CITY OF HOUSTON
INVITATION TO BID

Issued: June 4, 2010

Bid Opening:
Sealed bids, in duplicate, will be received by the City Secretary of the City of Houston, in the City Hall Annex, Public Level, 900 Bagby, Houston, Texas 77002 until **10:30 A.M.** Thursday, **June 24, 2010,** and all bids will be opened and publicly read in the City Council Chamber, City Hall Annex, Public Level, 900 Bagby at 11:00 A.M. on that date for the purchase of:

FACILITY IMPROVEMENTS AT FIRE STATION No. 20
(PHASE 2)
FOR THE GENERAL SERVICES DEPARTMENT
Bid No. S50-C23654
NIGP Code: 910-51

Buyer:
Questions regarding tits solicitation should be addressed to Arturo Lopez, Senior Procurement Specialist**, at 832-393-8731or e-mail to arturo.lopez@cityofhouston.net**

Electronic Bidding:
In order to submit a bid for the items associated with tits procurement, you must fill in the pricing information on the "**PLACE BID"** page.

Prebid Conference:
A Pre-Bid Conference will be held for all Prospective Bidders in the Strategic Purchasing Division, Concourse Level (Basement), Conference Room, #1 City Hall, 901 Bagby, at **10:00 a.m. on Wednesday, June 16, 2010**. **The site visit will be scheduled at the pre-bid conference.**

All Prospective Bidders are urged to be present. It is the bidder's responsibility to ensure that they have secured and thoroughly reviewed all aspects of the solicitation documents prior to the Pre-Bid Conference. Any revisions to be incorporated into tits solicitation document arising from discussions before, during and subsequent to the Pre-Bid Conference will be confirmed in writing by Letter(s) of Clarification prior to the bid due date. Verbal responses will not otherwise alter the specifications, terms and conditions as stated herein.

Bidding forms, specifications, and all necessary information should be downloaded from the Internet at www.houstontx.gov/purchasing/index.html. By registering and downloading tits solicitation document, all updates to tits solicitation document will be automatically forwarded via e-mail to any registered bidders. Tits information may also be obtained from the Supplier Assistance Desk, Strategic Purchasing Division, 901 Bagby, Concourse Level, Houston, Texas 77002.

The place of the bid opening may be transferred in accordance with Paragraph (b), (5) of Section 15-3 of The Code of Ordinances, Houston, Texas. The bid-opening meeting may be rescheduled in accordance with Paragraph (b), (6) of said Section 15-3.

The City reserves the right to reject any or all bids, or to accept any bid or combination of bids deemed advantageous to it.
City employees are prohibited from bidding on tits solicitation in accordance with the Code of Ordinances Section 15-1.

*__CONTENTS__:

*NOTE 1: Actual page numbers for each section may change when the solicitation document is downloaded from the Internet or because of letters of clarification. Therefore, bidders must read the solicitation document in its entirety and comply with all the requirements set forth therein.
***NOTE 2: To be considered for award please submit the electronic bid form and the forms listed in section A, including the signature page, which must be signed by a company official authorized to bind the company and a 10% Bid Bond.**

SECTION A

FORMAL ONE-TIME BID
FACILITY IMPROVEMENTS AT FIRE STATION No. 20
(PHASE 2)
FOR THE GENERAL SERVICES DEPARTMENT
Bid No. S50-C23654
NIGP Code: 910-51

To The Honorable Mayor
and City Council Members
of the City of Houston, Texas (the "City"):

The undersigned hereby offers to provide services necessary for the **Facility Improvements at Fire Station No. 20 (Phase 2), located at 6902 Navigation @ Macario Garcia,** F.O.B. destination point Houston, Texas, in accordance with the City's Specifications and General Terms & Conditions and/or samples/drawings provided herein. When issued by the City of Houston, Letters of Clarification shall automatically become part of tits bid document and shall supersede any previous specifications or provisions in conflict with Letters of Clarification. It is the responsibility of the bidder to ensure that it has obtained all such letters. By submitting a bid on tits project, bidder shall be deemed to have received all Letters of Clarification and to have incorporated them into the bid.

The City may accept tits bid offer by issuance of a Notice of Award Letter and/or a Purchase Order at any time on or before the 120th day following the day tits Official Bid Form is opened by the City. Tits offer shall be irrevocable for 120 days after bid opening or for 90 days after City Council awards the bid, whichever comes last, but tits period may be extended by written agreement of the parties.

The City reserves the right to INCREASE quantities during the twelve-month period following the issuance of the first purchase order subject to agreement in writing by the Prime Contractor/Supplier to honor the same bid price.

The City reserves the option, after bids are opened, to adjust the quantities listed on the electronic bid form upward or downward, subject to the availability of funds, and/or make award (s) on a line item basis.

SECTION A

Documents/forms must be downloaded from the City's Website
http://www.houstontx.gov/purchasing/index.html

Additional Required Forms to be Included with tits bid:

In addition to the electronic Bid Form and the Official Signature Page, the Forms listed in Table 1 **must be completed and submitted to the Office of the City Secretary on or before the date and time the bid is due:**

Table 1
Affidavit of Ownership
Fair Campaign Ordinance
Statement of Residence
Conflict of Interest Questionnaire
Pay or Play Contract Compliance Acknowledgement Form 1a
10% Bid Bond
Contractor References

Table 2 lists other documents and forms that should be viewed/downloaded from the City's website, but are not required to be submitted with the bid. The City will request these forms, as applicable, to be completed and submitted to the City by the recommended/successful bidder:

Table 2
Formal Instructions for Bid Terms
Drug Forms
Insurance Certificates Over $50,000.00
OCP Insurance Certificate Over $100,000.00
Pay or Play Form 2 / Certification of Agreement to Comply
Performance, Maintenance and Statutory Payment Bonds
2010 Building Construction Wage Rate

Questions concerning the Bid should be submitted in writing to: City of Houston, Strategic Purchasing Division, 901 Bagby, Room B506, Houston, TX 77002, Attn: Arturo Lopez or via fax: 832-393-8759 or via email (preferred method) to arturo.lopez@cityofhouston.net no later than ***4:00 PM, Friday, June 18, 2010.***

PERMITS:
Successful Contractor shall be responsible for securing any and all permits for proposed work. Any fee charged for these permits should be the responsibility of the Contractor and not the City of Houston.

CITY BUILDING CODES:
All work performed or equipment installed shall be in strict accordance with the City of Houston Building Codes. The Contractor will immediately correct any deficiencies discovered during work or after completion. Failure to correct deficiencies will result in the City having corrections made at the Contractor's expense.

BID BOND:
The Contractor shall be required to provide and submit with the bid a Bid Bond in the amount of 10% of the total amount bid by the Contractor. The Bid Bond shall be in the same form as that distributed by the City, and attached hereto, all duly executed by tits Bidder (as "Principal") and by a corporate surety company licensed to do business in the State of Texas, and if the amount of the bond is greater than $100,000.00 the surety must hold a certificate of authority from the United States Secretary of the Treasury, or a Cashier's or a Certified check in a like amount. Company or personal checks are not acceptable.

PERFORMANCE BOND and PAYMENT BOND:
The successful Contractor(s) shall be required to provide a Performance and Payment Bond in the total amount (100%) of the Contract if the award is in excess of $25,000.00.

The Performance and/or Payment Bond shall be in the same form as that distributed by the City, and attached hereto, all duly executed by tits bidder (as "Principal") and by an incorporated surety company licensed to do business in the State of Texas. If the amount of the bond is greater than $100,000.00 the surety must hold a certificate of authority from the United States Secretary of the Treasury.

The Contractor(s) shall be required to provide a Performance and/or Payment Bond as outlined above, which will be delivered to the City Purchasing Agent of the City, on or before the tenth (10^{th}) day following the day the bidder receives notice from the City.

MAINTENANCE BOND:
The Contractor shall furnish a maintenance bond in the total (100%) bid amount in the form required by the City (samples attached). One bond, also referred to as the One Year Maintenance Bond, will be conditioned upon Contractor's repair, replacement or restoration of any work or any portion of the work which is found to be defective or fails in any way to comply strictly with tits contract or the plans and specifications for such work within a period of one (1) year from the date of acceptance of such work by the City Council or after the date that the "CO", or its designee in writing, determines, in a written notice to the Contractor, to be the date upon which the project is both substantially complete and available for the full and beneficial occupancy or use of the City.

QUALITY AND WORKMANSHIP:
The bidder must be able to demonstrate upon request that it has performed satisfactorily, services similar to the services specified herein. The bidder will provide records of warranty and repair services performed for others upon request. The City of Houston shall be the sole judge whether the services performed are similar to the scope of services specified herein.

CONTRACTOR'S QUESTIONNAIRE

In order to receive bid award consideration, the bidder must be able to demonstrate that they are currently providing or have had at least one contract, for **Civil Work and Drainage Systems, Foundation and Structural Steel Construction, Masonry Wall and Dampproofing, Glazing, Roof and Gutter System, and Mechanical System Installation** that is similar in size and scope to this contract. **Bidder must have references documenting that it has performed Civil Work and Drainage Systems, Foundation and Structural Steel Construction, Masonry Wall and Dampproofing, Glazing, Roof and Gutter System, and Mechanical System Installation.** The reference(s) should be included in the space provided below. Please attach another piece of paper if necessary. If references are not included with the bid, the bidder shall be required to provide such references to the City of Houston within five working days from receipt of a written request from the City of Houston to do so. **Bidder's capability and experience shall be a factor in determining the Contractor's responsibility.**

1. Business Name: _____

Business Address: _____

City, State, Zip: _____

Name of Owner/Contact Person:

_____

Phone: _____ Fax: _____Email:_____

No. of Years providing Service to tits business: _____

2. Business Name: _____

Business Address: _____

City, State, Zip: _____

Name of Owner/Contact Person:

_____

Phone: _____Fax:_____ Email:_____

No. of Years providing Service to tits business: _____

3. Business Name: _____

Business Address: _____

City, State, Zip: _____

Name of Owner/Contact Person:

_____

Phone: _____Fax:_____ Email:_____

No. of Years providing Service to tits business: _____

SITE INSPECTION

The City of Houston reserves the right to inspect the bidder's current place of business to evaluate equipment condition and capabilities, staff experience, training and capabilities, and storage capabilities as they relate to the performance of tits contract.

SECTION B
SCOPE OF WORK

1.0 SUMMARY OF WORK

1.1 The contractor shall provide all supervision, labor, materials, equipment, machinery, tools, transportation and ancillary items necessary to complete the work in strict accordance with the specifications and drawings herein. Civil work shall include storm and sanitary underground systems, foundation and structural steel construction, exterior masonry wall construction including dampproofing, glazing, roof and gutter systems, and mechanical system installation.

1.1.1 Technical Specifications as per Division I Sections and specified herein.

1.1.2 Drawings

1.1.3 Structural Specifications

2.0 PERFORMANCE TIME:

2.1 The Contractor shall have ***120 calendar days*** to complete all work associated with tits project after receipt of the Notice – To - Proceed.

3.0 RELATED SECTIONS:

3.1 All Documents and Sections that are not visible in the Technical Specifications can be viewed from the following Public Works and Engineering web link:
http://pwecms.cityofhouston.net/forms-amp-policies/search_result-2.html

4.0 TECHNICAL SPECIFICATIONS

SECTION 4 - SPECIFICATIONS

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Fire Station 20 – (Part 2)

05300	METAL DECKING

DIVISION 6 - WOOD AND PLASTIC (NOT USED)

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07210	BUILDING INSULATION
07512	MODIFIED BITUMINOUS ROOFING
07600	FLASHING AND SHEETMETAL
07920	CAULKING AND SEALANTS

DIVISION 8 - DOORS AND WINDOWS (NOT USED)

DIVISION 9 – FINISHES (NOT USED)

DIVISION 10 – SPECIALTIES (NOT USED)

10200	ALUMINUM LOUVERS

DIVISION 11 – EQUIPMENT (NOT USED)

DIVISION 12 – FURNISHINGS (NOT USED)

DIVISION 13 - SPECIAL CONSTRUCTION (NOT USED)

DIVISION 14 – CONVEYING SYSTEMS (NOT USED)

DIVISION 15 – MECHANICAL

15000	HVAC GENERAL REQUIREMENTS
15100	MECHANICAL, HVAC EQUIPMENT
15105	MISCELLANEOUS EQUIPMENT
15120	MECHANICAL, VIBRATION ISOLATION
15140	MECHANICAL MOTORS AND CONTROLLERS
15250	THERMAL INSULATION

Section 01000

GENERAL CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.01 BIDDER'S REPRESENTATION

A. Each bidder in submitting its bid proposal represents that they have read and understands the bidding documents, drawings and the specifications, including the portion of the work under other contractors, and has visited the project site, and familiarized himself/herself with the local conditions under which the project is to be performed.

B. Each bidder represented that they have compared the site's existing conditions and compared it with the drawings and specifications, and satisfied himself/herself of the conditions of delivery, handling, storage of materials, and all other matters that are incidental to the work before submitting its bid or proposal.

C. Each bidder represents that its bid or proposal is based upon the materials and/or equipment described in the project's drawings and specifications.

D. Submission of a bid or proposal will be considered as evidence of the bidder's representation. No allowance will be made to the successful contractor by reason of any error or omission on its part due to neglecting the requirements of tits article.

1.02 GENERAL STIPULATIONS

A. Each contractor shall be responsible for the obtainment of all required trade permits under its contract, including the payment of all applicable fees to the governmental authorities with the jurisdiction over the project.

B. The drawings, in many instances, are schematic and do not define exact locations or dimensions. Items furnished may vary in dimensions and other ways from the specific items called for in the drawings. In such cases, the contractor shall, prior to performing the work, determine the exact position or dimensions by means of field measurements, drawings furnished by the suppliers and/or coordination with other trades.

C. Information as to existing conditions shown on the drawings reflect the best available data at the time the drawings were prepared, each contractor shall investigate and verify the data in the field prior to submitting its bid or proposal, and prior to start of field construction.

1.03 RELATION OF THE DOCUMENTS

A. Complementary: The drawing and specifications are complementary and anything included in one, but not in the other shall be provided as if included completely in both. In case of conflict between the documents or within either, the Engineer shall determine the intent.

B. Cost Basis: In case of conflicts, the requirement defining the greater quantity and/or the higher quality shall govern unless otherwise directed.

C. Standard Reference Documents: Various Standards Association documents are included by reference such as ASTM, ACI, AISC, etc. Provisions of each of these documents are basic to the contract unless exceeded by the drawings or specifications. Where building code standards apply to similar provisions, they shall govern unless exceeded by the referenced standard drawings or specifications.

D. General Conditions of the Construction Contract: Unless otherwise indicated in the contract documents, the "General Conditions for the Contract for Construction" fully applicable to tits project is "AIA Document A201-2007" published by the American Institute of Architects.

1.04 CONTRACTOR'S USE OF PREMISES AND ACCESS

A. Contractor's use of the premises shall be confined to established work and storage areas and approved access routes only, and he shall be responsible for protection and restoration to original conditions of all unaltered areas affected by the work.

B. Where not otherwise shown, details of work area enclosures, determination of access ways, and other limitations of Contractor's use of existing premises shall be developed with the Owner before commencement of the work and recorded for mutual understanding of the parties, and thereafter, any required or advisable changes shall likewise be developed with the Owner and recorded.

C. Protections: The Contractor is responsible for the installation of fences, barricades, temporary partitions, etc. with suitable locked doors or gates as required. These shall be provided for the protection of workers, occupants, the public and the work.

D. Separate Contractors: Accommodation shall be made for the requirements of separate contractors working on the same project.

1.05 SCHEDULE OF VALUES

No later than 20-days following issuance of letter of intent by the Owner, the Contractor shall furnish to the Owner Representative the Schedule of Values listing the names of major subcontractors and the cost breakdown of each subcontractor or trade, separated by labor material and equipment cost for each.

1.06 TEMPORARY FACILITIES

A. Lighting & Power: The contractor shall provide suitable lighting and power for all trades working on the project, including temporary wires for all poles, meter, lighting fixtures, expenses and charges for electric current, etc. At the completion of the project, or upon instructions from the Owner, all such temporary wires, poles, meters, etc. shall be removed from the project site.

B. Water: The contractor shall provide all water requirements for the construction of the project, including all necessary connections and fees. At project completion or upon Owner's instructions all such temporary piping and fittings shall be removed from the project site.

C. Sanitary: The contractor shall provide suitable portable toilets for the use of all workmen engaged on the project. Proper ventilation shall be provided and a sanitary condition maintained at all times. These facilities shall meet all local codes and regulations.

D. Winter Heating: The contractor shall provide portable heaters for the use of all trades, and the protection from condensation of work in place, OSHA and local code fire safety requirements shall be observed at all times.

E. Trash: A trash dumpster shall be provided by the contractor to facilitate the collection of construction debris. Hauling and appropriate fees to an approved dump site to be the responsibility of the Contractor.

F. Field Office: Provide a weather tight transportable building to serve as job office available for subcontractors and engineer with lights, heat & A/C, and phone. Provide as a minimum, a plan rack, table and desk with proper drawings and specifications.

G. Contractor shall be responsible for all Power and Utilities consumption costs until the official date of substantial completion determined by the Owner, Contractor and Engineer.

1.07 TAXES

A. Each bidder shall include in its bid or proposal amount, all applicable taxes associated with labor, materials and/or equipment incorporated into the project.

1.08 COOPERATION WITH OTHER CONTRACTORS

A. Each Contractor shall provide its own facilities to perform its work and shall cooperate with other contractors to facilitate the execution of theirs.

1.09 WARRANTY/GUARANTEE

A. Warranty/Guarantee on all material, equipment and labor shall be for a minimum of 1-year from the date of Substantial Completion, additional Warranty/Guarantee as required by these specifications shall remain in full force and effect.

1.10 SAFETY MEASURES

A. General Requirements: The contractor must also comply with Occupational Safety and Health Act (OSHA) Standards. OSHA Standards are subject to change. It is the Contractor's responsibility to maintain familiarity with OSHA Standards which are current.

B. Electrical Work:

1. Electrical work will not be performed on or near energized lines or equipment unless specified in the plans and specifications.

2. The Contractor must make arrangements with the appropriate entities for de-energizing lines and equipment so that work may be performed. All outages shall be reported through the authorized representative of the Owner a minimum of 7 days, unless otherwise specified, prior to the beginning of the requested outages.

C. Radiation Permits or Authorizations: Contractors contemplating the use of radioactive materials or radiation producing equipment while performing work on tits contract must obtain written authorization from the Owner.

D. Self-Propelled Elevating Work Platforms: All self-propelled elevating work platforms will be designed, constructed, maintained, used, and operated in accordance with the guidance provided in American National Standard for Self-Propelled Elevating Work Platforms (ANSI A92) together with any amendments, which may be in force at time contract is awarded.

E. Supporting Systems: “Supporting Systems, i.e., piling, cribbing, shoring, etc., shall be designed by a qualified person that meets accepted engineering requirements. Submit supporting systems construction details and design, which bear the seal of a licensed professional engineer.”

F. Telephone: A telephone or equivalent means to immediately initiate emergency response services shall be accessible at the job site at all times while work is underway.

G. Guarding of Sloped Roofs: A passive means of fall protection, such as guardrails or catch platforms, shall be used on all roofs where the fall distance exceeds six feet

1.11 CONSTRUCTION/ERECTION SUPPORTS AND LOADS

A. The lateral stability of tits structure is dependent on the total completion of all interconnected structural roof, wall, and floor framing/decking systems. The Contractor shall provide and adequately install and maintain all temporary supports such as temporary guys, lateral bracing, false work, cribbing, and any other type structural supports required for a safe erection operation to maintain stability of the structure until all structural systems are interconnected as required by the contract plans and specifications.

END OF SECTION

Section 01040

GENERAL COORDINATION

PART 1 - GENERAL

1.01 DAILY REPORT

A Contractor shall prepare daily Field Report in format directed and submit to Owner's Representative weekly.

1.02 RELATIONSHIP BETWEEN TRADES

A. Require cooperation and coordination between various Trades and Subcontractors whose work is dependent upon one another. Schedule such work so as to prevent delays in dependent work and so that all related work will progress together. Require each Trade or Subcontractor to make necessary provisions for the requirements of such other work areas. No additional compensation for extra work incurred through the lack of cooperation and coordination between various Trades and Subcontractors will be allowed.

1.03 ACCEPTANCE OF PRIOR WORK

A. New Work: Work executed in relation to following work shall be inspected and notice given of any defects, improper workmanship or materials, or other conditions that would affect the satisfactory execution and permanency of such following work. No further work shall be executed until such defects or conditions have been corrected. The absence of any such notifications will be construed as an acceptance by these Trades or Subcontractors of the prior related work, and later claims of defects in tits work will not in any way relieve the Prime Contractor from responsibility of the resulting defects.

1.04 MEASUREMENTS

A. Verify the governing lines, levels and dimensions of the premises, establish the lines and levels for construction from the data as confirmed, tape all dimensions and turn all angles by instrument and verify by triangulation and closure. Verify dimensions on existing work and report in writing all differences from the documents. Submit request for the direction prior to proceeding with the work. Verify all dimensions of new work as constructed and make good all discrepancies as directed. Layout rough and finish construction horizontally and vertically as the work progresses and verify the placement of the work of the various trades and subcontracts.

1.05 DOCUMENTS AND STANDARDS AT THE SITE

A. Drawings, Specifications and Addenda: One copy of the Drawings, Specifications and Addenda shall be kept in good order in the project office for ready reference. These copies shall not be taken on to the work. All Addendum changes shall be noted appropriately on the Drawings and in the Specifications before starting the work.

B. Shop Drawings, Product Data and Samples: One copy of all approved Shop Drawings and Product Data bearing the Engineer's or Consultants' approvals shall be forwarded to the project office on receipt and kept in an orderly file system for ready reference for the duration of the project. One of each set of approved selection samples shall be kept in the field office together with storable approved workmanship samples. Workmanship

samples made in place shall be identified and preserved until completion. Non-storable workmanship or product samples shall be located in protected site areas and preserved until completion of the governed work.

C. Change Record Prints: The set of Drawings required by the General Conditions to be kept for the Owner's Representative at the site shall be marked CHANGE RECORD PRINTS. Do not use tits set for construction purposes. Record and date each change made during construction on tits set. At the time of Substantial Completion deliver the full set of Change Record Prints to the Engineer. The record Prints will be checked monthly by the Owner to determine that they are current. Tits will be a requirement for issuance of a Certificate for Payment.

D. Standard Reference Documents: When directed, or as necessary to properly execute the work, copies of literature, standards and other data referred to but not included in the Specifications shall be available in the field office.

1.06 UTILITY SERVICE INTERRUPTIONS

A. Whenever, as a result of tits Work, there will be an interruption in any utility service to any existing facility, submit in writing at least 2 weeks prior to the anticipated interruption, a request to the Owner stating the predicted time and duration of the interruption. No such services may be interrupted without the Owner's approval.

1.07 SAFE LOADING

A. The Contractor shall ascertain the design loads and shall not load or permit loading of the structure beyond the design limits either by shoring, stockpiling or otherwise, and he shall make good all spread, deflection, cracking or other damage to the structure due to such cause as directed without cost to the Owner.

1.08 CUTTING AND PATCHING

A. Leave all chases, holes, and openings straight, true, and of proper size and cut those in existing work as may be necessary for the proper installation of the work. Consult with all Subcontractors concerned, regarding proper locations and size. In case of conflict between requirement for cutting and patching and any other requirement of the Work, submit request for direction before proceeding with the Work. In case of failure to leave or cut them in the proper place, they shall be cut afterward at no expense to the Owner.

B. No excessive cutting will be permitted, nor shall any piers or other structural members be cut without prior approval.

C. After such work has been installed, satisfactorily and carefully fit around, close up, repair, patch, and point up all cuts.

D. All work shall be done with proper tools by careful workmen of the particular trade to which work belongs and shall be done without extra expense to the Owner.

E. No description of specific cutting, patching, digging, etc., required for the work under a Specification Section that may be required for the proper accommodation of that work to the work of other trades shall relieve the Contractor from responsibility described herein. Execute tits work with competent workmen skilled in the trade required.

END OF SECTION

Section 01120

REMODELING PROCEDURES

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION OF WORK OF TITS SECTION

A. Work in general, includes procedures pertaining to remodeling, alteration, minor demolition, cutting, patching, removal, refinishing, relocation, and disposal work required throughout the Project and becomes a part of each Section and Division where remodeling, alteration, minor demolition, cutting, patching, removal, refinishing, relocation, and disposal work is required, with the same force and effect as if written in full therein.

B. The General Contractor, subcontractors and/or vendors are responsible for visiting the Project Site to determine by inspection all existing conditions, including access to the Site, the nature of structures, objects, and materials to be encountered, and all other facts concerning or affecting the Work. Information on the Drawings showing existing conditions does not constitute a guarantee that other items may not be found or encountered. Claims for additional time or extra costs will not be granted.

C. Obvious existing conditions, installations, and obstructions affecting work of tits Section shall be taken into consideration as necessary work and included as part of work of tits Section, the same as though completely shown or described.

1.02 REFERENCES

A. In addition to those requirements of local ordinances and governing codes, work shall be performed under the following regulations:

1. American National Standards Institute (ANSI): Safety Requirements for Demolition, Document A10.6
2. Occupational Safety and Health Administration (OSHA): Construction Safety Act, Part 1926

1.03 SUBMITTALS

A. Responsibility for planning and effective implementation of the Work, as well as safety to persons and property is the total responsibility of the Contractor. Tits responsibility shall not transfer to the Owner, Architect, Engineer or governing authorities.

B. Demolition procedures and operational sequence should consider permits and notices authorizing demolition, certificate of severance of utility serves, if required, method of traffic maintenance, permit for transport and disposal of debris, location of disposal area, etc.

1.04 PROJECT CONDITIONS

A. Contractor shall accept the conditions of the jobsite as they exist and perform its work accordingly.

B. Any adverse condition which might affect the performance of the work described in these specifications must be brought to the attention of the Owner's Representative in writing immediately upon its discovery.

C. Secure field measurements required for proper installation of work covered by tits Section. Exact measurements are Contractor's responsibility.

1.05 QUALITY ASSURANCE

A. Perform remodeling, alteration, minor demolition, cutting, patching, removal, refinishing, relocation, and disposal work in accordance with Federal, State, and local health and safety standards, codes and ordinances. Where conflicts occur, comply with the more restrictive requirements.

B. Perform remodeling, alteration, minor demolition; cutting, patching, removal, refinishing, and relocation work in such a manner as to preserve the aesthetic and structural integrity of materials and construction.

1.06 JOB CONDITIONS

A. Protections: Provide temporary protections and conduct operations to prevent injury to persons, buildings, including adjacent facilities and structures.

1. Erect temporary covered passageways, as required by authorities having jurisdiction, to ensure safe passage around demolition and removal work areas.
2. Provide temporary closures and covers to prevent entry of water and weather into existing facilities.
3. Provide interior and exterior shoring, bracing, and support as necessary to prevent movement, settlement, or collapse of structures to be demolished or removed and adjacent facilities to remain.

1.07 SEQUENCING/SCHEDULING

A. A written schedule shall be established and approved by Architect and Owner’s representative, prior to construction. Schedule work so as to impose a minimum of hardship on the present operation of the facilities and the performance of the work of other trades.

B. Maintain existing utilities indicated to remain, keep in service and protect against damage during demolition and removal operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the governing authorities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Matching Existing Work: Except where otherwise specifically indicated or specified as a definite change, the finish materials and appearance of the new work shall match the existing work and shall be relatively imperceptible in the finished work when viewed under finished lighting conditions from a distance of 5 ft.

B. Cutting

1. Structural Elements: If not specifically shown, removal or alteration only upon written approval of the Structural Engineer. Do not damage or alter any structural element of the existing building. Where drilling or fastening to reinforced concrete construction is required, Use appropriate metal detector devices at existing structure to determine rebar locations and potential for tension release before proceeding. Notify Architect in each instance when conflict occurs. Architect will determine corrective action where required. Do not proceed until corrective action has been received.
2. Concrete: Saw cut where exposed to view. Jack hammering below view with electric or pneumatic equipment is acceptable only with scheduled approval of Owner.
3. Masonry: Cut back masonry to joint lines and remove old mortar allowing space for repairs, unless indicated to be saw cut.
4. Resilient Tiles: Remove in whole units to natural breaking points and/or straight joint lines with no damaged or defective existing tiles remaining where joining new construction.
5. Plaster (if applicable): Cut back to sound plaster on straight lines, and back-bevel edges of remaining plaster. Trim and prepare existing lath for tying of new lath.
6. Existing Doors, Frames, and Sash: Remove in such a manner as to facilitate filling in of openings or installation of new work, as required by the Drawings.
7. Cutting for Access to Mechanical and Electrical Systems: The removal of existing ceilings and the removal, cutting, and patching and/or replacement of existing walls, partitions, and floors as may be necessary for access to valves, piping, conduit, and tubing by mechanical and electrical trades shall be included and performed as an obligation of, and as directed by the Contractor and approved by Architect.

2.02 SALVAGE MATERIAL

A. Prior to commencing demolition, contact Owner's representative to find out which items the Owner has an interest in retaining any salvage.

B. If the Owner wishes to keep some, or all of the salvage material, as listed on the Drawings. Stack, pile or roll to permit examination and protection from unnecessary loss and damage until the Owner removes, or rejects.

C. If the Owner elects to abandon some, or all of the salvage materials, they become the property of the Contractor.

PART 3 - EXECUTION

3.01 INSPECTION

Check Drawings carefully and thoroughly investigate existing building construction (if any), prior to the start of construction and demolition.

3.02 PREPARATION

A. Seal off areas in which work is in progress from the occupied portions of the building. Take all necessary measures to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level and prevent entry of dust and noise into occupied portions of the building.

1. If temporary closures block required exits, provide closures with approved openings equipped with gasketed self-closing doors openable in the direction of exit as approved by authorities having jurisdiction.

B. Furnish and maintain temporary types of protection as necessary to adequately protect and prevent accidental injury to the public, Owner's personnel and personnel employed at the work. Take all necessary precautions to keep trespassers out of work areas. Properly secure work areas from entry when work is not in progress.

C. Protect work to remain from damage. Use barricades, tarpaulins, temporary walls, plywood, planking, masking, and other suitable means and methods as approved.

1. Restore accidental or careless damage to work to remain in place to a condition as good as or better than existed before work was commenced and at no additional cost to the Owner.

D. Provide all shoring and bracing necessary to positively protect existing elements of the building. Use material adequate to support anticipated loads with a properly calculated margin of safety. Provide for transfer of stresses to successively lower construction.

E. Carefully remove and replace items of existing construction indicated to remain upon completion of the Contract, but which require removal to complete the work. Match condition of construction prior to the start of the Work unless otherwise required. Carefully remove items indicated for relocation in new Work, or to be retained by Owner, to avoid damage, thoroughly clean, and reinstall as indicated or store as directed.

F. Except for items Owner wants, items of salvageable value to the Contractor may be removed from the project as the work progresses; salvaged items must be transported from the Project Site as they are removed. Storage or sale of removed items on the Project Site will not be permitted. Owner has option on salvageable items and these items shall be stored or transported to the location on-site as directed by Owner or Architect at no additional cost to the Owner.

3.03 DUST CONTROL:

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the building and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

3.04 UTILITIES:

A. Utility Services: Disconnection of utility services, with related meters and equipment, are included under tits contract, for reference, see Section 15000 (Mechanical General Requirements) and 16000 (Electrical General Requirements).

B. Removal of Utilities: Existing utilities shall be removed as indicated. When utility lines are encountered that are not indicated on the drawings the Architect shall be notified. Work is not to proceed until directed in writing by the Architect.

C. Filling: Holes and other openings shall be filled in accordance with the applicable Sections in these specifications.

3.05 PERFORMANCE

A. Minor Demolition and Removals

1. Carefully remove and store all items indicated or required to be reused.
2. Perform minor demolition and removal work completely and remove debris from the Site. Use such methods as required to complete the work within the limitations of governing regulations.

    a. Proceed with demolition and removal work in a systematic manner, from the top to the bottom unless otherwise shown in areas indicated.
    b. Remove debris and lower to ground by means of hoists, derricks, or other suitable methods to limit air pollution.
    c. Locate demolition equipment throughout the structure and remove materials so as to not impose excess loads to supporting walls, floors, or framing.

B. Patching, Repairing, and Finishing of Existing Work

1. Perform in compliance with the applicable requirements of the Specification technical Section covering the work to be performed and the requirements of tits Section.

    a. All holes and damaged areas exposed to view in ceilings, walls, and floors of all finished spaces shall be repaired. Repaired construction shall match existing adjacent construction and finish, unless otherwise indicated or specified.
    b. Minor surface abrasions, small nail holes, cracks, aged checked natural wood finish and other similar deterioration not visible, when viewed under finished lighting conditions, from a distance of 5' will not be required to be repaired if the base material is sound and suitable to receive the scheduled finishes, if any.
    c. Interior penetration holes in walls, ceilings, and floors of unfinished spaces and spaces not exposed to view shall be grouted and sealed with approved materials as required for sound sealing and firestops where required.
    d. Penetration holes through exterior walls above grade shall be grouted and sealed as required to produce a weathertight seal.

2. Concrete: Edges of existing concrete shall be kept damp for 24 hours and scrubbed with neat Portland cement grout just before new concrete is placed; in lieu thereof, an approved epoxy concrete adhesive may be used. Finish shall match existing adjoining work. Unless otherwise approved, all concrete for patching shall be 3,000 psi concrete using white color cement (do not use grey color cement). Reinforcing bars and dowels shall be provided where required for proper stability. Where installation of concrete is impracticable, the openings shall be filled with dry packed non-shrink grout as directed.
3. Masonry (If applicable): Patch with sound whole units to match existing. Joints shall match adjoining joint surfaces. Fill gaps with appropriate masonry filler compound.
4. Lath (if applicable): Lath areas to be patched as required, install as required for new lath, and wire-tie to existing lath at edges at 6" intervals. Lap lath 3" minimum.
5. Plaster (if applicable): Dampen edges of existing plaster. Plaster patching shall be 3 coat work of type, thickness, and finish to match the existing work.
6. Damages: Promptly repair damages to adjacent facilities caused by demolition and removal operations at no additional cost to the Owner.
7. Painting and Finishing:

    a. Preparation: Prepare patched areas as required for new work. Wash areas to be repainted with neutral soap or detergent, thoroughly rinse, and sand when dry. Feather remaining paint edges smooth with sandpaper. Use care in removing paint coatings containing lead or other harmful substances to prevent injury to persons employed at the Project and all occupants and the public.
    b. Painting and Finishing: Conform to the applicable provisions of Painting Section. Prepare and build up bare areas and patches in existing painted surfaces with proper primer and intermediate coats, sand smooth and flush with adjoining surfaces. Paint all

areas scheduled and noted to be painted and/or repainted as specified in Painting Section of the Specifications.

C. Disposal of Debris: Clean up all materials, debris, and rubbish resulting from remodeling work, remove from the building and Site, and legally dispose of. Leave all areas of work in "broom clean" condition.

3.06 CLEAN-UP

A. Debris and Rubbish: Debris and rubbish shall be removed on a daily basis, unless otherwise directed by the Owner's Representative in writing.

B. Debris Control: Debris shall be removed and transported in a manner as to prevent spillage on streets or adjacent areas.

C. Regulations: Local regulations regarding hauling and disposal apply.

END OF SECTION

Section 01300

SUBMITTALS AND SHOP DRAWINGS

PART 1 - GENERAL

1.01 GENERAL

A. Submit a complete schedule of shop drawing submittals in conformance with tits specification. Applications for payments will not be processed until the schedule of shop drawing submittals has been reviewed by the Architect and in its opinion is in conformance with the contract documents.

B. Submit shop drawings and product data as required by the contract documents in a form and quality suitable for reproduction. The number of shop drawings and product data submittal shall include four for the use of the Owner plus two for Architect use.

C. Allow 15 calendar days for each submittal or resubmittal review, Contractor shall be responsible for allowing proper review time on long lead items, no time extensions will be granted on the basis of Contractor's failure to allow proper review time.

D. All shop drawings and submittal data shall be in the English language, and all dimensions, weights, capacities, and other measurements shall be expressed in the Standard English system of measurements.

1.02 CONTRACTOR RESPONSIBILITIES

A. Review shop drawings and product data prior to submission. Verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and other data.

4. Conformance with submission requirements.
5. Clear identification of all design deviations from the contract documents (if any).
6. Signature and sealing of all design deviations from the contract documents by a qualified Registered Professional Architect.

B. After checking and verifying all field measurements, and after complying with applicable procedures specified in the General Requirements, Contractor shall submit to Architect for review in accordance with the accepted schedule of shop drawing submissions, or for other appropriate action, all shop drawings, which will bear a stamp or specific written indication that Contractor has satisfied Contractor's responsibilities under the contract documents with respect to the review of the submission. All submissions shall be identified with a unique sequential number, and referencing the relative specification and where appropriate the drawing sheet. The data shown on the shop drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to enable Architect to review the information as required.

C. Contractor shall also submit samples and documents for review to Architect with such promptness as to cause no delay in the work. All samples will have been checked by and accompanied by a specific written indication that Contractor has satisfied Contractor's responsibilities under the contract documents with respect to the review of the submission and will be identified clearly as to material, supplier, pertinent data such as catalog numbers and the use for which intended.

D. Before submission of each shop drawing or sample, Contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto, and reviewed or coordinated each shop drawing or sample with other shop drawings and samples and with the requirements of the work and the contract documents.

E. At the time of each submission, Contractor shall give Architect specific written notice of each variation that the shop drawings or samples may have from the requirements of the contract documents and, in addition, shall cause a specific notation to be made on each shop drawing submitted to Architect for review of each variation.

F. Where a shop drawing or sample is required by the specifications, any related work performed prior to Architect review of the pertinent submission will be at the sole expense and responsibility of the Contractor.

G. Contractor's coordination of each submittal shall include submission of all components, necessary for the Architect to adequately review submittal, as a complete package. Reproduction of design drawings for use of shop drawings will not be allowed.

H. Contractor's responsibility for errors and omissions is not relieved by the Architect's review of submittals.

1.03 ARCHITECT'S RESPONSIBILITIES

A. Architect will review with reasonable promptness, shop drawings and samples, but Architect's review will be only for compliance with the information given in the Architect's documents and shall not relieve Contractor from the responsibility of complying with the contract documents and shall not extend to means, methods, techniques, sequences, of procedures of constructions, or extend to safety precautions or programs incident thereto. A separate item can not be reviewed without appropriate information on the assembly in which the item functions.

B. Architect's review of shop drawings, or samples, shall not relieve Contractor from total responsibility for the design and installation of any substitution from the requirements of the contract documents, nor will acknowledgment by Architect relieve Contractor from responsibility for errors or omissions in the shop drawings.

C. Architect will affix ink stamp and initials or signature, signifying review of submittal and return the submittal with appropriate comments within 15 days after each submittal, or re-submittal.

D. The Contractor shall transmit submittals per instructions in tits specification.

1.04 SHOP DRAWINGS

A. Identify equipment by reference to sheet and detail numbers on contract drawings.

B. Include on the drawings all information required for submission and submit transmittal letter containing required information in accordance with Submission Requirements.

1.05 PRODUCT DATA

A. Modify the manufacturer's standard schematic drawings to delete or supplement information as applicable.

B. For manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other descriptive data:

1. Clearly mark each copy to identify pertinent materials, products, or models being supplied.
2. Show dimensions and clearances required for product being supplied.
3. Show performance characteristics and capacities.
4. Show wiring diagrams and controls.

C. Include on the data all information required for submission or place required information on the transmittal letter.

D. Product data shall be submitted in a three-ring binder and properly indexed.

1.06 SUBMISSION REQUIREMENTS

A. Submittals shall be transmitted per Owner's representative instructions.

B. All design deviations must be signed and sealed by a qualified professional Architect registered in the State of Arizona.

C. All shop drawings and product data shall contain:

1. Field dimensions clearly identified as such.
2. A blank space on each shop drawing, approximately 5" x 5", for an ink stamp of the Architect.
3. Contractor’s stamp on each item submitted, initialed, or signed, certifying review of submittal, verification of field measurements, and compliance with contract documents.

END OF SECTION

Section 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

The Schedule of Values is an itemized list that establishes the value or cost of each part of the Work for Lump Sum Bid Items. Except for unit prices bid for calculating extra work, it shall be used as the basis for preparing applications for payments. Quantities and unit prices may be included in the schedule when approved by or required by the Architect.

1.02 PREPARATION

A. In the schedule, show breakdown of labor, materials, equipment and other costs used in preparation of the Bid.

B. Job mobilization, field supervision and all overhead costs are included in the individual contract prices.

C. Prepare the schedule of values on 8-1/2-inch by 11-inch white paper.

D. Use the Table of Contents from the Specifications as a basis for Schedule outline. Identify each item with number and title in the Table of Contents. List sub-items of major products or systems as appropriate or when requested by the Engineer.

E. When requested by the Engineer, support values with data that will substantiate the accuracy of the value.

F. The sum of individual values shown on the Schedule of Values must equal the total Contract Price.

G. Include a directly proportional amount of the Contractor's overhead and profit in each line item.

H. Include an adequate amount for Material Sampling and Testing.

I. Include a sufficient amount for Record Drawings and Operations and Maintenance Manual.

J. Include sufficient amount for HVAC Testing and Balancing.

K. Shall show the purchase and delivery costs for materials and equipment that the Contractor anticipates he shall request payment for prior to their installation.

L. Cross-reference for Schedule of Values to the Construction Schedule, showing which CPM activity corresponds to or includes each cost item.

1.03 SUBMITTAL

A. Submit six copies of Schedule to the Owner's Representative for review within 15 days following the Notice to Proceed and at least 20 days prior to submitting first application for a progress payment. After review by the Engineer, revise and resubmit the Schedule as required until it is correct.

B. No partial payments will be made until after the review process on the Schedule of Values.

END OF SECTION

Section 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 TESTING LAB SERVICES FURNISHED BY CONTRACTOR

A. The Contractor is responsible for payment and performance of all testing laboratory services in connection with concrete mix designs, soil compaction and Proctor samples at soil borrow pit source, composition of select fill material, and other tests and engineering data required by the contract documents. Submit for review of materials and equipment by the Owner's Representative prior to the start of Work. Contractor shall obtain acceptance of the testing laboratory by the Owner's Representative before having services performed.

B. The Contractor shall be responsible for providing materials, which meet the requirements indicated by the Contract Documents. Materials or equipment, which do not meet those requirements shall be removed or modified as directed by the Owner’s representative.

1.02 REFERENCES

A. The standards listed below form a part of tits specification to extent referenced. Standards are referred to in the text by text by basic reference only.

B. American Society for Testing and Materials (ASTM)

1. E329, Agencies Engaged in the Testing and/or Inspection of Materials Used in construction.

1.03 SELECTION

A. Contractor's independent testing laboratory will be required to inspect and test the materials and methods of construction, as required by individual Specification Sections, for compliance with the Contract Documents and to perform other technical services required by the Owner. Services will be performed in accordance with requirements of governing authorities and with specification standards. Contractor shall submit at least three (3) independent testing laboratories meeting the qualifications of tits specification. The owner will select one of the three to perform the work.

1.04 QUALIFICATION OF LABORATORY

A. Meet "Recommended Requirements for Independent Laboratory Qualification" published by American Council of Independent Laboratories.

B. Meet requirements of ASTM E329.

C. Authorized to operate in the State in which the Project is located.

D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection. Include a memorandum of remedies of any deficiencies reported by the inspector.

E. Maintain testing equipment calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards or accepted values of natural physical constants.

1.05 LABORATORY AUTHORITY AND DUTIES

A. The testing laboratory is not authorized to revile, alter, relax, enlarge, or release any requirements of the Contract Documents or to approve or accept any portion of the Work. The laboratory does not have the right of rejection or the right to stop the Work, except for such reasonable periods as may be required to conduct the sampling, testing, and inspection operations. Notify all concerned parties when it appears that the materials rested or inspected do not comply with the project requirements.

B. Cooperate with the Architect, Engineer, and Contractor. Review project documents with the Architect prior to start of construction. Attend pre-bid and pre-construction conferences with Architect, Consultants, Contractor, and materials suppliers to coordinate materials inspection and testing requirements with the planned construction schedule. Continue to participate in construction conferences throughout construction of the project.

C. Promptly submit 2 copies of each test and inspection report to the Architect. Reports shall include:

1. Date issued
2. Project title and number
3. Testing laboratory name, address, and telephone number
4. Name and signature of laboratory inspector
5. Date and time of sampling or inspection
6. Record of temperature and weather conditions
7. Date of test
8. Identification of Project and Specifications Section
9. Location of sample or test in the Project
10. Type of inspection or test
11. Observations and results of tests and compliance, or non-compliance, with specified standards and with Contract Documents.
12. Interpretation of test results

D. Perform specified inspections, testing, and additional tests required by the Contract Documents in accordance with the requirements of the Manual of Practice published by the American Council of Independent Laboratories, Inc.

1.06 CONTRACTOR DUTIES

A. Cooperate with Testing Laboratory personnel. At no additional cost to the Owner, furnish tools, equipment, facilities for proper curing and safe storage, and provide access to the Work, storage areas, and manufacturer's and fabricator's operations.

B. Notify laboratory sufficiently in advance of operations (24 hours minimum prior to expected time of operations requiring testing services) to allow for laboratory assignment of personnel and scheduling of tests.

C. Furnish incidental labor and facilities to provide access to Work to be tested and to facilitate inspections and tests.

D. Provide adequate samples of materials requiring testing.

E. Provide laboratory with preliminary concrete design mix and other material mixes requiring testing laboratory control.

F. Provide copies of manufacturer's product test reports as required.

G. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

1.07 SUMMARY OF SERVICES

A. Refer to various technical Sections of the Specifications.

END OF SECTION

Section 02200

EARTHWORK

PART 1 - GENERAL

1.01 APPLICABILITY TO OTHER WORK

A. Work governed by tits Section includes, but is not limited to, the following:

1. Site Grading
2. Building Excavation & Fill
3. Earthwork for Mechanical, Electrical, Plumbing and other Utilities

1.02 OWNER-PROVIDED DOCUMENTS

The following are hereby designated as Contract Documents, whether bound in with the other documents or separate. Their inclusion with the Architect's documents is for convenience. The Architect does not guarantee their contents as to accuracy, completeness or suitability. These Documents shall be the basis of the Contract only for existing subsurface conditions. The Drawings and the Specifications shall take precedence for all other requirements concerning building and site improvements.

A. SUBSURFACE INVESTIGATION: Refer to Geotechnical Report furnished by Owner.

1.03 CONCEALED SUBSURFACE CONDITIONS

Variations from conditions indicated by the Contract Documents shall be adjusted as described in the General Conditions.

1.04 APPLICABLE PUBLICATIONS

The publications listed below form a part of tits specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS:

D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using standard proctor.
D 2216	Laboratory Determination Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
D 2487	Classification of Soils for Engineering Purposes.
D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.05 DEFINITIONS

A. Select Fill Materials: Select Fill materials include materials classified in ASTM D 2487 as GW, GM, GC, GP, SW, SP, SM, SC, and CL and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.

