 5084	-
Pinhole	D 4647	-
Crumb	D 6572	-
Double Hydrometer	D 4221	-
pH of Soil	D 4972	Tex-128-E
Soil Suction	D 5298	-
Soil Sulfate	C 1580	Tex-145-E
Organics	D 2974	Tex-148-E

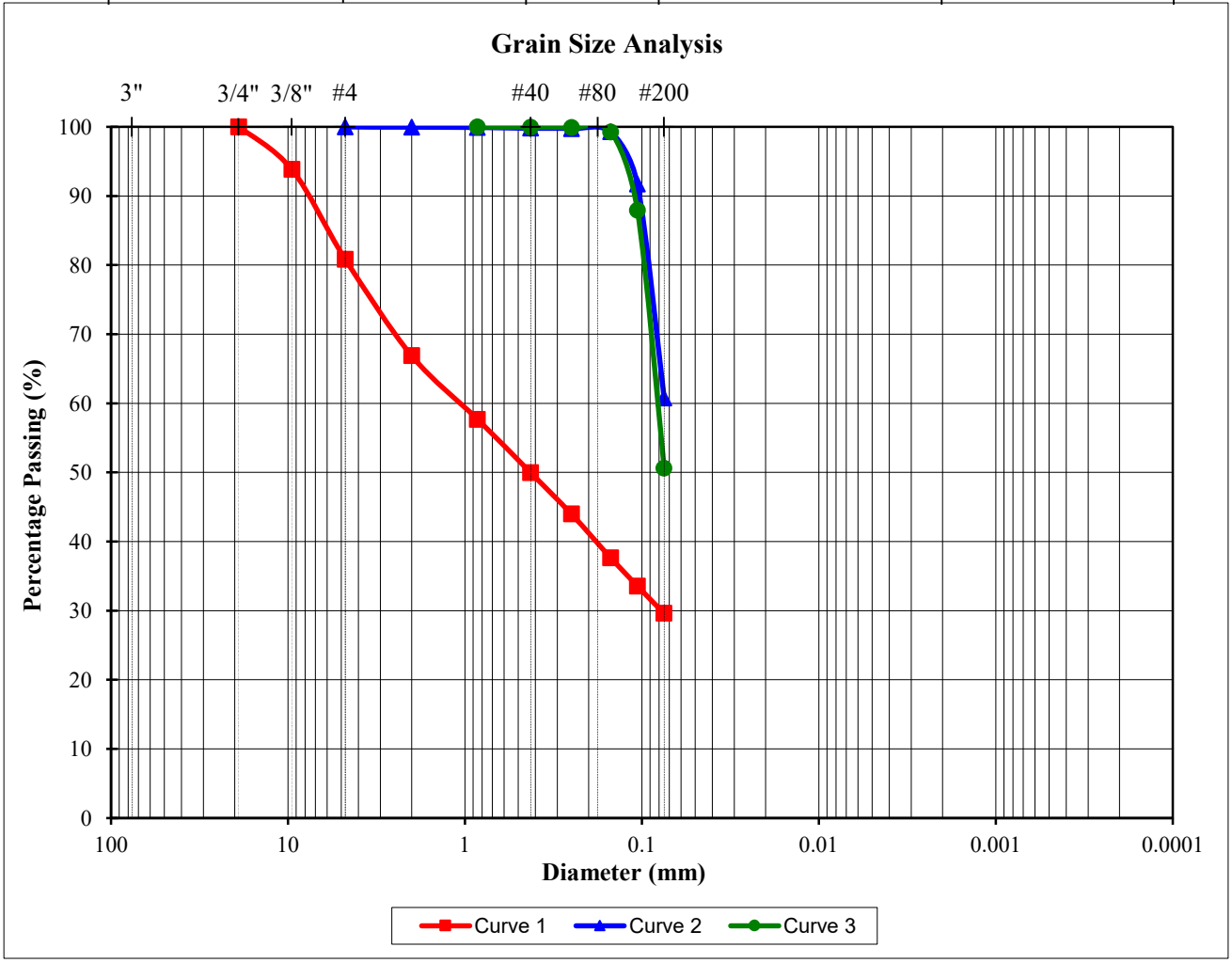
AVILES ENGINEERING CORPORATION

Consulting Engineers - Geotechnical, Construction Materials Testing, Environmental

GRAIN SIZE ANALYSIS - SIEVE (ASTM D 6913)

Project: Fort Bend County Barbara Jordan Park Extension **Job No.:** G118-23
Location of Project: Fort Bend County, Texas