PART 2 - PRODUCTS

2.01 SELECT FILL MATERIAL

Material placed under slabs, foundations or paving to be select materials to the following requirements.

B. Liquid limit: 30 to 45

C. Plasticity index: 7 to 20

D. Linear shrinkage: 10% maximum

E. Purity: No stones or debris larger than 2-1/2 inches

2.02 ORDINARY FILL MATERIAL (Required properties)

B. When backfill material is to be covered with paving or concrete slab, refer to Drawings for required compacted Select Fill material required, if such requirement is not shown on the drawings, refer to the Geotechnical Report. As a minimum, the top 18" must be Select Fill.

C. Excavated material may be reused for back-fill provided it meets the Select Fill criteria above and is suitable for compaction.

PART 3 - EXECUTION

3.01 REMOVAL OF TOPSOIL AND SPONGY SOIL

A. Locations: Removal required under any type of walks, paving, and concrete slabs.

B. Depth: Not less than 3 inches.

C. Disposal: Stock pile on the site and use as specified for grass areas, except when no soil is required for such use. Under such circumstances, remove from site to a proper disposal site at Contractor's responsibility and expense.

3.02 COMPACTION OF FILL AND BACKFILLS UNDER SLABS & PAVED AREAS

3.03 Test Method: Proctor compaction tests (ASTM D698) at optimum moisture.

A. Required Minimum Compaction at +/- 2% from optimum moisture: 95% of Max. Density for Cohesive Soils and 95% of Max. Density for Non-Cohesive Soils.

B. Placement: Layers not to exceed 8” per lift; add water or dry to maintain optimum moisture content.

C. Testing shall be the responsibility of the Contractor and shall be performed by an independent testing laboratory, acceptable to the Owner. (One set of tests per 1,000 SF of compacted area per 8” lift).

3.04 UTILITY AND DRAIN TRENCHES

Trenches for underground utilities systems and drain lines shall be excavated to the required alignments and depths. The bottoms of trenches shall be graded to secure the required slope and shall be tamped if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Provide cement stabilized sand (1.5 sack cement per cubic yard) as shown on the drawings, if such are not shown on the drawings, a minimum of 4” beneath and 4” on the sides and top of storm water and sanitary sewer lines shall be provided.

3.05 BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, approved material including material for non-expansive fill shall be obtained from approved sources at the Contractor’s responsibility and expense.

3.06 SUBGRADE PREPARATION

A. Leveling: Install to grades and lines of pavement, buildings and other appurtenances. Provide for paving, walks, curbs and slab thickness shown as a minimum.

B. Irregularities: Sharp changes in slab thickness not permitted.

C. Installation: Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content at or above optimum that will readily facilitate obtaining the specified compaction with the equipment used.

D. Unsuitable Materials: Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed, hauled away to a suitable disposal site and replaced with Select Fill materials

3.07 DISPOSAL OF EXCESS SOIL (if any)

Soil not suitable or not required for reuse shall be removed from the site, unless the Owner elects to retain. If Owner wishes to retain, stockpile or spread, as directed.

3.08 SAND LEVELING LAYER

A. Location: Under slabs on grade only.

B. Material: Bank sand or other granular material.

C. Thickness: Sufficient for proper leveling (2-inches maximum).

3.09 PROOF ROLLING OF EXISTING SUBGRADE

Proof roll the sub-grade to detect any wet, soft, or pumping areas. Treat these areas with drying or stabilizing agents as necessary or replace them with Select Fill material.

END OF SECTION

Section 02380

DRILLED PIERS

PART 1 - GENERAL

1.01 QUALIFICATIONS

The work shall be performed by a specialty Contractor, specializing in the specified foundation system and having experience installing the specified foundation system under similar subsurface conditions.

1.02 SUBSURFACE DATA

A. Information on Subsurface existing conditions shown on the drawings reflect the best available data at the time the drawings were prepared. The contractor shall insert a probe or plumbers rod at each drilled pier location to detect any buried obstructions at the upper 48” subgrade condition before start of drilling operations. If obstructions are encountered notify the architect and obtain alternate solutions before proceeding with the work. Any obstructions found within the upper 48” subgrade after drilling is started, shall be the responsibility of the Contractor.

1.03 SUPERVISION, INSPECTION, AND SAFETY

A. Contractor Supervision and Inspection: The Contractor shall provide supervision of all drilled pier construction. Each drilled pier shall be inspected by an authorized Testing Laboratory for its depth, size, cleanup, workmanship, rebar size & placement and all tolerance requirements before any concrete is poured.

B. Owner Inspection: The Owner, or its authorized representative, reserves the right to inspect each drilled pier excavation prior to placement of reinforcing steel and concrete. The Contractor shall furnish the Owner, or its authorized representative, all necessary equipment required for proper inspection of drilled pier excavations. Tits inspection in no way relieves the Contractor of its responsibilities under the contract.

C. Safety Precautions for Workmen and Inspectors: All work shall be performed in accordance with ASHA requirements. No drilled pier shall be left open overnight nor unmanned at any time. Tops of all rebars protruding

above grade shall be protected with plastic end caps or other devices suitable for preventing accidents.

PART 2 - PRODUCTS

2.01 CONCRETE WORK

Concrete work shall be in accordance with requirements of SECTION: CAST IN PLACE CONCRETE with the following minimum requirements:

A. Coarse Aggregate: Maximum size of coarse aggregate shall be 1-1/2 -inch.

B. Reinforcing Steel: Reinforcing steel shall conform to ASTM A 615 Grade 60. Steel shall be tied into cages and inserted securely in the drilled pier shaft, in position and alignment, as shown in the drawings, prior to concrete placement.

C. Strength: Concrete strength shall be 3000 psi at 28 days. Slump shall be not less than 5 nor more than 7 inches.

PART 3 - EXECUTION

3.01 PREPARATION

A. Excavation of piers or groups of piers shall be performed so that the excavation and the placement of reinforcing steel and concrete are a continuous operation performed the same day the excavation is started. Drilled piers shall be excavated to the depths and dimensions shown in the drawings. The bottoms of the pier excavation shall be cleaned of loose and disturbed materials or materials determined to be unsatisfactory for the required bearing pressure. Excavated material shall be removed off site to a proper disposal site provided and paid by the Contractor. Excavations below indicated depths, without specific direction by the Owner, or its authorized representative, shall be filled with concrete at no cost to the Owner. Where, in the opinion of the Owner, or its authorized representative, materials are encountered at the indicated depths that do not provide the required bearing capacity or would result in unsatisfactory construction, the excavation shall be extended as directed by the Owner, or its authorized representative. Payment for the additional excavation and pier construction will be in accordance with predetermined cost per cubic foot prior to start of drilling work.

B. The drilling equipment shall be of suitable type and of sufficient size and capacity to satisfactorily perform the required drilling operations as specified or indicated. All equipment shall be subject to specific approval by the Owner, or its authorized representative. Any equipment which fails to perform satisfactorily shall be immediately modified as approved or removed and replaced.

3.02 INSTALLATION

A. The Contractor shall ensure at its expense, that all pier holes are protected from inflow of ground or surface water. The maximum permissible depth of hosed water into the bottom of excavations is 1-1/2" at the start of concrete placement. In the event that excessive water enters the hole, the excavation shall be deepened to undisturbed material immediately prior to concrete placement.

B. Drilled piers shall be underreamed to the dimensions shown in the drawings. All pier underreams shall be measured using pier underream calipers specifically designed for tits purpose and approved by the Owner, or its authorized representative.

C. Concrete shall be placed in the pier hole within three hours after approval of the completed excavation. Concrete shall be continuously placed by methods that insure against segregation and dislodging of excavation sidewalls and shall completely fill the bell and shaft. Concrete shall be placed by pumps, tremie, or drop chutes. The discharge of pumping chute shall be kept a minimum of 3 feet below the fresh concrete surface during placement.

D. Concrete shall be vibrated for not less than the upper 3 feet of pier.

E. Protection shall be provided around the top of the excavation to prevent debris and water from entering the excavation and concrete placed therein.

3.03 CASING PROTECTION (If Required)

A. During construction, the pier excavation shall be adequately and securely protected against cave-ins, displacement of the surrounding earth, and inflow of ground and surface water by means of temporary steel casings as required and/or as directed by the Owner, or its authorized representative. Casings shall have outside diameters not less than indicated shaft sizes, and shall be capable of sustaining loads imposed by installing, sealing, maintaining the excavated hole, and extracting. The casing shall have a minimum wall thickness of 1/4-inch. The ends of the casing shall not be damaged such that proper seating and sealing are impaired. Damaged casing shall be immediately repaired or removed from the site. Temporary steel casings shall be withdrawn, as the concrete is being placed, maintaining sufficient head of concrete within the casing to offset water table and to prevent extraneous material from falling in from the sides or entering from beneath casing and mixing with concrete. Casings may be jerked upward a maximum of 4 inches to break the bottom seal but shall thereafter be removed with a smooth, continuous motion. All voids surrounding the casing shall be filled with concrete extruded from the bottom of the casing as it is being raised, with all free water surrounding the casing being forced to the surface ahead of the rising concrete. Venting shall be provided if necessary to insure removal of water around the casing as the concrete level rises, and the casing is being removed. Driving of casings shall not be permitted within 20 feet of concrete placed within the preceding 3 days.

B. The inside of steel casings shall be thoroughly cleaned before being placed in a pier hole.

3.04 TOLERANCES

A. Any pier out of center or plumb beyond the tolerance specified shall be corrected as necessary to comply with the tolerances and the Contractor shall bear any cost of correction. Method of correction shall be approved by the Owner, or its authorized representative.

B. Cross sections of shafts and bells shall not be less than design dimensions. Cross sections of shafts and bells shall not be greater than design dimensions plus 3 inches unless approved or directed by the Owner, or its authorized representative.

C. Location of the tops of installed piers shall not deviate from the centerline locations shown on the drawings more than 3 inches.

D. Vertical piers shall be installed plumb within a maximum of 1-1/2 inches for the first 10 feet and within 1/2-inch for each 10 feet of additional depth.

E. The center of the pier will be established after construction is completed and the center marked by a suitable permanent mark.

F. Batter piers shall be installed a maximum of 2% of length from specified inclination.

END OF SECTION

Section 03100

FORMWORK

PART 1 - GENERAL

1.01 STRUCTURAL RESPONSIBILITY

A. The Contractor shall be solely responsible for the structural adequacy of the forms, ties, shoring, bracing and framework for formwork.

1.02 MINIMUM SPECIFICATIONS

A. ACI Standard 347

1.03 APPEARANCE REQUIREMENTS

A. General: Any requirements given herein are minimum for appearance purposes only, not to be considered as structural design.

B. Accuracy Of Completed Concrete:

1. Exposed concrete shall be visually smooth, straight, plumb and level when viewed at a distance of 30 feet except for irregularities that will be removed in the finishing process.
2. Sufficiently accurate to accommodate the details of abutting work.

3. Measurably accurate so the maximum deviation is not over ¼" in 8'-0" for exposed surfaces and ½" in 8'-0" for concealed or covered surfaces. Floors and roofs shall be within ½" + or - of design elevation for their entire areas.
4. All edges that will be exposed to view when the structure is completed shall be chamfered, unless finished with molding tools.

1.04 EARTH FORMS

A. Permitted for interior sides of grade beams only.

1.05 DESIGN OF FORMS

A. General: Forms shall be of wood, plywood, steel, or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags, or other irregularities.

B. Strength: Withstand the concrete pressures and weight without deformation beyond 1/360 of spans, except 1/270 permitted in utility areas.

C. Top Edges of Pours: Except in unfinished locations, use the form tops or a continuous wood strip to establish accurate top edges for beams, slabs and construction joints.

PART 2 - PRODUCTS

2.01 FORM TIES

A. Type: Removable screw type that does not leave a hole larger than ½".

B. Wire: Not permitted unless no other tie method is feasible; clip out and remove wire 1 inch from surfaces, and patch hole as required.

2.02 FORM COATING AND RELEASE AGENT

A. Properties: Contractor to furnish submittal data with warranty information. The manufacturer shall warrant, in writing, that its product shall perform in the following manner, when applied according to instructions:

1. Will not stain concrete.
2. Will not impair the natural bonding character of any sealant, paint, or cementitious coating intended for use on concrete.
3. Will degenerate to dust if exposed to sunlight for several weeks.

B. Brands: Burke, Southform or Nox-Crete are suggested; cure and separating compound such as Nox-Crete "silicoseal" may be used.

2.03 MINIMUM WOOD FORMWORK DESIGN (Exposed locations)

A. Board Forms: Permitted only where entire width can be covered with one board 11-½" or less, wide.

B. Plywood Forms: ¾" minimum thickness with studs spaced 24" maximum; 5/8" minimum thickness with studs spaced 16" maximum.

2.04 CHAMFERS

A. All equipment pads & all edges on tilt-walls, if any.

2.05 SLAB MEMBRANE (Vapor Barrier)

A. Material: 10 mil polyethylene plastic film (Visqueen) conforming to NBS Standard PS 17-69.

B. Installation: Loose lap 6". Use tape with impregnated reinforcing fabric to hold laps; patch tears with overlays; screed stake holes only are permissible.

C. Locations: Under floor slabs placed on earth or sand; under walks and paving poured on sand, if any.

D. Optional Lap System: Continuous "C" folded with pins 1'-6" o.c.

PART 3 - EXECUTION

3.01 FORM COATING AND RELEASE AGENT

A. Apply before reinforcing is placed.

B. Apply according to supplier's directions so no holidays or excessive build-up occurs.

C. Final surfaces to be totally clean except some loose dust to remain that can be easily removed by light brushing, air blast, or water spray.

3.02 SLEEVES, INSERTS, ANCHORS, CUTOUTS

A. Each Sub-contractor shall supply and install their own, except cutouts and form changes to be done by the formwork Contractor.

3.03 FORM REMOVAL (General)

A. Vertical Forms: May be removed after 24 hours, providing the concrete will not be injured.

B. Supporting Forms and Shores: Keep in place until tests show sufficient strength to permit removal.

C. Wood Forms: Remove completely from all locations.

3.04 RUSTIFICATION FORM STRIPS

A. Material: White or Ponderosa pine; pressure treated or dipped in preservative to achieve high water repellence.

B. Finish: Planed smooth; sawn surface not acceptable.

C. Shape: Tapered to permit removal; if not shown, taper 15% on each side or 30% on one side.

D. Lengths: Grooves 12'-0" or less formed without joints.

E. Joints Locations: Where more than one groove occurs closest to another, stagger joint locations.

F. Joint Alignment: Hold butt ends in accurate alignment by fasteners immediately adjacent to joints or by nailing or other means.

G. Fasteners: Retain strips perfectly straight by mechanical means that does not damage strips; space fasteners at 16 to 24 inch centers.

END OF SECTION

Section 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 MINIMUM SPECIFICATIONS (Latest editions)

A. ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures, ACI 315

B. Specifications for Structural Concrete for Buildings, ACI 301

C. Building Code Requirements for Reinforced Concrete, ACI 318

1.02 SHOP AND INSTALLATION DRAWINGS

A. Submit detailed drawings for review with the number of copies and type of prints as directed. Correct and resubmit if necessary. Proceed with the Work only after review is complete.

B. Required for footings, plinths, grade beams, and structural members; omit for slabs on grade.

C. Include diagrams, schedules and details showing:

1. Layout
2. Sizes
3. Bends
4. Spacing
5. Supports
6. Locations of splices in continuous reinforcing

D. All reinforcing steel shall be fabricated in an established reinforcing steel fabricators shop.

1.03 REINFORCEMENT FOR MISCELLANEOUS WORK

Refer to all Drawing and Specifications for reinforcement relating to the complete Work.

1.04 DRAWING PRECEDENCE

Requirements on Structural Drawings govern tits Section.

PART 2 - PRODUCTS

2.01 MATERIAL SPECIFICATIONS

Except where shown otherwise, comply with the following:

A. Wire Fabric: ASTM A 185

B. Bars: ASTM A 615; Grade 60

C. Reinforcement shall be cut and bent in compliance with the requirements of the American Concrete Institute (ACI) Standard 315. Bars with kinks, cracks or improper bends will be rejected. When not specified in the steel schedule, bars may be cut and bent in the field. Bars shall not be heat bent.

2.02 REINFORCEMENT SUPPORTS ON EARTH

A. Bars: Support on chairs (plastic or concrete)

B. Wire Fabric: Support on chairs (plastic or concrete)

2.03 REINFORCEMENT SUPPORTS ON FORMS (Where surface becomes exposed to view)

A. Metal chairs, metal hangers, metal spacers, plastic chairs, and concrete chairs may be used to support the reinforcement. Metal hangers, spacers and ties shall be placed in such a manner that they will not be exposed in the finished concrete surface. The legs of metal chairs that may be exposed at the lower face of the slabs or beams shall be galvanized.

B. Precast concrete chairs shall be manufactured of the same class of concrete as that specified for the structure. Precast concrete chairs shall be moist at the time concrete is placed.

C. The chairs will be spaced as needed to prevent displacement of the steel. The need and method of supporting the reinforcement will be determined by the engineer and/or inspector or as shown on the drawings.

PART 3 - EXECUTION

3.01 PLACING

A. General: Accurately positioned and secured against displacement by using annealed wire of not less than No. 14 gauge or suitable clips at intersections

and shall be supported in a manner that will keep all metal away from the exposed surfaces.

B. Cleaning: Metal reinforcement, before being placed, shall be thoroughly cleaned of dirt and excessive loose rust scale, and of coatings that destroy or reduce the bond. Reinforcement appreciably reduced in section shall be rejected. Where there is delay in depositing the concrete, reinforcement shall be re-inspected, and when necessary, cleaned.

C. Built-In Items: Place and fasten all inserts, sleeves, ties, hangers, anchors, bolts, frames and structural steel members required to secure the work of other trades to concrete work. Maintain these in their proper positions during the placement operations.

D. Inspection: Give 24 hour notice in advance of concrete placement to permit inspection of the preparatory work and to make any required corrections.

E. Timing: All reinforcement needed in any one section shall be placed in position before concrete placement is begun.

F. Storage: Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

G. Cover: Bars of specified size shall be accurately placed as shown on the drawings and shall be securely tied in position to prevent its displacement during the placement of concrete. If not shown on the drawings, the minimum bar cover for concrete cast in forms or exposed to the weather shall be 1.5 inches (2 inches for #6 bars or larger). The minimum bar cover for concrete cast against earth shall be 3 inches.

END OF SECTION

Section 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 TESTING LABORATORY SERVICES

Four cylinder compression test sets for each 100 Cubic Yards of concrete area, two tested at seven (7) days and two tested at twenty-eight (28) days. Tests to be performed by Owner approved Testing Laboratory Service and paid for by contractor.

1.02 DRAWING PRECEDENCE

Requirements on Structural Drawings govern tits Section.

1.03 RESPONSIBILITY FOR PERFORMANCE

A. Rests solely with the Contractor

B. In the event the requirements of the Contract Documents interfere with providing the specified performance, give notification and obtain owner written approval before proceeding.

C. Suggestions or advice given by the supervising authority or testing laboratory are not to be considered as directions or permission to violate the specified performance.

1.04 DESIGN RESPONSIBILITY

Supplement the typical mix designs with project mix designs for owner's review and approval in writing before proceeding.

1.05 MINIMUM SPECIFICATIONS (Latest editions)

A. Specifications for Structural Concrete in Buildings, ACI 301.

B. Building Code Requirements for Reinforced Concrete, ACI 318

C. Recommended Practice for Hot and Cold Weather Concreting, ACI 305, 306.

1.06 TECHNICAL ASSISTANCE

The Contractor shall have the admix supplier provide (free of Charge) a qualified technician to assist in proportioning concrete for optimum use and help in adjustment of concrete mix to meet job conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregates shall conform to the requirements of ASTM C 33 for fine and coarse aggregate for concrete. The fine aggregates shall be graded as provided in Sections 5 and 6, ASTM C 33. The grading of coarse aggregates shall be size numbers 57, 67, or 467 for structural concrete, 57 or 67 for nonstructural concrete base slabs, or as shown on the plans.

B. Portland cement shall be:

1. Type I or Type IA for slabs 6" or thinner and non structural concrete only.
2. Type II or Type IIA for all walls, foundations, slabs thicker than 6" and all structural concrete framework.
3. Fly ash and Blast furnace slag used as a partial substitution of Portland cement, Not Acceptable

C. Mixing water shall be potable and clean free from deleterious substances.

2.02 ADMIXES

A. Air-entraining admixtures shall conform to the requirements of ASTM C 260. If air-entraining cement is used, any additional air-entraining admixture shall be of the same type as that in the cement.

B. Plasticizing admixtures shall conform to the requirements of ASTM C 1017.

C. Water reducing and/or retarding admixtures shall conform to the requirements of ASTM C 494, Types A, B, D, F or G. The admix supplier shall provide free of charge an experienced technical representatives to adjust amounts of admixture to obtain the desired results.

D. Accelerating and water-reducing and accelerating admixtures shall conform to the requirements of ASTM C 494, Types C and E.

2.03 CONCRETE MIXES

A. Concrete shall be composed of Portland Cement, fine and coarse aggregate, water, air entraining agent and admixes to obtain the class of concrete called for in the drawings. Minimum design strength for structural concrete to be 3,000 psi at 28 days.

B. Concrete shall be proportioned in accordance with ACI 211.1 to produce concrete with slump, air content, maximum size coarse aggregate and materials designed to minimize bleeding and segregation.

C. Slump at time of placing shall not exceed 5 in. for coarse aggregate concrete, except 9” permissible with super-plasticizer. Except, as noted on the Drawings.

2.04 MAXIMUM SIZE OF COARSE AGGREGATE

Not more than 1/5 of smallest dimension between sides of forms; not more than 1/3 of depth slabs nor more than ¾ of the minimum clear spacing between reinforcing bars.

2.05 AIR CONTENT AND CONSISTENCY

A. Unless otherwise specified the air content (by volume) shall be 3 to 6 percent of the volume of the concrete at the time of placement. Air entrainment admixtures can be added to meet the air content requirements.

B. Unless otherwise specified, the slump shall be 3 to 6 inches. High range, water reducing agents (plasticizers) may be used to increase workability, reduce water content, and control concrete temperature in hot weather. The maximum slump after adding high range water reducing agents (plasticizers) shall be 9 inches. The slump shall be 3.5 inches or less prior to the addition of any water reducing agents. When specified, directed, or approved by the engineer, a water-reducing, set-retarding, or other admixture shall be used. Any admixtures used shall meet the requirements in Section 2.02 unless otherwise approved by the engineer

PART 3 - EXECUTION

3.01 MIXERS AND MIXING

Concrete shall be uniform and thoroughly mixed when delivered to the work site. The proportions of the aggregates shall be such as to produce a concrete mixture that will work readily into corners and angles of the forms and around reinforcement when consolidated, but not segregated or exude free water during consolidation. Variations in slump of more than 1 inch within a batch are considered evidence of inadequate mixing and shall be corrected by increasing mixing time or other acceptable alternative.

3.02 HANDLING

A. Transportation operations shall conform to ASTM Designation C 94, latest edition.

B. No water shall be added to the mix that will increase the slump beyond what is specified.

C. Use no concrete that has been held in mixer more than one (1) hour if using a retarder above 75° F, 1-1/2 hour if using a retarder below 75° F.

D. Retempering of partially hardened concrete will not be permitted.

3.03 INSPECTION

Do not place concrete until forming, reinforcement, sleeves in beams and other critical items have been inspected and documented permission to proceed has been given. Give notification for Owner's Inspection at least 24 hours in advance of placement.

3.04 PLACING PROHIBITED

A. When air temperature in shade is below 40° F (4.4° C) and if there is reason to expect a temperature drop within 12 hours after placing

B. During rain, sleet or snow

C. Into water

3.05 PREPARATION

A. Subgrade:

1. Dampen all subgrades not covered with membrane by sprinkling immediately before placing concrete.
2. Dry out and compact/re-compact previously soggy subgrade to compaction requirements before pouring slabs.
3. Placing concrete on mud, dried earth, uncompacted fill or frozen subgrade is not permitted.

B. Forms:

1. Remove dirt, sawdust, nails and other foreign material from formed spaces.
2. Dampen dried out wood forms by sprinkling immediately before placing concrete.
3. When metal forms feel hot, cool by sprinkling with water immediately before placing.
4. Temperature of all surfaces in contact with concrete shall be not less than 40° Fahrenheit.

3.06 CONVEYING

A. Concrete shall be delivered to the site and discharged into the forms within 1-1/2 hours after the introduction of the cement to the aggregates.

B. In hot weather or under condition contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes unless an approved set-retarding admixture is used or the mix remains workable and the temperature does not exceed the requirements stated in Section 20. In any case, concrete shall be conveyed from the mixer to the forms as rapidly as practicable by methods that prevent segregation of the aggregates and assure no loss of mortar.

3.07 PLACING

A. Concrete shall not be placed until the subgrade, forms, steel reinforcement, and embedded items have been inspected and approved.

B. No concrete shall be placed except in the presence of the Owner's Representative or with the permission from the Owner's Representative. The contractor shall give reasonable notice to the Owner's Representative each time concrete is to be placed. Such notice shall provide sufficient time for the Owner's Representative to inspect the subgrade, forms, steel reinforcement, and other preparation for compliance with the specifications. Deficiencies are to be corrected before concrete is delivered for placing.

C. The concrete shall be deposited as closely as possible to its final position in the forms. It shall be worked into the corners and angles of the forms and around all reinforcement and embedded items in a manner to prevent segregation of aggregates or excessive laitance.

D. Formed concrete shall be placed in horizontal layers not more than 20 inches deep. When a super-plasticizer us used the horizontal layer can be increased to 5 feet deep. Slab concrete shall be placed to design thickness in one continuous layer.

E. Concrete shall not be dropped more than 4 feet vertically unless suitable equipment is used to prevent segregation. When a super-plasticizer is used, the concrete shall not be allowed to drop more than 8 feet. Hoppers and chutes, pipes, or "elephant trunks" shall be used as necessary to prevent segregation and the splashing of mortar on the forms and reinforcing steel above the layer being placed.

F. Immediately after the concrete is placed in the forms, it shall be consolidated by spacing, hand tamping, or vibration as necessary to ensure a smooth surface and dense concrete. Each layer shall be consolidated to ensure monolithic bond with the preceding layer.

G. The use of vibrators shall not be used to transport concrete in the forms, slabs, or conveying equipment. Vibration shall not be applied directly to the reinforcement steel or the forms.

H. If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when spaded or vibrated, the contractor shall discontinue placing concrete and shall make a construction joint.

I. If placing is discontinued when an incomplete horizontal layer is in place, the unfinished end of the layer shall be formed by a vertical bulkhead.

J. Place concrete in beams and walls in horizontal layers so that non run ahead to form diagonal layers in separate pours. Vibrate vertically about every 1'-6", penetrating a few inches into layer below.

K. Use screeds to level slabs unless otherwise noted on the drawings, concrete finish for structural slabs, building slabs shall be trowell finish. Concrete finish for slabs exposed to weather, sidewalks and paving shall be light broom finish.

L. Areas receiving trowel finish shall receive in accordance with manufacturer's recommendations, a minimum of one coat of Clear Curing and Sealing Compound (VOC Compliant). Conform to ASTM C309, Type 1, Class B, and the following requirements: 30 percent solids content minimum; non-yellowing under ultraviolet light after 500-hour test in accordance with ASTM D4587. Sodium silicate compounds are not permitted. Conform to local, state and federal solvent emission requirements.

END OF SECTION

Section 04200

MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of tits section.

B. Types of masonry work required include

1. Concrete Unit Masonry
2. Brick Masonry

3. Architectural units:

    a. Pre-faced Unit Masonry
    b. Split Face Unit Masonry
    c. Smooth Face Unit Masonry
    d. Split-Ribbed Unit Masonry

4. Reinforced Unit Masonry

1.02 RELATED WORK

A. Install work furnished under other sections, which must be built into unit masonry work, including, but not limited to

1. Glass Unit Masonry
2. Anchorage Devices
3. Flashings
4. Loose Steel Lintels

1.03 QUALITY ASSURANCE

A. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies, equivalent thickness, whose fire endurance has been determined by testing in compliance with ASTM E 119 by means acceptable to authorities having jurisdiction.

B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

C. Field Constructed Mock-Ups: Prior to installation of masonry work, erect representative sample wall panels to further verify selections made for color and texture characteristics, under sample submittals of masonry units and mortar, and to establish a standard for completed masonry work for qualities of appearance, materials, construction and workmanship

D. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

E. Build mock-ups for the following types of masonry in sizes approximately 4’ long by 4’ high, by full thickness, including face and back-up, as well as accessories.

1. Each type of exposed unit masonry work.
2. Typical exterior face brick wall.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory and other manufactured products.

B. Compliance: Submit certifications that each type complies with specified requirements.

C. Color Selection: For initial selection submit:

1. Unit masonry samples showing full extent of colors and textures available for each type of exposed masonry unit required.
2. Colored mortar samples showing full extent of colors available.

D. Samples: For verification purposes submit:

1. Unit masonry samples for each type of exposed masonry unit, include full range of color and texture to be expected in completed work.
2. For selection of brick, submit products of all manufacturers that the manufacturers or their agents consider to be their closest match. Re-submit until match meets approval of Architect.
3. Colored masonry mortar samples for each color required showing the full range of color which can be expected in the finished work. Label samples to indicate type and amount of colorant used.

1.05 REFERENCED STANDARDS

A. Comply with the current applicable provisions of all codes, standards and specifications referenced in tits section, except as modified by the requirements of tits Contract Documents, including, but not limited to, the following:

1. ACI 531 - Building Code Requirements for Masonry Structures.
2. ACI 531R - Commentary on Building Code Requirements for Masonry Structures.
3. ACI 530.1 - Specification for Masonry Construction.
4. ASTM A82 - Steel Wire, Plain, for concrete reinforcement
5. ASTM A 615 - Bars for concrete Reinforcement
6. ASTM A 153 - Zinc Coating
7. ASTM C 62 - Building Brick
8. ASTM C 90 - Load Bearing Masonry Units.
9. ASTM C 91 - Masonry Cement
10. ASTM C 129 - Non-Load Bearing Masonry Units.
11. ASTM C 140 - Testing Concrete Masonry Units.
12. ASTM C 270- Mortar for Unit Masonry
13. ASTM C 476- Grout for Masonry
14. ASTM C 494- Chemical Admixtures for Concrete
15. ASTM C 744 - Specification for Pre-Faced Concrete and Calcium Silicate Masonry Units.
16. ASTM C 780 – Preconstruction Evaluation of Mortar
17. ASTM D 1056 – Flexible Cellular Material Rubber
18. ASTM D 1667 – Flexible Cellular Material PVC
19. ASTM D 2000 – Rubber Products
20. ASTM E-119 - Fire Tests with Building Construction and Materials.
21. BIA - Technical Notes on Brick Construction.
22. NCMA - TEK Bulletins.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials to project in undamaged condition. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

B. Limit moisture absorption of concrete masonry units during delivery and until time of installation.

C. Store cementitious materials off the ground, under cover and in a dry location.

D. Store and protect aggregates where grading and other required characteristics can be maintained.

E. Store and protect masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.07 PROJECT CONDITIONS

A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

1. Extend cover a minimum of 24" down both sides and hold cover securely in place.

B. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

C. Staining: Prevent grout, mortar or soil from staining the face of masonry to be left exposed or painted. Remove grout or mortar in contact with such masonry immediately.

D. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

E. Protect base of walls from rain-splashed mud and/or mortar splatter by means of coverings spread on ground and over wall surfaces.

F. Protect sills, ledges and projections from droppings of mortar.

G. Cold Weather Protection:

1. Do not lay masonry units that are wet or frozen.
2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
3. Remove masonry damaged by freezing conditions.
4. For clay masonry units with initial rates of absorption which require them to be wetted before laying, comply with the following:

a. For units with surface temperature above 32 Degrees F, wet with water heated to above 70 Degrees F.
b. For units with surface temperature below 32 Degrees F, wet with water heated to above 130 Degrees F.

H. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperature existing at time of installation, except for grout:

1. For Grout: Temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 Degrees F.
2. 40 Degrees F to 32 Degrees F:

    a. Mortar: Heat mixing water to produce mortar temperature between 40 Degrees F and 120 Degrees F.
    b. Grout: Follow normal masonry procedures.

3. 32 Degrees F to 25 Degrees F:

    a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 Degrees F and 120 Degrees F. Maintain temperature of mortar on boards above freezing.
    b. Grout: Heat grout materials to 90 Degree F to produce in-place grout temperature of 70 Degree F at end of work day.

4. 25 Degrees F to 20 Degrees F:

    a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 Degrees F and 120 Degrees F. Maintain temperature of mortar on boards above freezing.
    b. Grout: Heat grout materials to 90 Degrees F to produce in-place grout temperature of70 Degrees F at end of work day.
    c. Heat both sides of walls under construction using salamanders or other heat sources.
    d. Use windbreaks or enclosures when wind is in excess of 15 mph.

5. 20 Degrees F and Below:

    a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 Degrees F and 120 Degrees F.
    b. Grout: Heat grout materials to 90 Degrees F to produce in-place grout temperature of70 Degrees F at end of work day.
    c. Masonry Units: Heat masonry units so that they are above 20 Degrees F at time of laying.
    d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40Degrees F for 24 hours after laying units.
    e. Do not heat mixing water for mortar and grout to above 160 Degrees F.

I. Protect completed masonry and masonry not being worked on in the following manner: (Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry; if for grouted masonry, temperature ranges apply to anticipated minimum night temperatures.)

1. 40 Degrees F to 32 Degrees F: Protect masonry from rain or snow for at least 24 hours by covering with weather-resistant membrane.
2. 32 Degrees F to 25 Degrees F: Completely cover masonry with weather-resistant membrane for at least 24 hours.
3. 25 Degrees F to 20 Degrees F: Completely cover masonry with weather-resistant insulating blankets or similar protection for at least 24 hours; 48 hours for grouted masonry.
4. 20 Degrees F and Below: Except as otherwise indicated, maintain masonry temperature above 32 Degrees F for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40 Degrees F for 48 hours.

PART 2 - PRODUCTS

2.01 CLAY OR SHALE BRICK

A. Clay or shale brick shall conform to ASTM C 62, selected for color range indicated by the approved sample. Grade SW shall be used for below grade work where bricks will be in contact with earth and for the first six exterior courses above grade. Grade SW or MW shall be used in other brickwork. Brick size shall be King Size, Queen Size or modular in size required to complete the work indicated. Color and texture shall match color range of the approved sample.

2.02 CONCRETE MASONRY UNITS

A. Concrete masonry units shall conform to ASTM C 90, Type I, Grade N-I normal weight for hollow-load-bearing units or ASTM C 145, Type I, Grade N-I normal weight for solid load-bearing units. Units shall be modular in size and shall include closer, jamb header, lintel, corners, sash, control joint, bond-beam units, and any special shapes and sizes required to complete the work indicated.

2.03 CONCRETE MASONRY UNITS USED IN FIRE-RATED ASSEMBLIES

A. Concrete masonry units used in fire-rated assemblies, in addition to the requirements specified for concrete masonry units, shall be of minimum equivalent thickness for the fire rating and corresponding type of aggregates indicated in TABLE 1. Units containing more than one of the aggregates listed in the table, will be rated on the aggregate requiring the greater minimum equivalent thickness to produce the required fire rating.

TABLE 1

Minimum Equivalent Thickness in Inches for Fire Rating of:

Aggregate Type	4 hours	3 hours	2 hours
Pumice	4.7	4.0	3.0

Expanded slag	5.0	4.2	3.3
Expanded clay, shale, or slate	5.7	4.8	3.7
Limestone, scoria, cinders or unexpanded slag	5.9	5.0	4.0
Calcareous gravel	6.2	5.3	4.2
Siliceous gravel	6.7	5.7	4.5

B. Minimum equivalent thickness shall equal net volume as determined in conformance with ASTM C 140 divided by the product of the actual length and height of the face shell of the unit in inches. Where walls are to receive plaster, to be faced with brick, or otherwise form an assembly; the thickness of other material in the assembly will be included in determining the equivalent thickness.

2.04 PRECAST CONCRETE ITEMS

Precast concrete items shall be factory-made units from a plant regularly engaged in producing such items. Units shall have beds and joints at right angles to the face, with sharp true arises and shall be cast with drip grooves on underside where units overhang walls. Unless otherwise indicated, concrete shall be 3000 psi minimum conforming to SECTION: 03300 – CAST IN PLACE CONCRETE using ½-inch to No. 4 nominal-size coarse aggregate. Exposed-to-view surfaces, unless otherwise specified, shall have smooth, dense finish, free of surface voids, spalls, cracks, and chipped or broken edges. Unless precast concrete items have been subjected during manufacture to saturated-steam pressure of 120 pounds or more per square inch for 5 hours or more, the items after casting shall be either damp-cured for 24 hours or more or steam-treated and shall then be aged under cover for 28 days or longer. Prior to use, each item shall be wetted and inspected for crazing. Items showing evidence of dusting, spalling, excessive crazing, or having surfaces treated with a coating will be rejected. Precast concrete members weighing over 80 pounds shall have built-in loops of galvanized wire or other approved provisions for lifting and anchoring. Reinforcement splices are not permitted.

A. Lintels: Precast lintels, unless otherwise shown, shall be reinforced with not less than two No. 4 bars for full lintel length. Reinforced lintels shall be used to span all openings over 12 inches wide in masonry. A minimum clearance of ¾-inch shall be maintained between reinforcement and faces of units. Lintels shall have top labeled "TOP" and shall be identified to show location in work.

B. Splash Blocks: Splash blocks of the size indicated, shall be formed with depressions in top surface to drain away from building and shall be reinforced as standard with the manufacturer.

C. Copings and Sills: Copings and sills shall be cast with washes. Sills for windows shall be cast in sections with head joints at mullions and a ¼-inch allowance for mortar joints. The ends of sills, except a ¾-inch margin at exposed surfaces, shall be roughened for bond. Treads of door sills shall have rounded nosings. Unless otherwise indicated, copings and sills shall be reinforced with not less than two No. 4 bars for full sill length of units.

2.05 MORTAR

A. Mortar shall conform to ASTM C 270, Type S. Mortar mix shall be based on laboratory-proportioned and tested mix. Laboratory testing of mortar shall be in accordance with the preconstruction evaluation of mortar section of ASTM C 780. Mortar mix shall be such that the mortar will develop a minimum laboratory compressive strength of 1800 psi at 28 days. Laboratory proportioned mortar shall be mixed to an initial flow of 100 to 115 percent and shall retain a flow after suction of at least 70 percent when tested for water retention in accordance with ASTM C 91. Cement shall be of one brand. Aggregates shall be from one source. Accelerating admixture, if used, shall be noncorrosive and chloride free conforming to ASTM C 494, Type C.

2.06 GROUT

A. Grout unless otherwise specified, shall conform to the requirements of ASTM C 476. Grout shall be laboratory-proportioned for a 2000 psi mix when tested in accordance with paragraph "STRENGTH TESTS OF GROUT." Grout slump shall be between 9 and 11 inches. Except as otherwise specified, fine grout shall be used to fill spaces where the smallest dimension is 2 inches or less. Coarse grout shall be used to fill spaces where the smallest dimension is greater than 2 inches.

2.07 ANCHORS AND TIES

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153, Class B-1, B-2, or B-3, as applicable for the size of material coated.

A. Dovetail Anchors: Dovetail anchors shall be triangular in shape and shall be fabricated of 3/16-inch steel wire attached to a 12-gauge steel dovetail section. Except where masonry abuts concrete columns or walls, length of anchors shall be such that the anchors will extend to within ½- to ¾-inch of the outer face of the masonry wall in which the anchors are placed. Where the vertical edge of masonry walls abut concrete columns or walls, the anchors shall be not less than 7 inches long. Dovetail slots are specified in SECTION: 03300 - CONCRETE FOR BUILDING CONSTRUCTION.

B. Adjustable Anchors: Adjustable anchors for anchorage of masonry to structural steel shall be rectangular or triangular in shape and shall be fabricated of 3/16-inch steel wire. Weld-on portions of anchors shall be fabricated of 12-gauge sheet steel or ¼-inch steel wire. Except where masonry abuts steel columns, length of anchors shall be such that the anchors will extend to within ½- to ¾-inch of the outer face of the masonry wall in which the anchors are placed. Where the vertical edge of masonry walls abut steel columns, the anchors shall be not less than 7 inches long.

C. Veneer Anchors: Veneer anchors for attaching masonry to wood or light metal framing shall be rectangular or triangular in shape and shall be fabricated of 3/16-inch steel wire with provisions for attaching to framing. Anchors shall have a minimum vertical adjustment of 2 inches. Stud plates shall have a minimum of two holes for attachment hardware. Anchors shall

be of length to extend from framing to within ½- to ¾-inch of the exposed surface of the masonry wall.

D. Wall Ties: Wall ties shall be rectangular or Z-shaped fabricated of 3/16-inch steel wire. Ties shall be of length to extend across the wythes to within ½- to ¾-inch of the faces of the masonry walls in which the ties are placed. Adjustable type wall ties, if approved for use, shall consist of two essentially U-shape elements fabricated of 3/16-inch steel wire. Adjustable ties shall be of the double pintle to eye type or hook to U-type. Pintle or hook portion of ties shall allow a maximum of 1-½ inches eccentricity between each element of the tie. Clearance between pintle and eye opening shall be not more than 1/16-inch.

E. Rigid Steel Z-Anchors: Rigid steel anchors shall be 1-¼ inches wide by 1/8- or 3/16-inch thick with ends turned in opposite directions not less than 3 inches, and of length required for the application indicated; however, length between turned ends shall not be less than 24 inches.

F. Rigid Steel U-Anchors: Rigid steel anchors shall be 1-¼ inches wide by 1/8- or 3/16-inch thick, with ends turned in same directions not less than 3 inches and of length required for the application indicated; however, length between turned ends shall not be less than 24 inches.

2.08 JOINT REINFORCEMENT

A. Joint reinforcement shall be fabricated of steel wire conforming to ASTM A 82. Fabrication shall be by welding; tack welding will not be permitted. Reinforcement shall be zinc-coated after fabrication in accordance with ASTM A 153, Class B-2. Reinforcement shall consist of 2 or more longitudinal wires joined with lateral wires in a ladder-type truss-type system. Spacing of lateral wires along the longitudinal wires shall not exceed 16 inches. Wire thickness of lateral wire shall not be less than 9 gauge and thickness of longitudinal wires shall not be less than 9 gauge. Drips or crimps shall not be formed in lateral wires. The outermost longitudinal wires shall be spaced 2 inches, plus or minus 1/8-inch, less than the nominal wall width in which placed. Joint reinforcement for cavity walls may be furnished with rectangular wall-type ties extending to the longitudinal wires. Reinforcement for straight runs shall be furnished in flat sections not less than 10 feet long. Factory-formed pieces shall be provided for corners and intersections of walls and partitions. Joint reinforcement shall be furnished with adjustable wall tie feature. Such assemblies shall consist of double eye or ladder section welded to joint reinforcement at 24 inches on center. Adjustable portion of the assembly shall consist of a U-shape double pintle tie or hook type box tie fabricated of 3/16-inch steel wire. Pintle or hook portion of ties shall allow a maximum of 1-½-inch eccentricity between the elements of adjustable assemblies. Clearance between pintle and eye opening shall not exceed 1/16-inch. Assemblies shall be of the design to match the type of wall construction.

2.09 REINFORCING BARS

A. Reinforcing bars shall be Grade 40 or 60 steel conforming to ASTM A 615. Size shall be as shown. Centering clips or caging devices shall be formed

from not lighter than 9 gauge wire and shall be of a design that will prevent displacement of reinforcing steel during construction. Bending of bars shall be as shown.

2.10 CONTROL JOINT KEYS

A. Control joint keys shall be factory-fabricated solid section of natural or synthetic rubber or a combination thereof conforming to ASTM D 2000. The material shall be resistant to oils and solvents and shall have a durometer hardness of 65 to 75. The key shall be of the width and shape indicated and shall be designed to be used with standard concrete masonry sash units. Shear section shall be 5/8-inch minimum thickness. Control joint masonry units may be furnished in lieu of the sash units and filler specified.

2.11 EXPANSION-JOINT MATERIALS

A. Premolded type shall be closed-cell cellular rubber conforming to ASTM D 1056 or closed-cell vinyl or polyvinyl chloride conforming to ASTM D 1667.

2.12 BOARD-TYPE INSULATION

A. Board-type insulation shall be polystyrene conforming to ASTM C 578; polyurethane or polyisocyanurate conforming to these specifications. Faced insulation shall have either aluminum foil or asphalt or asphalt impregnated felt on both sides of board. Insulation thickness shall be sufficient to provide an “R” value of 3. Insulation adhesive shall be specifically prepared to adhere the insulation to be used to the masonry damp proofing with no deleterious effect on the insulation or damp proofing.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

Wall sections, types of construction, and dimensions shall be as shown. Masonry shall be laid in running bond and vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Units shall be laid in a nonfurrowed full bed of mortar, beveled and sloped toward the center of the wythe on which the mortar was placed. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control and expansion joints, shall be completely filled with mortar. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned and relaid with fresh mortar. Fins will be permitted to protrude up to ½-inch into the space between the facing wythe and the backup wall; means shall be provided to prevent mortar from dropping into the space below. Chases and raked-out joints shall be kept free from mortar and other debris. Space around metal door frames and other built-in items shall be solidly filled with mortar as each course is laid. Faces of units in finished areas shall be free from chipped edges or other imperfections detracting from the appearance of the finish work. Weepholes in cavity walls shall be provided over foundations, bond beams, through wall flashing, and any other horizontal interruptions of the cavity. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe

by more than 8 inches.

A. Surface Preparation: Surfaces on which masonry is to be laid shall be cleaned of laitance and other foreign material and slightly roughened to provide a surface texture with a depth of at least 1/8-inch.

B. Hot Weather Masonry Construction: Masonry erected when the ambient air has a temperature of more than 99° F in the shade and has a relative humidity of less than 50 percent shall be protected from direct exposure to wind and sun during installation and for 48 hours after installation.

C. Cold Weather Masonry Construction: Temperatures of masonry units shall not be less than 40° F when laid and the temperature of the mortar and grout used shall be between 40° F and 120° F. When the ambient temperature is 32° F or less, masonry work under construction shall be protected and maintained at a temperature greater than 32° F during installation and for a period of 24 hours after installation. The proposed method of maintaining the temperature within the specified range shall be submitted for approval prior to implementation.

D. Tolerances: Except for work constructed of ceramic glazed structural clay facing units or prefaced concrete masonry units, masonry units shall be laid plumb, level and true to line units shall be laid plumb, level and true to line within the tolerances specified in TABLE 2; and all corners shall be square unless otherwise indicated.

TABLE 2

<u>Variation from Plumb</u>	
In adjacent units	1/8 inch
In 10 feet	¼ inch
In 20 feet	3/8 inch
In 40 feet or more	½ inch
<u>Variation from level or grades</u>	
In 10 feet	1/8 inch
In 20 feet	¼ inch
In 40 feet or more	½ inch
<u>Variation from linear building lines</u>	
In 20 feet	3/8 inch
In 40 feet or more	½ inch

<u>Variation from cross sectional dimensions of columns and walls</u>
Plus ½ inch to minus ¼ inch

1. Surfaces to Receive Ceramic Tile: Masonry surfaces shall be level and plumb with struck joints and square openings. No variations in the surfaces exceeding 1/8-inch in 10 feet and no abrupt irregularities exceeding 1/16-inch shall be allowed where ceramic tile installed over masonry by the dry set method.

E. Brick Veneer

1. Shelf Angles: Brick veneer shall be supported by shelf angles as shown on drawings. Shelf angles shall be installed in lengths not exceeding 72 inches, with a 1/8-inch separation between angles to allow for expansion and contraction. Shelf angles shall be adjusted as required to keep the masonry level and at the proper elevation. Angles shall be laid on fully compressible material to form pressure-relieving joints. Joints shall be sealed with elastomeric sealant.
2. Expansion Joints: Vertical expansion joints shall be provided full height in the brick veneer. Joints shall be ½-inch in width. Vertical expansion joints shall be carried up through parapet walls. Parapet walls shall have additional joints spaced halfway between those running full height, unless the parapet is reinforced. Joints shall be sealed with elastomeric sealant.
3. Flashing: Flashing for brick veneer panels shall be provided at horizontal surfaces such as at the roof or parapet, at shelf angles, at all openings such as doors and windows, and at the bottom of the wall just above grade. Flashing shall be sheet metal as specified in SECTION: 07600 -SHEET METALWORK, GENERAL. Except at the bottom of the wall, flashing shall extend through the brick to within ½-inch of the outer face of the wall. At the bottom of the wall, flashing shall extend through the outer face of the wall and turn down to form a drip.
4. Weep Holes: Weep holes shall be located in the head joints immediately above all flashing and spaced at intervals not exceeding 16 inches on center. The holes may be formed by placing short lengths of well greased No. 10, 5/16-inch nominal diameter, braided cotton sash cord in the mortar and withdrawing the cords after the brick facing has been completed. Other approved methods may be used for providing weep holes. Weep holes shall be kept free of mortar and other obstructions.

3.02 MIXING OF MORTAR

A. Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes but not more than 5 minutes. Measurement of ingredients for mortar shall be either by volume or weight. If ingredients are measured by volume, measurement of sand shall be accomplished by the use of a container of known capacity or shovel count based on a container of known capacity. If ingredients are measured by weight, measurement of sand shall be based on the dry weight of sand of 80 pounds per cubic foot. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability; mortar that has reached its initial set or that has not been used within 2-½ hours shall be discarded.

3.03 CUTTING AND FITTING

A. Wherever possible, full units shall be used in lieu of cut units. Where cut units are required to accommodate the design, cutting shall be done by

masonry mechanics using power masonry saws, except that cutting of units in unexposed work may be accomplished with masonry hammers and citsels. Wet-cut units shall be dried to the same surface-dry appearance as uncut units before being placed in the work. Cut edges shall be clean, true, and sharp. Openings to accommodate pipes, conduits, and other accessories shall be neatly formed so that framing or escutcheons required will completely conceal the cut edges. Cutting of webs of hollow units shall be kept to a minimum. Insofar as practicable, all cutting and fitting shall be accomplished while masonry work is being erected.

3.04 CLAY OR SHALE BRICK

A. When being laid, brick shall have suction sufficient to hold the mortar and to absorb water from the mortar, but shall be damp enough to allow the mortar to remain in a plastic state to permit the brick to be leveled and plumbed immediately after being laid without destroying bond. Brick with frogging shall be laid with the frog side down and the better or face side exposed to view. Brick that is cored, recessed, or otherwise deformed shall not be used in sills, treads, soldier courses, or in other areas where deformations will be exposed to view.

3.05 CONCRETE MASONRY UNITS AND CONCRETE BRICKS

A. Concrete masonry units and concrete bricks shall not be wetted before laying. Hollow units shall be laid so as to preserve the vertical continuity of cells that are to be filled with grout. Pre-insulated units shall be laid in a manner to ensure insulation integrity and continuity. Except as specified in paragraph “ANCHORAGE AND JOINT REINFORCEMENT,” courses shall be masonry bonded at corners. Where indicated, cells shall be filled with grout; or solid units may be used in lieu of filled cells where no vertical reinforcement or anchor embedment is required. Concrete brick shall be incorporated in unexposed work as necessary to fill out masonry sections.

3.06 JOINTING

Joint widths shall be uniform and such that the specified widths are maintained throughout. Joints in concealed masonry surfaces and joints at top of electrical boxes in wet areas shall be cut flush with the masonry surfaces. Joints indicated to be caulked shall be raked a depth of ¾-inch. Interior control joints shall be raked to a depth of ½-inch. All other joints shall be tooled slightly concave. Tooling shall be accomplished when mortar is thumbprint hard and in a manner that will compress and seal the mortar joint and produce joints of straight and true lines free of tool marks.

A. Concrete Masonry Unit Joints: Joints in concrete masonry unit construction shall be 3/8-inch wide.

B. Brick Joints: Joints in brick construction shall be of thickness equal to the difference between the actual and nominal dimensions of the brick in either height or length, but in no case shall the joints be less than ¼-inch nor more than ½-inch wide.

C. Facing Unit Joints: Ceramic glazed structural clay facing unit joints and prefaced concrete masonry unit joints shall be not less than ¼-inch nor more than 3/8-inch wide.

3.07 ANCHORAGE AND JOINT REINFORCEMENT

A. Spacing of joint reinforcement and type and spacing of anchors shall be as indicated. Joint reinforcement shall be continuous except at expansion or control joints. Splices in joint reinforcement shall be lapped at least 6 inches. Where walls or partitions intersect to form T-sections, the intersecting walls shall be anchored together with rigid steel anchors or joint reinforcement as indicated. Nail-on ties shall be attached to wood framing with eight penny galvanized nails and to metal framing with stainless steel or plastic coated galvanized steel self-tapping metal screws. Screws shall be of a length to be fully engaged with the metal framing. A washer of neoprene or other similar material shall be inserted between the sheathing and the screw head or tie.

3.08 REINFORCING STEEL

A. Reinforcing steel shall be cleaned of loose or flaky rust and scale, grease, mortar, or other coating which would tend to reduce bonding of the grout to steel. Steel shall be in place at the time of grouting. The minimum clear distance between bars and masonry units shall be ½-inch; and between parallel bars, the minimum clear distance shall be one bar diameter. Reinforcement shall be held in place with centering clips or caging devices. Vertical bars shall be supported near each end and at intermediate intervals not exceeding 192 bar diameters. Horizontal reinforcement shall be set in a full bed of grout. Splices in adjacent bars shall be staggered. Reinforcing bars where spliced shall be lapped a minimum of 40 bar diameters. Welded or mechanical connections shall develop at least 125 percent of the strength of the reinforcement.

3.09 GROUTING

Grout dry ingredients shall be mechanically mixed with sufficient water to bring the mixture to a pouring consistency for at least 5 minutes using the mix design established in the laboratory as specified in paragraph "GROUT." Where high-lift grouting is to be used, cleanout holes shall be provided at the bottom of all cores containing vertical reinforcement in hollow unit masonry. Areas to be grouted shall be cleaned of mortar droppings and other debris and cleanout holes shored or closed with masonry units to contain the grout. Grout shall be placed by hand bucket, concrete hopper, or grout pump. Each lift of grout shall be consolidated after water has left but before plasticity is lost. Consolidation shall be accomplished by mechanically vibrating to insure complete filling of the grout space. When consolidating successive lifts of plastic grout, the tip of the vibrator shall penetrate the preceding lift approximately 10 inches to ensure grout continuity in the wall section. Trowel blade shall not be used for consolidation of grout. If grouting operation is stopped for 1 hour or longer, the grout placement shall be stopped in a manner to provide a 1-½-inch keyway below the top of the masonry unit. Grout holes shall be formed in slab, spandrel beams and other in-place overhead construction. Holes shall be located over spaces to be grouted and shall be in sufficient numbers and spaced as required to insure that the space to be grouted shall be completely filled. If the space to be grouted is larger than

two bricks in thickness, the space may be filled with clay or shale bricks or concrete bricks and grout. Bricks so placed shall have not less than ¾-inch of grout around each brick. Walls to be grouted shall be adequately shored or braced to prevent shifting, buckling or blowouts. After grouting operations are completed the faces of cleanout holes shall be patched to closely match the surrounding surfaces.

A. Low-Lift Grout: Hollow-unit masonry to be grouted by the low lift method shall be constructed and grouted in lifts not exceeding 4 feet. Double wythe masonry to be grouted by the low-lift method shall be constructed and grouted in lifts not exceeding 8 inches. Slushing with mortar will not be permitted.

B. High-Lift Grout: If grouting is accomplished by the high-lift method, double wythe masonry shall be allowed to cure at least 72 hours and hollow-unit masonry shall be allowed to cure at least 24 hours before grouting. In double wythe construction, vertical grout barriers shall be built across the grout space to the height of the grout lift. Grout barriers shall not be spaced more than 30 feet apart. Grout shall be placed in lifts not to exceed 4 feet in depth. Each lift shall be allowed to set for 10 minutes after initial consolidation of grout before successive lift is placed. The full height of each section of wall shall be grouted in one day.

3.10 BOND BEAMS

A. Bond beams shall consist of concrete masonry bond beam units reinforced and filled with grout or concrete as indicated. Structural bond beams shall be continuous through control joints. Dummy joints shall be formed in structural bond beams at control joints. Where splices are required, reinforcement shall be lapped a minimum of 40 bar diameters or 24 inches, whichever is greater. A minimum clearance of ½-inch shall be maintained between reinforcement and interior faces of units.

3.11 CONTROL JOINTS

A. Control joints shall be located and constructed as indicated.

3.12 EXPANSION JOINTS

A. Expansion joints shall be located where indicated and shall be of the size and detail shown.

3.13 SILLS, LINTELS, AND COPINGS

A. Sills, lintels, and copings shall be set in a full bed of mortar with faces plumb and true.

3.14 DISCONTINUOUS WORK

A. When necessary to temporarily discontinue the work, masonry units shall be stepped back for joining when work resumes. Toothing may be resorted to only when specifically approved. Before resuming work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned. Top of walls

exposed to rain or snow shall be covered with nonstaining waterproof covering or membrane when work is not in process. Covering shall extend a minimum of 2 feet down on each side of the wall and be held securely in place.

3.15 BOARD-TYPE INSULATION

A. Board-type insulation shall be applied directly to the dampproofed masonry with adhesive. Insulation shall be neatly fitted between obstructions without impaling of insulation on ties or anchors. The insulation shall be applied in parallel courses with joints breaking midway over the course below, shall be applied in moderate contact with adjoining insulation without forcing, and shall be cut to fit neatly against abutting surfaces.

3.16 STRENGTH TESTS OF GROUT

A. Two samples of grout shall be taken for each 30 cubic yards of grout placed each day. The sample shall be prepared by forming on a flat nonabsorbent base a space approximately 3 inches by 3 inches by 6 inches or 4 inches by 4 inches by 8 inches using masonry units having the same moisture condition as those being laid. The surfaces of the masonry units that will be in contact with the grout shall be lined with a permeable liner to permit water in the grout mixture to pass through the liner into the masonry units. Grout samples shall be placed in the space in two layers and each layer shall be puddled with a 1-inch by 2-inch puddling stick to eliminate air bubbles. The samples shall be struck off even with the top of the mold, covered, and kept damp for a period of 48 hours. After 48 hours samples shall be removed from the molds and placed in a fog room until tested. Samples shall be tested in accordance with ASTM C 39 by an approved commercial testing laboratory, and shall exhibit a minimum compressive strength of 1500 psi at 28 days.

3.17 EFFLORESCENCE TESTS

Efflorescence tests shall be performed by an approved commercial testing laboratory. Sampling for the tests shall be the responsibility of the Contractor.

A. Masonry Units: Clay or shale brick and Concrete masonry units that will be exposed in the finish work shall be sampled and tested for efflorescence in accordance with ASTM C 67 and the rating shall be not more than slightly effloresced.

B. Mortar and Grout: A specimen of each proposed mix, weighing approximately 3 ounces, shall be prepared using as little water as possible. While still in the plastic condition and prior to its initial set, each specimen shall be placed in a glass or glazed receptacle, and 4 ounces of distilled water shall be mixed with the specimen and stirred thoroughly for 5 minutes. The receptacle shall be of such a size that when the specimen and water are combined in solution, and a masonry unit is placed into it, the solution will have a depth of ½- to 1-inch. A masonry unit, which has been tested and found free of efflorescence, shall be placed on end in the solution and the water level maintained at ½-inch to 1-inch with distilled water. After being indoors at temperatures of 75° F plus or minus 15° F for 7 days, the masonry

unit shall be removed from the solution and air dried for 24 hours. The masonry unit shall be compared with an untreated unit, and if the difference due to efflorescence is noticeable, when viewed at a distance of 10 feet, the components of the mixes shall be tested in separate receptacles, each containing a masonry unit which has been tested and found free of efflorescence. The cementitious components shall be prepared for testing by thoroughly mixing 1 ounce of the cementitious material with 4 ounces of distilled water; and the aggregate component shall be prepared for testing by thoroughly mixing 3 ounces of the aggregate component with 4 ounces of distilled water. Each mixture shall be tested as specified above for the proposed mix. The component causing efflorescence will be rejected.

3.18 CLEANING

Mortar daubs or splashings, before setting or hardening, shall be completely removed from masonry unit surfaces that will be exposed, painted, or dampproofed insulated with board-type insulation. Before completion of the work, all defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Cleaning shall be accomplished with the use of stiff bristle fiber brushes, wooden paddles, wooden scrapers, or other suitable nonmetallic tools. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout.

A. Concrete-Masonry-Unit and Concrete-Brick Surfaces: Concrete-masonry-unit and concrete-brick surfaces shall be dry-brushed at the end of each day's work after any required pointing has been done.

B. Clay-Brick or Shale-Brick Surfaces: Before cleaning, the sample masonry panel of similar material shall be examined for discoloration or stain. If the sample panel is discolored or stained, the method of cleaning shall be changed to assure that the masonry surfaces in the structure will not be adversely affected. The exposed masonry surfaces shall be saturated with water and cleaned with a proprietary masonry cleaning agent recommended by the clay products manufacturer and that will not adversely affect the masonry surfaces. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence or other similar stains shall be removed in conformance with the recommendations of the masonry unit manufacturer.

END OF SECTION

Section 05060

WELDING, STRUCTURAL

PART 1 - GENERAL

1.01 APPLICABLE PUBLICATIONS

The publications listed below form a part of tits specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) PUBLICATION

Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (Latest Edition).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARD

Z49.1	Safety in Welding and Cutting.

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT) PUBLICATION

SNT-TC-1A	Personnel Qualification and Certification in Nondestructive Testing.

AMERICAN WELDING SOCIETY (AWS) PUBLICATIONS

A2.4	Symbols for Welding and Nondestructive Testing.
A3.0	Welding Terms and Definitions.
D1.1	Structural Welding Code - Steel.

1.02 GENERAL REQUIREMENTS

A. The design of welded connections shall conform to the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Welding shall be as specified in tits section, except where additional requirements are shown on the drawings or are specified in other sections. Welding shall not be started until welding procedures, welders, welding operators, and tackers have been qualified and the submittals furnished to the Owner, or its authorized representative.

B. Definitions: Definitions of welding terms shall be in accordance with AWS A3.0.

C. Symbols: Symbols shall be in accordance with AWS A2.4, unless otherwise indicated.

D. Safety: Safety precautions during welding shall conform to ANSI Z49.1.

1.03 WELDER, WELDING OPERATOR, AND TACKER QUALIFICATION

A. Each welder, welding operator, and tacker assigned to work on tits contract shall be qualified in accordance with the applicable requirements of AWS D1.1 and as specified in tits section.

B. Certificates: Before assigning any welder, welding operator, or tacker to work under tits contract, the Contractor shall submit the names of the welders and their valid certificates, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. The certification shall state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. The certification shall be kept on file, and 3 copies shall be furnished. The certification shall be kept current for the duration of the contract.

PART 2 - PRODUCTS

2.01 WELDING EQUIPMENT AND MATERIALS

A. All welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. All welding equipment and materials shall comply with the applicable requirements of AWS D1.1.

PART 3 - EXECUTION

3.01 WELDING OPERATIONS:

A. Requirements: Workmanship and techniques for welded construction shall conform to the requirements of AWS D1.1 and AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings. When AWS D1.1 and the AISC specification conflict, the requirements of AWS D1.1 shall govern.

3.02 QUALITY CONTROL

A. An approved inspection, testing laboratory or certified technical consultant shall do testing. The Contractor shall perform visual and ultrasonic inspection testing to determine conformance. Procedures and techniques for inspection shall be in accordance with applicable requirements of AWS D1.1.

3.03 STANDARDS OF ACCEPTANCE

A. Dimensional tolerances for welded construction, details or welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings. Nondestructive testing shall be by visual inspection and ultrasonic. The minimum extent of nondestructive testing shall be random 10 percent of welds or joints, as indicated on the drawings.

3.04 OWNER INSPECTION AND TESTING

A. In addition to the inspection and tests performed by the Contractor for quality control, the Owner will perform inspection and testing for acceptance to the extent determined by the Owner, or its authorized representative. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory

welds are discovered by the Owner, or its authorized representative. The Owner reserves the right to perform supplemental nondestructive tests to determine compliance.

3.05 CORRECTIONS AND REPAIRS

A. When inspection or testing indicates defects in the weld joints, the welds shall be repaired using a qualified welder or welding operator as applicable. Corrections shall be in accordance with the requirements of AWS D1.1 and the specifications. Defects shall be repaired in accordance with the approved procedures. Defects discovered between passes shall be repaired before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, the affected area shall be blended into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before rewelding, the area shall be examined by suitable methods to insure that the defect has been eliminated.

B. Repair welds shall meet the inspection requirements for the original welds. Any indication of a defect shall be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.

END OF SECTION

Section 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 APPLICABILITY TO OTHER SECTIONS

A. Tits section governs the work described in the title regardless in which section the work occurs.

B. Drawing Precedence: Requirements given on the structural drawings supplement and take precedence over requirements given herein.

C. Shop Drawings: Submit for approval showing quantities, locations, dimensions, joints, materials and finishes; submit anchor bolt drawings separately if necessary, so not to delay work.

D. Documentation as to the manufactured location of steel is mandatory (submit prior to fabrication).

1.02 SUMMARY

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

C. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components, which do not comply.

D. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

1.03 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 specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts (each type), including nuts and washers.
3. Structural steel primer paint.
4. Shrinkage-resistant grout.

B. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, and type of each weld.

1. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of others sections.

C. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" is including "Commentary" and Supplements thereto as issued.
2. AISC "Specifications for Architecturally Exposed Structural Steel".

3. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

C. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests and are current.

1. If recertification of welders is required, retesting will be Contractor's responsibility.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time not to delay work.

C. Store materials to permit easy access for inspection. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale 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.

B. Structural Steel Shapes, Plates and Bars: ASTM A 36.

C. Cold-Formed Steel Tubing: ASTM A 500, Grade B.

D. Hot-Formed Steel Tubing: ASTM A 501.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.

1. Finish: Black, except where indicated to be galvanized.

F. Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

G. Anchor Bolts: ASTM A 307, Grade A 307, non-headed type unless otherwise indicated.

H. Unfinished Threaded Fasteners: ASTM A 307, Grade regular low-carbon steel bolts and nuts.

1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.
2. Quenched and tempered alloy steel bolts, nuts and washers, complying with ASTM A 490.
3. Direct tension indicator washers shall be used at all friction type connections.

I. Electrodes for Welding: Comply with AWS Code.

J. Structural Steel Primer Paint: Fabricator's standard rust-inhibiting primer.

K. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

2.02 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence, which will expedite erection and minimize field handling of materials.

C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

D. Connections: Weld or bolt shop connections, as indicated.

E. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

F. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" (RCRBSJ).

G. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

H. Assemble and weld built-up sections by methods, which will produce true alignment of axes without warp.

PART 3 - EXECUTION

3.01 ERECTION

A. Surveys: Employ a surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

D. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

E. Tighten anchor bolts 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.

F. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow curing.

G. Field Assembly: 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.

H. Level and plumb individual members of structure within specified AISC tolerances.

I. 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 final shop drawings.

J. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

K. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

3.02 SHOP PRIMER SYSTEM

A. Minimum Preparation: Remove loose mill scale, loose rust and other foreign materials to the standards SSPC SP-2 and SP-1.

B. Acceptable Primers: Any primer that meets Federal or SSPC specifications for use over the specified preparation; three such primers are Fed. Spec. TT-P-86, Type I or II, SSPC-Paint 4-64T or TT-P-636c iron oxide zinc chromate alkyd primer.

C. Proprietary Primers: Use is permissible when performance properties equal those mentioned above.

D. Primer Thickness: 2.0 mils min. dry film, except for minor deficiencies.

E. Omit from these locations:

1. Field weld areas.
2. Galvanized items.

3.03 FABRICATION/SPLICE LOCATIONS

A. Only where shown on the drawings.

B. If not shown, submit locations for approval on Shop Drawings.

C. Locate splices only where shown on the approved Shop Drawings.

3.04 FABRICATION

A. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

B. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

C. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

D. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members, which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

E. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

F. Apply touch-up painting by brush or spray to provide minimum dry film thickness of 1.5 mils.

END OF SECTION

Section 05210

STEEL JOISTS

PART 1 - GENERAL

1.01 APPLICABILITY TO OTHER SECTIONS

A. Tits section governs the work described in the title regardless in which section the work occurs.

1.02 WARRANTY

A. Warrant the Work for one year against becoming unserviceable or objectionable in appearance as a result of being defective or non-conforming.

1.03 SHOP AND INSTALLATION DRAWINGS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI "Specifications".

B. Submit detailed drawings for approval with the number of copies and type of prints as directed. Proceed only after approval.

1.04 CERTIFICATION OF COMPLIANCE

A. Submit certificates at same time Shop Drawings are submitted.

B. Certificate shall evidence compliance with requirements of SJI or AISC "Standard Specifications and Load Tables".

C. Certificate of fabricator approval by City Building Dept.

1.05 DRAWING PRECEDENCE

A. Requirements given on the Structural Drawings supplement and take precedence over requirements given herein.

1.06 QUALITY ASSURANCE

A. Provide joists fabricated in compliance with the following, and as herein specified.

1. Steel Joist Institute (SJI) "Standard Specifications, Load Tables and Weight Tables" for:

a. K-Series Open Web Steel Joists

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society "Structural Welding Code", AWS D1.1.

C. Inspection: Inspect joists in accordance with SJI specifications.

D. Performance Test: If required, conduct performance tests in accordance with procedures described in SJI "Recommended Code of Standard Practice".

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle steel joists as recommended in SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: Comply with SJI "Specifications".

B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, Regular hexagon type, low carbon steel.

2.02 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification".

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable SJI "Specifications" and load tables.

D. 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 suite manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within ½" of finished wall surface unless otherwise indicated.

E. Bridging: Provide horizontal or diagonal type bridging for joists, complying with SJI "Specifications".

F. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

G. End Anchorage: Provide end anchorages including bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications", unless otherwise indicated.

H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

2.03 SHOP PRIMER

A. Minimum Preparation: Remove loose mill scale, loose rust and other foreign materials to the standards SSPC SP1 & SP2 or SP3.

B. Acceptable Primers: SSPC Paint 15, Type I red oxide.

C. Proprietary Primers: Use is permissible when performance properties equal 150 hours of 5% salt fog on 1 mil dry thickness to ASTM B 117 and meet performance below.

D. Primer Thickness: 2.0 mils minimum dry film, except for minor deficiencies.

E. Temporary Protection Performance:

1. Length of Protection: Minimum of 6 months exposed at the job site.
2. Conditions of Exposure: No more severe than a normal rural, urban or industrial atmosphere over 1,500 ft. from bodies of salt water and discharge point of corrosive or solvent fumes not in continuous contact with water or moist materials.
3. Permissible Failure: Limited to 5% of surface areas measured by touch-up areas.
4. Failure Definition: Rust or other primer deterioration which make the surface unsuitable for continuing the paint system without additional preparation.

F. Responsibility

1. Primer Performance: Shall be the responsibility of the applicator who shall coordinate the details of the primer system within the specification given herein.
2. Physical Damage: Handling and erection damages shall by touched up. The party responsible for such damage shall bear the cost.
3. Touch-Up: Required where failure exceeds permissible amount.

2.04 INCLUDED ACCESSORY ITEMS

A. Headers and framing around openings that interrupt the joints.

B. Anchors, inserts, shelf angles, clip angles necessary to the joist system.

C. Clip angles shown connected to the joist for the attachment of other materials.

D. Holes for the attachment of other materials.

PART 3 - EXECUTION

3.01 ERECTION

A. Place and secure steel joists in accordance with 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, plumbed and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

C. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

1. Where “open web” joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

D. 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.

E. Fastening Joists

1. Field weld joists to supporting steel framework in accordance with SJI “Specifications” for type of joists used. Coordinate welding sequence and procedure with placing of joists.
2. Provide unfinished threaded fasteners for bolted connections, unless otherwise indicated.

F. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, 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.

END OF SECTION

Section 05300

METAL DECKING

PART 1 - GENERAL

1.01 MINIMUM SPECIFICATIONS

A. AISI-Specifications for the Design of Cold-Formed Steel Structural Members, latest edition.

1.02 REFERENCES

The publications listed below form a part of tits specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S335	Specification of Structural Steel Buildings - Allowable Stress Design.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-673	Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 108	Steel Bars, Carbon, Cold Finished, Standard Quality.
ASTM A 446	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
ASTM A 525	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
ASTM A 570	Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
ASTM A 611	Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.
ASTM A 792	Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

1.03 DRAWING PRECEDENCE

A. Requirements given on the Structural Drawings supplement and take precedence over requirements given herein.

PART 2 - PRODUCTS

2.01 APPROVED SUPPLIERS

A. Bethlehem Steel

B. Wheeling Steel

C. Vulcraft

D. H.H. Robertson Co.

E. Others whose products meet specifications

2.02 TYPES AND REQUIREMENTS

A. Refer to the Structural Drawings for depth, gage, and physical properties.

2.03 MATERIALS

A. Steel: ASTM A 446 Grade E

B. Finish: Galvanized ASTM A 525, Class G-60

PART 3 - EXECUTION

3.01 ERECTION

A. Place perpendicular to supports with corrugation edges up.

B. Lap sides one corrugation. Lap ends a minimum of 2 inches.

C. Do not extend bottom sheet beyond the supporting member, except where shown.

END OF SECTION

Section 07210

BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes furnishing and installing building insulation at exterior wall, soffit and roof areas shown.

1.03 RELATED WORK

A. Related Work of Other Sections:

1. Section 05410 - Cold Formed Steel Framing.

1.04 DELIVERY, STORAGE AND PROTECTION

A. Protect insulation materials from physical damage and deterioration by moisture, soiling, and other sources. Store materials inside in a dry location. Handle store and protect materials in accordance with manufacturer's printed instructions.

PART 2 - PRODUCTS

2.01 INSULATION PRODUCTS AND MANUFACTURERS

A. Unfaced Glass Fiber or Mineral Fiber Blanket Insulation: ASTM C 665, Type I, Class A flame spread.

1. Product: Owens-Corning "Unfaced Fiberglas Building Insulation", or Certainteed "Unfaced Building Insulation", or Manville "Unfaced" blankets, or Knauf "Unfaced Thermal and Acoustical Blanket".
2. Thickness, Thermal Resistance, and Locations: 3-1/2" thick, R-13 in perimeter walls and other areas indicated.

B. Rigid Insulation: Rigid Closed cell extruded polysterene thermal board insulation:

1. Comply with ASTM C578-95, Type X, density 1.35 .b/cuftmin, compressive strength 15 psi (ASTM 1621-94)
2. Thermal resistance: 5 year aged R values of 5.4 and 5.0 min deg F-ft2-h/Btu2/inch at 40 deg F and 75dF respectively (ASTM C 518-91).
3. Water absorption: Max .01% by volume (ASTM C 272-91).
4. Surface Burning Characteristics: Flame Spread: 5; Smoke Developed: 165

2.02 MISCELLANEOUS MATERIALS

A. Tapes and Sealants: 3M No. 8086 Contractor Sheathing Tape.

B. Impaling Clips: Type recommended by insulation manufacturer.

C. Netting: For support of blanket insulation as recommended by insulation manufacturer.

D. Wire: For support of blanket insulation as indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation, General: Install a single layer of insulation of the required thickness over entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Install insulation units to substrate by the method indicated, or if not indicated mechanically anchor to provide permanent placement and support of units.

1. Comply with insulation manufacturers written instructions applicable to products and application indicated.
2. Vapor Barriers: Set vapor barrier faced insulation units with vapor barrier installed toward the exterior of construction. Repair cuts and tears in vapor barriers with vapor barrier tape. Do not obstruct ventilation spaces, except for fire stopping.
3. Provide wire supports at maximum 48” centers where construction will not provide permanent and secure support of insulation.
4. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
5. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions.

Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

6. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
7. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

B. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07512

MODIFIED BITUMINOUS ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Related Sections include the following:

1. Section 07600 Flashing and Sheet Metal

1.02 DESCRIPTION OF WORK

A. Tits section includes all material, labor, equipment, temporary protection and tools for the proper installation and completion of the work as required in tits specification.

B. The following items are specified in tits section:

1. Roof Insulation
2. Fasteners
3. Roof membrane
4. Roof membrane flashings
5. Treated wood
6. Sealants
7. Adhesives

1.03 REFERENCES

A. American Society of Testing and Materials (ASTM)

A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C728 Specification for Perlite Thermal Insulation Board

D41 Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

D146 Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing

D312 Specification for Asphalt Used in Roofing

D4601 Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

D5147 Test Methods for Sampling and Testing Modified Bituminous Sheet Material

E84 Test Method for Surface Burning Characteristics of Building Materials

B. Factory Mutual (FM)

Approval Guide: Approval Standards No. 4470 Class 1 Roof Covers

C. Federal Specification (FS)

HH-I-1972/2 Class 1 - Insulation Board, Thermal, Polyurethane or Polyisocyanurate, Faced with Asphalt/Glass Fiber Felt on Both Sides of the Foam

D. National Roofing Contractor's Association (NRCA)

Roofing and Waterproofing Manual

E. Underwriter's Laboratories, Inc. (UL)

Roofing Materials and Systems Directory

1.04 SUBMITTALS

A. General: Submit the following in accordance with conditions of Contract and Division 1.

B. Submit documentation of Manufacturer's proposed assembly based on substrate conditions as shown on Contract Documents.

C. Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for each type of roofing product required. Include data substantiating that materials comply with the specified requirements.

D. Submit copy of the membrane manufacturer's warranty covering materials.

E. Submit copy of the Roofing Contractor's warranty covering workmanship.

F. Submit proposed installation method for insulation and membrane for each different section of roof. Include insulation type (e.g. flat, tapered) and

fastener patterns if applicable. Show Contractor's proposed method of achieving specified roof slopes.

G. Submit proposed profile details of flashing methods for penetrations and terminations if not indicated in the Contract Documents.

H. Submit written documentation from the manufacturer that the proposed roofing system, including insulation and fasteners, meets the applicable requirements and code approvals as referenced in tits specification, and that the roofing system meets the requirements for the manufacturer standard warranty, covering material.

I. Submit locations and name(s) of building owner(s) to meet the installation requirement of 500 roofing squares for more than five (5) years in the Southwest.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet, bitumen, membrane flashings, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.

B. Installer Qualifications: Engage an experienced Installer who is certified by modified bituminous sheet roofing system manufacturer as qualified to install manufacturer's roofing materials. The Roofing Contractor must have completed a minimum of 500 roofing squares of modified bitumen membrane in the Southwest. To qualify for tits requirement, the completed membrane must have met all conditions to obtain material and labor warranty, and must be performing successfully.

C. Membrane manufacturer shall supply a list of projects, completed in the Southwest, where the specified membrane has been in place and performing successfully for a period of not less than five (5) years. A minimum of 500 roofing squares must have been installed to meet tits requirement.

D. Code Requirements: The proposed roofing system shall meet the requirements of the following recognized code approval or testing agencies. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in Article 1.04 "Submittals."

1. Underwriters Laboratories, Inc. (UL) Class A membrane.
2. Factory Mutual (FM) 1-60 or 1-90 uplift rating, as indicated on Contract Documents per FM Approval Standard No. 4470.

E. For new installations, ponding shall not occur in accordance with NRCA Roofing and Waterproofing Manual good roof design practice, which dictates that there shall be no ponding of water present 48 hours after rainfall.

1.06 DELIVERY, STORAGE, AND HANDLING

A. All products delivered to the job site shall be in the original unopened container or wrappings.

B. Membrane rolls and insulation shall be stored fully protected from moisture and wind damage.

1. Store membrane rolls on end on pallets or other raised surface.
2. Remove plastic and cover insulation with tarpaulins on a raised surface.

C. Bonding adhesives shall be stored at temperatures recommended by the manufacturer.

D. Handle all materials to prevent damage. Any materials which are determined to be damaged, according to the Owner's Representative, are to be removed from the job site and replaced at no cost to the Owner.

1.07 PROJECT CONDITIONS

A. Construction may not be fully represented on the drawings, and some modifications to details may be required to accomplish the intent of the documents. Contractor shall coordinate with General Contractor and other sub-contractors prior to bidding to ascertain to its satisfaction, that the specifications and drawings are workable and not in conflict with the manufacturer's requirements for material warranty.

B. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The building and its contents shall be protected against all risks, and any damages shall be repaired or replaced at no cost to the Owner. All exterior lighting, equipment, landscaping, and paving shall be protected from damage.

C. Contractor shall test drains prior to and upon completion of roofing work to insure that no blockage exists or has occurred.

D. Only as much of the new roofing as can be made weather tight each day including all flashing work, shall be installed. Plug all roof drains before starting work each day and unplug all drains at the end of each workday.

E. All surfaces to receive insulation, membrane or flashing shall be thoroughly clean and dry. Should surface moisture occur, the Contractor shall provide the necessary equipment and labor to dry the surface prior to application?

F. All construction, including equipment and accessories, shall be secured against wind blow-off damage.

G. Temporary waterstops shall be installed at the end of each day's work and shall be removed before proceeding with the next day's work. Water stops shall be compatible with all materials, shall not emit dangerous or incompatible fumes, and shall be installed per manufacturer's recommendations and details.

H. Contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Plywood protection shall be provided for all new and existing roof areas which receive traffic during construction.

I. Prior to and during applications, all dirt, debris and dust shall be removed from surfaces either by sweeping or vacuuming. Compressed air cleaning is prohibited.

J. Liquid materials such as solvents and adhesives shall be stored and used away from open flames, sparks and excessive heat.

K. Membranes and accessories shall not be exposed to a prolonged temperature in excess of 160 degrees F (71 degrees C).

L. Contaminants, such as grease, fats, oils and solvents shall not be allowed to come into direct contact with the roofing membrane. Any exposures shall be presented to the membrane manufacturer for assessment of impact on the roof system performance.

M. Site clean-up, including both interior and exterior building areas below or adjacent to the construction area for the roof. Cleaning of the membrane with gasoline is prohibited. Mineral spirits shall be used to clean tar or asphalt from the membrane. Notify the Owner's Representative before using any solvent or cleaner to allow intake fans to be shut down.

N. All roofing, insulation, flashings, and metal work removed for construction shall be promptly taken off the site to a legal dumping area.

O. Contractor shall take care during application and storage to insure that overloading of the deck and structure does not occur.

P. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Coordinate closing or shut-off of vents and intakes during roofing and flashing operations.

1.08 WARRANTY

A. Upon completion of the work and receipt of final payment, the manufacturer shall submit executed copy of roofing manufacturer's standard limited service warranty agreement including flashing endorsement, signed by an authorized representative of modified bitumen sheet roofing system manufacturer, for minimum of ten (10) years after date of substantial completion.

B. B. Roofing Contractor shall supply Owner's Representative with a minimum two (2) year workmanship warranty. In the event any work related to roofing, flashing, or metalwork is found to be defective or otherwise not in accordance with the Contract Documents within two (2) years of final acceptance, the Roofing Contractor shall remove and replace the defects at no cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

Provide a Styrene Butadiene Styrene (SBS) -modified bituminous sheet roofing system that is comprised of fully compatible components for use in the proposed application. All proposed materials shall be compatible with substrate.

2.02 MEMBRANE

A. SBS Roof Membrane Cap: ASTM D5147; SBS roofing membrane sheet shall be polyester, glass, or composite polyester and glass reinforced sheet with continuous layers of mineral granules factory-applied to top exposed surface. Thickness shall be a minimum of 138 mils (3.5 mm).

B. Base Sheet

1. Asphalt-impregnated and coated, fiberglass base sheet dusted with mineral granules both sides, complying with ASTM D4601 and ASTM D146.
2. SBS-modified bitumen base sheet, with fiberglass reinforcing mat, dusted with fine mineral granules, both sides, comply with ASTM D5147.

2.03 FLASHING MEMBRANE

Flashing membrane shall be as supplied by the roofing membrane manufacturer. Flashing membranes are generally the same material as the roofing membrane unless otherwise specified on the Contract Documents.

2.04 INSULATION

A. General: Provide insulating materials to comply with requirements indicated for materials and compliance with referenced standards; in sizes to fit applications, select from the manufacturer’s standard thicknesses, widths and lengths.

B. Polyisocyanurate Board Roof Insulation: Provide cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer’s standard facing laminated to both sides to comply with FS HH-I-1972/2 Class 1. Provide in two (2) layers for a total thickness to meet an average R-value of 20.0, unless indicated elsewhere on the Contract Documents.

Surface Burning Characteristics: Comply with ASTM E84 with a maximum flame spread and smoke developed values of 25 and 145, respectively.

Recycled Content: Minimum 9 percent

C. Insulation, fasteners and adhesive shall be supplied or approved by the roof membrane manufacturer for compatibility with the system, and the required FM and UL requirements.

D. Insulation Overlay Board

Perlite board, 3/4”-inch (19.1 mm) thick, ASTM C728.

E. Recovery Board: Provide one half-inch (1/2”-inch, 13mm) Den’s Deck, or approved equal, over all insulation and tapered insulation.

2.05 ACCESSORY PRODUCTS

A. Asphalt: Roofing asphalt, complying with ASTM D312, Type IV.

B. Primer: Asphalt primer, complying with ASTM D41.

C. Sealants: As recommended by the membrane manufacturer.

D. Fasteners

1. Nailable Substrates: As recommended by manufacturer specially designed to be used in roofing applications for the attachment of roofing insulation and other accessories.
2. Non-Nailable Substrates: As recommended by manufacturer specially designed to be used in roofing applications for the attachment of roofing insulation and other accessories.

E. Vented Base Sheet: Provide membrane manufacturer’s recommended vented base sheet over decks that require ventilation of water vapor or over existing reroofing membranes before reroofing, when required or recommended by membrane manufacturer for the intended application or when indicated on Contract Documents.

F. Wood Nailers: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on the Contract Documents. Wood shall be #2 or better, treated lumber. Height of nailers shall match that of the insulation thickness or as indicated on the drawings. Nailers shall be firmly anchored at a maximum spacing of 12”-inches (305mm) unless noted otherwise on drawings and capable of resisting a force of 300 pounds per lineal foot (446 kg/m) in any direction. One-half inch (1/2-inch, 13mm) expansion spaces shall be provided between lengths of nailers.

G. Cant Strips: Provide 45 degree cant strips at all parapet walls, cures, expansion joints and as recommended by membrane manufacturer.

1. Wood Cant Strips: Treated wood shall be #2 or better, treated lumber.
2. Perlite Board Cant Strips: Comply with ASTM C728.

H. Sheet Metal Accessory Materials: ASTM A653, with 0.20 percent copper, G90 hot-dipped galvanized, 24-gauge (0.61 mm) or heavier.

I. Expansion Joint Covers: Shall be the manufacturer’s prefabricated units.

J. Roof Walkways: Provide 36”-inch (914 mm) wide cap sheet walkways per manufacturer’s recommendations specifically for hot bituminous application on SBS-modified bitumen sheet roofing as a protection course for foot traffic.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine substrate surfaces to receive SBS-modified bitumen sheet roofing system and associated work, and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected to the satisfaction of the Owner's Representative.

B. Prior to all work of tits section, Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where tits installation may properly commence.

C. Verify that work of other trades that penetrate the roof deck has been completed.

D. Verify that roofing system may be installed in strict accordance with all pertinent codes and regulations, the original design and the manufacturer's recommendations.

E. In the event of discrepancy, immediately notify the Owner's Representative.

F. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

G. Upon starting the installation of a new roof, the OWNER'S REPRESENTATIVE and the General Contractor and their sub-contractor, if applicable, will designate a portion of the installation to be used as a mock up. Tits area will be the model of how the roof installation shall be installed. The mock up should include the insulation, a curb, flashing, parapet and an inside and outside corner along with a termination and lap seam.

H. Throughout the project and at completion, the manufacturer's representative shall be allowed to inspect the roof, including probing as necessary to ensure proper installation.

3.02 PREPARATION OF SUBSTRATE

A. General: Comply with the insulation and membrane manufacturer's instructions for preparation of the substrate to receive the roofing system.

B. Clean substrate of dust, debris, and other substances detrimental to the system work. Remove sharp projections.

3.03 INSTALLATION OF INSULATION

A. General: Comply with insulation manufacturer's instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.

B. B. Insulation shall be neatly cut to fit around all penetrations and projections.

C. Install tapered insulation where applicable in accordance with insulation manufacturer's approved shop drawings.

D. D. Install tapered insulation around drains creating a drain sump. Trim surface of insulation where necessary at roof drains so completed surface is flush with perimeter of drain.

E. Do not install more insulation board than can be covered with membrane by the end of the day or onset of inclement weather.

F. All joints and seams shall be a tight fit to prevent any gaps, voids, and surface irregularities.

G. Insulation Attachment with Mechanical Fasteners

1. Secure insulation to deck using mechanical fasteners specifically designed and sized for attaching specified insulation to deck type shown. Fasten insulation over entire area of roofing at spacing as required by FM for specified windstorm resistance classification. Run long joints for insulation in continuous straight lines, perpendicular to roof slope with end joints staggered between rows.
2. Perform pull out tests for the Owner's Representative to verify deck conditions and actual pull out values prior to installation of the membrane.
3. Use fastener tools with a depth locator as recommended or supplied by the fastener manufacturer to ensure proper installation.

H. Two-Layer Installation: Where overall insulation thickness is two (2"-inches, 51mm) or greater, install required thickness in two (2) layers staggered from joints of first layer a minimum of twelve (12"-inches, 305mm) each direction. Install second layer in full mopping of hot Type IV asphalt.

3.04 INSTALLATION OF MEMBRANE

A. Install materials in accordance with manufacturer's instructions for the intended application.

B. B. Surface of the insulation or overlay board shall be inspected prior to installation of the roof membrane. The insulation surface shall be clean and smooth with no excessive surface roughness, contaminated surfaces, or unsound surfaces such as broken or delaminated insulation boards.

C. Membrane shall be installed per the membrane manufacturer's written installation procedures for an approved hot mopped system.

D. During the course of the work, the entire roof area shall be kept clear of loose or spilled fasteners and metal scraps to guard against puncture of the membrane.

3.05 MEMBRANE FLASHINGS AND STRIPPING

A. Substrate shall be smooth and free of all dirt and debris.

B. Area to be flashed shall be primed as recommended by the manufacturer. Allow primer to dry so area is tack-free.

C. Install SBS-modified bituminous flashing at cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof. Install one (1) ply of flashing sheet material by mopping substrate and back of flashing sheet with Type IV asphalt and embedding flashing solidly against substrate. Extend flashing a minimum of six (6”-inches, 152mm) onto SBS-modified bituminous sheet roofing.

D. Install SBS-modified bituminous stripping where metal flanges are set on roofing. Install one (1) ply of SBS-modified bituminous stripping in a continuous mopping to Type IV asphalt and extend stripping a minimum of six (6”-inches, 152mm) onto the roof membrane.

E. The membrane flashing shall be applied from the low point of the roof to the high point so that all laps shed water. As the membrane flashing is being applied, it must be pressed firmly against the substrate to maximize the adhesion. Particular attention must be taken while the flashing is being installed to prevent possible tenting that is a result of stress put on the membrane when applied improperly.

F. Projections and Extension Through the Roof: All pipes, vents, ducts, stacks, and openings shall be installed through the roof deck before the roofing is applied. No projections shall be constructed through the perimeter flashing.

G. Pipe penetrations shall be flashed a minimum of eight (8”-inches, 203mm) above the roofing membrane, and terminate with a stainless steel hose clamp with sealant applied along the top edge. Factory fabricated pipe seals and roof membrane shall be welded as outlined. A buffer layer of membrane shall be installed between hose clamp and flashing sheet to avoid damage.

H. Roof Drains: Set 30”-inch x 30”-inch (762mm x 762mm) lead flashing sheet in bed of roofing cement on completed modified bituminous roofing sheet. Cover lead sheet with modified bituminous stripping, with stripping extending a minimum of four (4”-inches, 102mm) beyond edge of lead flashing onto roof membrane. Clamp roof membrane, lead flashing, and stripping onto roof membrane.

I. Install other accessories in accordance with manufacturer’s instructions and National Roofing Contractor’s Association (NRCA) construction details as applicable.

3.06 WALKWAY INSTALLATION

Walkways: Install walkway pads at location shown in Construction Documents. Hot-air weld along edges a minimum of 2”-inches (51mm) to substrate, and fully adhere walkway pads between welds to substrate with compatible adhesive according to roofing system manufacturer’s written instruction. Corners of walkway are to be rounded and hot-air welded in accordance with manufacturer’s written instruction.

3.07 TEMPORARY CUTOFF

A. Flashing shall be installed concurrently with roof membrane in order to maintain a watertight condition as work progresses. When a break in the day's work occurs in the central area of the roof, temporary waterstop shall be constructed to provide a watertight seal.

1. Waterstop shall be installed per manufacturer's recommendations unless otherwise specified per details shown on the Contract Documents.
2. When work on new system is suspended, stagger of insulation joints shall be maintained by installing partial fillers. New membrane shall be carried into the waterstop.
3. When work resumes, contaminated membrane, insulation fillers, etc., shall be removed from work area and disposed off-site. Do not use these materials in new work.

B. If inclement weather occurs while a temporary waterstop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.

3.08 COMPLETION

A. Prior to Contractor's request for final inspection by Owner's Representative, membrane manufacturer's technical consultant shall provide on-site inspection of installed roofing system.

1. Membrane manufacturer shall provide Contractor and Owner's Representative with itemized list of defects or non-compliance with manufacturer's recommendations.
2. Contractor shall immediately correct identified items. Complete corrections before request for final inspection from Owner's Representative.