Gravel	Sand		Silt	Clay
	Coarse to Medium	Fine		



Curve	Boring	Depth (ft)	Soil Description	D50 (mm)	Cu	Cc
1	B-1	0-2	Silty Sand (SM)	0.43	N/A	N/A
2	B-1	10-12	Sandy Silt (ML)	N/A	N/A	N/A
3	B-3	14-16	Sandy Lean Clay (CL)	N/A	N/A	N/A

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APPENDIX B

Plate B-1 Straight Sided Drilled Shaft Capacity Curves

G118-23 Fort Bend County Barbara Jordan Park Extension
Straight Shaft Drilled Shaft Capacity Curves (Based on Borings B-1 to B-3)

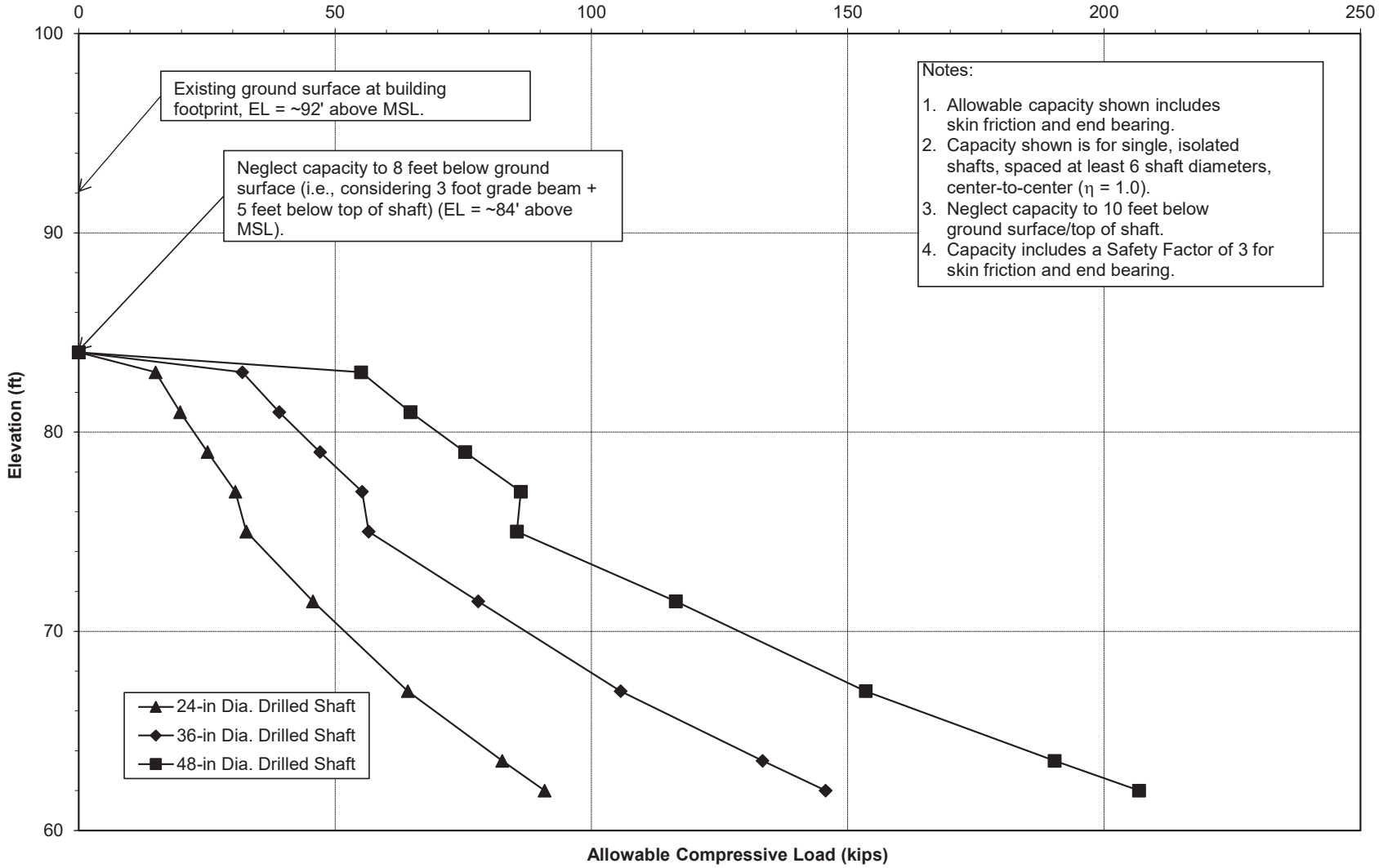

PLATE B-1