B. Prior to demobilization from site, work shall be inspected by Contractor.

1. Itemize defects or non-compliance with these specifications or membrane manufacturer's recommendations in punch list.
2. Contractor shall immediately correct identified items prior to demobilization, to satisfaction of Owner's Representative and membrane manufacturer.

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coping, parapet and cap flashings.

B. Gutters, downspouts, and gravel stops.

C. Counter flashings over flexible base flashings, roof mounted equipment, vent stacks and exhaust fans.

D. Expansion-joint cover flashings.

1.02 RELATED SECTIONS

A. Section 07411- Manufactured Metal Roof Panels

B. Section 07900: Joint Sealers.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. A 167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
2. A 653 - Steel Sheet, Zinc Coated, (galvanized) by the Hot-Dip process, Structural (Physical) Quality Property.
3. A 924 - Steel Sheet, Zinc Coated, (galvanized) by the Hot-Dip process.
4. D 226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

a. Federal Standards (FS):
   i QQ-L-201F - Lead Sheet.
   ii O-F-506 - Flux, Soldering, Paste and Liquid.
   iii QQ-S-571 - Solder, Tin Alloy.
   iv SS-C-153 - Cement, Bituminous, Plastic.
   v TT-C-494- Coating Compound, Bituminous, Solvent Type Acid Resistant.
b. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
c. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual.

1.04 SYSTEM DESCRIPTION

A. Work of tits Section is to physically protect roofing, base flashings, and expansion joints from damage that would permit water leakage to building interior.

1.05 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal flashing work with three years minimum experience.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver and store products under provisions of Manufacturers.

B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.

C. Prevent contact with materials during storage, which may cause discoloration, staining, or damage.

1.07 PROJECT CONDITIONS - ENVIRONMENTAL REQUIREMENTS

A. Do not install sheet metal components during inclement weather.

B. Do not install sheet metal components to damp or frozen surface.

1.08 SEQUENCING AND SCHEDULING

A. Coordinate work under provisions of Section 01040.

B. Where applicable limit removal of existing roofing or sheet metal components, to ensure new installation can be made watertight by end of day.

C. Coordinate installation of flanged metal components, including gravel guards, pitch pans, and accessories to ensure strip-in with hot bitumen (where applicable) on same day they are installed.

D. Schedule work to avoid storage on, and traffic over finished work.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A 653, Grade A, G90, 24-gage minimum core steel.

B. Lead: FS QQ-L-201F, 4-lb/sq ft and 2-1/2-lb/sq ft.

C. Prefinished Galvanized Steel: ASTM A 653, Grade A, G90, 24 gage minimum core steel, exposed face prefinished with fluorocarbon type coating (Kynar7 500), color as selected by Owner's Representative from manufacturer's standard selections; unexposed face finished with manufacturer's standard primer; manufactured by Centria, PAC-CLAD, or MBCI. Protect finish with factory applied plastic film.

D. Stainless Steel: ASTM A 167, Type 302/304, soft temper; 24-gage minimum; No. 2D finish.

2.02 COMPONENTS

A. Counter and Slip Flashings, Base and Cover Plates, End Caps, Joint Fasteners, and Gravel Stops: Profiled as indicated and to suit existing conditions.

2.03 FASTENERS

A. Manufacturers

1. Construction Fasteners, Inc.
2. Hilti

3. Olympic
4. Powers
5. Simplex

B. Fasteners and Anchorage Devices: Comply with SMACNA requirements, unless otherwise indicated.

1. Appropriate for purpose intended; approved by Factory Mutual where required.
2. Rust-resistant and compatible with materials to be joined.
3. Ferrous Metals: Stainless steel; finish of exposed fasteners same as flashing metal.
4. Rivets: Stainless steel (rivet and mandrel), Series 44.

C. Length: As required for thickness of material to penetrate substrate 1/2-inch minimum.

D. Exposed Fasteners: Provide metal-jacketed neoprene or EPDM washers; jacket color to match pre-finished sheet metal.

1. Mechanical Fasteners for Sheet metal to Substrate Anchorage:

E. Masonry: One-step, screw-type drive anchor (nailing); heat-treated, stress relieved, stainless steel pin; zinc jacketed; sized for intended application; minimum 1-1/4-inch length x 1/4-inch diameter; Hammer-Screw® manufactured by Powers Fasteners, Inc.

F. Wood Blocking: Hexagonal head screws, stainless steel, with neoprene rubber washers; jacket color to match pre-finished sheet metal.

1. Concrete: Same as masonry or other power actuated fasteners, suitable for application.

G. Roofing Nails: Hot-dipped galvanized or non-ferrous type, with annular rings, size as required to suit application; minimum 11-gage with 3/8-inch diameter head.

H. Mechanical Fasteners for Sheet metal to Metal Fabrications (Support Framing) Anchorage: Appropriate for purpose intended, size as required to suit application and achieve positive anchorage to substrate material.

2.04 ACCESSORIES

A. Solder: FS QQ-S-571; 50/50 type.

B. Flux: FS O-F-506; and special stainless steel type.

C. Metal Primer: Zinc-rich, or Zinc Chromate, compatible with metal and substrate material.

D. Protective Backing Paint: FS TT-C-494, Bituminous.

E. Bedding Compound: Rubber-asphalt type, acceptable to roof membrane manufacturer.

F. Asphalt Primer: ASTM D 41, cut-back type.

G. Plastic Cement: FS SS-C-153, ASTM D 4586, Type I-asphaltic, compatible with roofing bitumen, ASBESTOS FREE.

H. Reglets/Receivers: Recessed stainless steel; face and ends covered with plastic tape.

I. Sealant: As specified in Section 07900. Urethane.

1. Metal Contact: Type I.

J. Vent Flashings: Preformed 2-1/2-lb lead sheet, with 4-inch wide roof flange; minimum height above roof: 8-inches.

K. Penetration Seal System: ChemCurb™ System – Penetration Seals, manufactured by Chem Linc, Inc. 416 E. Ransom St., Kalamazoo, MI 49007, (880-826-1681).

1. Curb Components: Precast, polymer modified cement or structural urethane.
2. Curb Adhesive: Special silicone sealant – DURALINk™.
3. Pourable Sealant: Two-component urethane.

L. Substitutions: Under provisions of Section 01300.

2.05 FABRICATION

A. Form all sheet metal components (except corners) in longest practical length up to 10-feet maximum; true to shape, square, accurate in size, and free from distortion or defects detrimental to appearance or performance.

B. Fabricate continuous cleats and starter strips of same material as sheet, inter-lockable with sheet.

C. Hem exposed edges of metal 1/2-inch; miter and seam corners.

D. Fabricate vertical faces with bottom edge formed outward 3/4-inch at 30 degrees and hemmed to form drip.

1. Where vertical height exceeds 8-inches, fabricate with stiffing grooves in accordance with SMACNA, unless specifically approved otherwise.

E. Form all sheet metal material to provide watertight joints:

1. Unprotected Horizontal Surfaces (expansion joint covers, etc.): Standing seam or drive cleat joints.
2. Vertical Surfaces (copings, cap flashings, gravel guards, etc.): Flat lock or cover and backer plate seams.

F. Fabricate corners on all sheet metal components (gravel guards, copings, cap flashings, etc.) to form one piece with minimum 18-inch and maximum 36-inch long legs.

G. Prefabricate all sheet metal accessory components (pitch pans, utility sleeves, umbrellas, etc.) as much as practical.

H. Miter all sheet metal corners and solder, weld, or fasten and seal all joints watertight:

1. Prefinished Galvanized Steel: Apply minimum 1/4-inch bead of sealant between connecting metal flanges and drill and fasten with rivets at 2-inches o.c.
2. Stainless Steel: Solder joints watertight.
3. Unfinished Galvanized Steel: Solder joints watertight.
4. After soldering, remove flux. Wipe and wash solder joints clean.
5. Install sealant so it will not be visible on outside of joints.

I. Fabricate elements complete with required connection pieces.

J. Fabricate all components with allowance for expansion at joints. Provide enlarged or oval holes at all piercing fasteners.

K. Fabricate all components with horizontal (flat) surfaces with built-in slope for drainage toward roof unless indicated otherwise.

L. Fabricate gutter and downspout accessories seal watertight.

2.06 FINISH

A. Shop prepare and prime exposed ferrous metal surfaces.

B. Back-paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15-mils.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

3.03 INSTALLATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install reglets and/or receivers on vertical surfaces to receive counter flashings.

1. Sawcut new reglets where required.

a. Install receiver component and anchor with lead wedges at 12-inches on center.
b. Provide bayonet style lap joints, minimum 4-inch overlap.
c. Fill voids between wedges with backer rod.
d. Seal receiver to vertical face of wall.

2. Install surface mounted reglets true to lines and levels.

a. Seal top of reglets with sealant.

C. Insert flashings into reglets or receivers to form tight fit. Apply 1/4-inch bead of sealant and lap sheet metal minimum 4-inches.

1. Reglets: Secure in place with plastic wedges at maximum 6-inches on center.
2. Receivers: Secure in place with neoprene head screws at maximum 12-inches on center.

D. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Owner's Representative.

F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Provide minimum 6-inch wide backer and cover plates at copings and gravel guards. Fit to ensure complete and permanent watertight seal of joints.

1. Apply 1/4-inch bead of sealant between each layer of metal at each edge.
2. Backer Plates: Secure with fasteners suitable for substrate, 6-inches o.c. each face.
3. Cover Plates: Hook front or exposed face of cover plate over drip edge.
4. Fasten back or unexposed edge of copings using screws with neoprene washers, 12-inches o.c.
5. Do not use mastic between sheet metal components.

H. Lock and seal all sheet metal joints watertight.

I. Install lead flashings at all soil pipe penetrations. Coat exposed lead with flashing cement.

J. Install lead flashings at all roof drains.

K. Provide Penetration Seal System at all small penetrations not otherwise detailed.

1. Clean roof surfaces to receive Penetration Seal Systems.
2. Clean pipes and penetrating elements to remove plastic cement, bitumen, and other contaminants by wire brushing and scraping.
3. Caulk around penetrating elements with special silicone sealant DURALINk™.
4. Apply beads of special silicone sealant to flat side of first precast curb component. Place caulked curb onto roof surface to form half circle around penetrating element.
5. Apply beads of special silicone sealant to flat side and to scarf joints of second precast curb component. Place second section of curb onto roof surface to form circle with first section.
6. Press scarf joints together firmly and press both sections down.
7. Apply continuous bead of special silicone sealant around outside edge of curb at roof.
8. Fill around penetrating element with pourable sealant to top of curb.

L. Protect all membrane penetrations as indicated and as recommended in SMACNA and NRCA manuals.

3.04 SCHEDULE – MATERIALS

A. Exposed to View Components at:

1. One-Piece Flashing and Expansion Joint Terminations: Galvanized steel, powder coated to match adjacent prefinished galvanized steel components.
2. All Other Components: Prefinished galvanized steel.

3.05 SCHEDULE - MINIMUM STEEL THICKNESS

A. Cap and Counter flashing: 24-gage,

B. Downspouts: 24-gage prefinished.

C. Downspout brackets: 1/8 inch by 1 inch wrapped with 24 gage prefinished.

D. Gutters 5 x 5 inch: 24 gage prefinished, brackets ¼ x 1 ½ inch galvanized wrapped with 24- gage prefinished.

E. Hook Strips or Cleats: 22-gage, prefinished.

END OF SECTION

SECTION 07920

CAULKING AND SEALANTS

PART 1 - GENERAL

1.01 SUMMARY OF THE WORK

A. Tits section includes but is not limited to the following:

1. Preparing sealant substrate surfaces.
2. Installation of Sealant and backing materials.

1.02 RELATED SECTIONS

A. Section 04200 – Building Masonry.

B. Section 08100 - Metal Doors and Frames.

C. Section 08200 – Plastic Faced Wood Doors.

D. Section 08120 – Aluminum Doors, Frames

E. Section 08810 - Glass and Glazing.

1.03 REFERENCES

A. ANSI/ASTM D1565 - Flexible Cellular Materials, Vinyl Chloride Polymers and Copolymers (Open-cell foam).

B. ASTM C790 - Use of Latex Sealing Compounds.

C. ASTM C804 - Use of Solvent-Release Type Sealants.

D. ASTM C834 - Latex Sealing Compounds.

E. FS TT-S-00227 - Sealing Compound: Elastomeric Type, Multi-Component.

F. FS TT-S-001543 - Sealing Compound, Silicone Rubber Base.

G. SWI (Sealing and Water-proofers Institute) - Sealant and Caulking Guide Specification.

1.04 SUBMITTALS

A. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

1.05 QUALITY ASSURANCE

A. Applicator: Company specializing in applying the work of tits Section approved by sealant manufacturer.

B. Conform to Sealant and Waterproofers Institute requirements for materials.

1.06 FIELD SAMPLES

A. Five cartridges of each caulking and sealant specified herein shall be submitted for approval. The sample containers shall include the same information on the label as specified for containers delivered to the job.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install solvent curing sealants in enclosed building spaces.

B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 SEQUENCING AND SCHEDULING

A. Coordinate the work of tits Section with all Sections referencing tits Section.

1.09 WARRANTY

A. Provide two (2) years non-protected written warranty for materials and labor.

B. Warranty: Include coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.01 SEALANTS

A. General Requirements:

1. For exposed joints, provide colors selected to match adjacent materials as approved by Owner's Representative.
2. For each specific application, select specified or approved alternate materials for compatibility with joint surfaces and expected use, with modulae of elasticity and hardness as recommended by manufacturer.

B. Single-Component Polyurethane Sealant: One-part moisture-curing sealant; self-leveling type; conforming to requirements of ASTM C920; non-staining and non-bleeding.

1. Applications: Exterior and interior joints of horizontal wearing surfaces (foot or vehicular traffic) where elastomeric sealant is indicated.
2. Acceptable Products:

a. Urexpan NR-201 manufactured by Pecora Corporation.
b. Sikaflex-1A, Self-Leveling type manufactured by Sika Corporation.
c. Vulkem 45 manufactured by Mameco International.

C. Two-Component, elastomeric-type compound conforming to FS TT-S-00227, Type II, Class A. The compound shall be supplied with pre-measured kit form for on-the-job mixing.

1. Applications: Exterior locations for sealing control joints, expansion joints and other moveable joints in concrete, masonry and metal. Tits sealant shall also be used for perimeter sealing of metal frames (all metal door and window frames); channel glazing; bedding and sealing of curtain walls; precast concrete panels; and flashings.
2. Acceptable Products:

a. Sonolastic NP II as manufactured by Soneborn Bldg. Products, Inc.
b. Others subject to written approval by the Architect.

D. Caulking Compound shall be oil-and-resin based conforming to FS TT-C-00598, Type I.

1. Applications: Caulking of interior joints between masonry, wood, or metal substrates where only limited movement is expected. It shall not be used where contact with water is expected. It must be painted after application is dry.

2.02 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ANSI/ASTM D1565; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.

B. Beginning of installation means installer accepts existing surfaces.

3.02 PREPARATION

A. Clean, prepare, and size joints in accordance with manufacturer's instructions.

B. Remove loose materials and foreign matter, which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with ASTM C804 for solvent release, and ASTM C790 for latex base sealants.

E. Protect elements surrounding the work of tits Section from damage or disfiguration.

3.03 INSTALLATION

A. Perform installation in accordance with ASTM C804 for solvent release, and ASTM C790 for latex base sealants.

B. Install sealant in accordance with manufacturer's instructions.

C. Measure joint dimensions and size materials to achieve required width/depth ratios.

D. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

E. Install bond breaker where joint backing is not used.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

H. Tool joints as detailed.

3.04 CLEANING AND REPAIRING

A. Clean adjacent soiled surfaces.

B. Repair or replace defaced or disfigured finishes caused by work of tits Section.

3.05 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

END OF SECTION

Section 10200

ALUMINUM LOUVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes furnishing and installing aluminum louvers with bird & insect screens.

1.03 RELATED WORK

A. Related Work of Other Sections:

1. Section 07110 – Bituminous Damp-proofing.
2. Section 07920 – Caulking and Sealants.

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.

B. Wind Loads: Provide louver system, including anchorage, capable of withstanding wind-load design pressures applicable to the Project based upon a 3 second gust wind speed of 110-miles per hour (49-meters per second) at 33-feet (10-meters) above grade (Exposure B, Importance Factor 1.15), according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on the Drawings

C. Thermal Movements: Provide louvers 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 connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and night time sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.05 SUBMITTALS

A. Product Data: For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.

1. For installed louvers and vents indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of metal finish required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2, "Structural Welding Code--Aluminum."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 PRODUCT AND MANUFACTURER

A. Drainable Louvers: Provide extruded aluminum louvers, stationary, drainable blade type, as follows:

1. Subject to compliance with requirements, provide Ruskin, Model No. ELF3750X (Construction Specialties, Inc., Model No. 4157, Airolite Model K 6776,) or approved equivalent
2. Louver Depth: 4 inches (100 mm).
3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.080 inch (2.0 mm) for blades and 0.080 inch (2.0 mm) for frames.
4. Performance Requirements:

    a. Free Area: Not less than 7.0 sq. ft. (0.65 sq. m) for 48-inch- (1.2-m-) wide by 48-inch- (1.2-m-) high louver.
    b. Air Performance: Not more than 0.10-inch wg (25-Pa) static pressure drop at 800-fpm (4.1-m/s) free area velocity.
    c. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rain fall rate of 8 inches (200 mm) per hour and a wind speed of 50 mph (22.4 m/s) at a core area intake velocity of 500 fpm (2.5 m/s)

5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

B. Bird Screens: Provide manufacturer's standard bird screens in re-wireable aluminum frames, finished to match louvers.

2.02 BLANK-OFF PANELS

A. Insulated, Blank-off Panels: Laminated metal-faced panels consisting of insulating core surfaced on back and front with metal sheets.

1. Thickness: 1 inch (25 mm) 2 inches (50 mm).
2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch (0.8-mm) nominal thickness.
3. Insulating Core: Unfaced mineral-fiber or foamed-plastic rigid insulation board.
4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum channel frames, not less than 0.080-inch (2.0-mm) nominal thickness, with corners mitered and with same finish as panels.
5. Seal perimeter joints between panel faces and louver frames with 1/8-by-l-inch (3.2-by-25-mm) PVC compression gaskets.
6. Panel Finish: Same finish applied to louvers.
7. Attach blank-off panels to back of louver frames with stainless-steel sheet metal screws.

2.03 ALUMINUM FINISH

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. 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.

C. Exterior High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical finish: cleaned with inhibited chemicals; Chemical finish: conversion coatings; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear 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 – "Voluntary Specification, performance Requirements and Test Procedures for Superior Performance Organic Coatings on Aluminum Extrusions and Panels" and with coating and resin manufacturers' written instructions.

1. Color: Provide color to match manufactured metal roof panels as approved by the City.

2.04 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 60 inches (1524 mm) o.c., whichever is less.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.02 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.03 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weather-tight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.04 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the City, remove damaged units and replace with new units.

D. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating

END OF SECTION

Section 15000

HVAC GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL

A. See provisions of Division 1.

B. These Specifications are part of the contract documents and must be used in connection with the Drawings.

1.02 WORK INCLUDED

A. The Contractor shall furnish all labor, materials, tools, transportation, equipment, services, facilities required for the complete and substantial

installation of all HEATING, VENTILATING and/or AIR CONDITIONING work shown on the Plans or outlined in these Specifications. The work shall include all materials, accessories, and apparatus not specifically mentioned herein or noted on the Plans, but which are necessary to make a complete working installation of all systems shown on the Plans or described herein.

B. Work consists of, but is not limited to:

1. HVAC

a. Split system HVAC systems
b. Ductwork systems
c. Exhaust fans
d. Grilles, diffusers, louvers
e. Unit Heaters

C. Related work described elsewhere:

1. Painting unless otherwise noted
2. HVAC control conduit
3. Flashing of roof openings
4. Electrical connections to HVAC and plumbing equipment

1.03 CODES, REGULATIONS, STANDARDS, PERMITS, AND FEES

A. Work shall comply with pertinent local ordinances or regulations.

B. Materials and equipment shall meet standards of and be approved by nationally recognized standards and testing authorities where such materials and equipment are available.

C. Installation shall be by competent mechanics, thoroughly experienced in tits type of work and performing tits work in a neat and workmanlike manner.

D. Contractor shall comply with safety and occupational health requirements of OSHA and of local authorities. Responsibility for compliance rests solely on the Contractor and cannot be abrogated by virtue of these Plans and Specifications or actions of the Owner, or Engineer.

1.04 CONTRACTOR QUALIFICATIONS AND RESPONSIBILITIES

A. Any Contractor bidding on these Specifications and Drawings shall be a specialist in tits field and have the personal skill and organization to provide a practical working system. Any practical criticism or exception given with the proposal will be considered at that time. If no criticism or exception is given with the proposal, it shall be assumed that the Contractor agrees that the system, as outlined in the Drawings and Specifications, can be made into a completely working system.

B. Use of the term “Contractor”, “HVAC Contractor”, “Plumbing Contractor”, “Electrical Contractor” or similar terminology in these Specifications is intended as an aid to the bidder only and to mean the organization engaged to execute the work included whether it be the General Contractor, its

subcontractor, or others, and is not intended to indicate any jurisdictional assignments or other assignments of work, that being the responsibility of the General Contractor.

C. The Specifications and accompanying Drawings are intended to encompass a system that will not interfere with the structural, mechanical, or architectural design of the building, and which will fit into the several available spaces. As it is not within the scope of the Drawings to show all necessary offsets, obstructions, or structural conditions, it shall be the responsibility of the Contractor to install its work in such a manner that it will conform to the structure, avoid obstructions, and interferences with other trades, and keep passageways clear.

1.05 PLANS AND SPECIFICATIONS

A. Reference to Engineer from tits point forward in these specifications shall be interpreted to mean the person designated by the Owner to interface with the Contractor.

B. The Drawings show diagrammatically the sizes and location of the various outlets and equipment items and the sizes of the major interconnecting ducts, etc., without showing exact details as to elevations, offsets, control lines, and installation details.

C. The Contractor shall carefully lay out its work at the site to conform to the architectural and structural conditions and to avoid obstructions. Exact locations of outlets, apparatus, and connections thereto shall be determined by reference to the general plans, to all detail Drawings, roughing-in Drawings, etc., by measurement at the building and in cooperation with other Contractors and in all cases shall be subject to the approval of the Engineer.

D. It shall be the Contractor’s responsibility to visit the actual site and compare same with the Drawings and Specifications, ascertain and check locations of any existing obstructions, underground or otherwise, which may affect the work. Failure to determine conditions will not be considered cause for granting additional compensation. Submittal of bid shall constitute constructive agreement that the site has been visited and that no circumstances will adversely affect the work other than those shown on the Plans.

E. In case of conflict between Plans and Specifications, or discrepancies within Plans and/or Specifications, the Contractor shall request clarification from the Engineer. For purposes of bidding, the more expensive materials or method shall be bid. After clarifications, if the less expensive method or material is indicated, due credit will be issued.

F. All ductwork and piping except in various equipment rooms, unfinished spaces, or where specifically designated herein or on the Plans shall be concealed in furrings or chases. Where conditions exist which would cause any of these items to be exposed in finished spaces, or to interfere with architectural features or work of other divisions, the Contractor shall immediately call the situation to the attention of the Engineer and shall stop work in those areas until the Engineer directs resumption of work.

G. The Engineer shall have the right to clarify location of grilles, louvers, and diffusers, and to direct minor relocation of such items prior to rough-in at no additional cost to Owner.

H. Do not scale Drawings. If location of grilles, diffusers, control devices, or equipment is not dimensioned on Drawing and is not obvious or fixed by architectural features, verify location prior to installation.

I. Wall mounted equipment, devices, etc., shall be grouped neatly in a logical arrangement, in as aesthetically pleasing a manner as possible, and at the same height, unless otherwise indicated. Coordinate with other trades to satisfy tits requirement.

J. Contractor shall refer to architectural sheets in the set of Drawings and shall notify the Engineer of any difference from items shown on Drawings related to tits section.

1.06 COORDINATION WITH OTHER SECTIONS

A. Coordinate work with work of other trades in putting the installation in place at the time when the space required by tits installation is accessible. Cutting and patching necessitated by any failure on the part of the Contractor to do tits shall be performed at no additional cost to the Owner.

B. Verify openings, supports, and space availability shown on plans for use of tits Contractor or for installation of its equipment. If such items are not suitable, notify the Engineer immediately.

C. Provide roof jacks, vents, sleeves, etc., as required for HVAC and plumbing equipment installation. Install these prior to final roof installation and coordinate with Roofing Contractor for flashing.

D. Each trade shall coordinate with other trades to assure that plans properly reflect the correct equipment connection requirements for equipment furnished by that trade or connected by that trade.

1.07 WARRANTY

A. In addition to all legally inherent warranties, the Contractor shall provide a written guarantee that:

1. All material and equipment shall be new, free from defect, and of the quality and rating shown or specified.
2. Any defect due to missing or improper material or faulty workmanship existing or developing during the resulting warranty period shall be corrected and the resulting damage repaired without additional cost to the Owner. Equipment replaced under warranty shall carry an additional one year warranty on equipment and labor.
3. Period of warranty shall be as legally stipulated, but shall be a minimum of one year from the date of acceptance by the Engineer unless specifically extended by these Specifications for certain equipment.

B. Above warranty shall be concurrent with manufacturer's warranties on equipment. Manufacturer's written warranties shall be submitted to the Owner as specified elsewhere.

1.08 MATERIALS

A. Properly store all material and equipment at the job site, protecting same from the elements when in open storage and from damage by work of other trades when in place. Material improperly handled or damaged from rough usage or improper storage shall be taken out and replaced at no additional cost to the Owner with new units at the direction of the Engineer.

B. Whenever a definite manufacturer's product is specified, it is the intent of these Specifications and Drawings to set a standard of performance and quality and to define features of the product. Unless "no substitutions" are indicated, products by other reliable manufacturers will be accepted, provided they have equal capacity, construction, features, performance, maintenance requirements, and other qualities deemed significant. Final approval, however, shall rest with the Engineer at the time of submittal of Shop Drawings and brochures.

C. It must be understood that the Contractor shall be responsible for all consequences of any substitution, e.g., required changes in space requirements, access, layout, and clearances; effect on related equipment; impact on building codes; impact on work and interface of other trades.

D. Contractor shall verify that materials used in all phases of tits work comply fully with local code requirements and are approved for use by the authority having jurisdiction. Notify Engineer prior to installation if use of any material is questionable.

E. Submittal of bid by Contractor is assumed to be for the specified or scheduled material unless specifically noted at the time of submission of bid.

F. Where performance criteria or specific features are listed for items of material or equipment, tits requirement shall take precedence over manufacturer's designation or model number indicated.

1.09 SUBMITTALS

A. Required submittals consist of three categories: Shop Drawings, Maintenance and Operations Literature, and Record Drawings. Contract shall not be considered complete until satisfactory compliance with all categories.

1. Shop Drawings

a. Submit Shop Drawings in accordance with General Provisions. Contractor shall utilize Shop Drawings to assure coordination with and absence of interference with work of other trades, and compatibility with physical features of the project. Shop Drawings consist of brochures, catalog cut sheets, Drawings, specification sheets which completely describe all items. Shop Drawings shall be submitted per procedure described in general or supplemental

conditions or, in absence thereof, shall be submitted in five (5) copies, four of which will be returned to the Contractor after review and appropriate comments. Purpose of review shall be to assure compliance with intent of design and shall not relieve Contractor of any responsibilities under the Contract. Material or items submitted will be held to comply exactly with characteristics of scheduled items or with specifications unless deviations are specifically noted on the submittal. See related requirements under Materials.

b. Submit Shop Drawings on the following items and on any other items requested by the Engineer:

i. HVAC
   a) Ductwork systems
   b) Grilles, diffusers, louvers
   c) Control components
   d) Split system HVAC systems
   e) Exhaust systems
   f) Unit Heater

c. Shop Drawings shall be submitted as early as practical providing ample time for review and re-submittal if required. Failure of the Contractor to receive returned submittal shall not relieve him of any obligation or responsibilities under the Contract.

d. Shop Drawings shall be submitted in logical groupings including as few groups as possible. All submittals shall be signed by the submitting Subcontractor indicating its review and agreement with the submittals. Failure to sign shall be cause for rejection. Submittals shall be explicitly keyed to identifying numbers or symbols in the Drawings and Specifications.

2. Maintenance and Operations Literature

a. Submit at conclusion of project, three (3) copies of permanent three-ring binders containing, for all installed items, manufacturer's Maintenance and Operation instructions, spare parts lists, installation instructions, etc. Specifically included shall be recommended periodic maintenance information for all items requiring periodic maintenance.

b. Include also copies of all manufacturers' warranties. Tits compilation of information shall be properly identified on cover and back.

3. Record Drawings: Submit, at conclusion of project, one (1) set of prints, marked in red, to indicate as-built conditions including any deviations or changes whether covered by change order or not. Contractor shall secure from the Engineer one (1) set of prints for tits purpose and tits purpose exclusively. Prints submitted shall be marked "Record Prints", bear the name of the General Contractor and Subcontractor, and be signed by an officer of the submitting Subcontractor.

1.10 GENERAL REQUIREMENTS

A. All equipment and materials shall be installed in conformance with manufacturer's recommendations and instructions unless in conflict with these Drawings and Specifications.

B. Conform to specific requirements shown on the Drawings or described elsewhere in these Specifications. All equipment furnished and installed shall be properly secured in place. Follow manufacturer's recommendations unless otherwise indicated; use vibration isolators where applicable. (See NOISE AND VIBRATION).

C. All piping, raceways, and equipment suspended from structure shall be supported with hangers designed for the purpose. Makeshift supports of wire are not acceptable. Hangers of perforated strap are not acceptable. Pipe support spacing shall be per Manufacturer's recommendations or as scheduled on the Drawings.

D. Wall-mounted equipment, devices, etc., shall be grouped neatly in a functionally logical arrangement, and in as aesthetically pleasing a manner as possible. Coordinate with other trades where their wall-mounted equipment is in close proximity.

E. Penetrations through walls, ceilings, or floors shall be accomplished neatly. Where visible, penetrations shall be provided with appropriate trim. Penetrations through exterior walls shall be made weatherproof and insect-proof.

F. Penetrations shall not impair the integrity of the wall, floor, or ceiling; e.g., dust-tight walls, soundproof walls, fire-rated walls, etc. Penetrations through roofs shall be made weatherproof.

G. All ferrous metal of equipment or structures installed outdoors shall be galvanized or galvanized then painted, unless other treatment is specified or scheduled. All ferrous metal on equipment or structures installed indoors shall be painted, galvanized, or otherwise protected from rusting. Care shall be taken to protect integrity of finishes during handling, installation, field cutting, etc. Touch up all scratches, cuts, etc., with matching finish in a manner acceptable to Engineer.

H. Unless otherwise noted, motor starters for HVAC equipment shall be furnished by Contractor furnishing such equipment, and shall be installed by Electrical Contractor.

I. Unless otherwise indicated on the Drawings, hot water, where included in the project, shall have temperature set for 120° F maximum. Contractor shall verify temperature setting with thermometer.

1.11 NOISE AND VIBRATION

A. Each of the various pieces of equipment shall operate without objectionable vibration or noise. All rotating equipment shall be in static and dynamic balance and shall be mounted, supported and fastened so that no equipment vibration is transmitted to building structure, piping, ductwork, or other equipment. Vibration isolation, if not otherwise specified, shall be in accordance with manufacturer's recommendations.

B. If, in opinion of the Engineer, objectionable vibrations, or transmission thereof to the building occurs, the Contractor shall undertake such remedial measures as may be necessary to eliminate the objectionable condition at no additional cost to the Owner.

1.12 NAMEPLATE, IDENTIFICATIONS, AND MARKINGS

A. The following shall be identified with engraved nameplates as described hereinafter:

1. HVAC

a. Air handling units
b. Exhaust fans
c. Compressor/condenser units
d. Boiler
e. Unit Heaters

B. Unless otherwise indicated, nameplates shall be black phenolic with chamfered edges engraved with minimum 3/16" letters to white core. Attachment will be made by stainless steel screws. Adhesive attachments will not be accepted.

C. Nameplates on materials and equipment furnished will be maintained in original condition. Whenever possible, equipment shall be installed so that nameplates are readily visible. Damaged or unreadable nameplates shall be replaced. Where equipment is modified, nameplates shall be appropriately corrected.

D. Location of underground piping shall be marked by the use of underground warning tape, colored with printed message. Tape to be buried directly over pipe, 6" below finished grade. Tape to be polyethylene, 6" wide. Tape for metallic pipe to be .004" thick; tape for non-metallic pipe to consist of two layers of polyethylene with a metallic film ribbon between.

1.13 DESIGN CONDITIONS

A. The design of the Air Conditioning and Heating Systems are based on the data as shown on the Drawings including design temperatures and outside air requirements.

B. Above parameters are with system tolerances, capabilities, and design limitations. Equipment used must be able to produce the design conditions.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.01 INSPECTION, TESTS, CLEANING, ADJUSTMENT

A. Periodic inspections will be made during construction by Engineer and/or Owner. Contractor will have an experienced, knowledgeable representative accompany inspector, open enclosures, provide requested tests, etc.

B. Contractor will provide a knowledgeable representative to demonstrate all systems to Owner's operating and maintenance personnel. Tits demonstration shall be set a minimum three (3) days in advance and shall be at a time specified by the Owner.

C. Contractor shall test and balance system to meet original airflow quantities set forth on the Plans. The results of air balance tests are to be included in Maintenance and Operation Literature submittal. Results of tests are to be signed by the performing technician and by an officer of the sub-contractor.

D. After installation is completed, all work shall be thoroughly cleaned of dirt, dust, oil, grease, etc.; air filters shall be clean at the acceptance of the project. Refer to "Filters" as specified hereinafter in tits Section.

E. Bearings shall be properly lubricated in accordance with manufacturer's recommendations.

F. After systems have been cleaned and tested to satisfaction of Engineer, they shall be operated for a minimum period of one week and all necessary adjustments made to assure that systems are properly operating when turned over to the Owner.

G. After installation is completed, all work shall be thoroughly cleaned of dirt, dust, oil, grease, etc., remove all protective covers and polish all chrome, brass, etc.

3.02 EQUIPMENT INSTALLATION

It is the intent of these construction documents to describe an installation in which equipment is positioned to provide adequate clearances for compliance with applicable

A. codes, for proper operation, for efficient maintenance, and for effective repairs. Care shall be taken by the Contractor to accomplish tits end. Conduit, piping, insulation, mounting hardware, suspension members, etc. shall be installed to maintain these clearances. Coordinate with other trades.

B. If with careful and prudent planning, it is apparent that clearances indicated, or clearances recommended by the manufacturers, cannot be accomplished, the Contractor shall immediately notify the Engineer and stop the affected work until instructed to proceed. No additional compensation shall be due the Contractor for rework due to failure to notify the Engineer in a timely manner.

END OF SECTION

Section 15100

MECHANICAL, HVAC EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of Mechanical General Requirements, Section 15000, apply.

PART 2 - PRODUCTS

2.01 EXHAUST FANS

A. Furnish and install exhaust fans as scheduled. Fans (other than rest room exhaust fans) shall be rated in accordance with standards of Air Moving and Conditioning Association, Inc. (AMCA). Sound rating shall be available for all units in accordance with AMCA Standard 301.

B. Belt drive fans shall utilize totally enclosed, fan cooled, ball bearing motors unless otherwise specified. Provide high quality, steel core belts.

C. Roof mounted fans shall be equipped with curb caps. Fan housing shall have cylindrical venturi throat, enclosed wind bands with wing type, counter-balanced damper. Fan wheels shall have die formed blades, mounted on welded steel hubs, entire assembly balanced for vibration free operation. HVAC Contractor shall coordinate with General Contractor to assure that metal building roof has proper size curb, in proper location, and will support the weight of the fan.

2.02 SPLIT HVAC SYSTEMS

A. Furnish and install split system HVAC systems as and of the ratings indicated on the Drawings.

B. Split system shall consist of compressor/condenser unit, electric duct heater with evaporative coil, interconnecting refrigerant piping, accessory items, and controls. Compressor/condenser unit and air handling unit with evaporator coil shall all be of same manufacture. Combined system shall have an EER rating of 10 or greater per ARI Standard 210 and a SEER rating of 11 or greater per DOE test conditions.

C. Compressor/condenser unit shall consist of compressor, condenser coil, condenser fan, controls, piping, and casing. Casing shall be of galvanized steel, properly treated, with a finish coat of outdoor baked enamel. Access panels shall allow for ready accessibility of all components. Base shall allow for draining of moisture. Openings shall be provided for refrigerant and electrical lines. Compressor shall be hermetically sealed, resiliently mounted, suction cooled, overload protected, internal pressure relief protected, have internal protection from excessive temperature and pressure, and have crankcase heater. Compressor shall have four year warranty, in addition to and beyond warranty specified elsewhere. Condenser coil shall be copper tube, aluminum fin and shall be protected by steel guards. Condenser fan shall have inherent overload protection.

D. The contractor shall assure that control compartment is marked to indicate function. If not factory marked, laminated engraved legend plate shall be applied. If reset device is installed and not accessible from the exterior, the legend plate shall, in addition, read “Reset Inside”.

E. Air handling unit shall consist of a air handler with electric heating elements, duct mounted evaporator coil, expansion valve assembly. Air handler shall consist of blower/filter section, Electric heating section, and cabinet. Cabinet shall be construction of galvanized steel, properly treated with baked on enamel finish. Cabinet shall be insulated with minimum 1” thick fiberglass insulation; removable panels shall provide easy access to all components. Blower shall be centrifugal type, statically and dynamically balanced, forward curved, double inlet blower wheel, permanently lubricated bearings, adjustable belt drives. Motors shall be NEMA standard frame types. Filter racks shall accommodate 1 1/2” filters and must be provided with hinged access doors for easy access to change filters. Filters shall be as hereinafter specified. Duct mounted evaporator coil shall be contracted of aluminum plate fins bonded to copper tubes by mechanical expansion. Coil shall be galvanized steel housing with drain pan, internally insulated with one-inch fiberglass insulation and flanged for ductwork connection.

F. Interconnecting refrigerant piping shall be sized per manufacturer’s recommendations. Provide suction line strainer, filter dryer, sight glass, and service valves. Insulate suction line with minimum 1” wall thickness insulation.

G. Where refrigerant lines are over sixty feet in length, or vertical rise or drop exceeds twenty feet, obtain from the manufacturer a letter confirming validity of the warranty for the specific installation; submit letter in M&O binder heretofore specified.

H. Refrigerant system controls shall include high and low pressure switches. Provide low ambient kit. Provide timed off control to require minimum five minute “off” period.

I. Provide thermostat(s) as described elsewhere.

J. Furnish and install auxiliary drain pans under air conditioning units where noted. Drain pans shall be constructed of 20 gauge galvanized sheet steel large enough to catch any overflow from unit served. Pans shall have 2” vertical sides, hemmed top edge, with all joints soldered.

K. Provide for installation meeting Division 16 requirements, all motor starters required. Motor starters, unless otherwise noted, shall be NEMA 1, magnetic, line voltage type. Provide melting alloy type overload relays in each ungrounded conductor if blower motors are not integrally protected.

PART 3 - EXECUTION

Not applicable

END OF SECTION

Section 15105

MISCELLANEOUS EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Miscellaneous Equipment and other miscellaneous items if not specifically included under other Sections of these specifications.

1.02 UNIT PRICES

A. No separate payment will be made for Miscellaneous Equipment under tits section. Include payment in price for work of which tits is a component part.

1.03 SUBMITTALS

A. Submit under provisions of the project general requirements of tits specification.

B. Submit manufacturer's technical literature and test reports showing certified capacities.

PART 2 - PRODUCTS

2.01 INSECT SCREEN

A. Square mesh hardware cloth (Birdscreen) shall be furnished and installed by the Contractor at all air intakes and exhausts and elsewhere where shown or required. Screens shall be galvanized steel #2 mesh, 19 gauge plain weave conforming to ANSI/ASTM A740-76. The minimum acceptable free area shall be 72%. Secure hemmed edge of hardware cloth to duct opening or louver with corrosion resistant bolts 8" on centers with minimum of three fasteners per side.

2.02 VENT FLUES

A. Furnish and install the flues and accessories for all boilers and/or heaters as indicated on the drawings.

B. Factory-built flues shall be laboratory tested and listed by the Underwriter's Laboratories, Inc. for use with the specified equipment burning gas or liquid fuels as described in NFPA 211, which produce exhausted flue gasses at a temperature not exceeding 1400°F under continuous operating conditions.

C. The double wall flue shall have an outer jacket of Type 304 stainless steel .025" thick for sizes 6" through 24" and .034" thick for larger diameters. There shall be minimum 1" air space between the walls. The inner liner shall be .035" nominal thickness for all diameters.

D. The flues shall comply with all national safety standards and building codes when installed according to the manufacturer's pre-printed installation instructions and the limits of its listing.

E. Inner pipe joints shall be sealed by use of V bands and RTV Silicone sealant for flue gas temperature up to 600° F. For flue gas temperatures above 600° F, joints shall be sealed with V bands and High Temperature Joint Cement as outlined in the installation instructions supplied by the manufacturer.

F. Flues extending above the roof shall be terminated as required by local codes or as required by NFPA 211, whichever is more stringent and shall be a minimum of 4 feet above the finished roof with a factory supplied flue cap. Wind bracing or tiebacks shall be provided as required.

G. The actual design of each vent flue system shall follow the layout shown on the Drawings but shall be completely laid out and calculated by the flue manufacturer to suit actual equipment served, field conditions and thermal temperatures to: straight sections, elbows, offset, increases, tees, equipment, connections, supports, drains, ventilated roof thimble/flashing assembles, stack caps and other required accessories. If recommended by the manufacturer for the proposed installation, a drain section with drain piping and trap shall be provided in vertical stacks.

H. Flues shall be Model PS as manufactured by Amerivent or Selkirk Metalbestos.

2.03 DOMESTIC COLD WATER PRESSURE REDUCING VALVE ASSEMBLIES

A. Domestic water pressure reducing assemblies shall be provided where indicated on the drawings. The pressure reducing assemblies shall have the capacities indicated in the schedule on the drawings and shall maintain a constant downstream pressure with the varying inlet pressure indicated over the minimum to maximum flow range listed in the schedule. The pressure reducing valves shall be selected to provide stable flow conditions without cavitation or valve chatter over the entire flow range specified. PRV piping, valves, and strainers shall be full size of incoming line. Valve shall be sized as scheduled or noted on the Drawings.

B. The high flow pressure reducing valve shall be a hydraulically operated, pilot controlled diaphragm-type cast iron (ASTM-A48) body, globe valve with 303 stainless steel trim and suitable for a working pressure as indicated on the Drawings. The pressure reducing valve shall have an adjustable outlet pressure range suitable for the scheduled valve outlet pressure. The valve shall be stem guided at both ends and have a single removable seat and resilient disc. The pilot control shall be a bronze ASTM B-61 direct-acting, adjustable, spring loaded, normally open diaphragm valve designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice and flow stabilizer or reduce low flow fluctuations. Furnish the pilot control system completely factory piped (303 stainless steel) with shut-off cocks to isolate the pilot system on valves 4" and larger. The pressure reducing valve shall be Clayton 90G-01, Charles M. Bailey Company No. 400 or approved equal.

C. The low flow pressure reducing valve shall be selected to operate at flow rate below the minimum flow rate of the high flow valve and the minimum flow rate indicated in the schedule of the drawings. The low flow pressure reducing valve shall be a spring loaded direct acting globe valve suitable for a working pressure as indicated on the Drawings. The outlet pressure setting shall be field adjustable. The pressure reducing valve shall be Watts #223, or approved equal.

D. Furnish and install relief valves suitable for the working pressure where required and as indicated on the drawings. Relief valve size shall be as required by the applicable code, and as indicated on the drawings. Domestic cold water pressure reducing assembly relief valve shall have an adjustable range of 20 to 200 psig and shall be Clayton Series 50 with X105 limit switch.

E. Provide and install pilot operated solenoid valves as detailed on the drawings in the inlet to each pressure reducing valve station. Tits valve shall close upon activation of the pressure relief valve for its zone. Valve shall be Cla-Val Model 136-01, 120 volt, 60 hertz.

2.04 GAS PRESSURE REGULATORS

A. Pressure regulating controllers shall be furnished and installed in accordance with Manufacturer's recommendations.

B. Regulators shall have capacities as scheduled.

C. Regulators shall be installed and vented in accordance with A.G.A. Bulletin 90.

D. If it complies with these specifications, one of the following manufacturers will be acceptable: Rockwell or Fisher-Governor.

2.05 GAS SOLENOID VALVES

A. Provide and install gas solenoid valves in the gas supply and vent piping.

B. Gas valve shall have aluminum body with Buna "N" diaphragm, and be UL listed for the application.

C. Valves shall be as manufactured by ASCO or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install all materials in accordance with manufacturer's written installation instructions, applicable standards, and recognized industry practices.

END OF SECTION

Section 15120

MECHANICAL, VIBRATION ISOLATION

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of HVAC General Requirements, Section 15000, apply.

1.02 VIBRATION, GENERAL

A. It is the intent of these specifications that all equipment shall operate without excessive self-destructive vibration, and that any vibration generated shall not be transmitted to other equipment or the building structure.

B. The contractor shall provide recommended vibration isolation to accomplish tits intent.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS APPLICATION

A. Vibration isolators shall be supplied for the following:

1. Equipment: Air Handling Unit, Floor Unit
2. Vibration Isolator Type: Stable Spring, Un-housed Isolator
3. Remarks: Korfund WSC, Sized for Equipment Point Loads

B. Catalog designations given are by Korfund; equal equipment by Amber/Booth, Vibration Mounting and Control, or Mason is acceptable.

C. Selection of size and ratings of vibration isolators shall be made by the vibration isolator supplier based on equipment information supplied by the HVAC Contractor and/or Plumbing Contractor.

D. Installation shall conform to manufacturer’s recommendations.

2.02 VIBRATION ISOLATION PADS

A. Vibration isolating pads shall be provided at all vibrating equipment in accordance with manufacturer’s recommendation and where indicated on the Drawings.

END OF SECTION

Section 15140

MECHANICAL MOTORS AND CONTROLLERS

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of HVAC General Requirements, Section 15000, apply.

PART 2 - PRODUCTS

2.01 MOTORS, GENERAL

A. All motor-driven mechanical equipment shall be furnished with motors, factory installed.

B. Motors shall be suitable for continuous duty in ambient temperature for -30° C to 40° C at the rated service factor.

C. Motors shall have a service factor of 1.15, minimum.

D. All motors shall be UL listed.

E. Motor bearings shall be ball or cylindrical roller bearings, grease lubricated. Bearings shall be selected to provide a L-10 rated life of 30,000 hours with external load factors per NEMA MGI-14.42.

2.02 MOTORS, ENERGY EFFICIENT

A. Standard NEMA frame motors for equipment so indicated on the drawings shall be classified as “energy efficient” by the manufacturer.

B. Efficiency data for these motors shall be published by the manufacturer having been determined by testing are in accordance with the latest revision of NEMA MGI-12.53a, IEEE Test Standard, Method B with segregated loss analysis.

C. Typical minimum efficiencies of three phase energy efficient motors shall be as follows:

	HP	RPM	Efficiency	PF%
1.	3	1,800	88.5	84.0
2.	5	3,600	88.5	92.5
		1,800	87.5	85.0
		1,200	89.5	79.5
3.	7-½	3,600	89.5	88.5
		1,800	90.2	84.0
		1,200	91.0	78.5
4.	10	3,600	89.5	89.5
		1,800	90.2	86.5
		1,200	91.7	79.0
5.	15	3,600	91.0	92.0
		1,800	91.7	83.5
		1,200	91.7	82.0
6.	20	3,600	91.7	93.0

1,800	92.4	85.0
1,200	91.7	83.5

2.03 MOTOR CONTROLLERS - GENERAL

A. HVAC Contractor shall furnish, for all motor driven equipment furnished by them, motor controllers appropriate for the equipment, complying with applicable codes, and complying with these specifications.

B. All motor control equipment (with exception of variable frequency controllers) furnished by a single sub-contractor shall be of the same manufacturer.

C. All motor control equipment shall include a normally closed auxiliary contact to control motor winding heaters.

2.04 MOTOR CONTROLLERS - ACROSS-THE-LINE START

A. Motor controllers (starters) shall be of the NEMA type, not IEC, unless otherwise noted. Overload relays shall be melting alloy type unless otherwise noted.

B. Motor controller, not automatically controlled, shall have start-stop push buttons in cover and shall have pilot light to indicate starter is energized.

C. Motor controllers, automatically controlled, shall have H-O-A switch in cover and shall have pilot light to indicate starter is energized.

D. Starter coils shall operate on 120 VAC. Provide control powered transformer with secondary fuse for starter operating on 460 volts. For starter operating on 208 volt system, line-to-neutral may be used for control; provide control fuse in starter enclosure. Where outside control signal is a voltage signal, furnish interposing relay.

PART 3 - EXECUTION

Not applicable

END OF SECTION

Section 15250

THERMAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Thermal Insulation and other miscellaneous items if not specifically included under other Sections of these specifications.

1.02 UNIT PRICES

A. No separate payment will be made for Thermal Insulation under tits section. Include payment in price for work of which tits is a component part.

1.03 REFERENCES CODES AND STANDARDS

A. Refer to the Design Criteria Section and the Basic Division 15 Requirements Sections.

1.04 SUBMITTALS

A. Submit under provisions of the project general requirements of tits specification.

B. Submit manufacturer's technical literature and test reports showing certified capacities.

1.05 QUALITY ASSURANCE

A. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable.

1. Insulation:

a. Armstrong World Industries, Inc.
b. Certainteed Corporation
c. Insulation Materials Corporation of America
d. Knauf
e. Manville
f. Owens/Corning Fiberglass
g. PABCO
h. Pittsburgh Corning

2. Adhesive/Sealants:

a. Childers
b. Foster
c. Insul-Coustic
d. MEI

3. Fitting Covers:

a. Foster
b. Fuller-Sealfas
c. Manville
d. Knauf/Proto

B. Codes and Standards:

1. Fire/Smoke Ratings: Fire and smoke hazard rating as tested by Procedure ASTM E84, NFPA 225, and UL 723 shall not exceed Flame Spread 25, Smoke Developed 50:

a. Insulation products shall have a composite rating (insulation jacket or facing, and adhesive used to adhere the facing or jacket to the insulation).
b. Adhesives, mastics, sealants, tapes, cements, bands, covers, etc. shall comply with these same ratings.
c. Product containers and shipping cartons shall include labels indicating compliance with fire/smoke rating requirements.

2. Specifications:

a. Preformed fiberglass - ASTM C547
b. Fiberglass Blanket - ASTM C553
c. Polyisocyanurate board - ASTM
d. Expanded closed cell elastomeric - ASTM C534
e. Preformed Calcium silicate block - ASTM C533, Type 1
f. Cellular glass - ASTM C552
g. Aluminum jacket - ASTM B209
h. Vapor barrier jacket - ASTM C1136
i. Thermal efficiency test method - ASTM C177
j. Dimensional standard - ASTM C585

PART 2 - PRODUCTS

2.01 PREFORMED FIBERGLASS INSULATION

A. General: Insulation material shall be Manville Micro-Lok APT, Owens-Corning ASJ/SSL, or Certainteed Snap-On ASJ/SSL preformed glass fiber, pipe insulation.

B. Conductivity: Preformed glass fiber pipe insulation shall have an average thermal conductivity (K factor) not to exceed 0.23 BTU at 75° F mean temperature and a 850° F temperature limit.

C. Jacket: The insulation shall include an all purpose jacket consisting of a 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 lap sealing system.

2.02 FIBERGLASS BLANKET INSULATION

A. General: Insulation material shall be Manville R-Series Microlite FSK, Owens-Corning Type ED100, or Certainteed Type 100 duct wrap 1 pound FSK flexible glass fiber blanket.

B. Conductivity: Insulation shall have an average thermal conductivity (K-value) of no more than 0.31 BTU at 75° F mean temperature and a 250° F temperature limit.

C. Jacket: Insulation shall be furnished with a factory applied foil-scrim-Kraft facing consisting of 0.35 mil aluminum foil reinforced with glass yarn mesh and laminated to 40 pound chemically treated and fire resistant white Kraft paper.

2.03 POLYISOCYANURATE BOARD INSULATION

A. General: Insulation shall be Trymer #9501, or approved equal, rigid modified polyisocyanurate cellular plastic insulation board.

B. Conductivity: Insulation shall have an average thermal conductivity (K-value) of no more than 0.14 BTU at 75° F mean temperature, and maximum water absorption of 0.05 lb. per SF.

2.04 ELASTOMERIC INSULATION

A. ELASTOMERIC PIPE INSULATION

1. General: Insulation shall be Armstrong Armaflex AP or Manville R-180-FS flexible elastomeric pipe insulation.
2. Conductivity: Insulation shall have a thermal conductivity (K-factor) of no more than 0.28 BTU at 75° F mean temperature, and a water vapor permeability of 0.20 perm-inch or less.

B. ELASTOMERIC SHEET INSULATION

1. General: Insulation shall be Armstrong Armaflex II or Manville/Rubatex R-1800-FS flexible elastomeric sheet insulation.
2. Conductivity: Insulation shall have a thermal conductivity (K-factor) of no more than 0.28 BTU at 75 °F mean temperature, and a water vapor permeability of 0.20 perm-inch or less.

2.05 PREFORMED CALCIUM SILICATE BLOCK INSULATION

A. General: Insulation shall be similar and approved equal to Manville Thermo-12, Owens Corning Kaylo AF or Pabco Super Caltemp calcium silicate, non-asbestos material.

B. Conductivity: Insulation shall have an average thermal conductivity (K-factor) not to exceed 0.45 BTU at a mean temperature of 300° F. Insulation materials shall be suitable for 1200° F service.

2.06 CELLULAR GLASS INSULATION

A. General: Insulation shall be Pittsburg - Corning Foamglas, or approved equal cellular glass insulation.

B. Conductivity: Insulation shall have an average thermal conductivity (K-factor) of no more than 0.35 BTU at 75° F mean temperature, water vapor permeability of 0.00 perm-in, and moisture absorption of 0.2%.

C. Copper Pipe: Where used with copper pipe, bore coat cellular glass insulation with hydrocal B11.

2.07 FIBERGLASS INTERNAL DUCT LINER

A. General: Duct liner insulation shall be 2 pound density Manville Lina-Coustic or Owens-Corning Aeroflex fiberglass or Certainteed Ultralite. The liner shall meet life safety standards as established by NFPA 90A.

B. Conductivity: Insulation shall have an average thermal conductivity (K-factor) of no more than 0.26 BTU at 75° F mean temperature.

2.08 HIGH TEMPERATURE BLANKET FIBERGLASS INSULATION

A. General: Insulation shall be Manville Spin-Glas HTB-23, Owens-Corning TIW Type II, or approved equal high temperature blanket (1000° F) insulation, 2# density.

B. Conductivity: Insulation shall have an average thermal conductivity (K-factor) of no more than 0.23 BTU at 75° F mean temperature

2.09 HIGH TEMPERATURE CALCIUM SILICATE INSULATION BOARD

A. General: Insulation shall be Pabco Super Firetemp (SFL) 3" thick rigid structural grade calcium silicate fireproofing board, designed for continuous service at temperatures up to 1700° F.

B. Material must meet and be installed according to the Council of American Building Officials report No. NER-332 for 0" clearance combustibles.

2.10 PIPE INSULATION ACCESSORIES

A. Protection Shields: Provide protection shields at all clevis hangers as required.

B. Protection Shield Inserts: Where protection shields are used, provide an insert between the piping and the shield 2" longer and 2" wider than the shield, having the same thickness and contour as the adjoining insulation. Inserts shall be minimum 8.5# density, minimum 100 psi compressive strength.

1. Pittsburgh-Corning Foamglas cellular glass
2. Manville Thermo-12 calcium silicate
3. Owens-Corning Kaylo AF calcium silicate

C. Preformed Fitting insulation/Covers: Fittings, flanges, strainers, unions, and valves shall be insulated with premolded rigid glass fiber insulation and one piece preformed PVC covers. Blanket insulation shall not be used for fittings.

1. Manville Zeston 2000
2. Knauf/Proto
3. Fuller-Sealfas
4. Foster Smoke-safe

D. Banding: Pipe insulation 2" and larger shall be banded with either of the following:

1. A.J. Gerrard & Company "Steel-Binder" 0.02" thick by ½" wide aluminum bands or approved equal.

2. Thomas & Betts “TY-RAP” nylon ties or approved equal.

2.11 ADHESIVE/SEALANTS/COATINGS

A. Elastomeric Adhesives:

1. Armstrong 520
2. Manville No. 57

B. Vapor Barrier Coatings: Water based vapor barrier coating for service - 20°F to 180°F, less than 0.08 perm.

1. Childers CP-35
2. Foster 30-80
3. Insul-Coustic
4. MEI

2.12 INSULATION SCHEDULE

A. General: Insulation thickness shall be at least the minimum value scheduled. Thickness shall be increased where required to prevent condensation or to comply with governing energy code requirements.

EQUIPMENT/SYSTEM SURFACE	TYPE	THICKNESS
1. Piping Systems:		
Refrigerant	Elastomeric	1”
Condensate (Cooling Coils)	Preformed Fiberglass	½”
Heating Hot Water 2” & smaller (above grade)	Preformed Fiberglass	1”
Heating Hot Water 2-½ & larger (above grade)	Preformed Fiberglass	1-½”
Heating Hot Water 2” & smaller (below grade)	**Cellular Glass**	1”
Heating Hot Water 2” & smaller (below grade)	**Cellular Glass**	1”
Heating Hot Water 2-½ & larger (above grade)	Cellular Glass	1”
Domestic Cold Water 2-½” and smaller (exposed to freezing)	Preformed Fiberglass	1-½”
Floor Drain/Hub Drain Piping ***	Preformed Fiberglass	½”
Floor Drain/Hub Drain Traps, Bodies ***	Fiberglass Blanket	1-½”
All other pipe exposed to freezing temperature	Preformed Fiberglass	1-½”
2. Equipment (Non-Factory Insulated):		
Air Distribution Devices (in plenums having ducted return air)	Fiberglass Blanket	1-½”
3. Ductwork:		
Conditioned Supply Air	Fiberglass Blanket	1-½”
Unconditioned Outside Air	Fiberglass Blanket	1-½”
Outside Air Intake Plenums	Fiberglass Blanket	1-½”
Rigid Round and Flexible Supply Air not Factory Insulated	Fiberglass Blanket	1-½”

Return Air	Fiberglass Blanket	1-½"
Toilet Exhaust 20 ft. upstream of fan *	Fiberglass Duct Liner	1"
All other toilet and relief exhaust	Uninsulated	

*Where located in air conditioned spaces and plenums only.
**Where located in non-air conditioned spaces and plenums only.
***Systems that receive cooling coil condensate or refrigerated drinking water only.

PART 3 - EXECUTION

3.01 INSTALLATION

A. GENERAL

1. Install thermal insulation on clean, dry surfaces after all leakage testing and inspection is completed. Any leaking equipment shall be brought to the attention of the Contractor who shall cause these conditions to be corrected. Thermal insulation installation shall be in strict accordance with these specifications, the Midwest Insulation Contractors Association (MICA) Commercial and Industrial Insulation Standards, recognized industry practice, and the manufacturer's printed installation instructions.
2. Where there is evidence of vapor stop failure or "wet" insulation after installation, the insulation shall be removed, and the surface shall be cleaned, dried, and properly reinsulated.
3. The insulation shall be handled and applied in a manner that will not adversely affect its structural, insulating, or vapor permeability properties.

B. PIPING

1. Condensate Drains: Condensate drain lines from floor mounted air handling unit cooling coils located in return air plenums require insulation in accordance with local codes.
2. Drain Bodies: The substitution of ductwrap insulation for piping insulation is prohibited except on drain bodies.
3. Miscellaneous Valves and Fittings: All valve operators, "Pete's Plugs", drain valves, meter and gauge fittings, and other items, which must protrude through the pipe insulation shall be suitably insulated with removable insulation caps. Bevel and seal insulation and joints at removable caps. Chilled water riser support plates shall be suitably insulated.
4. Protection Shield Inserts: Protection shield insert blocking shall be thoroughly vapor sealed and finished to match pipe insulation.
5. Preformed Fitting Insulation Covers: An approved vapor retarder mastic compatible with the insulation cover shall be applied around the edges of the adjoining pipe insulation and on the fitting cover overlap seam. The fitting cover shall then be applied and shall be secured with pressure sensitive 1-½" wide, 10 mil PVC tape along the throat seam and the circumferential edges overlapping itself 2" on the downward side.
6. Installation of Preformed Fiberglass Insulation:

a. Longitudinal and Butt Joint Vapor Seal: Longitudinal self sealing laps and butt joint 3" wide self sealing strips of the insulation jacket shall be further sealed by applying one coat of fire resistant vapor barrier coating over the entire joint surface. Longitudinal joints on insulation systems utilizing dual factory applied adhesive strips, such as Owens-Corning SSL II, need not be further sealed as required above.
b. Butt joint Vapor Stop/Seal: Provide an isolating vapor stop between pipe insulation jacket and the pipe at butt joints of insulation at fittings, flanges, valves, hangers and at 21 foot intervals on continuous runs using vapor barrier coating. Extend the vapor barrier coating 2" along the insulation jacket, across the face of the insulation, and 4" along the pipe.

7. Installation of Elastomeric Pipe Insulation: Insulation shall be installed in continuous lengths over piping and glued with adhesive at butt joints. Horizontal suspended piping shall be provided with protection shields at hangers. Coat all elastomeric insulation exposed to view or ultra-violet light with two coats of vinyl finish compound (Armstrong WB, Rubatex 374).

C. EQUIPMENT

1. Installation of Elastomeric Sheet Insulation: Flexible elastomeric sheet insulation shall be glued directly to equipment contoured surfaces using elastomeric adhesive for surface attachment and butt joint sealant. Adhesive shall be applied over the entire surface to be insulated. Insulation shall be applied to equipment such that equipment may be disassembled and maintained without damaging insulation. Insulation shall be finished with two coats of the manufacturer's recommended finish compound vinyl-lacquer, or approved equal.
2. Pumps:
   a. Insulation board shall be constructed into a box configuration covering the upper and lower sections of the split case pump casing in such a manner as to allow removal of the upper section without destroying the insulation.
   b. The upper section shall overlap and be secured to the lower section using ½" stainless steel band(s) with adjustable fasteners.
   c. The exposed surfaces of the insulation shall be covered with canvas and finished with two coats of vapor barrier coating over the entire surface.
   d. The interior area of the insulation box shall be filled with fiberglass blanket insulation, insuring that the surface area of the pump casing is covered.

D. DUCTWORK

1. Ductwork Fiberglass Blanket Insulation (Indoors):
   a. Insulation shall be but slightly longer than circumference of duct to insure full thickness at the corner.
   b. All insulation shall be applied with edges tightly stitched with staples on 3" centers.

c. The insulation shall be additionally secured to the bottom of all square ducts 24" or wider by means of welded pins and speed clips on 12" centers.

d. The vapor barrier facing shall be thoroughly sealed at joints, cuts, tears and where the pins have pierced through the vapor barrier with 3" pressure sensitive aluminum foil vapor barrier tape or one coat of vapor barrier coating reinforced with 20 x 20 glass cloth.

END OF SECTION

Section 15300

MECHANICAL, HVAC AIR DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of Mechanical General Requirements, Section 15000, apply.

PART 2 - PRODUCTS

2.01 DUCTWORK, RIGID

A. Furnish and install ductwork complying with Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) manual complete with necessary appurtenances. Prepare and submit Shop Drawings of ductwork systems indicating elevation of ductwork with respect to structure. Utilize Shop Drawings to plan offsets, etc.

B. Sheet metal shall be galvanized, "Softite" as manufactured by Wheeling or Armco or equal. Longitudinal seams in rectangular ducts shall be double locked and hammered flat. Duct systems shall be made airtight in accordance with SMACNA Balancing Manual.

C. Turning vanes shall be installed in non-radius turns greater than 30 degrees.

D. Splitters where indicated shall be constructed of 16 gauge galvanized steel secured to a square operating rod of adequate cross-section to prevent distortion. Splitter shall be minimum of 1-½ times width of narrow split. Provide sheet metal sleeves where splitters occur in acoustic lined ductwork.

E. Where branch take-offs are indicated, furnish and install Tuttle and Bailey "Vectrol", Titus AG-45 with #3 controller, or equal.

F. Where ductwork is concealed, splitters and branch take-offs shall be equipped with No. 315 Young Regulator Operator, or equal, with chrome plated cover set flush with ceiling and located so as to avoid conflict with light fixtures. Where ductwork is exposed or above accessible ceiling they shall be equipped with locking type quadrants.

G. Furnish and install manual volume dampers where shown on Drawings. Damper blades shall be constructed of minimum 16 gauge galvanized sheet metal securely fastened to square operating rod.

H. Where structure, ductwork, conduit, piping, or other items are visible in plenum space through return air grills, these items shall be painted or otherwise concealed to the satisfaction of the Engineer.

I. Verify compatibility of grilles, diffusers, registers, louvers to type of walls or ceilings called for on Architectural Plans. Install recessed devices so no gap is left between device and surface. Install device square with room walls unless otherwise noted.

J. Louvers installed in exterior walls shall be made weather-tight; properly flash device to walls with flashing compatible with wall material and construction.

2.02 FIRE DAMPERS

A. Furnish and install at locations shown on plans, indicated on schedules, or required by Code, fire dampers constructed, tested, and labeled in accordance with UL Standard 555. Fire dampers shall have a 1-½ hour UL classification where installed in walls, partitions, or floors having a fire resistance rating of more than two hours but less than three hours as indicated on Architectural Plans. Fire dampers in walls, partitions, and floors rated three hours or more shall have a three hour UL classification. All fire dampers shall have a 212° F fusible link unless otherwise noted.

B. Fire dampers used for protection of ceiling openings shall be specifically classified as a ceiling fire damper.

C. Fire dampers shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed using steel sleeves, angles, and other materials and practices required to comply with NFPA, SMACNA, and manufacturer's installation requirements, and to provide an installation substantially equal to conditions under which damper was tested at UL. Fire dampers shall be accessible for resetting and replacement of fusible link through an access door. Exposed access doors shall be architecturally compatible with wall or partition in which it is mounted.

D. Fire dampers in the open position shall not significantly impede air flow and, generally, shall not exceed 0.05 inches w.c. pressure drop at air flows indicated on plans. Submittal literature shall include performance data in accordance with AMCA Standard 500.

2.03 FILTERS

A. Provide filters in air handling units and elsewhere where called for.

B. Unless otherwise indicated on the Plans, the air filters shall be commercial grade cleanable panel type filters having minimum arrestances as follows:

1. 1 ½ " thick - 60 - 65%

C. All filters shall be 1 ½" thick unless otherwise noted.

D. Filters shall be American Air Filter type HV-2.

E. Filters shall be installed in system prior to initial operation of air moving equipment. Operation without filters installed shall mandate cleaning of coils and duct prior to acceptance.

F. Install clean set of filters at time of final acceptance. Leave one complete set of filters, labeled to indicate location of use, on the job site for future installation by Owner.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

Section 15320

MECHANICAL, HVAC TESTING, ADJUSTING, BALANCE

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of HVAC General Requirements, Section 15000, apply.

1.02 QUALIFICATION OF THE TAB CONTRACTOR

A. The proposed Testing and Air Balancing Contractor (TAB), in order to be candidates for final selection by the Engineer, shall possess the following:

1. Be independent of any HVAC Contractor and show proof of a minimum of five (5) years experience in air distribution balancing.
2. Have the necessary test equipment to properly perform balancing.
3. Have a competent staff of Engineers and Technicians and, as a minimum, have at least one supervising engineer, currently registered in a U.S. State, who will oversee collection of data, analyze data, recommend adjustments, and prepare the final report.

B. The HVAC Contractor shall assure that the TAB Contractor meets the same insurance requirements as the HVAC Contractor either by inclusion under the HVAC Contractor's coverage or by separate coverage.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.01 AIR BALANCING AND TESTING

A. Contractor shall obtain, at its expense, the services of an independent Testing and Air Balancing Contractor (TAB) who shall make final balance adjustments on the system and shall prepare and submit a written TAB balance report. The HVAC Contractor shall submit the names of at least two (2) qualified TAB Contractors for final selection by the Engineer. See 1.02 above.

B. The HVAC Contractor shall make any changes in the sheaves, belts, dampers, valves, deviations, etc., required for correct balance as required by the TAB Contractor, at no additional cost to the Owner.

C. In order that all systems may be properly tested, balanced, and adjusted as required herein by these specifications, the HVAC Contractor shall operate the system for the length of time necessary to properly verify completion and readiness for TAB. Tits length of time shall be acceptable to the Engineer.

D. The plans and specifications have indicated dampers and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it shall be the responsibility of the HVAC Contractor to install these devices in a manner that will leave them accessible and readily adjustable. Should any such device not be readily accessible, the HVAC Contractor shall provide access to said device. Also, any malfunction encountered by the TAB Contractor and reported to the HVAC Contractor, General Contractor, or the Construction Inspector, shall be corrected by the HVAC Contractor immediately so the testing and balancing work can proceed.

3.02 PRELIMINARY REVIEW BY TAB CONTRACTOR

A. The HVAC Contractor shall, prior to installation of any piping or ductwork, submit a set of plans to the selected TAB Contractor, who shall review the plans and provide comments concerning any additional dampers, adjustment, or test points, which he believes necessary for proper air balance of the project. These comments will be submitted through the submittal procedure previously detailed.

3.03 REPORTING DOCUMENTATION

A. TAB contractor shall furnish for owner's use one copy of all testing and balancing reports within one week of performing work. Additional copies of reports as required by the specifications for operation and maintenance manuals shall be furnished by the TAB contractor.

END OF SECTION

Section 15400

MECHANICAL, HVAC CONTROLS

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of HVAC General Requirements, Section 15000, apply.

PART 2 - PRODUCTS

2.01 CONTROLS

A. Provide, for each air conditioning system, a low voltage programmable thermostat, automatic changeover, cooling, heating, fan on auto. Provide single or two stage for heating or cooling as indicated on the Drawings. Thermostats shall be Honeywell chronotherm III or approved equal.

B. All HVAC control wiring to be in conduit. Electrical Contractor to furnish outlet box and conduit between air handling unit and compressor/condenser unit. Conduit to contain pull wire. HVAC Contractor to install and connect all low voltage wiring.

C. Coordinate with Electrical Contractor for proper location of boxes and conduit attachment equipment.

D. Exposed control wiring at units, strapped to piping, or any other location will not be accepted.

E. Control sequence to be as described on the Drawings.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

Section 15800

MECHANICAL, INSULATION

PART 1 - GENERAL

1.01 GENERAL

A. All provisions of Mechanical General Requirements Section apply.

PART 2 - PRODUCTS

2.01 DUCT INSULATION

A. All supply and return air ducts will be insulated unless otherwise noted or specified. All sheet metal ducts shall be externally insulated with duct wrap;

use tight cloth finish around external insulation for painting by others in area exposed to view.

B. Insulation shall be firmly butted at all joints with maximum allowable compression of 25%. All seams shall overlap a minimum of 2" and be finished with appropriate pressure sensitive tape with acrylic adhesive approved by SMACNA.

C. Installed thickness shall be as follows:

1. Supply
   a. In Return Air Plenum- 2"
   b. Not in Return Air Plenum 2"
2. Return
   a. In Return Air Plenum- 2"
   b. Not in Return Air Plenum 2"

D. Unless otherwise specified lining material shall be as manufactured by Certain-Teed, Knauf, Owens-Corning, Manville, or approved equal.

2.02 PIPE INSULATION

A. Insulate all chilled water piping, all interior condensate lines not in mechanical rooms equipped with floor drains, and all water piping installed by tits contractor as exposed to outside temperatures, as follows:

1. Chilled water piping: Insulate with Armstrong Fiberglass Insulation, ¾" wall thickness.
2. Condensate lines in return air plenums as described above: Insulate with Armstrong Armaflex 2000, ¾" wall thickness.
3. Condensate lines not in return air plenum and as described above: Insulate with Armstrong Armaflex 2000, ¾" wall thickness.
4. Domestic Water piping exposed to outside temperatures: Insulate with Armstrong Armaflex AP, ¾" wall thickness.

B. Equivalent insulations by other manufacturers, meeting these specifications will be considered. Insulations shall be unicellular foamed elastomeric rubber meeting ASTM C534 and ASTM D-1056-SBE-41. Insulate for use in return air plenums shall, in addition, have flame spread rating of 25 or less and a smoke developed rating of 50 or less as tested by ASTM E-84-75.

C. Insulation shall be installed per manufacturer's published procedures including the use of the recommended adhesive.

D. Exposed insulation, both inside and outside shall be finished with two coats of vinyl lacquer per manufacturer's published procedures.

E. Insulated piping shall be supported with appropriate hangers as elsewhere specified.

PART 3 - EXECUTION

Not applicable

END OF SECTION

5.0 DRAWINGS:

5.1 Structural drawings seen below beginning on page 134 of 168

A PDF version of the Structural Drawings can also be viewed on the following web Link
https://purchasing.houstontx.gov/buyer/BidDocumentManager.aspx?id=C23654

CONSTRUCTION DOCUMENTS

FOR

PROPOSED PRIVATE PAVING REPAIR, SANITARY SEWER SYSTEM, WATER DISTRIBUTION AND STORM SEWER SYSTEM TO SERVE A FIRE STATION

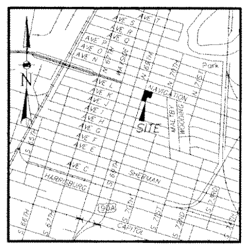
FOR

FIRE STATION No. 20 (PHASE 2)

6902 NAVIGATION BOULEVARD
HOUSTON, HARRIS COUNTY, TEXAS

PROPOSED BY:
CITY OF HOUSTON GENERAL SERVICES

DATE: MARCH 2010 JOB NO: 0809-2920



VICINITY MAP
NTS
KEY MAP NO. 494 V
ZIP CODE: 77011
GIMS NO: 5556 B

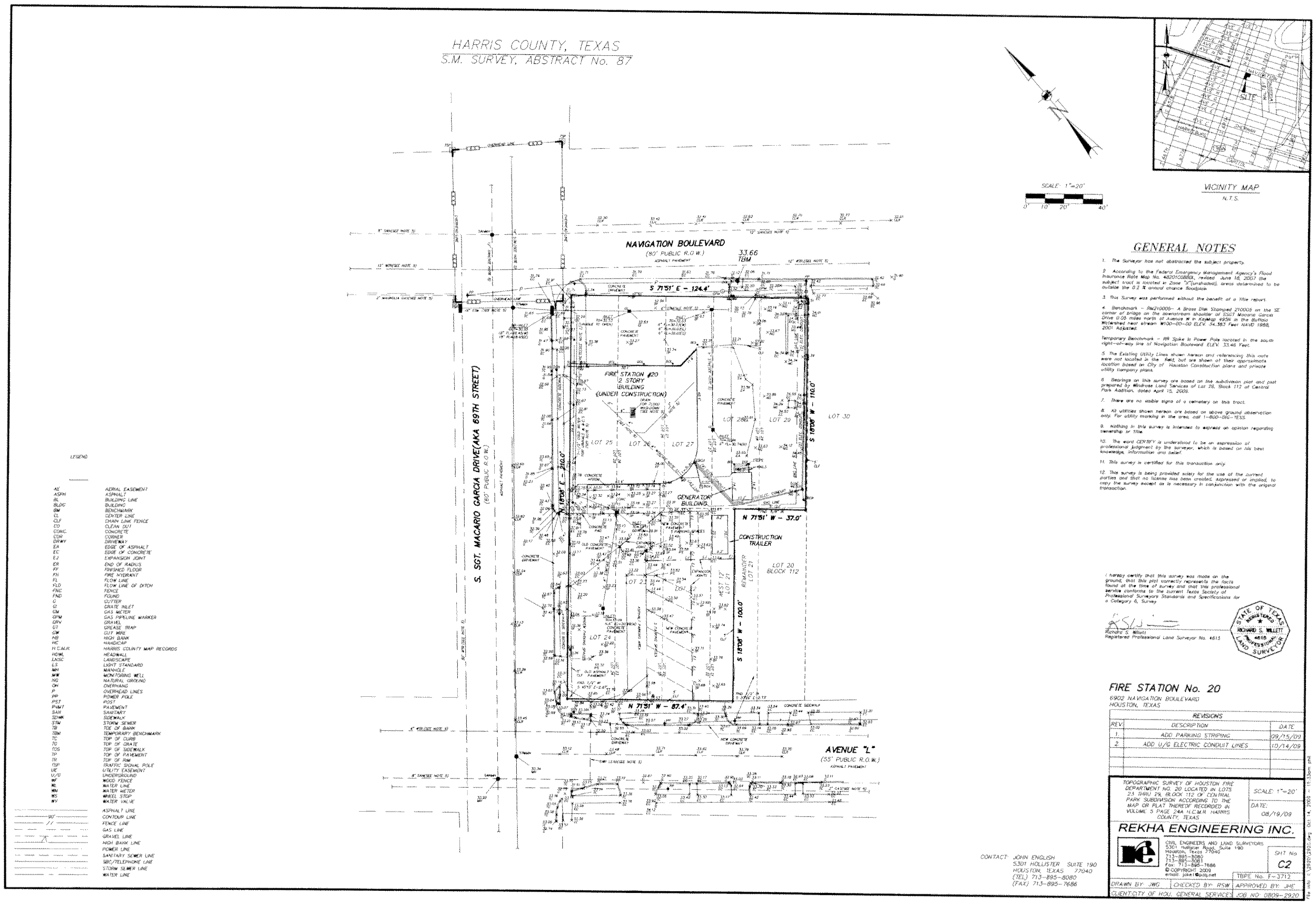
SHEET INDEX

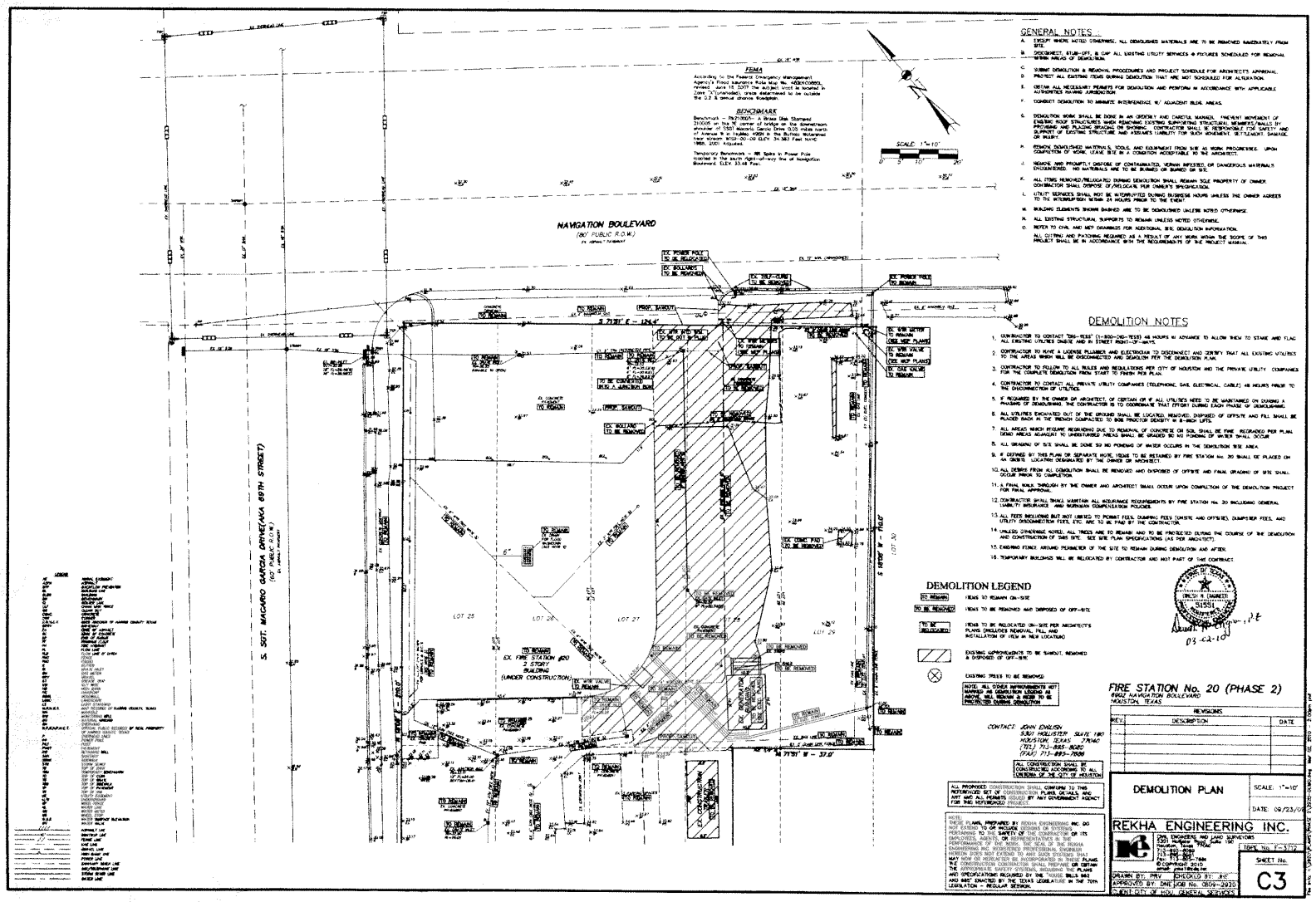
DESIGN ENGINEER:
REKHA ENGINEERING INC.
CIVIL ENGINEERS AND LAND SURVEYORS
5301 HOLLISTER, SUITE 190
HOUSTON, TEXAS 77040
713-895-8080
713-895-8081
FAX: 713-895-7686
EMAIL: joke1@pdq.net
TBPE No. F-3712

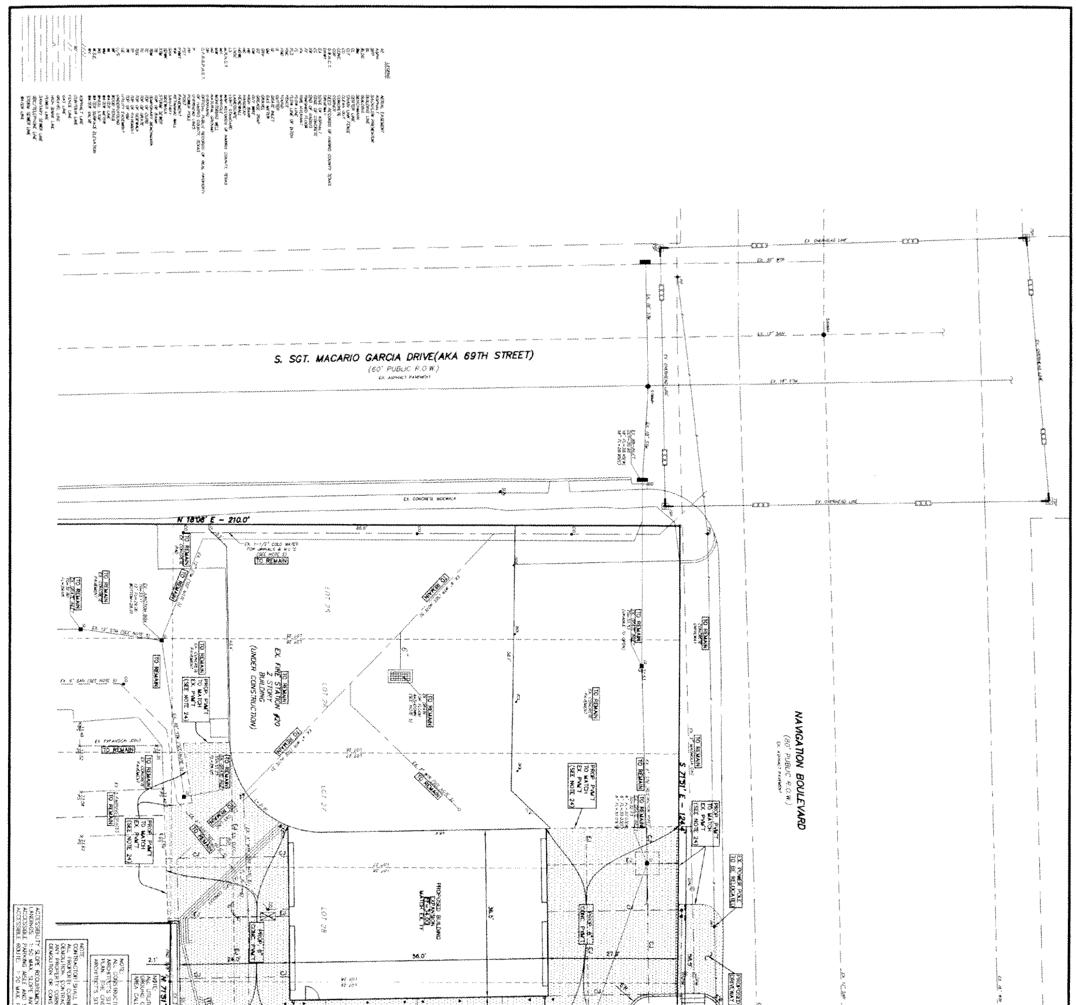
SURVEYED BY: REKHA ENGINEERING, INC.

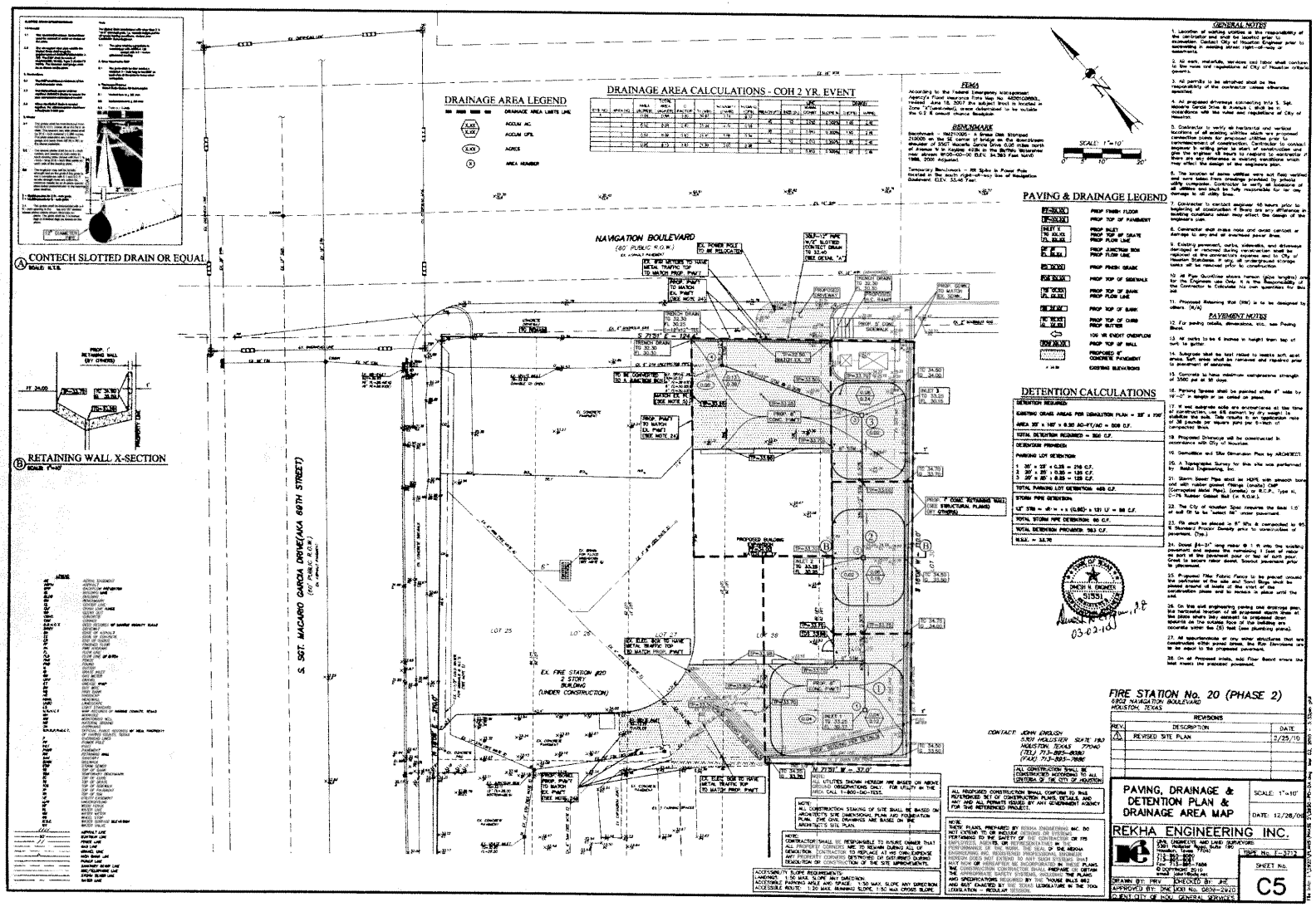
STATE OF TEXAS
DINESH N. ENGINEER
51551
REGISTERED PROFESSIONAL ENGINEER
03-02-10

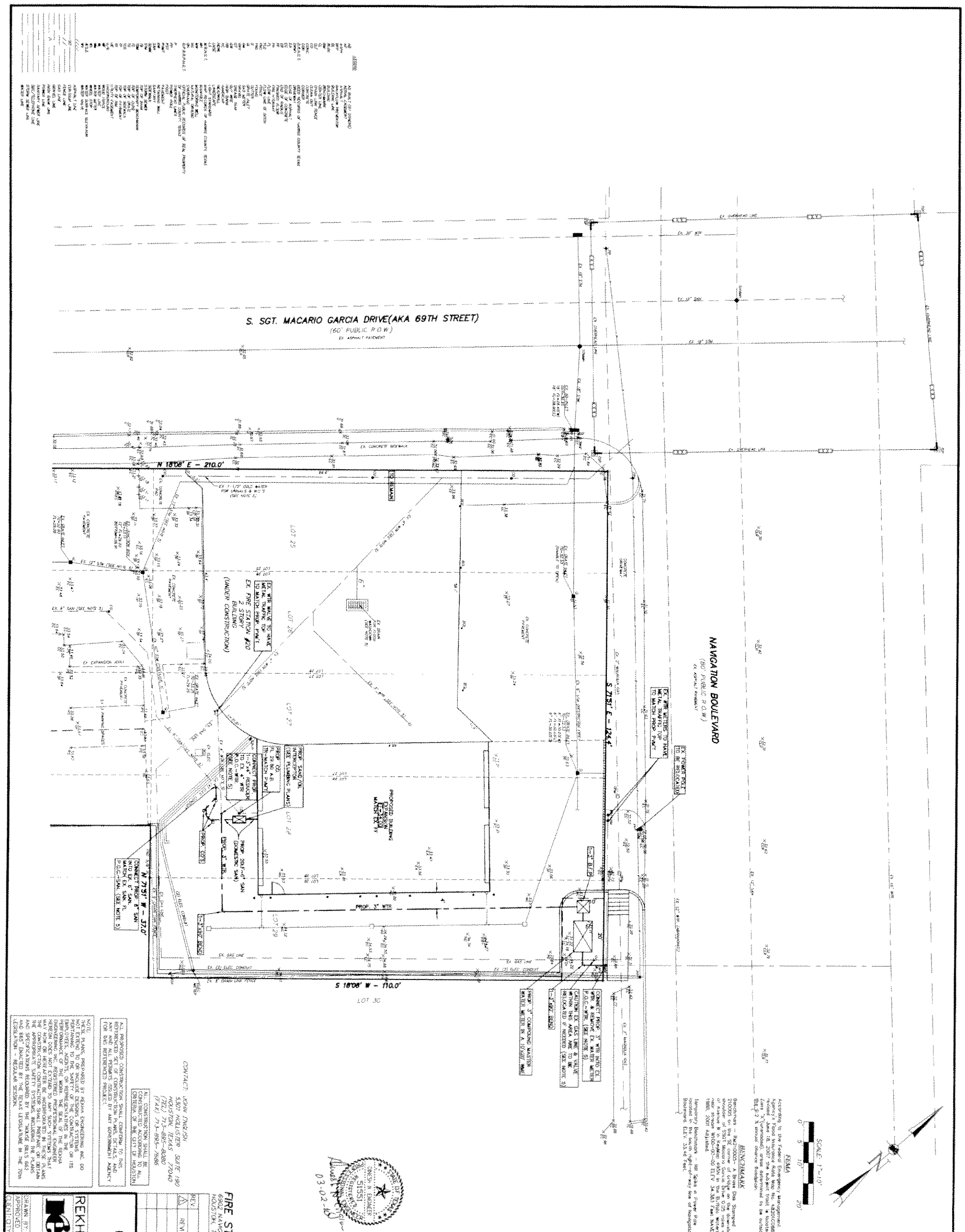
TBPE No. F-3712
SHEET No.
C1

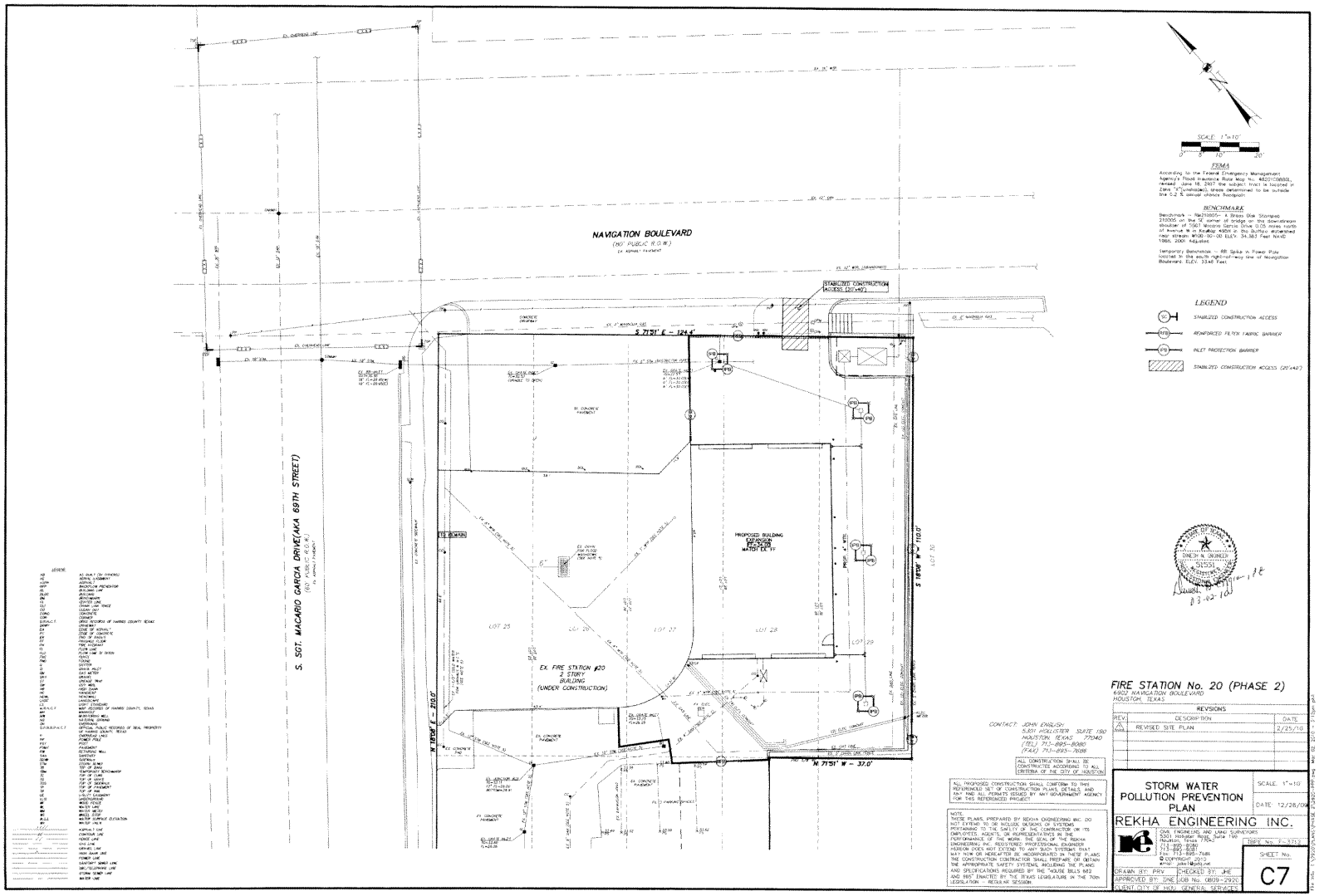

HARRIS COUNTY, TEXAS
S.M. SURVEY, ABSTRACT No. 87
NAVIGATION BOULEVARD
(80' PUBLIC R.O.W.)
33.66
TBM
S. SGT. MACARIO GARCIA DRIVE(AKA 69TH STREET)
(60' PUBLIC R.O.W.)
AVENUE "L"
(55' PUBLIC R.O.W.)
S 71°51' E - 124.4'
S 18°08' W - 110.0'
N 18°08' E - 210.0'
N 71°51' W - 87.4'
N 71°51' W - 37.0'
S 18°08' W - 100.0'
FIRE STATION #20
2 STORY
BUILDING
(UNDER CONSTRUCTION)
GENERATOR
BUILDING
CONSTRUCTION
TRAILER
LOT 20
BLOCK 112
LOT 30
LOT 21
LOT 22
LOT 23
LOT 24
LOT 25
LOT 26
LOT 27
LOT 28
LOT 29
REMAINDER
LOT 21
SCALE: 1"=20'
0' 10' 20' 40'
VICINITY MAP
N.T.S.
GENERAL NOTES
1. The Surveyor has not abstracted the subject property.
2. According to the Federal Emergency Management Agency's Flood Insurance Rate Map No. 48201C0[illegible], revised June 18, 2007 the subject tract is located in Zone "X"(unshaded), areas determined to be outside the 0.2 % annual chance floodplain.
3. This Survey was performed without the benefit of a title report.
4. Benchmark - RM210005- A Brass Disk Stamped 210005 on the SE corner of bridge on the downstream shoulder of SSGT Macario Garcia Drive 0.25 miles north of Avenue N in Keymap 495N in the Buffalo Watershed near stream W100-00-00 ELEV. 34.383 Feet NAVD 1988, 2001 Adjusted.
Temporary Benchmark - RR Spike in Power Pole located in the south right-of-way line of Navigation Boulevard ELEV. 33.46 Feet.
5. The Existing Utility Lines shown hereon and referencing this note were not located in the field, but are shown at their approximate location based on City of Houston Construction plans and private utility company plans.
6. Bearings on this survey are based on the subdivision plat and plat prepared by [illegible] Land Services of Lot 28, Block 112 of Central Park Addition, dated April 15, 2008.
7. There are no visible signs of a cemetery on this tract.
8. All utilities shown hereon are based on above ground observation only. For utility marking in the area, call 1-800-DIG-TESS.
9. Nothing in this survey is intended to express an opinion regarding ownership or title.
10. 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.
11. This survey is certified for this transaction only.
12. 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.
I hereby certify that this survey was made on the ground, that this plat correctly represents the facts found at the time of survey and that this professional service conforms to the current Texas Society of Professional Surveyors Standards and Specifications for a Category 6, Survey.
Richard S. Willett
Registered Professional Land Surveyor No. 4615
STATE OF TEXAS
REGISTERED
RICHARD S. WILLETT
4615
PROFESSIONAL
LAND SURVEYOR
FIRE STATION No. 20
6902 NAVIGATION BOULEVARD
HOUSTON, TEXAS
REVISIONS
REV. DESCRIPTION DATE
1. ADD PARKING STRIPING 09/15/09
2. ADD U/G ELECTRIC CONDUIT LINES 10/14/09
TOPOGRAPHIC SURVEY OF HOUSTON FIRE DEPARTMENT NO. 20 LOCATED IN LOTS 23 THRU 29, BLOCK 112 OF CENTRAL PARK SUBDIVISION ACCORDING TO THE MAP OR PLAT THEREOF RECORDED IN VOLUME 5 PAGE 24A H.C.M.R. HARRIS COUNTY, TEXAS
SCALE: 1"=20'
DATE: 08/19/09
REKHA ENGINEERING INC.
CIVIL ENGINEERS AND LAND SURVEYORS
5301 Hollister Road, Suite 190
Houston, Texas 77040
713-895-8080
713-895-8081
Fax: 713-895-7686
© COPYRIGHT 2009
SHT No
C2
TBPE No. F-3712
DRAWN BY: JWG
CHECKED BY: RSW
APPROVED BY: JHE
CLIENT:CITY OF HOU. GENERAL SERVICES
JOB NO: 0809-2920
CONTACT: JOHN ENGLISH
5301 HOLLISTER SUITE 190
HOUSTON, TEXAS 77040
(TEL) 713-895-8080
(FAX) 713-895-7686
LEGEND


NAVIGATION BOULEVARD
(80' PUBLIC R.O.W.)
S. SGT. MACARIO GARCIA DRIVE(AKA 69TH STREET)
(60' PUBLIC R.O.W.)
EX. FIRE STATION #20
2 STORY
BUILDING
(UNDER CONSTRUCTION)
LOT 25
LOT 26
LOT 27
LOT 29
LOT 30
S 71°31' E - 124.4'
N 71°31' W - 37.0'
SCALE: 1"=10'
FEMA
BENCHMARK
GENERAL NOTES
DEMOLITION NOTES
DEMOLITION LEGEND
CONTACT: JOHN ERKUSH
5301 HOLLISTER SUITE 180
HOUSTON, TEXAS 77040
(713) 713-883-8080
(FAX) 713-883-7606
FIRE STATION No. 20 (PHASE 2)
6902 NAVIGATION BOULEVARD
HOUSTON, TEXAS
REVISIONS
REV. DESCRIPTION DATE
DEMOLITION PLAN
SCALE: 1"=10'
DATE: 09/23/09
REKHA ENGINEERING INC.
TBPE No. F-3772
SHEET No.
C3
DRAWN BY: PRV CHECKED BY: RK
APPROVED BY: DNE JOB No. 0809-2920
CLIENT: CITY OF HOU, GENERAL SERVICES


S. SGT. MACARIO GARCIA DRIVE(AKA 69TH STREET)
NAVIGATION BOULEVARD
FIRE STATION No. 20 (PHASE 2)
SITE LAYOUT PLAN
REKHA ENGINEERING INC.
C4


DRAINAGE AREA LEGEND
DRAINAGE AREA CALCULATIONS - COH 2 YR. EVENT
CONTECH SLOTTED DRAIN OR EQUAL
RETAINING WALL X-SECTION
NAVIGATION BOULEVARD
S. SGT. MACARIO GARCIA DRIVE(AKA 60TH STREET)
EX. FIRE STATION #20
2 STORY
BUILDING
(UNDER CONSTRUCTION)
PROPOSED BUILDING
PAVING & DRAINAGE LEGEND
DETENTION CALCULATIONS
GENERAL NOTES
PAVEMENT NOTES
FIRE STATION No. 20 (PHASE 2)
6302 NAVIGATION BOULEVARD
HOUSTON, TEXAS
REVISIONS
REV. DESCRIPTION DATE
1 REVISED SITE PLAN 2/25/10
PAVING, DRAINAGE & DETENTION PLAN & DRAINAGE AREA MAP
SCALE: 1"=10'
DATE: 12/28/09
REKHA ENGINEERING INC.
SHEET No.
C5


S. SGT. MACARIO GARCIA DRIVE(AKA 69TH STREET)
NAVIGATION BOULEVARD
FIRE STATION No. 20 (PHASE 2)
UTILITY PLAN
REKHA ENGINEERING INC.
C6



FIRE STATION No. 20 (PHASE 2)

6402 NAVIGATION BOULEVARD
HOUSTON, TEXAS

REVISIONS

REV.	DESCRIPTION	DATE
A	REVISED SITE PLAN	2/25/10

CONTACT: JOHN ENGLISH
5301 HOLLISTER SUITE 190
HOUSTON, TEXAS 77040
(TEL) 713-895-8080
(FAX) 713-895-7688

ALL CONSTRUCTION SHALL BE CONSTRUCTED ACCORDING TO ALL CRITERIA OF THE CITY OF HOUSTON

ALL PROPOSED CONSTRUCTION SHALL CONFORM TO THE REFERENCED SET OF CONSTRUCTION PLANS, DETAILS, AND RENT AND ALL PERMITS ISSUED BY ANY GOVERNMENT AGENCY FOR THIS REFERENCED PROJECT

NOTE:
THESE PLANS PREPARED BY REKHA ENGINEERING INC. DO NOT EXTEND TO OR INCLUDE DESIGNS OF SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE ENGINEER OF REKHA ENGINEERING INC. REGISTERED PROFESSIONAL ENGINEER HEREON DOES NOT EXTEND TO ANY SUCH SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE PLANS AND SPECIFICATIONS REQUIRED BY THE "HOUSE BILLS 662 AND 1887 ENACTED BY THE TEXAS LEGISLATURE IN THE 70th LEGISLATION – REGULAR SESSION

STORM WATER POLLUTION PREVENTION PLAN

SCALE: 1"=10'

DATE: 12/28/09

REKHA ENGINEERING INC.

CIVIL ENGINEERS AND LAND SURVEYORS
5301 Hollister Road, Suite 190
Houston, Texas 77040
713-895-8080
Fax: 713-895-7688
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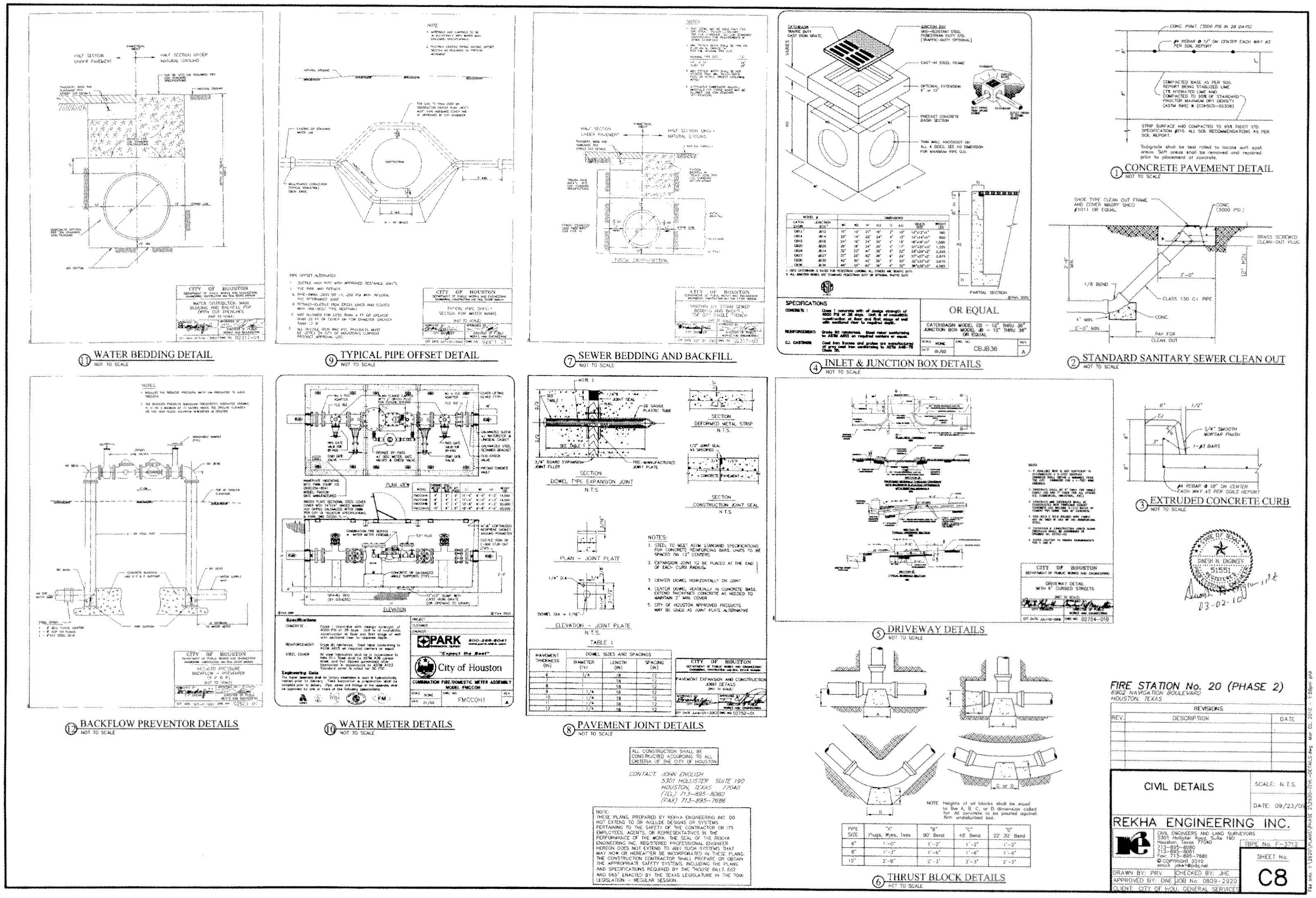
e-mail: john@rekha.net

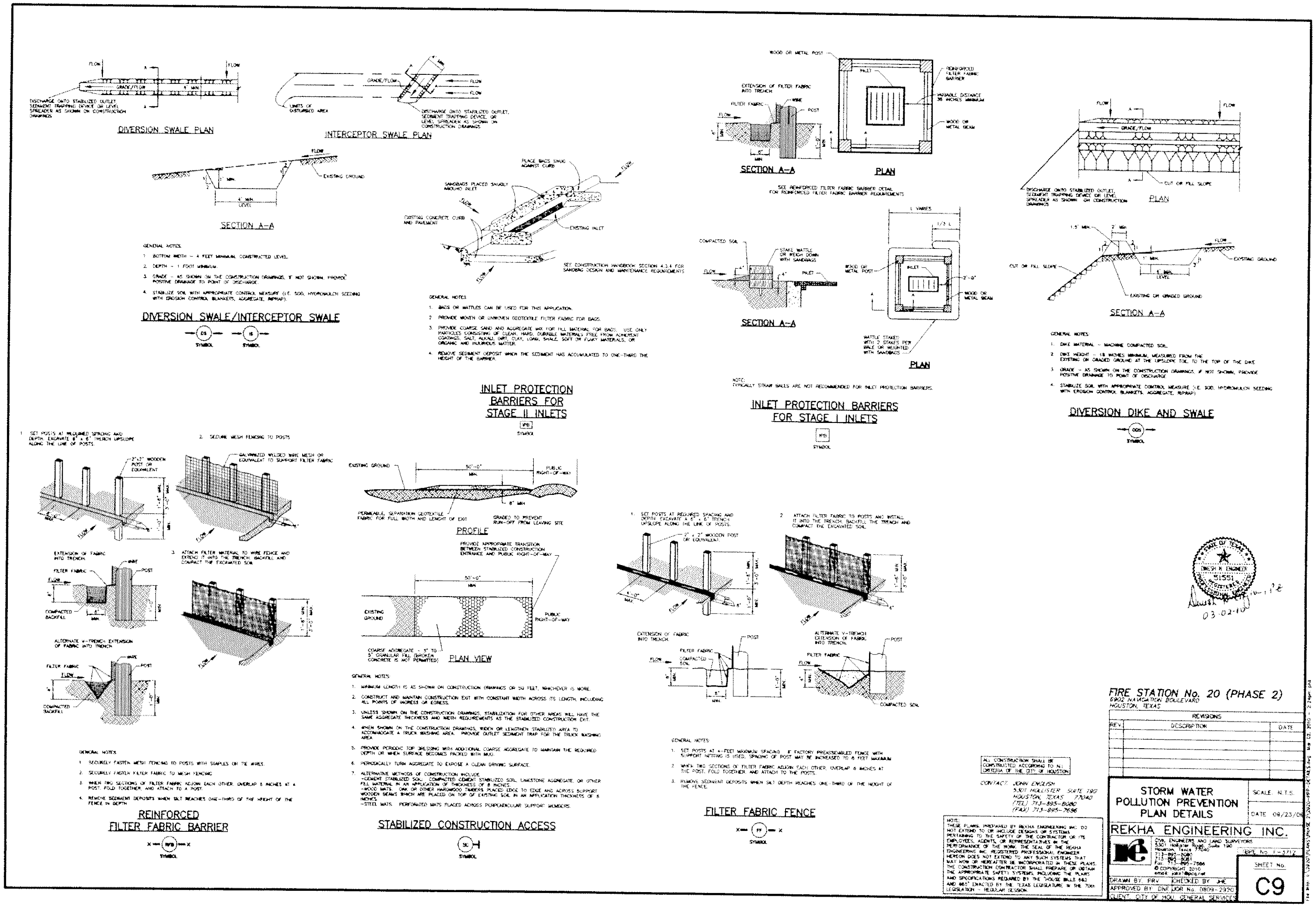
TBPE No. F-3713

DRAWN BY: PRV CHECKED BY: JHE
APPROVED BY: JHE JOB No. 0809-2970
CITY OF HOU. GENERAL SERVICES

SHEET No.
C7



11 WATER BEDDING DETAIL
NOT TO SCALE
9 TYPICAL PIPE OFFSET DETAIL
NOT TO SCALE
7 SEWER BEDDING AND BACKFILL
NOT TO SCALE
4 INLET & JUNCTION BOX DETAILS
NOT TO SCALE
OR EQUAL
1 CONCRETE PAVEMENT DETAIL
NOT TO SCALE
2 STANDARD SANITARY SEWER CLEAN OUT
NOT TO SCALE
12 BACKFLOW PREVENTOR DETAILS
NOT TO SCALE
10 WATER METER DETAILS
NOT TO SCALE
PARK
City of Houston
8 PAVEMENT JOINT DETAILS
NOT TO SCALE
5 DRIVEWAY DETAILS
NOT TO SCALE
3 EXTRUDED CONCRETE CURB
NOT TO SCALE
6 THRUST BLOCK DETAILS
NOT TO SCALE
ALL CONSTRUCTION SHALL BE CONSTRUCTED ACCORDING TO ALL CRITERIA OF THE CITY OF HOUSTON
CONTACT: JOHN ENGLISH
5301 HOLLISTER SUITE 190
HOUSTON, TEXAS 77040
(TEL) 713-895-8080
(FAX) 713-895-7686
FIRE STATION No. 20 (PHASE 2)
6902 NAVIGATION BOULEVARD
HOUSTON, TEXAS
REVISIONS
REV. DESCRIPTION DATE
CIVIL DETAILS
SCALE: N.T.S.
DATE: 09/23/09
REKHA ENGINEERING INC.
CIVIL ENGINEERS AND LAND SURVEYORS
DRAWN BY: PRV
CHECKED BY: JHE
APPROVED BY: DNE
JOB No. 0809-2920
CLIENT: CITY OF HOU. GENERAL SERVICES
SHEET No.
C8


DIVERSION SWALE PLAN
INTERCEPTOR SWALE PLAN
SECTION A-A
DIVERSION SWALE/INTERCEPTOR SWALE
INLET PROTECTION BARRIERS FOR STAGE II INLETS
SECTION A-A
PLAN
INLET PROTECTION BARRIERS FOR STAGE I INLETS
PLAN
SECTION A-A
DIVERSION DIKE AND SWALE
PROFILE
PLAN VIEW
REINFORCED FILTER FABRIC BARRIER
STABILIZED CONSTRUCTION ACCESS
FILTER FABRIC FENCE
FIRE STATION No. 20 (PHASE 2)
HOUSTON, TEXAS
REVISIONS
REV.
DESCRIPTION
DATE
STORM WATER POLLUTION PREVENTION PLAN DETAILS
SCALE N.T.S.
REKHA ENGINEERING INC.
SHEET No.
C9

GENERAL

1. These plans were prepared to meet or exceed Texas Commission on Environmental Quality, Harris County and City of Houston Rules and Regulation as currently amended.
2. Water lines, wastewater collection systems, and drainage systems shall be constructed in accordance with the City of Houston, Department of Public Works and Engineering's "Standard Construction Specifications for Wastewater Collection Systems, Waterlines, Storm Drainage, and Street Paving", dated October, 2002, latest revision, and "Standard Construction Details for Wastewater Collection Systems, Water Lines, Storm Drainage and Street Paving, dated October, 2002, latest revision, unless otherwise noted and approved on these plans. The design is consistent with the minimum standards established in the "Infrastructure Design Manual", dated October, 2002, latest revision. Contractor shall use current copies of Design Manual, Standard Construction Specifications and Standard Construction Details issued by the City of Houston. Copies can be obtained at the City of Houston File Room, 611 Walker, Basement.
3. Contractor shall comply with occupational safety and health administration standards and any other federal, state and local regulations regarding trench safety systems for trench excavation.
4. Contractor shall notify the office of the City Engineer, Department of Public Works and Engineering at (713) 863-1450 for inspection at least 48 hours prior to commencing the construction.
5. This project is not tied into the official City of Houston Survey System in compliance with ordinance No. 69-1978 because a city survey marker has not been established within 2,000 feet of this property.
6. Engineer shall notify Harris County Engineering Department 24 hours in advance of commencing construction at 713-316-3561 and give written notice 48 hours in advance. Contractor shall notify the City of Houston, Department of Public Works and Engineering, construction division at 713-837-7000 48 hours before starting work on this project.
7. Authorization notice issued by Harris County Public Infrastructure Engineering Department Permit Office required prior to construction of utilities or left turn lanes with Harris County Right-of-Way. Contact Harris County Permit Office 713-956-3000.
8. Contractor to obtain all construction permits required by the "Regulations of Harris County, Texas for Flood Plain Management" prior to starting construction.
9. The contractor shall be fully responsible for any and all damage to the existing public utility lines, including but not limited to water lines, wastewater collection systems and storm sewers, during construction. All damages shall be repaired in accordance with City of Houston, Department of Public Works and Engineering "Standard Construction Specifications" with latest addenda and amendments thereto with no cost to the public (no additional pay to contractor).
10. Contractor shall be responsible for locating and protecting all existing utilities and other facilities. Contractor shall verify in the field the exact locations prior to commencing construction. Contractor shall notify Texas One Call at (713) 226-4567 at least 48 hours before proceeding with any excavation.
11. Adequate drainage shall be maintained at all times during construction and any drainage ditch or structure disturbed during construction shall be restored to the satisfaction of the owning authority. All construction storm runoff shall comply with the final draft of Stormwater Management handbook for construction activities as prepared by Harris County/HCFCD, and the City of Houston all in compliance with the Texas Pollutant Discharge Elimination System (TPDES) requirements.
12. Condition of the road and/or right-of-way, upon completion of job, shall be as good or better than condition prior to starting work.
13. The contractor shall be fully responsible for any and all damage to the existing public or private utility lines, including but not limited to water lines, wastewater collection systems and storm sewers, during construction. All damages shall be repaired in accordance with City of Houston, Department of Public Works and Engineering "Standard Construction Specifications" with latest addenda and amendments thereto, with no cost to the public.
14. Contractor shall take necessary precaution to protect root systems of shrubs plants and trees along the areas of excavation.
15. Unless specifically indicated otherwise on the plans, utilities within easements shall be located in accordance with standards outlined by the most current utility coordinating committee drawings.
16. If the construction does not begin within a year after the plans have been signed, new signatures must be obtained and letters of availability (if necessary) must be updated.
17. Contractor shall prepare a set of "As-Built" drawings showing any field changes made to the approved engineering plans and submit to the design consultant for submission to the city engineering.

GENERAL CONSTRUCTION NOTES FOR SWPPP AND SWQMP COMPLIANCE:
>1.0<5.0 ACRES
Considered small construction activities
Submit a Construction Site Notice (CSN) to the City and TCEQ
Post a Construction Site Notice at the construction site
Required to develop a SWP3
Not required to submit a NOI or NOT
Any supporting concrete or asphalt plant is separately authorized to discharge under an individual TPDES Permit.

SWPPP CONSTRUCTION NOTES

1. Contractor shall implement inlet protection devices and Reinforced Filter Fabric barrier along road and side ditches at locations shown on the typical Storm Water Pollution Prevention (SWPP) plans to keep silt and/or excavated materials from entering into the storm water inlets and ditches eventually polluting the receiving storm.

2. During the excavation phase of the project, Contractor shall schedule the work in short segments so that excavated material can be quickly hauled away from the site and to prevent it from staying uncollected on the existing pavement. Any loose excavated material which falls on pavements or driveways shall be swept back into the excavated area.

3. Contractor shall clean up the existing street intersections and driveways daily, as necessary, to remove any excess mud, silt or rock tracked from the excavated area.

4. Contractor shall follow good housekeeping practices during the construction of the project, always cleaning up dirt and loose material as construction progresses.

5. Contractor to inspect and maintain the areas listed below at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.
Disturbed areas of the construction site that have not been finally stabilized
Areas used for storage of materials that are exposed to precipitation
Structural control measures.
Locations where vehicles enter or exit the site

6. Contractor to be responsible to maintain existing ditches and/or culverts for unobstructed drainage at all times. Where sodding is disturbed by excavation on backfilling operations, such areas shall be replaced by seeding or sodding. Slopes 4:1 or steeper shall be replaced by block sodding.

SANITARY SEWERS

1. SANITARY SEWER SHALL BE BUILT ACCORDING TO CITY OF HOUSTON SPECIFICATIONS AND/OR ALL APPLICABLE BUILDING CODES.

2. MANHOLES SHALL BE BUILT IN ACCORDANCE WITH CITY OF HOUSTON DRAWING NO. 02601-02C FOR SEWERS 6" TO 24" OR DRAWING NO 02601-03C FOR SEWERS 27" TO 60". ALL MANHOLES MUST BE PRECAST, WITH THE BASE SLAB REINFORCED WITH NO. 5 BARS AT 8" ON CENTER, EACH WAY. BRICK MANHOLES ARE NOT ALLOWED.

3. ALL SANITARY SEWER PIPE AND FITTINGS, UNLESS LABELED IN THE PLANS AS DUCTILE IRON (D.I.P.), SHALL BE P.V.C. AND SHALL CONFORM TO ASTM D-2241. P.V.C. PIPE MATERIAL SHALL CONFORM TO ASTM D-1784 WITH A RESIN CELL CLASSIFICATION OF 12454-B (PVC 1120). P.V.C. PIPES SHALL HAVE ELASTOMERIC JOINTS CONFORMING TO ASTM D-3139 AND GASKETS CONFORMING TO ASTMF-477. ALL 8" & 10" GRAVITY SANITARY SEWERS SHALL BE CONSTRUCTED USING SDR 26 PVC OR C-900 DR 18 PIPE UNLESS OTHERWISE SPECIFIED. P.V.C. FORCE MAINS SHALL MEET OR EXCEED THE REQUIREMENTS FOR SDR 21 (PR 200) PIPE. DUCTILE IRON PIPE SHALL BE IN CONFORMANCE WITH AWWA C-151 AND AWWA C-111, STANDARD CLASS 350, WITH BELL AND SPIGOT PUSH-ON JOINTS. D.I.P. SHALL HAVE AN INTERIOR COATING OF 40 MILS POLYETHYLENE AND EXTERIOR 8 MIL POLYETHYLENE WRAP.

4. ALL P.V.C. SANITARY SEWER PIPES SHALL HAVE BEDDING AND BACKFILL AS SHOWN ON CITY OF HOUSTON DRAWING NO. 02317-08. NO SEPARATE PAY.

5. SANITARY SEWERS LOCATED UNDER OR WITHIN ONE-FOOT OF PROPOSED OR FUTURE PAVING SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND (1-½ SACK/CUBIC YARD) TO WITHIN ONE FOOT OF PAVEMENT AS SHOWN ON CITY OF HOUSTON DRAWING NO. 02601-04 AND 02227-01C. NO SEPARATE PAY. (LAB VERIFICATION WILL BE REQUIRED PRIOR TO PLACEMENT OR PAVEMENT).

6. ALL SEWER LINES THAT REQUIRE DEWATERING FOR INSTALLATION SHALL BE BEDDED AND INSTALLED IN GENERAL CONFORMANCE WITH CITY OF HOUSTON DRAWING NO. 02601-04 AND 02227-01C.

7. ALL SEWER LINES 18 FEET OR GREATER IN DEPTH (AS MEASURED FROM THE MANHOLE RIM TO THE FLOWLINE OF THE PIPE) SHALL BE TELEVISED AND VIDEOTAPED BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER. TAPES SHALL BE MADE IN THE VHS FORMAT, IN COLOR, AND TWO COMPLETE COPIES SHALL BE PROVIDED TO THE OWNER.

8. ALL SANITARY SEWER MANHOLES RIMS SHALL BE SET 3" TO 5" ABOVE SURROUNDING FINISHED GRADE, WITH SLOPED FILL ADDED FOR STORM WATER DRAINAGE AWAY FROM THE MANHOLE RIM.

9. ALL 6" SANITARY SERVICE LEADS SHALL BE LAID WITH A MINIMUM GRADE OF 1.0%.

10. DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE AND SEMI-RIGID PIPE, EXCEPT SERVICE LEADS. THE TEST 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 IS TO BE RUN 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 PIE'S NOMINAL DIAMETER. THE TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES.

11. ALL SANITARY SEWER MANHOLE RIMS SHALL BE SET 3" TO 5" ABOVE SURROUNDING FINISHED GRADE, WITH SLOPED FILL ADDED FOR STORM WATER DRAINAGE AWAY FROM THE MANHOLE RIM. WHERE SPECIFIED IN THE PLANS, SANITARY MANHOLES BELOW THE 100-YEAR FLOOD PLAIN (OR WHERE OTHERWISE REQUIRED) SHALL HAVE THE RIM SET FLUSH WITH THE FINISHED GRADE. THE RIM SHALL BE WATERPROOFED USING A NEOPRENE GASKET. ONLY STAINLESS STEEL SCREWS OR NUTS & BOLTS CAN BE USED TO HOLD DOWN THE COVER.

12. SANITARY SEWER LINES PARALLEL TO WATER LINES SHALL BE INSTALLED WITH AT LEAST A 9-FOOT CLEARANCE AND IN SEPARATE TRENCHES.

13. SANITARY LINES CROSSING BELOW WATER LINES MUST HAVE A FULL LENGTH JOINT (20' NOMINAL) CENTERED AT THE CROSSING WITH A MINIMUM SEPARATION DISTANCE OF SIX-INCHES.

14. SANITARY LINES CROSSING ABOVE WATER LINES MUXCEED A DEST HAVE A FULL LENGTH JOINT (20' NOMINAL) CENTERED AT THE CROSSING WITH A MINIMUM SEPARATION DISTANCE OF TWO-FEET.

15. SANITARY SEWER FORCE MAINS SHALL BE BROWN OR GREEN AND SHALL BE LABELLED EVERY TWO FEET. "NON POTABLE WATER."

16. ALL SANITARY SERVICE SHALL BE LAMP TESTED MANHOLE TO MANHOLE.

17. ALL GRAVITY SANITARY SEWERS SHALL BE AIR TESTED PER SPECIFICATIONS.

All sanitary sewer bore and jacking work is to use either AWWA C-900, DR-18, PVC pipe or polyethylene lined & encased D.I.P., Thk Cl 50-54, (thick-wall high pressure type of pipe). Use same for any san. swr. pipe (in the road R-O-W) having less than 6' of top cover from the adjacent natural ground @ the road R-O-W's nearest edge.

Any And All D.I.P. To Be Used Will Have Both External And Internal Protection. - External Polyethylene Tubing Or Double Wrap Will Be 8 Mils. Thick Per Layer And Tied To Pipe At 3' MAx. Internals (If Laid) Or Bonded To Pipe At 1' Max. Internals (W/Screw-Tightened Steel Bands) If Jacked. - Internal Polyethylene Heat Fused Bonded Liner Will Be 40 Mils. Min. Thickness.

STORM SEWERS

GENERAL
1. Contractor shall provide 12" minimum clearance at storm sewer and water line crossings.
2. The contractor shall be responsible for protecting, maintaining and restoring any backslope drainage system disturbed as a result of his work.
3. All ditches shall be regarded to proposed elevations to insure proper drainage. All outfalls shall be properly backfilled and compacted. All disturbed area shall be regraded, seeded and fertilized.
4. All driveways will be located to avoid existing curb inlet structures.
5. "STM. S. E." indicates "Storm Sewer Easement".

MANHOLES/INLETS.
6. All storm sewer manhole rims located outside the proposed paving shall be set to proposed finished grade elevation, in accordance with requirements of section 02086.
7. 24" to 72" storm sewers shall have type "C" M.H.S.
8. All inlets to be type "B-B" unless otherwise noted.

PIPES.
9. All storm sewer pipes and inlet leads shall be 24" and larger RCP (Class III, C-76) unless otherwise noted.
10. Concrete pipe shall be installed using rubber gasket joints only conforming to ASTM C 443.
11. All proposed pipe stub-outs from manholes or inlets are to be plugged with 8" brick walls unless otherwise noted.
12. Storm sewers and leads shall be reinforced concrete pipe, C-76, Class III, and shall be installed, bedded, and backfilled in accordance with City of Houston specifications and drawings 02317-02, 02317-03, 02317-04, 02317-05, 02317-06 and 02317-07 (Oct. 2002) as applicable.
13. C.M.P. (Corrugated Metal Pipe) shall be installed, bedded and backfilled according to Harris County Flood Control details.

BEDDING:
14. All sewers constructed in side lot easements shall be R.C.P. (C-76 Class III) and shall be bedded in accordance with City of Houston specifications and details included in this plan set as applicable - min 20' easement shall be provided.
15. All sewers under proposed or future pavement and to a point one (1) foot back of all proposed or future curbs shall be backfilled with 1 ½ sack cement/c.y. stabilized sand as per details. The remaining depth of trench shall be backfilled with suitable earth material in 8 inch lifts, with test taken at 100 foot intervals on each lift, and mechanically compacted to a density of not less than 95% of the maximum dry density as determined by the standard proctor compaction test (ASTM Designation D-698/AASHTO T99). Moisture content of backfill shall be in accordance with the requirements of the cement-stabilized sand specification, latest edition. Alternate to cement stabilized sand backfill for pipes 54-inch and larger, from 1-foot above the top of pipe to the bottom of the subgrade. Contractor may backfill with suitable material, provided the backfill material is place in 8-inch lifts and mechanically compacted to 95% standard proctor density. Test shall be taken at 100-foot intervals on each lift. Bedding and backfill to 1-foot above the top of the pipe shall be cement stabilized sand.

UTILITY BACKFILL
1. Backfill for utilities shall be in accordance with City of Houston specification 02317 and per City of Houston details included in these plans or any other applicable City of Houston details.
2. Backfill compaction to be at a minimum of 90 percent (outside of pavement) and 95 percent (under or within 1 foot of pavement) of the maximum dry density and at a moisture content recommended from geotechnical investigation.

PAVING
1. Guidelines set forth in the Texas manual on uniform traffic control devices shall be observed.
2. Clean exposed steel and tie to existing pavement; if not exposed, saw cut and break off 24" to expose steel.
3. All curb return RADII are 25', unless otherwise noted, and have a 1% min. grade.
4. Paving shall be in accordance with Harris County "Regulations of Harris County, Texas for the approval and acceptance of infrastructure", pavement detail sheet S/D-1 and the latest revisions and/or amendments of same.
5. All stop signs shall be T.M.U.T.C.D. standard No. MR-1-1 (24"X24"). Stop sign shall be placed as shown at radius point curb approximately two feet behind curb.
6. All proposed inlets to be constructed to avoid conflicts with any future driveways.

STORM WATER QUALITY PRE-CONSTRUCTION INSPECTION REQUIREMENTS
1. The property owner or the contractor shall contact the Harris County Storm Water Quality Permitting Section at 713-956-3000 for a pre-construction inspection prior to commencing any clearing or construction activities on the site.

STANDARD HCFCD NOTES FOR CONSTRUCTION DRAWINGS

1. Notify the Harris County Flood Control District, Property Management Department in writing at least 48 hours prior to construction. Submit the HCFCD 48 hour pre-construction notification form and a copy of the approved construction drawings to HCFCD, 9900 Northwest Freeway, Houston, Texas 77092. Attn: Property Management Dept.

2. Engineer shall submit certification letter and record drawings to the Harris County Flood Control District, Property Management Department, requesting inspection of items constructed in Harris County Flood Control District right-of-way. Prior to requesting inspection, the drainage right-of-way and/or easements shall be staked and flagged.

3. Protect, maintain, and restore existing backslope drainage systems.

4. Backslope swale and interceptor structure elevations and locations shown on plans are approximate. Final elevations and locations shall be field verified by the engineer prior to installation.

5. Establish turf grass on all disturbed areas within the channel or detention right-of-way, except the channel bottom and where structural erosion measures are used. Minimum acceptance criteria are 75% coverage of live Bermuda grass and no erosion or rills deeper than 4".

6. Backfill in accordance with the Harris County Flood District Standard Specification, Section 02315-Excavating and Backfilling, or equivalent.

7. Excavate channel flowline to design elevation as shown on plans and downstream, as necessary, to ensure no water in storm sewer during "dry" conditions.

8. Maintain flow in channel during construction and restore channel to original condition.

9. Remove all excavated material from the Harris County Flood Control District or drainage right-of-way. No fill is to be placed within a designated flood plain area without first obtaining a fill permit from the appropriate jurisdictional authority.

10. Obtain and comply with all applicable City, County, State, and Federal permits and approvals, with assistance from Engineer, if necessary.

WATER LINES

GENERAL:
1. Contractor shall provide for a minimum horizontal clearance of 9' (nine feet) between water lines and sanitary sewer manholes and lines.
2. "W.L.E." indicates "Water Line Easement".
3. This project shall be constructed by means of open cut, except where noted on the drawings. The contractor will determine the locations of bore pits in the field, subject to the City Engineer's approval.

PIPE:
4. 4" thru 12" water lines shall be P.V.C. class 150, DR-18, AWWA C-900
5. All water lines shall have a 12" bottom and 12 side bank - sand envelope and shall be backfilled to a minimum compacted depth of 12" over the top of the pipe to provide a compacted encasement in accordance with City of Houston water department specifications and details included in this plan set.
6. All water pipe and related products must conform to ANSI/NSF standard 61.
7. Pipe shall not be laid in water or placed where it can be flooded with water or sewage during its storage or installation in compliance with TAC 290.44(f) (1).
8. All plastic pipe for use in public water systems must also bear the national sanitation foundation seal of approval (NSF-pw) as required in section 290.44(a)(2) of the rules.
9. 4" through 12" fittings shall be cement mortar lined compact ductile iron pressure fittings per ANSI A21.53 CONFORMING TO THE REQUIREMENTS OF SECTION 02528- Polyethylene Wrap, or push on fittings per ANSI A21.10 pressure rated at 250 PSIG.

BEDDING:
10. Water lines under proposed or future paving and to within 1 foot back of all proposed or future curbs shall be encased in bank sand to 12" above pipe and backfilled with 1 ½ sack cement / c.y. stabilized sand to within one (1) foot of subgrade.
11. All fill and compaction to 95% standard proctor density shall be performed prior to construction of water lines.

TESTING:
12. All water lines to be disinfected in conformance with AWWA C-651. A minimum of one bacteriological sample shall be collected for each 1,000 feet of completed waterline to check efficiency of disinfection procedures and shall be repeated if contamination persists.
13. Hydrostatic Testing: All water pipe shall be tested for leakage in accordance with AWWA C-600, section 4 standards for a duration of not less then two hours. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof, to maintain pressure within 5 PSI of the specified test pressure after the pipe has been filled with water and the air has been expelled. The test pressure shall be either a minimum of 125 PSIG or 1.5 times the working pressure whichever is larger. The maximum leakage shall be calculated using the formula as follows:

L = (S) (D) (P ^ ½)/133,200
WHERE L = ALLOWABLE LEAKAGE IN GAL./HR.
S = LENGTH OF PIPE TESTED IN FEET
D = INSIDE DIAMETER OF PIPE IN INCHES
P = PRESSURE IN POUNDS PER SQUARE INCH (GAUGE)

OR COH STANDARD SPECIFICATION 02515-2 3.03 b (10/01/2002) CONTRACTOR SHALL FOLLOW THE MORE STRINGENT OF THE TWO SPECIFICATIONS.

1. The hydrostatic leakage rate for PVC pipe and appurtenances shall not exceed the amount allowed or recommended by formulas in AWWA C-605 as required in section 290.44(a)(5) of the rules. [L = NDP½/7,400]

This approval is for construction using auger/bore and jack method only. For any reason, if open cut method is required, appropriate pavement restoration typical sheet shall be submitted for review at least 48 hours in advance before starting construction. These restorations typical shall be drawn on Mylar, sealed, signed and dated by a Professional Engineer in the State of Texas.

Fill exceeding 1 (one) foot in height above natural grade requires a grading permit in compliance with Appendix "C" 2000 International Building Code, unless exempted by Sect. E103.2. Grading in the private properties shall be approved and permitted by the Code Enforcement Branch of the Department of Public Works and Engineering.

1. Existing pavement, curbs sidewalks, and driveways damaged or removed during construction shall be replaced to City of Houston standards.

TRAFFIC NOTES

1. Contractor shall provide and install traffic control devices in conformance with Part VI of the Texas Manual on Uniform Traffic Control Devices (Texas MUTCD, most recent edition with revisions) during construction.
2a. No lanes shall be closed during the hours of 7:00 AM to 9:00 PM and 4:00 PM to 6:00 PM Monday through Friday.
2b. No lanes shall be closed during the hours of 7:00 PM to 7:00 AM.
3. Contractor shall maintain one lane of traffic in each direction during working hours.
4. Contractor shall cover open excavations with steel plates anchored properly during non-working hours, and open lanes for normal traffic flow.
5. Off-duty uniformed police officer/flagger(s) is/are required to direct traffic when lanes are blocked.
6. In the event when no "Traffic Control Plans" exist as part of contract drawings, contractor shall prepare plans and submit to Plan Review Section for approval ten working days prior to implementation.

*These plans shall be drawn to scale on reproducible mylars and sealed by a licensed engineer in the State of Texas. Plus will become part of the contractor drawings.

7. Approval copies of "Traffic Control Plans" and lane/sidewalk closure permits* shall be available for inspection at job site at all times.

*Contractor must secure "Lane/sidewalk Closure Permits" from City's Traffic Management and Maintenance Branch before closing a lane/sidewalk. The request must be made at least ten business days prior to the date for which the closure is sought. Note that working hours may be restricted or the request my be denied. Call 713-837-7280 for an application.

SBC NOTE

The locations of SBC facilities are shown in an approximate way only. The contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by this failure to exactly locate and preserve these underground utilities.

The contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.

When excavating within eighteen inches (18") of the indicated location of SBC facilities, all excavations must be accomplished using non-mechanized excavation procedures. When boring the contractor shall expose the SBC facilities.

When SBC facilities are exposed, the contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the contractor shall brace the pole for support.

ALL CONSTRUCTION SHALL BE CONSTRUCTED ACCORDING TO ALL CRITERIA OF THE CITY OF HOUSTON

CONTACT: JOHN ENGLISH
5301 HOLLISTER SUITE 190
HOUSTON, TEXAS 77040
(TEL) 713-895-8080
(FAX) 713-895-7686

NOTE:
THESE PLANS, PREPARED BY REKHA ENGINEERING INC. DO NOT EXTEND TO OR INCLUDE DESIGNS OF SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE REKHA ENGINEERING INC. REGISTERED PROFESSIONAL ENGINEER HEREON DOES NOT EXTEND TO ANY SUCH SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE PLANS AND SPECIFICATIONS REQUIRED BY THE "HOUSE BILLS 662 AND 665" ENACTED BY THE TEXAS LEGISLATURE IN THE 70th LEGISLATION - REGULAR SESSION.

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 or 1-800-669-8344 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) 967-8037 (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-mechanized excavation procedures.

When CenterPoint Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.

The contractor is fully responsible for any damages caused by his failure to exactly locate and preserve these underground facilities.

WARNING: OVERHEAD ELECTRICAL FACILITIES

Overhead lines may exist on the property. We have not attempted to mark those lines since they are clearly visible, but you should locate them prior to beginning any construction. Texas law, Section 752, Health & Safety code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under this law. This law carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at 713-207-2222.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
STREET BRIDGE AND RIGHT-OF-WAY NOTES
(INSIDE HOUSTON CITY LIMITS)

1. Department of Public Works and Engineering's "Standard Construction Specifications", dated October 2002, and "Standard Construction Details for Wastewater Collection Systems, Water Lines, Storm Drainage and Street Paving", dated October 2002 (and later) unless otherwise noted and approved on these plans. The design is consistent with the minimum standards established in the "Infrastructure Design Manual" dated October 2002.
2. Fill areas on plans shall be filled in layers not exceeding 8" in depth and each compacted to not less than 95% standard proctor density prior to installation of water line and fill area shall be seeded and fertilized within working days.
3. Utility contractor shall provide temporary silt barrier fence on all non-curb inlets which will remain in place after underground contract is complete.
4. Contractor shall provide silt barrier fence on all stage 1 curb inlets.
5. Existing pavements, curbs, sidewalks, and driveways damaged or removed during construction shall be replaced to City of Houston Standards.
6. Condition of the road and/or right-of-way, upon completion of job, shall be as good as or better than the condition prior to starting work.
7. Adequate drainage shall be maintained at all times during construction and any drainage ditch or structure disturbed during construction shall be restored to the satisfaction of the owning authority.
8. Expose 15" of reinforcing steel at proposed sawed joint. If no reinforcing steel exists, use horizontal dowels. Horizontal dowels shall be #6 bars, 24" long, 24" C-C. Drilled and embedded 8" into the center of the existing slab with "PO ROC" or equal.
9. Contractor to take necessary precautions to protect root systems of shrubs, plants and trees along the area of excavation.
10. The contractor shall comply with OSHA regulations and state of Texas law concerning excavation. Trenching and shoring as specified in City of Houston Ordinance #87-1457.
11. Wheel chair ramps shall be installed in accordance with the City of Houston standards at all intersections where existing curb or sidewalk is damaged or removed during construction.
12. Wastewater collection systems, water lines, storm drainage system shall be constructed in accordance with the City of Houston, Department of Public Works and Engineering's "Infrastructure Design manual" dated october 2002 with all subsequent amendments added there to unless otherwise noted and approved on these plans. The design must agree with the minimum standards established in the "Infrastructure Design Manual" dated october 2002. Note that plan signatures expire after 1 year and the latest editions of design rules, specifications & manuals shall govern as of the date of resigning.
13. The contractor shall be fully responsible for any and all damage to existing public or private utility lines, including but not limited to paving, water lines, wastewater collection systems and storm sewers during construction. All damage shall be repaired in accordance with City of Houston Department of Public Works and Engineering "Standard Construction Specifications" with latest addenda and amendments thereto with no cost to the public.
14. Prior to street construction, the contractor shall contact the Department of Public Works and Engineering at 713-535-7579 or 713-535-7582 and comply with all requirements for the issuance of the necessary permits/work orders for street construction.

STATE OF TEXAS
DINESH N. ENGINEER
51551
REGISTERED PROFESSIONAL ENGINEER

03-02-10

FIRE STATION No. 20 (PHASE 2)
6902 NAVIGATION BOULEVARD
HOUSTON, TEXAS

REVISIONS		
REV.	DESCRIPTION	DATE

STANDARD NOTES

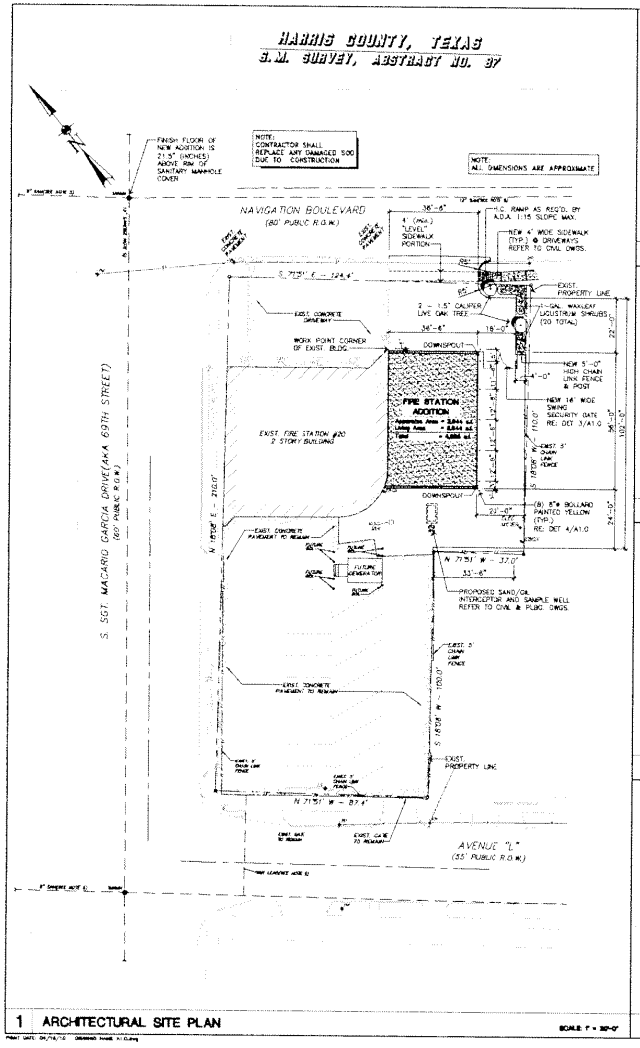
SCALE: N.T.S.
DATE: 12/28/09

REKHA ENGINEERING INC.
CIVIL ENGINEERS AND LAND SURVEYORS
5301 Hollister Road, Suite 190
Houston, Texas 77040
713-895-8080
713-895-8081
Fax. 713-895-7686
© COPYRIGHT 2010
email: jake1@pdq.net
TBPE No. F-3712

DRAWN BY: PRV
CHECKED BY: JHE
APPROVED BY: DNE
JOB No. 0809-2920
CLIENT: CITY OF HOU. GENERAL SERVICES

SHEET No.
C10

File info: I:\2920\PLANS\PHASE 2\2920-NOTES.dwg Mar 02, 2010 - 2:05pm pnd



1 ARCHITECTURAL SITE PLAN SCALE: 1" = 30'-0"

APPROX. BUILDING AREAS:
- EXIST. FIRE STATION GFA OF LIVING AREA = 4,180 SF
- NEW ADDITION GFA OF LIVING AREA = 2,050 SF

REQUIRED PARKING:
- EXIST. FIRE STATION 2.5 PER 1000 GFA = 11
- NEW ADDITION 2.5 PER 1000 GFA = 5
TOTAL NUMBER OF PARKING SPACE REQ'D. = 16

TOTAL NUMBER OF EXIST. PARKING SPACES = 16

LANDSCAPING:
STREET TREES REQUIRED = $\frac{60}{30}$ = 2

PARKING TREES REQ. = N/A ALL PARKING IS EXISTING

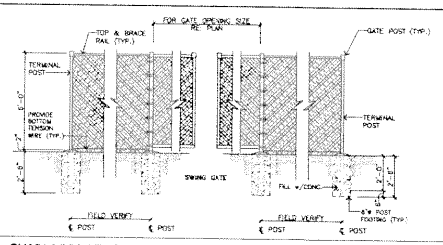
TREE PLANTING EQUIVALENCY CREDITS:
NO PROPOSED TREE CREDITS

TOTAL TREE PLANTING REQUIRED: = 2
TOTAL TREE PLANTING PROVIDED: = 2

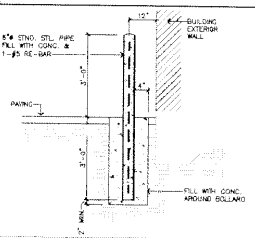
SHRUBS
SHRUBS REQUIRED = 2x10= 20
SHRUBS PROVIDED = 20

TREE & PLANT SPECIES:
TREES TO BE LIVE OAK (1.5" CALIPER)
SHRUBS TO BE WAXLEAF LIGUSTRUM (7 GAL.)

2 C.O.H. PARKING & LANSCAPING ANALYSIS



3 TYPICAL CHAIN-LINK FENCE DETAIL SCALE: N.T.S.



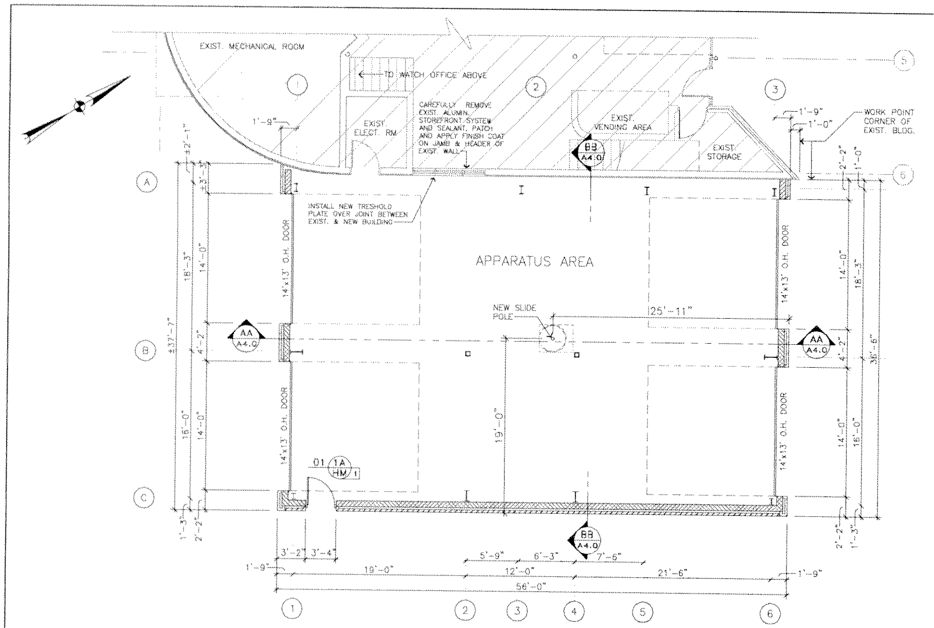
4 TYPICAL GUARD POST DETAIL SCALE: N.T.S.

CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
6902 NAVIGATION BLVD., HOUSTON, TEXAS

SEAL

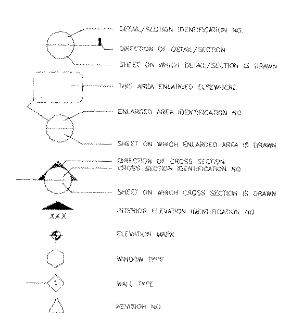
LAY-SU Architects & Engineers
TBPE REGISTRATION FIRM #F-626

ARCHITECTURAL
SITE PLAN & DETAILS
A1.0



1 1st LEVEL ARCHITECTURAL FLOOR PLAN

SCALE: 3/16" = 1'-0"



2 DRAFTING SYMBOLS

1. DATUM LINE SHALL BE ESTABLISHED AS GROUND LEVEL FINISH FLOOR, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
2. DIMENSIONS SHOWN ON DRAWINGS ARE TO FACE OF MASONRY, CENTER LINE OF COLUMN OR GRID LINE, OR TO THE FACE OF STUD PARTITIONS, UNLESS OTHERWISE NOTED.
3. CEILING HEIGHTS SHOWN ON FINISH SCHEDULE ARE FROM FINISH FLOOR TO BOTTOM FACE OF CEILING.
4. UNLESS OBVIOUSLY SHOWN OTHERWISE, DOOR LOCATIONS NOT INDICATED BY DIMENSIONS SHALL BE CENTERED IN WALL OR SHALL BE LOCATED 3 INCHES FROM FINISH WALL TO EDGE OF DOOR BUCK.
5. SEE SPECIFICATIONS FOR FINISHES OF CONCRETE, ALUMINUM, PAINT, ETC., WHICH ARE NOT NOTED ON DRAWINGS AND FINISH SCHEDULES
6. ALL GLASS WITHIN 18" OF FLOOR SHALL BE TEMPERED GLASS AND COMPLY WITH ANSI STANDARD Z97.1, 1975. INSTALLATION OF GLASS SHALL CONFORM TO FEDERAL SPECIFICATION CFR-1201.
7. PROVIDE APPROVED GALVANIC BARRIER BETWEEN ALL STEEL AND ALUMINUM IN CONTACT.
8. IN TYPICAL METAL STUDS THAT ARE NON-LOAD BEARING PARTITIONS, BRACES TO THE MAIN STRUCTURE SHALL BE PROVIDED EVERY 60 INCHES ON CENTER. (UNLESS OTHERWISE SHOWN ON DRAWINGS).
9. THE GOVERNING CODE IS THE INTERNATIONAL BUILDING CODE AND ALL APPLICABLE STATE AND LOCAL ORDINANCES.
10. THE CONTRACTOR SHALL VERIFY THE CONDITIONS OF THE SITE AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK
11. MECHANICAL VENTILATION SHALL BE PROVIDED IN TOILET AND SHOWER ROOMS TO FURNISH THE REQUIRED AIR CHANGES PER CODE.
12. ALL EXTERIOR WALL OPENINGS, FLASHING, COUNTER FLASHING, AND EXPANSION JOINTS, SHALL BE CONSTRUCTED IN SUCH A MANNER AS TO MAKE THEM WEATHERPROOF.
13. THE JUNCTION OF THE ROOF AND VERTICAL SURFACES SHALL BE FLASHED AND COUNTERFLASHED IN A MANNER TO MAKE THEM WEATHERPROOF.
14. ALL CONCRETE SIDEWALKS TO BE 4" THICK w/W1.4 x W1.4 REINF. PROVIDE EXPANSION JOINTS AT 10'o.c.(max.) AND CONTROL JOINTS AT 5'o.c.(max.).
15. UNLESS OTHERWISE NOTED, ALL MASONRY WALLS ARE TO HAVE VERTICAL EXPANSION JOINTS AT 24'o.c.(max.).
16. ALUMINUM THRESHOLD 1/2" TALL(max.) TO BE SET IN A FULL BED OF SEALANT AT ALL EXTERIOR DOORS.
17. ALL WOOD BLOCKING, STRONGBACKS, STUDS, ETC. SHALL BE FIRE RETARDANT WOOD.
18. ALL DECORATIONS USED SHALL BE NON-COMBUSTIBLE OR FLAMEPROOFED IN AN APPROVED MANNER BY THE GOVERNING CODE.

3 ARCHITECTURAL GENERAL NOTES

CODE ANALISYS BASED ON "IBC 2003"

1. OCCUPANCY CLASSIFICATION "B" - FIRE STATION
2. TYPE OF CONSTRUCTION:
   TYPE "II-B" (CODE TABLE 601)
   - EXTERIOR WALLS NON COMBUSTIBLE
   - INTERIOR WALLS NON COMBUSTIBLE
3. MAXIMUM HEIGHT AND ALLOWABLE FLOOR AREA (CODE TABLE 503):
   - ALLOWED FLOOR SPACE PERMITED PER FLOOR = 23,000 SF.
   - ACTUAL FLOOR SPACE:
     2,050 SF OF PRIVATE GARAGE SPACE
     2,050 SF OF LIVING SPACE
   - ACTUAL FLOOR SPACE = 4,100 SF < 23,000 SF OK ✓
   - MAX. HEIGHT PERMITTED = 55ft.
   - ACTUAL HEIGHT = 30'-0"ft. < 55ft. OK ✓
4. OCCUPANCY LOAD ANALYSIS CALULATIONS (CODE TABLE 1003.2.2)
   NOTE:
   ACCESSORY USE AREAS (OFFICES, RESTROOMS, MECHANICAL ROOMS & GARAGE) THAT ORDINARILY ARE USED ONLY BY PERSONS WHO OCCUPY THE MAIN AREAS OF AN OCCUPANCY SHALL BE PROVIDED WITH MEANS OF EGRESS AS THOUGH THEY ARE COMPLETELY OCCUPIED, BUT THEIR OCCUPANT LOAD NEED NOT BE INCLUDED WHEN COMPUTING THE TOTAL OCCUPANT LOAD OF THE BUILDING. THE FOLLOWING DOSE INCLUDE THE ACCESSORY USE AREAS MENTIONED ABOVE.
   - GARAGE SPACE = 2,050 SF ÷ 200 SF PER PERSON = 10 PERSON
   - LIVING SPACE = 2,050 SF ÷ 100 SF PER PERSON = 20 PERSON
   - MAX. OCCUPANT LOAD PERMITTED = 30 PERSON
   - ACTUAL OCCUPANT LOAD = 5 PERSON

4 BUILDING CODE ANALYSIS

Room Name	Floor	Base	Walls North	Walls South	Walls East	Walls West	Ceiling	Ceiling Height	Remarks
Apparatus Area	F-1	--	W1	W1	W1	W1	C-1	--	
Lounge Area	F-2	B-1	W2	W2	W2	W2	C-2	7'-11"	
Mechanical Rm.	F-1	--	W2	W1	W2	W2	C-1	--	
Unisex R.R.	F-3	B-2	W3	W3	W3	W3	C-2	7'-3"	
Exercise Area	F-1	B-1	W2	W2	W2	W2	C-2	7'-11"	
Chief's Office	F-2	B-1	W2	W2	W2	W2	C-2	7'-11"	
Chief's Rm.	F-2	B-1	W2	W2	W2	W2	C-2	7'-3"	
Chief's R.R.	F-3	B-2	W3	W3	W3	W3	C-2	7'-3"	
Dormitory	F-2	B-1	W2	W2	W2	W2	C-2	7'-11"	

LEGEND

Floor:
- F-1 Exposed Concrete
- F-2 Owner specified commercial grade carpet - Color Selection by Owner
- F-3 Owner specified Ceramic Tile - Color Selection by Owner

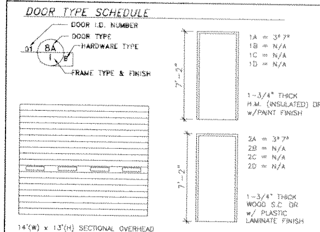
Base:
- B-1 Owner specified (Coved) Rubber Base - Color Selection by Owner
- B-2 Owner specified Coved Ceramic Tile Base - Color Selection by Owner

Ceiling:
- C-1 Exposed structure painted - Color: P29-64 Bronzetone by Benjamin Moore
- C-2 2x4x5/8" Lay-in Ceiling with 15/16" Exposed Tee (Ceramaguard mineral fiber by Armstrong)

Walls:
- W1 CMU painted - Color Selection by Owner
- W2 Gyp. Bd. With Light Texture Paint, Flat Latex Finish Pastel Color - Color Selection by Owner
- W3 Owner specified Ceramic Tile - Color Selection by Owner

5 ROOM FINISH SCHEDULE

DOOR TYPE SCHEDULE



14'(W) x 13'(H) SECTIONAL OVERHEAD DOOR WITH ONE (1) ROW OF WINDOWS TO MATCH EXISTING OVERHEAD DOORS. PROVIDE ELECTRIC OPERATOR WITH 3-BUTTON CONTROL.

NOTES:
1. PLASTIC LAMINATE DOOR COLOR SELECTION BY OWNER
2. PAINT COLOR FOR H.M. DOORS TO MATCH ADJACENT WALL COLOR

HARDWARE SCHEDULE

H.W. SET 1	H.W. SET 2	H.W. SET 3	H.W. SET 4
1 1/2 PR BUTTS	1 1/2 PR BUTTS	1 1/2 PR BUTTS	1 1/2 PR BUTTS
1 EA. LOCKSET	1 EA. LOCKSET	1 EA. PRIVACY LOCKSET	1 EA. PUSH PLATE
1 EA. CLOSER	1 EA. CLOSER	1 EA. DEADBOLT (KEYED OUTSIDE/THUMB LATCH INSIDE)	1 EA. PULL
1 PC. THRESHOLD	1 EA. DOOR STOP	1 EA. CLOSER	1 EA. CLOSER
1 EA. RAIN DRIP CAP	3 EA. SILENCERS	1 EA. DOOR STOP	1 EA. DOOR STOP
		3 EA. SILENCERS	3 EA. SILENCERS

NOTE:
MATCH EXISTING KEY SYSTEM

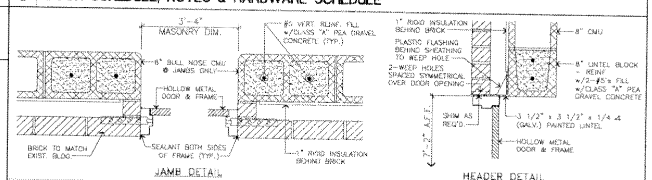
DOOR FRAME SCHEDULE

HM - HOLLOW METAL (SEMI-GLOSS PAINT FINISH) WELDED JOINTS, 16ga. MATERIAL

DOOR / HARDWARE/ FRAME NOTES

1. ALL NEW HARDWARE TO MATCH TYPE AND FINISH OF HARDWARE IN THE EXISTING BUILDING & MEET INTERNATIONAL FIRE CODE REQUIREMENTS (MATCH EXISTING KEY SYSTEM).
2. DOOR CLOSERS SHALL BE ADJUSTED SO THAT FROM AN OPEN POSITION OF 70°, THE DOOR WILL TAKE 3-SEC. TO MOVE TO A POINT 3" FROM LATCH.
3. CLOSERS SHALL HAVE A MAX. PUSH/PULL FORCE OF 5LBS.
4. ALL EXTERIOR DOOR TO HAVE WEATHERSTRIPPING, THRESHOLD & HEAD DRIP CAP.
5. CONTRACTOR SHALL COORDINATE ALL DOORS AND DETAILS FOR PROPER CLEARANCE AND REINFORCEMENT FOR THE HARDWARE INDICATED.
6. CONTRACTOR SHALL ENSURE THAT ALL DOOR UNDERCUTS ARE PROPERLY COORDINATED WITH FLOOR FINISHES & THRESHOLDS PRIOR TO ORDERING DOORS
7. ALL INTERIOR DOORS SHALL HAVE WALL MOUNTED DOOR STOPS
8. CONTRACTOR SHALL COORDINATE ALL FRAME TYPES WITH WALL THICKNESS WHERE THESE WILL BE INSTALLED.

6 DOOR SCHEDULE, NOTES & HARDWARE SCHEDULE



7 EXTERIOR HOLLOW METAL DOOR JAMB & HEADER DETAIL

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

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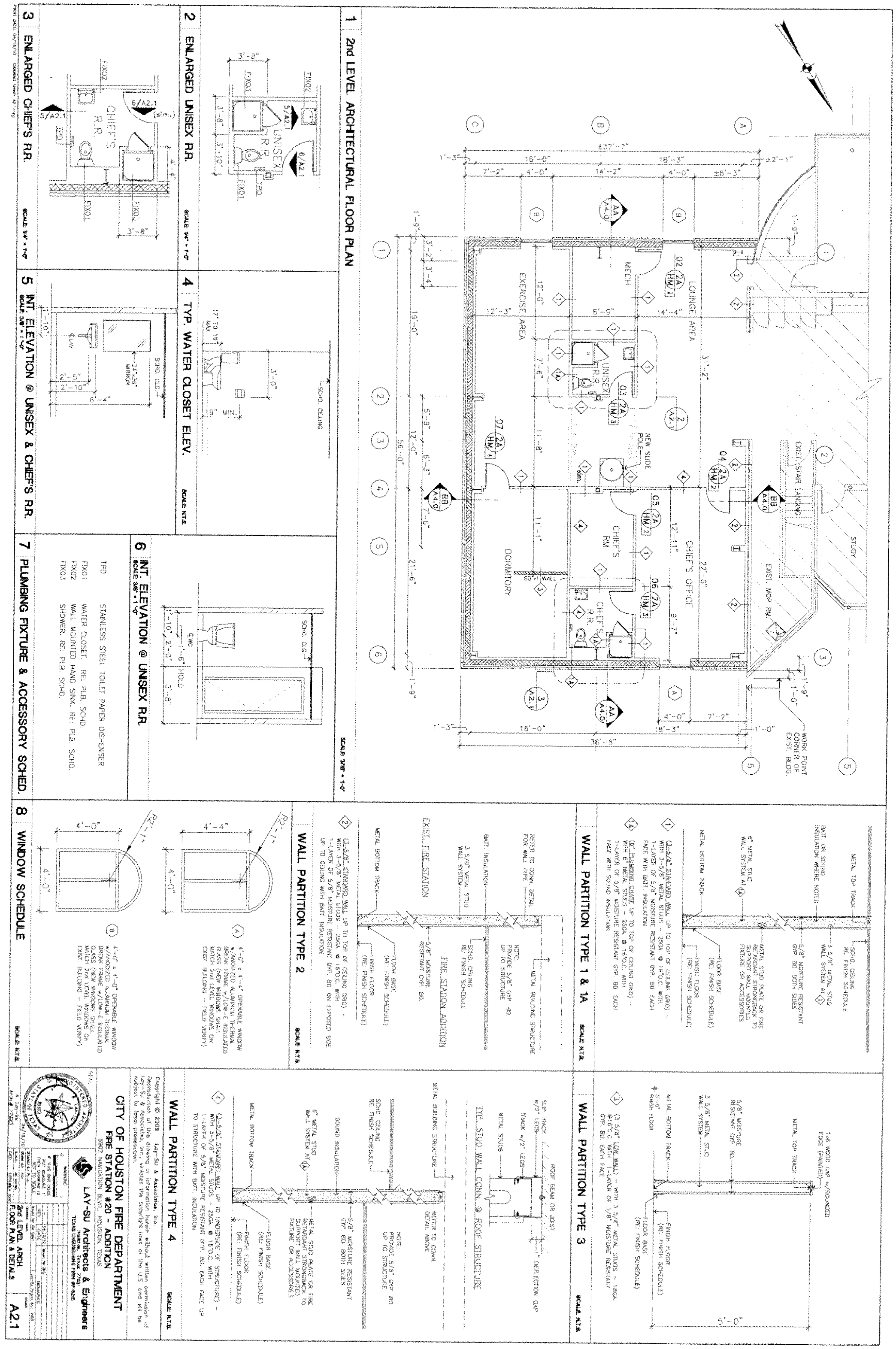
HOUSTON, TEXAS 77081
TEXAS ENGINEERING FIRM #F-8205

1st LEVEL ARCH. FLOOR PLAN & SCHEDULES

A2.0

PRINT DATE: 04/16/10 DRAWING NAME: A2.0.dwg


1 2nd LEVEL ARCHITECTURAL FLOOR PLAN
2 ENLARGED UNISEX R.R.
3 ENLARGED CHIEF'S R.R.
4 TYP. WATER CLOSET ELEV.
5 INT. ELEVATION @ UNISEX & CHIEF'S R.R.
6 INT. ELEVATION @ UNISEX R.R.
7 PLUMBING FIXTURE & ACCESSORY SCHED.
TPD STAINLESS STEEL TOILET PAPER DISPENSER
FIX01 WATER CLOSET. RE: PLB. SCHD.
FIX02 WALL MOUNTED HAND SINK. RE: PLB. SCHD.
FIX03 SHOWER. RE: PLB. SCHD.
8 WINDOW SCHEDULE
WALL PARTITION TYPE 1 & 1A
WALL PARTITION TYPE 2
WALL PARTITION TYPE 3
WALL PARTITION TYPE 4
LOUNGE AREA
EXERCISE AREA
MECH
UNISEX R.R.
NEW SLIDE POLE
CHIEF'S RM
CHIEF'S OFFICE
CHIEF'S R.R.
DORMITORY
EXIST. STAIR LANDING
EXIST. MOP RM.
STUDY
EXIST. FIRE STATION
FIRE STATION ADDITION
TYP. STUD WALL CONN. @ ROOF STRUCTURE
CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
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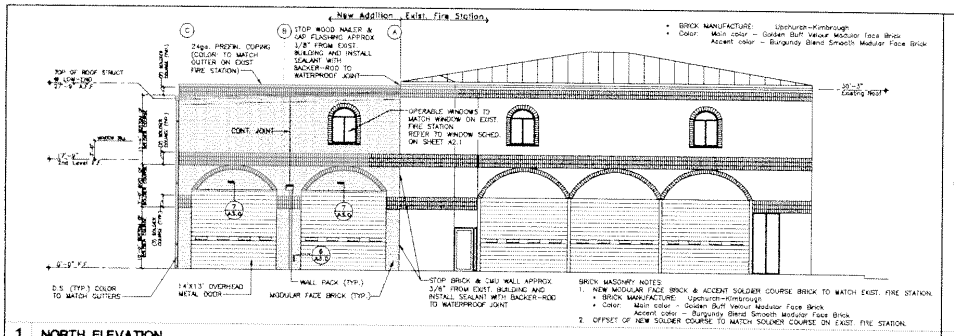
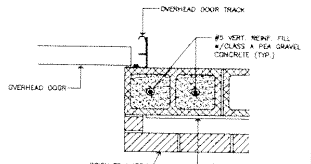
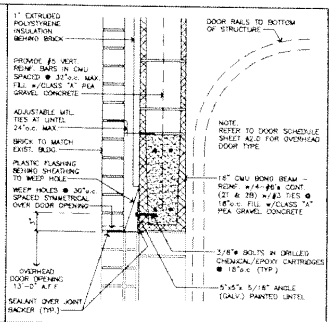
2nd LEVEL ARCH. FLOOR PLAN & DETAILS
A2.1



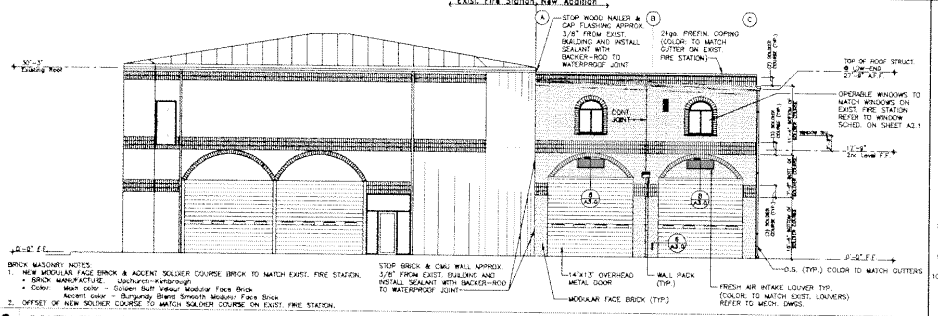
1 NORTH ELEVATION SCALE: 1/8" = 1'-0"



6 OVERHEAD DOOR JAMB DET. SCALE: 1 1/2" = 1'-0"



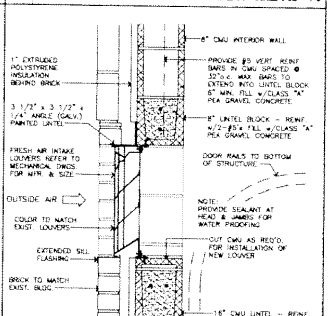
7 OVERHEAD DOOR HEADER DET. SCALE: 1 1/2" = 1'-0"



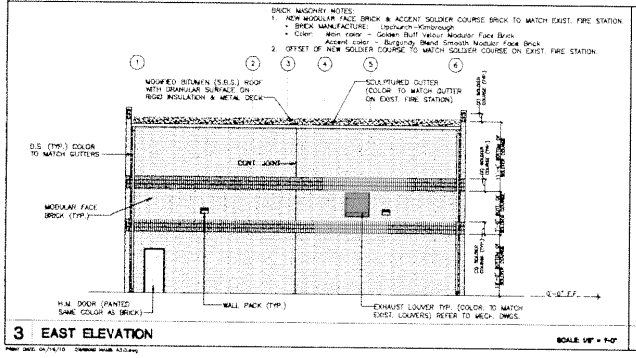
2 SOUTH ELEVATION SCALE: 1/8" = 1'-0"

1. HOLLOW CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C90 TYPE I, GRADE N-1, UNITS SHALL INCLUDE: CLOSER, JAMB, HEADER, LINTEL, CORNERS, SASH, CONTROL JOINTS, BOND BEAMS AND ANY SPECIAL SHAPES AND SIZES REQUIRED TO COMPLETE THE WORK INDICATED.
2. MORTAR SHALL CONFORM TO ASTM C-270, TYPE S AND GROUT SHALL CONFORM TO ASTM C476. THE MINIMUM COMPRESSIVE STRENGTH AS DETERMINED BY ASTM C91, SHALL BE 1,500 PSI FOR MORTAR AND 2,000 PSI FOR GROUT AT 28 DAYS.
3. VERTICAL CONTROL JOINTS OR EXPANSION JOINTS SHALL BE INSTALLED AT A MAXIMUM SPACING OF 26 FT. INSTALLED AT LESS SPACING DISTANCES WHERE SHOWN ON THE DRAWINGS.
4. HORIZONTAL WALL REINFORCING SHALL BE TRUSS TYPE OF 3/16" SIDE RODS AND #9 GAGE TRUSS RODS CONFORMING TO ASTM B2 AND IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE.
5. HORIZONTAL WALL REINFORCEMENT SHALL BE PLACED AT MAXIMUM VERTICAL SPACINGS OF 24" O.C., EXCEPT IMMEDIATELY ABOVE LINTELS.
6. VERTICAL REINFORCEMENT (MINIMUM OF 1-#5 BAR FILLED w/CLASS "A" PEA GRAVEL CONCRETE), SHALL BE INSTALLED IN CELLS ADJACENT TO ANCHORING BOLTS, WALL OPENINGS SUCH AS DOORS, WINDOWS, ETC., AND AT 32" CENTER TO CENTER.
7. ALL EXPOSED MASONRY SURFACES (IF ANY), SHALL BE PAINTED.
8. THE CONTRACTOR SHALL ADEQUATELY AND RIGIDLY BRACE ALL MASONRY WALLS UNTIL THE ROOF AND/OR SUPPORTING STRUCTURE IS COMPLETED AND PROPERLY ANCHORED TO THE MASONRY WALLS.
9. HECKMANN #188 (–TYPE COLUMN ANCHORS WELDED TO COLUMNS AS DESCRIBED IN SPECS, SHALL BE INSTALLED AT EACH BOND BEAM LEVEL.
10. BOND BEAMS SHALL HAVE A MINIMUM OF 2 – #5 GARSCLASS "A" PEA GRAVEL CONCRETE (UNLESS NOTED OTHERWISE)

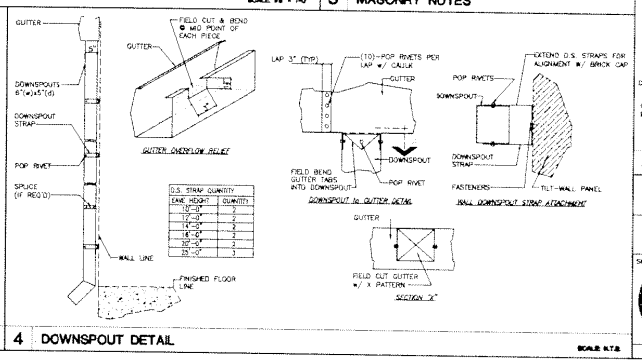
5 MASONRY NOTES



8 O.H. DOOR & LOUVER DETAIL SCALE: 1 1/2" = 1'-0"



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



4 DOWNSPOUT DETAIL SCALE: N.T.S.

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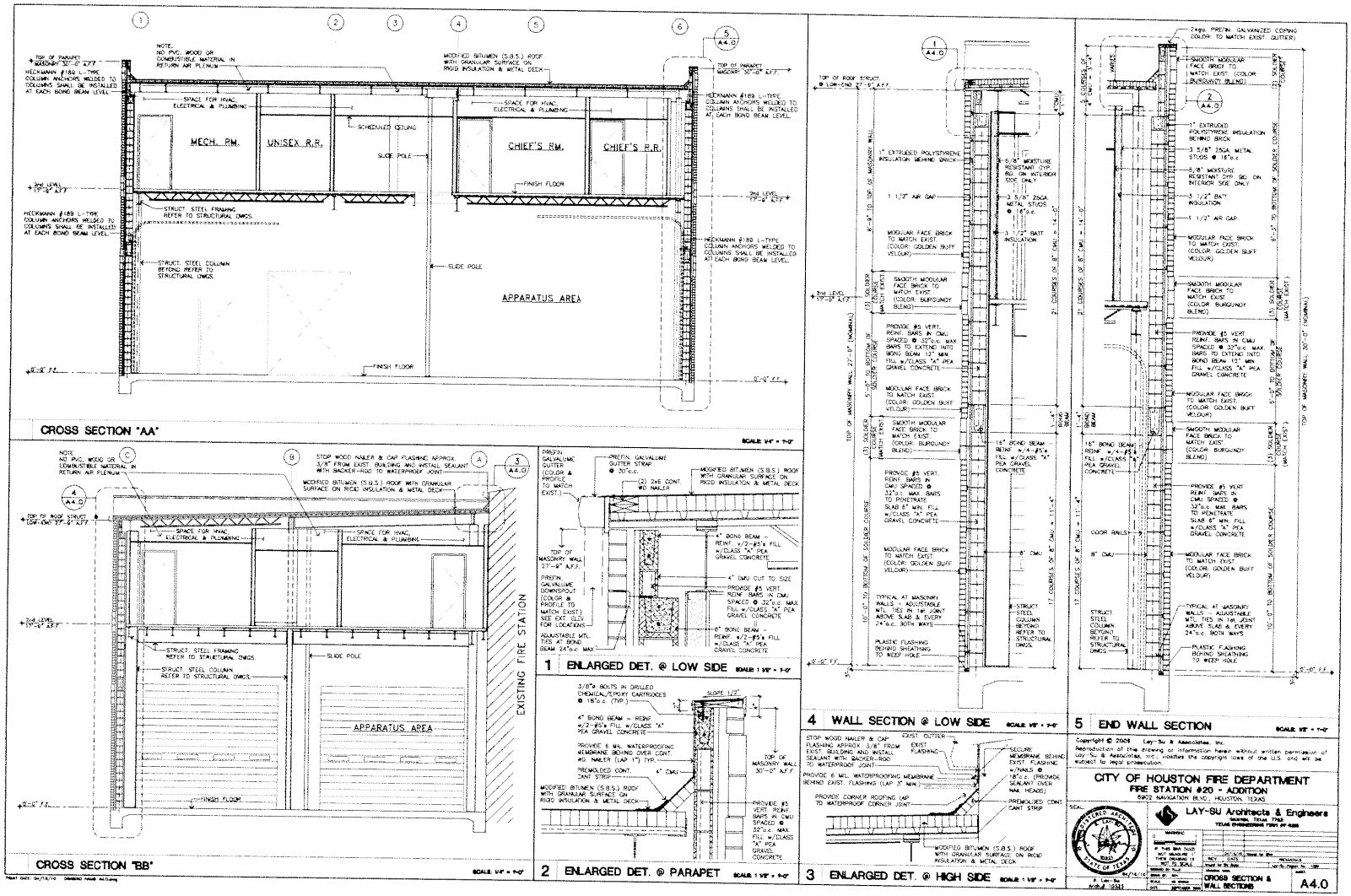
SEAL

EXTERIOR ELEVATIONS & DETAILS

A3.0



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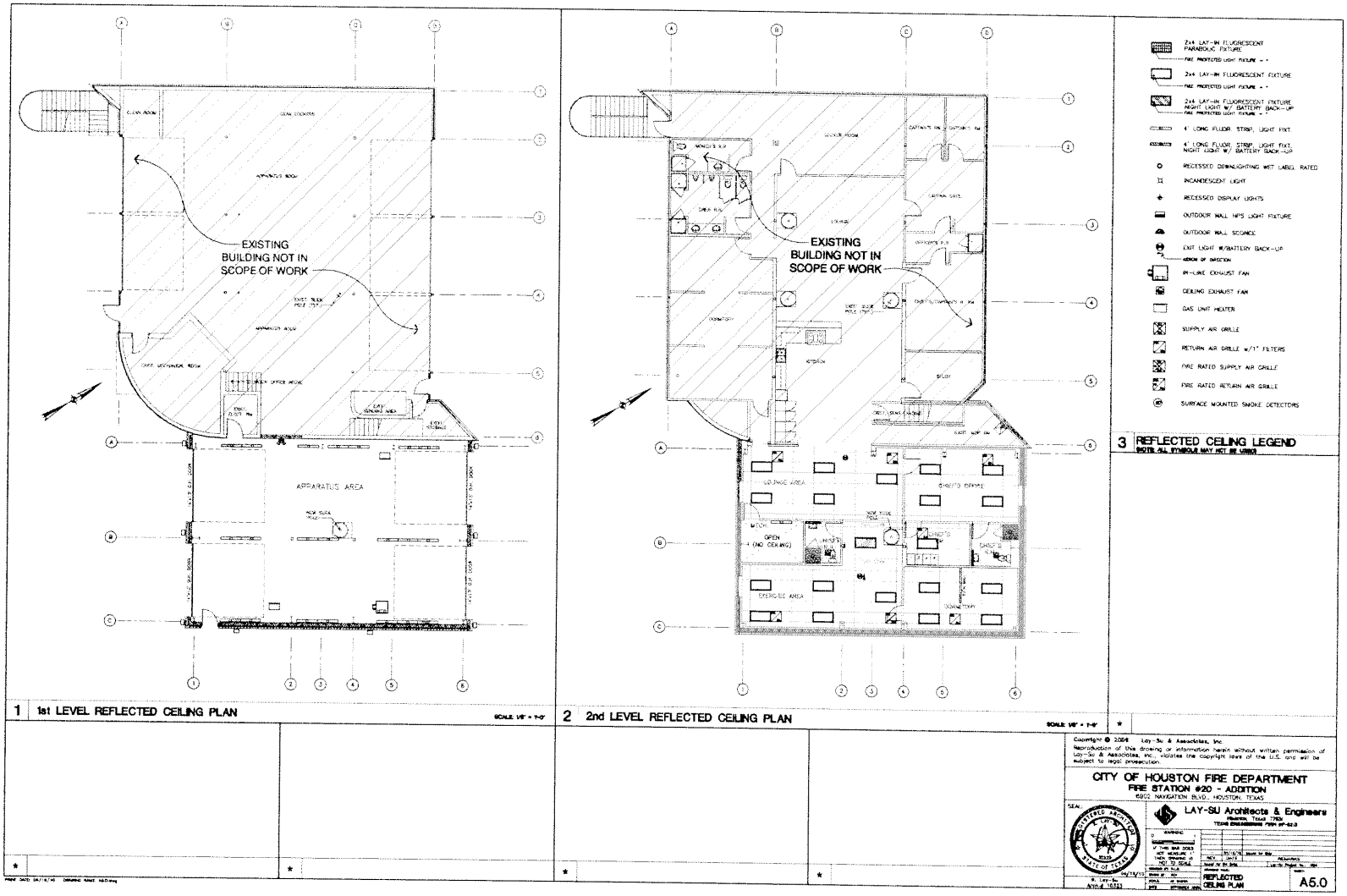
CROSS SECTION & WALL SECTIONS — A4.0



1 1st LEVEL REFLECTED CEILING PLAN

2 2nd LEVEL REFLECTED CEILING PLAN

3 REFLECTED CEILING LEGEND

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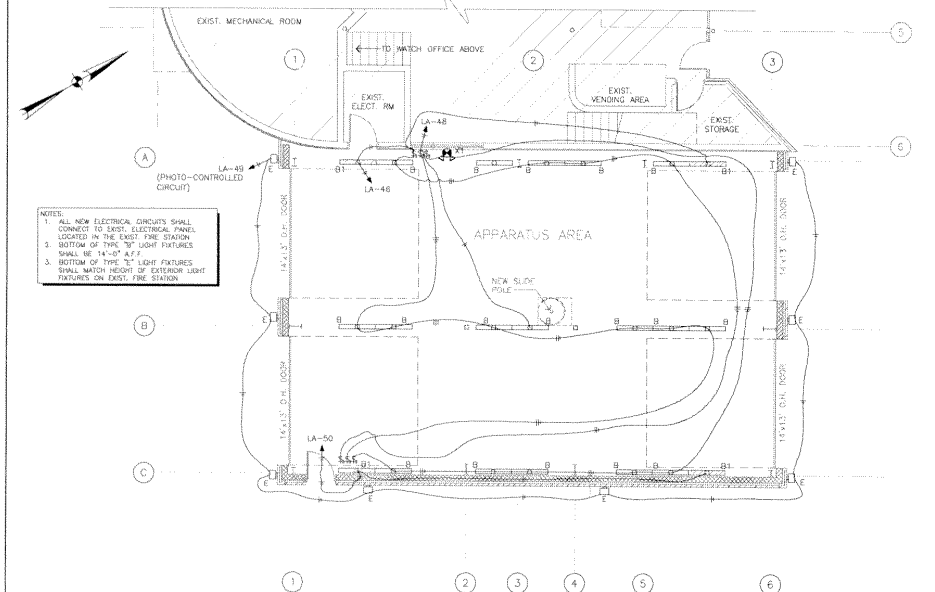
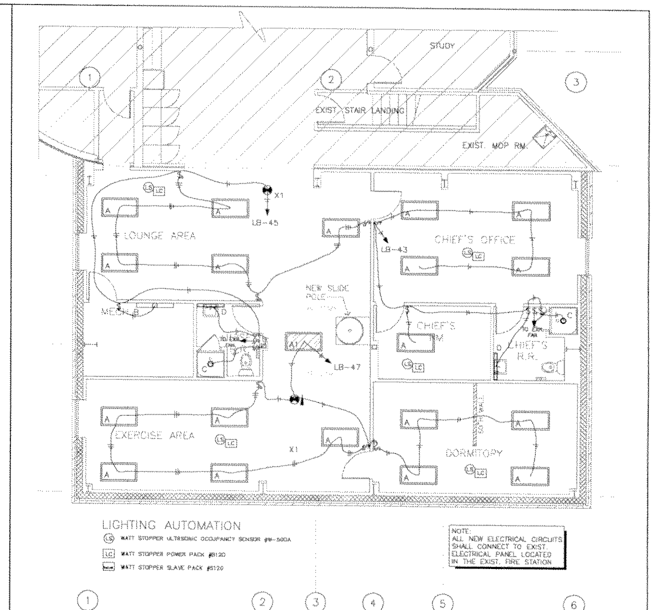
REFLECTED CEILING PLAN

A5.0



1 1st LEVEL ELECTRICAL LIGHTING PLAN

SCALE: 3/16" = 1'-0"



2 2nd LEVEL ELECTRICAL LIGHTING PLAN

SCALE: 3/16" = 1'-0"

1. ELECTRICAL WORK IS TO COMPLY WITH THE MOST RECENTLY REVISED VERSIONS OF ALL APPLICABLE RULES, REGULATIONS, AND ORDINANCES OF LOCAL AND STATE CODE, AND THE NATIONAL ELECTRICAL CODE (2005 NEC).
2. THE SCOPE OF ELECTRICAL WORK INCLUDES THE FURNISHING AND INSTALLATION OF ALL ELECTRICAL WORK NECESSARY FOR A COMPLETE INSTALLATION OF ALL ITEMS SHOWN ON ARCHITECTURAL, CIVIL/UTILITIES, MECHANICAL, ELECTRICAL, AND/OR PLUMBING DRAWINGS.
3. ELECTRICAL PLAN DRAWINGS ARE FOR LIGHT FIXTURE AND OUTLET CIRCUITING INFORMATION ONLY. REFER TO OTHER DRAWINGS FOR NOTES, MOUNTING DETAILS AND EXACT LOCATIONS.
4. ELECTRICAL CONTRACTOR IS TO COORDINATE WITH ARCHITECTURAL, MECHANICAL, AND PLUMBING DRAWINGS FOR EXACT EQUIPMENT LOCATION SUCH AS, AIR HANDLING UNITS, COMPRESSORS, EXHAUST FANS, WATER HEATERS, EMERGENCY SHOWERS, PUMPS ETC.
5. ALL EXTERIOR ELECTRICAL EQUIPMENT TO BE PAINTED TO MATCH EXTERIOR WALL FINISHES. CONTRACTOR SHALL SUBMIT AND VERIFY COLOR(S) WITH ARCHITECT.
6. UNDERGROUND CONDUITS SHALL BE GALVANIZED EMT OR SCH-40 PVC.
7. ALL CONDUITS ABOVE GROUND SHALL BE GALVANIZED EMT OR RIGID GALVANIZED STEEL (RGS). MINIMUM SIZE FOR CONDUIT TO BE 1/2".
8. WIRES SMALLER THAN #12 ARE NOT ACCEPTABLE. THEY MAY BE USED FOR CONTROL CIRCUITS ONLY.
9. VERIFY ELECTRICAL REQUIREMENTS (IF ANY) FOR ANY SPECIAL EQUIPMENT OR KITCHEN APPLIANCE PRIOR TO ANY WORK PERFORMED. PROVIDE ISOLATED GROUND WIRE AS PER MANUFACTURER'S INSTALLATION REQUIREMENTS
10. ALL RECEPTACLES AND TELEPHONE OUTLETS, TO BE MOUNTED 18" ABOVE FLOOR LEVEL, EXCEPT WHERE OTHERWISE NOTED OR AREAS NOTED WITH CABINETS.
11. PROVIDE 1/2"C WITH PULL STRING, STUBBED UP 6" PASS TOP OF WALL TYPICAL FOR EACH TELEPHONE AND DATA/COMMUNICATIONS OUTLET.
12. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL MOTOR STARTERS UNLESS OTHERWISE NOTED ON DRAWINGS. (COORDINATE WITH MECHANICAL CONTRACTOR FOR POWER REQUIREMENTS.)
13. ALL LIGHT FIXTURES IN MECHANICAL AREAS SHALL BE COORDINATED WITH MECHANICAL AND PLUMBING EQUIPMENT TO AVOID CONFLICTS. LOCATE LIGHT FIXTURES ON PERIMETER WALLS OF MECHANICAL AREAS WHERE PRACTICAL.
14. EACH CONDUIT SHALL BE LIMITED TO (3) CIRCUITS MAXIMUM.
15. NO MORE THAN THREE SINGLE-PHASE CIRCUITS AND NO MORE THAN SIX CURRENT CARRYING CONDUCTORS SHALL BE INSTALLED IN A SINGLE RACEWAY. THEIR CURRENT CARRYING AMPACITIES SHALL BE DERATED AS REQUIRED BY THE NEC FOR NON-DIVERSIFIED LOADS. THE INSTALLED WIRE SIZE SHALL HAVE A NOMINAL AMPACITY RATING OF 125% OF THAT REQUIRED OR SPECIFIED WHEN FOUR OR MORE CURRENT CARRYING CONDUCTORS ARE INSTALLED IN A SINGLE RACEWAY. NEUTRAL CONDUCTORS SHALL BE CONSIDERED A CURRENT CARRYING CONDUCTOR IN ALL NON-LINEAR LOADED CIRCUITS AS REQUIRED BY THE NEC.
16. SEPARATE NEUTRALS SHALL BE RUN WITH EACH COMPUTER CIRCUIT WHEN GROUPED IN THE SAME CONDUIT. NEUTRALS FOR COMPUTERS OR HIGH HARMONIC LOADS OR CURRENT CARRYING CONDUCTORS.
17. VERIFY MOUNTING HEIGHTS OF RECEPTACLES WITH CABINET ELEVATIONS FOR LOCATION AND COORDINATION OF ELECTRICAL OUTLETS. AT KNEESPACE LOCATIONS, LOCATE ELECTRICAL OUTLETS WITHIN KNEESPACE, LOCATE OUTLETS HORIZONTALLY 6" ABOVE BACK SPLASH, UNLESS NOTED OTHERWISE.
18. ALL LIGHTING, RECEPTACLE, AND EQUIPMENT BRANCH CIRCUITS CONDUITS SHALL CONTAIN A GROUND WIRE. USING THE CONDUIT SYSTEM AS THE ONLY GROUND PATH IS NOT ACCEPTABLE.
19. REFER TO MECHANICAL DRAWINGS FOR FAN SCHEDULE.
20. CENTER ALL EXIT SIGNS OVER DOORS.
21. PROVIDE DUCT MOUNTED SMOKE DETECTORS IN SUPPLY DUCTS OF ALL AIR HANDLERS.

3 ELECTRICAL GENERAL NOTES

PRINT DATE: 04/18/10 DRAWING NAME: E1.0.dwg

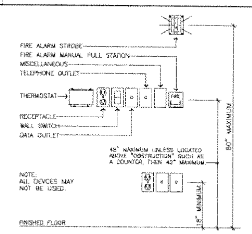
- 2x4 LAY-IN FLUORESCENT FIXTURE — FIRE PROTECTED LIGHT FIXTURE = *
- 2x4 LAY-IN FLUORESCENT FIXTURE NIGHT LIGHT W/90 min. BATTERY BACK-UP — FIRE PROTECTED LIGHT FIXTURE = *
- 4' LONG FLUOR. STRIP, LIGHT FIXT.
- 3' LONG FLUOR. STRIP, LIGHT FIXT.
- EXIT LIGHT W/BATTERY BACK-UP — ARROW OF DIRECTION
- EMERGENCY LIGHT W/BATTERY BACK-UP
- $ WALL SWITCH
- $3 THREE-WAY WALL SWITCH
- $ SINGLE POLE MOTION SENSOR SWITCH
- $D DIMMER SWITCH
- 1H-4,6,8 PANELBOARD 1H CIRCUIT NUMBERS 4,6,8
- BRANCH CIRCUIT HOMERUN WITH GROUND WIRE (GROUND WIRE TO BE ROUTED FROM PANELBOARD TO LAST WIRING DEVICE ON BRANCH CIRCUIT)

4 ELECTRICAL LEGEND

ALL SYMBOLS MAY NOT BE USED

TYPE	DESCRIPTION	MFR	MODEL No.	LAMP	REMARKS
A	2x4 LAY-IN	COLUMBIA	4PS24-232G-FS-A12-EU	2F32	
A1	2x4 LAY-IN	COLUMBIA	4PS24-232G-FS-A12-EU	2F32	BATTERY BACK-UP (NIGHT LIGHT)
B	4' STRIPLITE	HUBBELL	CSR4232BLANKEU	2F32	
B1	4' STRIPLITE	HUBBELL	CSR4232BLANKEU	2F32	BATTERY BACK-UP (NIGHT LIGHT)
C	5"DIA. DROP SHOWER LIGHT	LIGHTOLIER	1021-1004F26	50W	UL LISTED FOR WET LOCATIONS
D	3' STRIPLITE WALL MTD.	COLUMBIA	SA3-225-EU	2F32	
E	WALL PACK	EXCELINE	GXSW-42-HFL-L-***-1	42W	w/410W BAFFLE
X1	EXIT LIGHT	HIGH-LITES	BP-PLED5-R-DEH		

5 LIGHTING FIXTURE SCHEDULE



6 A.D.A. DEVICE MOUNTING HEIGHTS

SCALE: N.T.S.

*

CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
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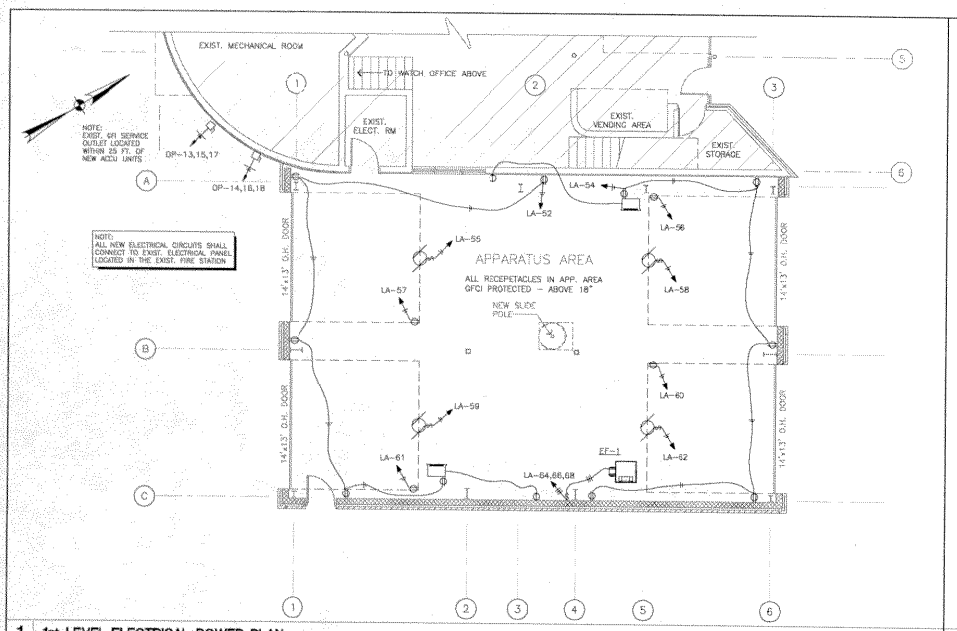
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SCALE: AS SHOWN

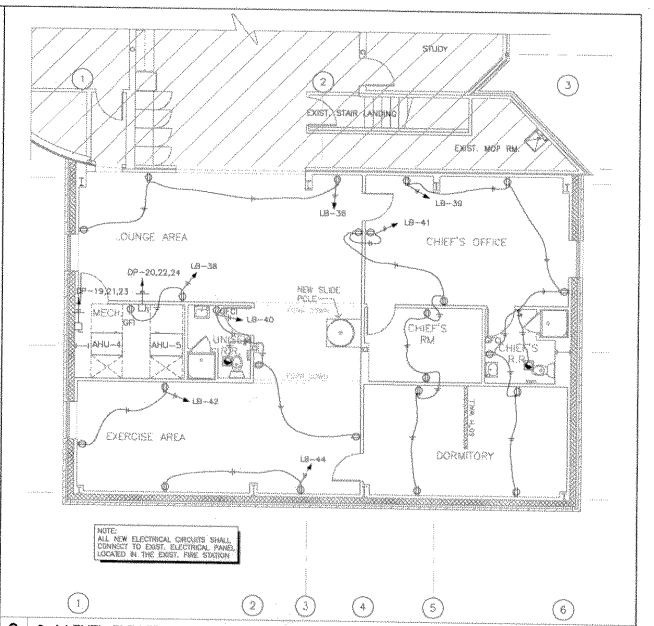
DRAWING NAME: 1st & 2nd LEVEL ELECTRICAL LIGHTING PLAN

SHEET: E1.0



1 1st LEVEL ELECTRICAL POWER PLAN

SCALE: 3/16" = 1'-0"



2 2nd LEVEL ELECTRICAL POWER PLAN

SCALE: 3/16" = 1'-0"

- ② JUNCTION BOX
- ⓡ RECEPTACLE STANDARD LEVEL
- ⓒ CHILD PROOF RECEPTACLE
- ⓢ SPECIAL RECEPTICLE FOR SERVER SEE SPECS
- ⓠ QUAD-PLEX RECEPTACLE
- ⓓ DEDICATED RECEPTACLE
- ⓦ RECEPTACLE w/GFI & WEATHER PROOF
- ELECTRICAL PANEL BOARD
- DISCONNECT
- HL-4,6,8 PANELBOARD HL CIRCUIT NUMBERS 4,6,8
- BRANCH CIRCUIT HOMERUN WITH GROUND WIRE (GROUND WIRE TO BE ROUTED FROM PANELBOARD TO LAST WIRING DEVICE ON BRANCH CIRCUIT)
- GFI FLOOR RECEPTACLE w/GFI
- WALL SWITCH
- 3 THREE-WAY WALL SWITCH
- T THERMOSTAT MOUNTED TO MEET A.D.A REQ.

3 ELECTRICAL LEGEND ALL SYMBOLS MAY NOT BE USED

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6902 NAVIGATION BLVD., HOUSTON, TEXAS

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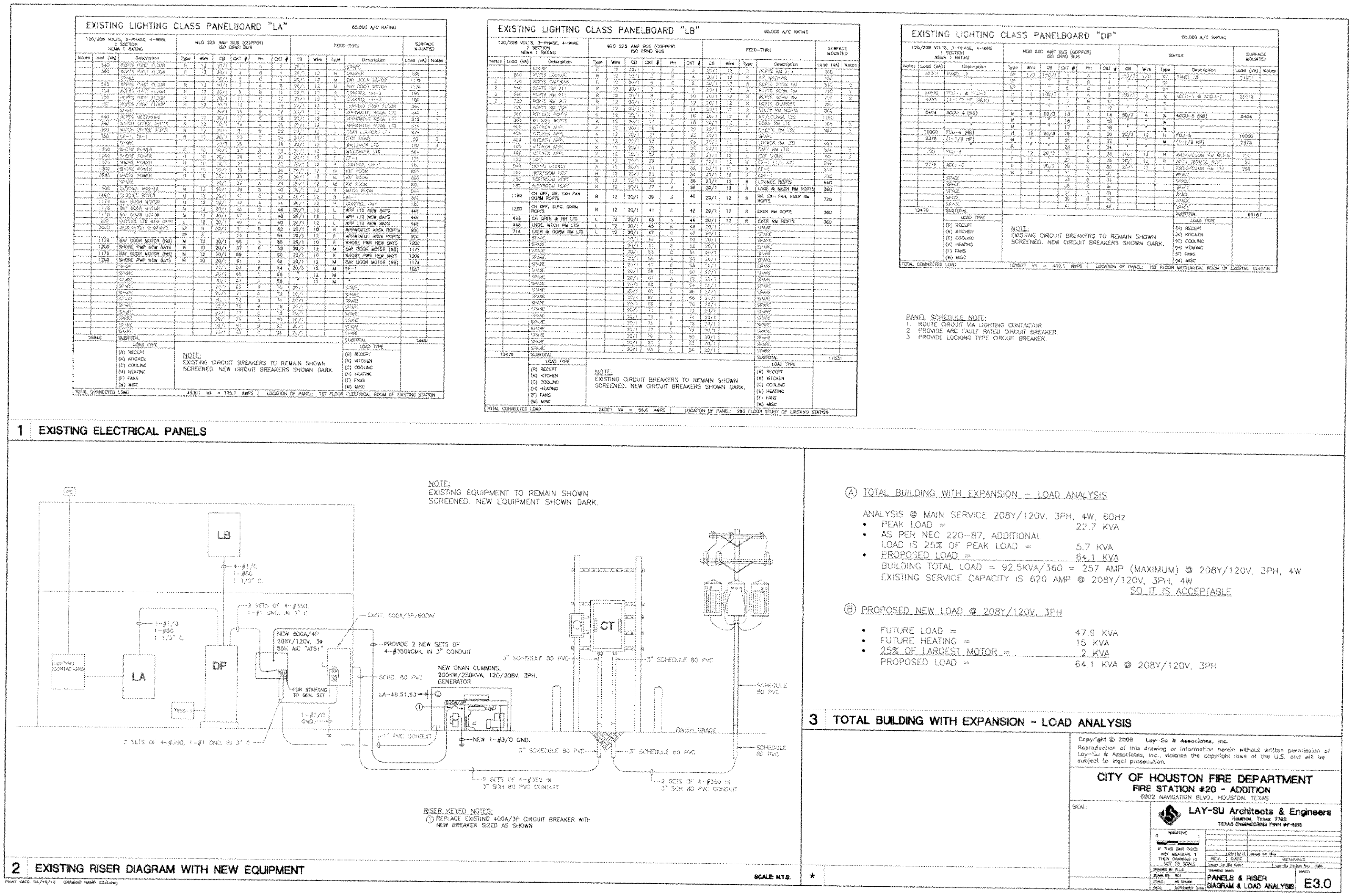
1st & 2nd LEVEL ELECTRICAL POWER PLAN

E2.0


EXISTING LIGHTING CLASS PANELBOARD "LA"
65,000 A/C RATING
NOTE:
EXISTING CIRCUIT BREAKERS TO REMAIN SHOWN SCREENED. NEW CIRCUIT BREAKERS SHOWN DARK.
TOTAL CONNECTED LOAD 45301 VA = 125.7 AMPS
LOCATION OF PANEL: 1ST FLOOR ELECTRICAL ROOM OF EXISTING STATION
EXISTING LIGHTING CLASS PANELBOARD "LB"
65,000 A/C RATING
NOTE:
EXISTING CIRCUIT BREAKERS TO REMAIN SHOWN SCREENED. NEW CIRCUIT BREAKERS SHOWN DARK.
TOTAL CONNECTED LOAD 24001 VA = 58.6 AMPS
LOCATION OF PANEL: 3RD FLOOR STUDY OF EXISTING STATION
EXISTING LIGHTING CLASS PANELBOARD "DP"
65,000 A/C RATING
NOTE:
EXISTING CIRCUIT BREAKERS TO REMAIN SHOWN SCREENED. NEW CIRCUIT BREAKERS SHOWN DARK.
LOCATION OF PANEL: 1ST FLOOR MECHANICAL ROOM OF EXISTING STATION
PANEL SCHEDULE NOTE:
1. ROUTE CIRCUIT VIA LIGHTING CONTACTOR
2. PROVIDE ARC FAULT RATED CIRCUIT BREAKER.
3. PROVIDE LOCKING TYPE CIRCUIT BREAKER.
1 EXISTING ELECTRICAL PANELS
NOTE:
EXISTING EQUIPMENT TO REMAIN SHOWN SCREENED. NEW EQUIPMENT SHOWN DARK.
LB
LA
DP
CT
LIGHTING CONTACTORS
NEW 600A/4P 208Y/120V, 3Ø 65K AIC "ATS1"
EXIST. 600A/3P/600AF
PROVIDE 2 NEW SETS OF 4-#350KCMIL IN 3" CONDUIT
NEW ONAN CUMMINS, 200KW/250KVA, 120/208V, 3PH, GENERATOR
FOR STARTING TO GEN. SET
2 SETS OF 4-#350, 1-#1 GND. IN 3" C
NEW 1-#3/0 GND.
3" SCHEDULE 80 PVC
FINISH GRADE
RISER KEYED NOTES:
① REPLACE EXISTING 400A/3P CIRCUIT BREAKER WITH NEW BREAKER SIZED AS SHOWN
2 EXISTING RISER DIAGRAM WITH NEW EQUIPMENT
SCALE: N.T.S.
Ⓐ TOTAL BUILDING WITH EXPANSION - LOAD ANALYSIS
ANALYSIS @ MAIN SERVICE 208Y/120V, 3PH, 4W, 60Hz
• PEAK LOAD = 22.7 KVA
• AS PER NEC 220-87, ADDITIONAL LOAD IS 25% OF PEAK LOAD = 5.7 KVA
• PROPOSED LOAD = 64.1 KVA
BUILDING TOTAL LOAD = 92.5KVA/360 = 257 AMP (MAXIMUM) @ 208Y/120V, 3PH, 4W
EXISTING SERVICE CAPACITY IS 620 AMP @ 208Y/120V, 3PH, 4W
SO IT IS ACCEPTABLE
Ⓑ PROPOSED NEW LOAD @ 208Y/120V, 3PH
• FUTURE LOAD = 47.9 KVA
• FUTURE HEATING = 15 KVA
• 25% OF LARGEST MOTOR = 2 KVA
PROPOSED LOAD = 64.1 KVA @ 208Y/120V, 3PH
3 TOTAL BUILDING WITH EXPANSION - LOAD ANALYSIS
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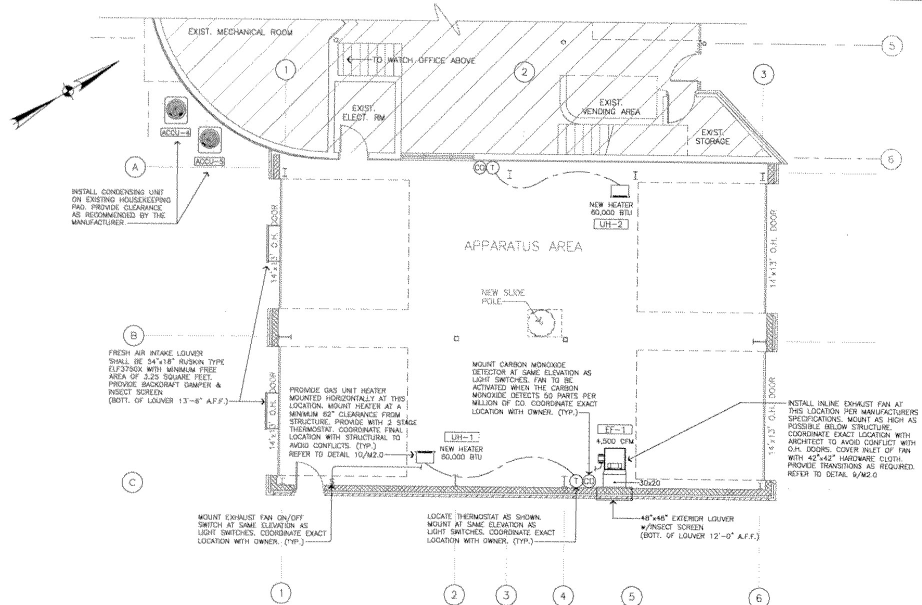
CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
6902 NAVIGATION BLVD., HOUSTON, TEXAS
LAY-SU Architects & Engineers
PANELS & RISER DIAGRAM & LOAD ANALYSIS
E3.0



1 1st LEVEL HVAC MECHANICAL PLAN

SCALE: 3/16" = 1'-0"

1. CONTRACTOR IS TO INSTALL DUCTWORK WITH CAREFUL CONSIDERATION OF LIGHTING, PLUMBING PIPING, CONDUITS, ETC. COORDINATE WITH GENERAL CONTRACTOR AND OTHER SUBCONTRACTORS PRIOR TO INSTALLATION. INSTALL ALL DUCTWORK TIGHT AGAINST BOTTOM OF STRUCTURE UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
2. CLEARANCES ARE VERY CRITICAL. CONTRACTOR TO VERIFY CLEARANCES WITH ALL TRADES PRIOR TO DUCT ROUTING. ALL DUCTWORK SHALL BE MOUNTED DIRECTLY BENEATH THE STRUCTURAL MEMBERS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. CONTRACTOR TO COORDINATE ALL DIFFUSER LOCATIONS WITH REFLECTED CEILING PLANS AND ELECTRICAL DRAWINGS PRIOR TO INSTALLATION.
4. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL CODES AND AUTHORITIES HAVING JURISDICTION OVER THE PROJECT.
5. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS, MOUNTING HEIGHTS AND SPECIFICATIONS OF ALL EXTERIOR LOUVERS, PROVIDE CORROSION RESISTANT SCREEN OF NOT LESS THAN 1/4" MESH. COORDINATE WITH GENERAL CONTRACTOR PRIOR TO ORDER.
6. VERIFY THERMOSTAT LOCATIONS WITH GENERAL CONTRACTOR PRIOR TO INSTALLATION. (MOUNTING HEIGHT TO BE 48" ABOVE FLOOR LEVEL UNLESS OTHERWISE NOTED). ALL THERMOSTATS TO BE 7-DAY PROGRAMABLE.
7. PRIOR TO SUBMITTING BID PRICE, MECHANICAL CONTRACTOR SHALL VERIFY ACCESSIBILITY AND CLEARANCES REQUIRED FOR FILTER AND COIL CONNECTION/REMOVAL BASED ON ROOM SIZE AND UNIT ORIENTATION MODIFICATIONS TO EQUIPMENT TO ENSURE ACCESSIBILITY AND CLEARANCE TO BE THE MECHANICAL CONTRACTOR'S RESPONSIBILITY.
8. DUCT SIZES INDICATED ON PLANS ARE INSIDE FREE AREA. ALL MAIN DUCTS SHALL BE OF SHEETMETAL CONSTRUCTION MEETING SMACNA.
9. PROVIDE A MINIMUM OF 2" THICK INSULATION AROUND SUPPLY AIR NECK AND OVER SUPPLY AIR DIFFUSERS TO MINIMIZE CONDENSATION.
10. ALL SUPPLY AND RETURN AIR DUCTS SHALL HAVE A MINIMUM OF 2" THICK EXTERNAL INSULATION. (SEE SPECIFICATIONS FOR TYPE OF DUCTWORK INSULATION.)
11. PROVIDE ROUND FLEXIBLE DUCT, 12'-0"(MAX. LENGTH), SAME SIZE AS DIFFUSER NECK AT FINAL DROPS ONLY.
12. PROVIDE CONTROL DAMPERS AT SUPPLY BRANCHES AND INDIVIDUAL AIR SUPPLY OUTLETS FOR COMPLETE CONTROL OF AIR FLOW.
13. PROVIDE TURNING VANES AT EACH CHANGE IN DIRECTION TO MINIMIZE FRICTION LOSS.
14. ALL ROOF PENETRATIONS, FLASHING, AND MOUNTING SHALL BE COORDINATED WITH ROOFING CONTRACTOR AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
15. ALL FLOOR PENETRATIONS SHALL BE COORDINATED WITH CONTRACTOR AND INSTALLED PER MANUFACTURER'S RECOMMENDATION.
16. PROVIDE INSULATION ON FIRST 12'-0" OF CONDENSATE DRAIN PIPING EXTENDING FROM UNIT. DRAIN LINE TO HAVE SLOPE OF 1/8" PER FOOT IN THE DIRECTION OF FLOW AND DISCHARGE AT CODE APPROVED LOCATIONS.
17. CONDENSATE DRAIN PIPING SHALL BE SCH-40 PVC IN DUCTED RETURN INSTALLATIONS AND COPPER TYPE 'L' IN RETURN AIR PLENUM INSTALLATIONS.
18. PROVIDE AUXILIARY DRAIN FOR ALL UNITS LOCATED ABOVE THE CEILING. DRAIN PAN SHALL BE CONSTRUCTED OF 12ga. SHEET METAL WITH A 1" DIAMETER DRAIN AND SHALL BE LARGE ENOUGH TO COVER THE ENTIRE UNIT.
19. ROUTE AUXILIARY DRAIN PIPE TO OUTSIDE OF BUILDING IN AN AREA WHERE IT CAN BE OBSERVED.
20. INSULATE ALL REFRIGERATION SUCTION LINES WITH ARMSTRONG ARMAFLEX AP, 1" WALL THICKNESS. INSULATION SHALL BE FINISHED WITH TWO COATS OF VINYL LACQUER PER MANUFACTURER'S PUBLISHED PROCEDURES.
21. UNITS LOCATED ABOVE THE CEILING SHALL BE SUPPORTED WITH UNISTRUT AND ALL-THREAD IN A MANNER TO ALLOW EASY ACCESS TO MAINTENANCE PANELS.
22. CONCRETE PAD FOR HVAC EQUIPMENT SHALL BE A MINIMUM OF 6" LARGER THAN FOOTPRINT OF EQUIPMENT. EQUIPMENT PAD SHALL BE PROVIDED BY GENERAL CONTRACTOR, BUT SIZED BY HVAC CONTRACTOR. PROVIDE ISOLATION PADS PER MANUFACTURER'S RECOMMENDATIONS.
23. HVAC CONTRACTOR SHALL PROVIDE, AT HIS EXPENSE, THE SERVICES OF AN INDEPENDENT TESTING AND AIR BALANCING CONTRATOR (TAB) AND SUBMIT A WRITTEN 'TAB' BALANCE REPORT. ALL ADJUSTMENTS IN SHEAVES, BELTS, DAMPERS, VALVES, ETC., REQUIRED BY 'TAB' REPORT SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.

2 HVAC GENERAL NOTES

PRINT DATE: 04/16/10 DRAWING NAME: M1.0.dwg

- SUPPLY AIR GRILLE
- RETURN AIR GRILLE
- EXHAUST FAN
- THERMOSTAT
- SMOKE DECTECTOR
- CARBON MONOXIDE DECTECTOR
- 12" SA 250 CFM — FLEX DUCT SIZE; GRILLE TYPE; CFM DISTRIBUTION

3 MECHANICAL LEGEND

UNIT No.	EF-1	EF-2	EF-3	-	-
AREA SERVED	APPARATUS	UNISEX R.R.	CHIEF'S R.R.	-	-
TYPE	CENT/BELT	CEILING	CEILING		
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK		
MODEL No.	BSQ-200-10	SP-B70	SP-B70		
GENERAL DATA					
MOTOR ELECTRICAL	208/3/60	120/1/60	120/1/60		
CFM	4,500	50	50		
S.P.	0.30	0.25	0.25		
NOTES	1,2,3,6,7	4,5	4,5		

NOTES:
1. INSECT SCREEN
2. DISCONNECT SWITCH (BY ELECTRICAL CONTRACTOR)
3. WEATHERPROOF WALL LOUVER
4. FAN TO BE OPERATED BY SAME SWITCH AS LIGHTS.
5. INTERLOCK FAN WITH ASSOCIATED AIR HANDLING UNIT.
6. PROVIDE CARBON MONOXIDE DETECTOR TO TURN ON FAN WHEN CARBON MONOXIDE REACHES A LEVEL OF 50 PARTS PER MILLION.
7. PROVIDE WITH BACKDRAFT DAMPER AND FAN-MOUNTED SPEED CONTROL.

4 EXHAUST FAN SCHEDULE

UNIT No.	UH-1	UH-2		
AREA SERVED	APPARATUS BAY	APPARATUS BAY		
MANUFACTURER	DAYTON	DAYTON		
MODEL No.	3E133	3E133		
GENERAL DATA				
GAS CONNECTION (IN)	1/2	1/2		
GAS INPUT (BTUH)	60,000	60,000		
WEIGHT (LBS)	35	35		
STAGES	2	2		
GAS TYPE	NATURAL GAS	NATURAL GAS		
MOTOR ELECTRICAL	120/1/60	120/1/60		
NOTES	1,2,3,4	1,2,3,4		

NOTES:
1. INSTALL PER MANUFACTURES SPECIFICATIONS
2. PROVIDE WITH UNIT MOUNTED TEMPERATURE SENSOR. HEATER SHALL BE ENERGIZED WHEN TEMPERATURE DROPS BELOW 50°F.
3. PROVIDE PRESSURE REDUCING VALVE (PRV) AND CUT-OFF VALVE AT EA. UNIT.

5 GAS UNIT HEATER SCHEDULE

OUTSIDE AIR REQUIREMENTS FOR VENTILATION

OCCUPANCY CLASSIFICATION
BATHROOMS = 35 cfm of O/A per room
DORMITORY = 15 cfm of O/A per person
LOUNGE AREA = 30 cfm of O/A per room
EXERCISE AREA = 15 cfm of O/A per person
OFFICE SPACES = 20 cfm of O/A per person
APPARATUS AREA = 1.5 cfm per square foot of floor area
(PER CHAPTER 4 OF THE MECHANICAL CODE TABLE 403.3)

O/A REQUIRED FOR AHU-4
BATHROOMS = 1 x 35 cfm = 35 cfm
DORMITORY = 4 x 15 cfm = 60 cfm
EXERCISE AREA = 4 x 15 cfm = 60 cfm
TOTAL O/A REQUIRED = 155 cfm
TOTAL O/A PROVIDED = 200 cfm > 155 cfm O.K.

O/A REQUIRED FOR AHU-5
BATHROOMS = 1 x 35 cfm = 35 cfm
DORMITORY = 1 x 15 cfm = 15 cfm
OFFICE SPACE = 1 x 20 cfm = 20 cfm
LOUNGE AREA = 1 x 30 cfm = 30 cfm
TO O/A REQUIRED = 100 cfm
TOTAL O/A PROVIDED = 200 cfm > 100 cfm O.K.

O/A REQUIRED FOR EF-1
APPARATUS AREA = 1,900SF x 1.5 cfm = 2,850 cfm
TOTAL O/A PROVIDED = 4,500 cfm > 2,850 cfm O.K.

6 O/A CALCULATIONS FOR AHU 1, 2 & EF-1

GRILLES AND REGISTERS

ITEM NUMBER	TYPE	MATERIAL	NECK SIZE	AIR VOLUME MIN-MAX	VOLUME DAMPER	FIRE DAMPER	MAXIMUM NC	MAXIMUM VELOCITY	MANUFACTURER	MODEL NUMBER	COMMENTS
6-SAD	LAY-IN CLG	STEEL	6 IN DIA	25 - 90	YES	NO	30	450 FPM	METAL*AIR	5800-6	SEE NOTES
8-SAD	LAY-IN CLG	STEEL	8 IN DIA	95 - 200	YES	NO	30	450 FPM	METAL*AIR	5800-6	SEE NOTES
10-SAD	LAY-IN CLG	STEEL	10 IN DIA	205 - 300	YES	NO	30	450 FPM	METAL*AIR	5800-6	SEE NOTES
12-SAD	LAY-IN CLG	STEEL	12 IN DIA	305 - 400	YES	NO	30	450 FPM	METAL*AIR	5800-6	SEE NOTES
14-SAD	LAY-IN CLG	STEEL	14 IN DIA	405 - 550	YES	NO	30	450 FPM	METAL*AIR	5800-6	SEE NOTES
10-RAGR	LAY-IN CLG	ALUMINUM	10 IN DIA	165 - 245	YES	NO	30	450 FPM	METAL*AIR	RHF-TB	SEE NOTES
12-RAGR	LAY-IN CLG	ALUMINUM	12 IN DIA	250 - 345	YES	NO	30	450 FPM	METAL*AIR	RHF-TB	SEE NOTES
SIDE-GRILL	WALL MTD.	ALUMINUM	12 IN DIA	320 - 450	YES	NO	30	500 FPM	METAL*AIR		

NOTES:
1. ALL AIR TERMINALS TO HAVE OFF-WHITE FINISH UNLESS NOTED OTHERWISE
2. ALL DIFFUSER PATTERNS TO BE FOUR WAY BLOW UNLESS NOTED OTHERWISE (FULL CONE UNIT REQUIRED)

7 GRILLES AND REGISTERS FOR SUSPENDED ACOUSTICAL CEILINGS

DX SPLIT SYSTEM SCHEDULE

INDOOR UNIT	GENERAL	MARK	AHU-4	AHU-5
		AREA SERVED	EAST ZONE	WEST ZONE
		SUPPLY AIR (CFM)	1200	1200
		OUTSIDE AIR (CFM)	200	200
		FAN MOTOR HORSEPOWER	1.5	1.5
		BELT/DIRECT DRIVE	BELT	BELT
	HEAT	TOTAL HEATING kW	10	10
		VOLTS/PHASE/HERTZ	208/3/60	208/3/60
	BASIS	MANUFACTURE	TRANE	TRANE
		MODEL	BCV036	BCV036
		WEIGHT (LBS)	--	--
CONDENSING UNIT	GENERAL	MARK	ACCU-4	ACCU-5
		STEPS OF CAPACITY	1	1
		EER	13	13
		AMBIENT AIR	100	100
	ELECTRIC	VOLTS/PHASE/HERTZ	208/3/60	208/3/60
		MCA	15	15
		MOCP	25	25
		MANUFACTURE	TRANE	TRANE
		MODEL	4TTA3036A3	4TTA3036A3
		NOMINAL TONS	3	3
		REFRIGERANT	R-410A	R-410A
COMMENTS			1,2,3,4,5	1,2,3,4,5

COMMENTS:
1. PROVIDE CONDENSER COIL HAIL GUARDS.
2. PROVIDE LOW AMBIENT CONTROL.
3. PROVIDE REFRIGERANT PIPING IN STRIC ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.
5. PROVIDE PROGRAMMABLE THERMOSTAT.
6. UNITS SHALL BE PROVIDED WITH HOT GAS BYPASS.
7. PROVIDE UNIT WITH ELECTRIC HEATING.
8. PROVIDE UNITS WITH A SINGLE POINT ELECTRICAL CONNECTION.
9. ALL RETURN OPENING SHALL BE PROVIDED WITH 1½" AIR FILTER.
10. ELECTRICAL CONTRACTOR TO PROVIDE DISCONNECT, WIRING FROM ELECTRICAL PANEL TO SINGLE HOOK-UP CONNECTION AND BREAKER (REFER TO MANUFACTURER FOR REQUIRED BREAKER SIZE).
11. AHU SHALL BE CONNECTED TO SMOKE DETECTORS LOCATED IN MIXING PLENUM, UPON ACTIVATION, THE SMOKE DETECTORS SHALL SHUT DOWN THE AIR DISTRIBUTION SYSTEM. HVAC CONTRACTOR SHALL INCLUDE WIRING (24 VOLT) AND INSTALLATION FROM SMOKE DETECTOR TO AHU.

8 AIR HANDLING UNIT SCHEDULE

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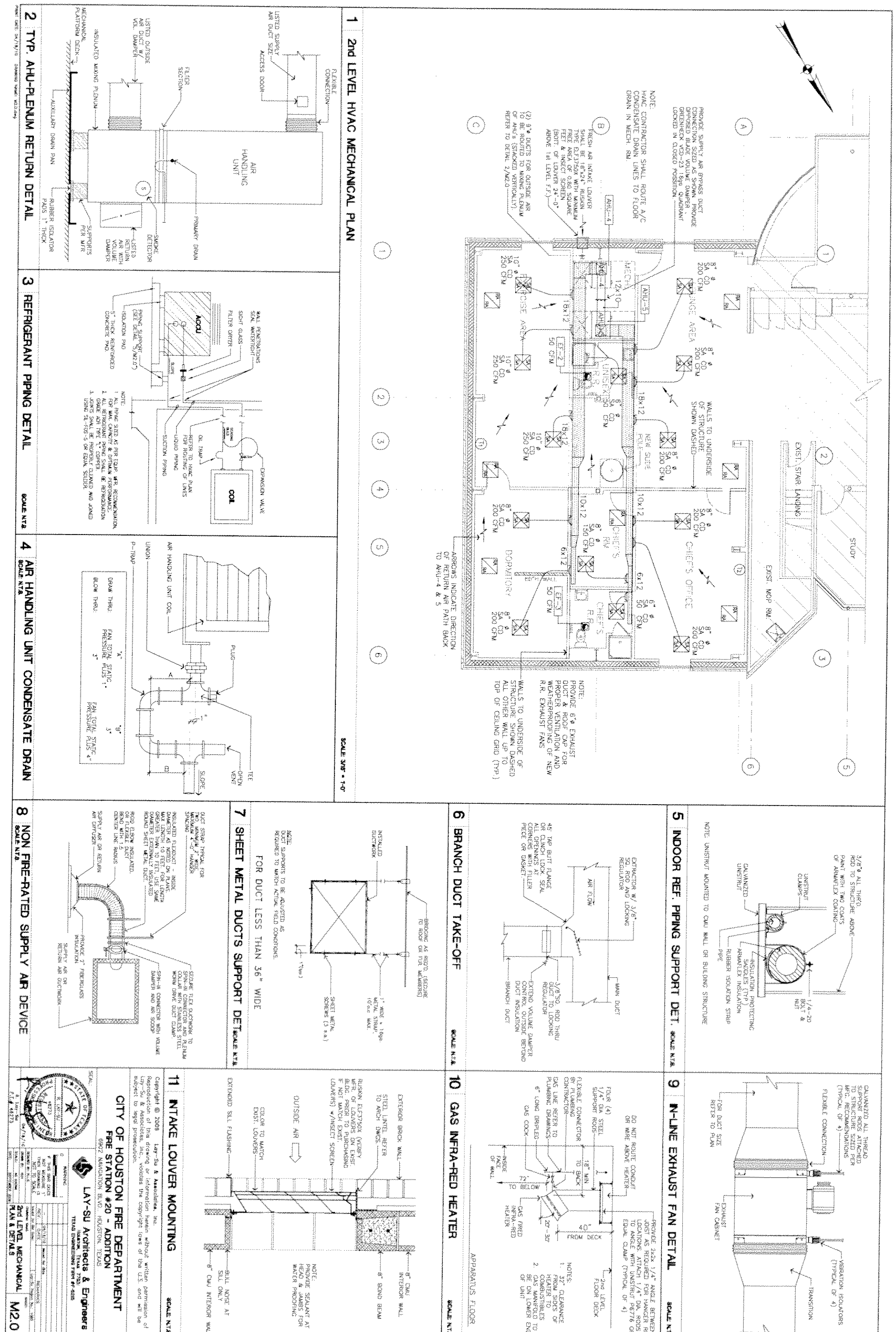
1st LEVEL MECHANICAL PLAN & SCHEDULES

M1.0


1 2nd LEVEL HVAC MECHANICAL PLAN
2 TYP. AHU-PLENUM RETURN DETAIL
3 REFRIGERANT PIPING DETAIL
4 AIR HANDLING UNIT CONDENSATE DRAIN
5 INDOOR REF. PIPING SUPPORT DET.
6 BRANCH DUCT TAKE-OFF
7 SHEET METAL DUCTS SUPPORT DET.
8 NON FIRE-RATED SUPPLY AIR DEVICE
9 IN-LINE EXHAUST FAN DETAIL
10 GAS INFRA-RED HEATER
11 INTAKE LOUVER MOUNTING
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FIRE STATION #20 - ADDITION
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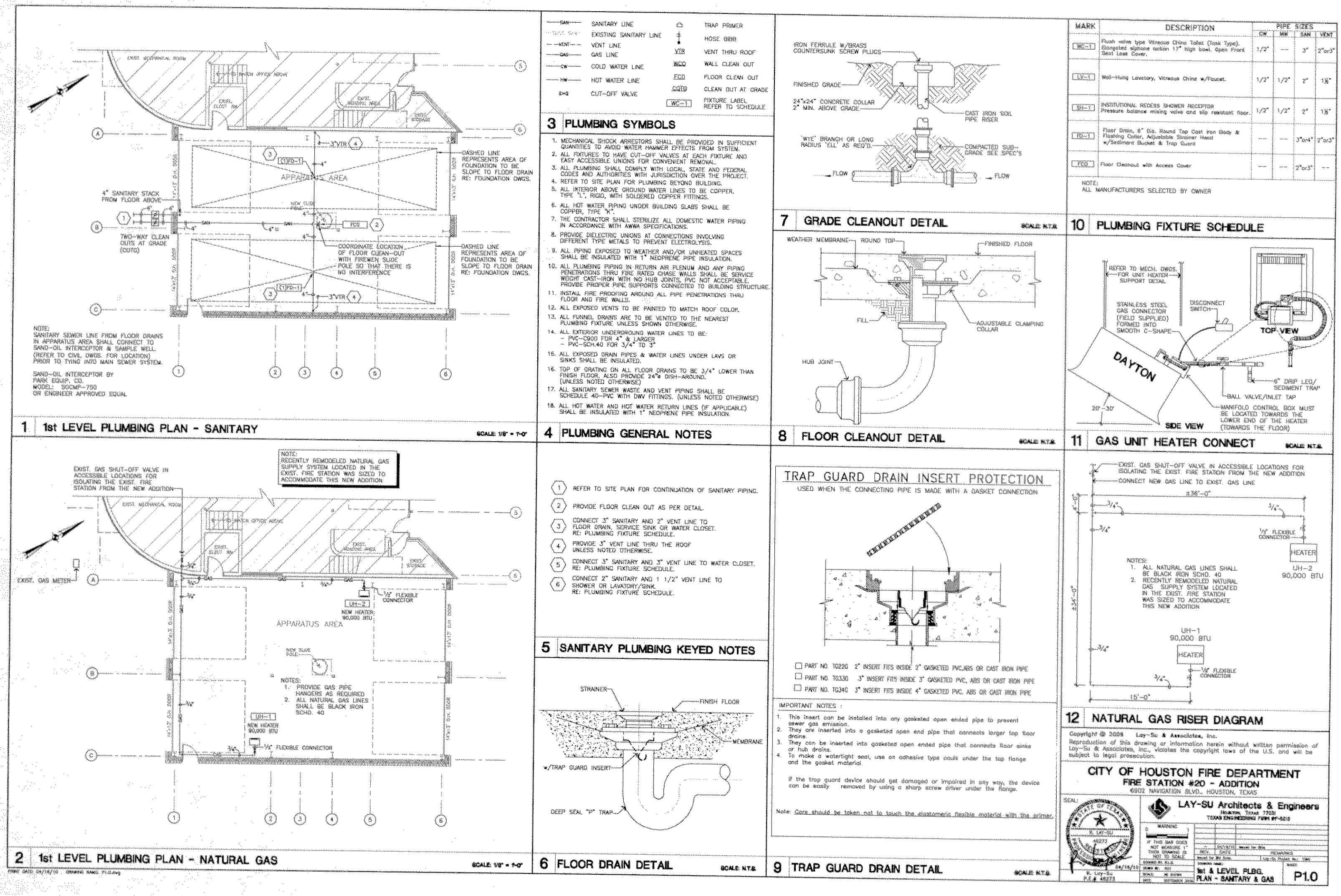
M2.0


1 1st LEVEL PLUMBING PLAN - SANITARY
SCALE: 1/8" = 1'-0"
2 1st LEVEL PLUMBING PLAN - NATURAL GAS
SCALE: 1/8" = 1'-0"
APPARATUS AREA
NOTE: SANITARY SEWER LINE FROM FLOOR DRAINS IN APPARATUS AREA SHALL CONNECT TO SAND-OIL INTERCEPTOR & SAMPLE WELL. (REFER TO CIVIL DWGS. FOR LOCATION) PRIOR TO TYING INTO MAIN SEWER SYSTEM.
SAND-OIL INTERCEPTOR BY PARK EQUIP. CO. MODEL: SOCMP-750 OR ENGINEER APPROVED EQUAL
4" SANITARY STACK FROM FLOOR ABOVE
TWO-WAY CLEAN OUTS AT GRADE (COTG)
COORDINATE LOCATION OF FLOOR CLEAN-OUT WITH FIREMEN SLIDE POLE SO THAT THERE IS NO INTERFERENCE
DASHED LINE REPRESENTS AREA OF FOUNDATION TO BE SLOPE TO FLOOR DRAIN RE: FOUNDATION DWGS.
NOTE: RECENTLY REMODELED NATURAL GAS SUPPLY SYSTEM LOCATED IN THE EXIST. FIRE STATION WAS SIZED TO ACCOMMODATE THIS NEW ADDITION
EXIST. GAS SHUT-OFF VALVE IN ACCESSIBLE LOCATIONS FOR ISOLATING THE EXIST. FIRE STATION FROM THE NEW ADDITION
EXIST. GAS METER
NEW HEATER 90,000 BTU
1/2" FLEXIBLE CONNECTOR
NOTES: 1. PROVIDE GAS PIPE HANGERS AS REQUIRED 2. ALL NATURAL GAS LINES SHALL BE BLACK IRON SCHD. 40
3 PLUMBING SYMBOLS
SANITARY LINE
EXISTING SANITARY LINE
VENT LINE
GAS LINE
COLD WATER LINE
HOT WATER LINE
CUT-OFF VALVE
TRAP PRIMER
HOSE BIBB
VTR VENT THRU ROOF
WCO WALL CLEAN OUT
FCO FLOOR CLEAN OUT
COTG CLEAN OUT AT GRADE
WC-1 FIXTURE LABEL REFER TO SCHEDULE
4 PLUMBING GENERAL NOTES
1. MECHANICAL SHOCK ARRESTORS SHALL BE PROVIDED IN SUFFICIENT QUANTITIES TO AVOID WATER HAMMER EFFECTS FROM SYSTEM.
2. ALL FIXTURES TO HAVE CUT-OFF VALVES AT EACH FIXTURE AND EASY ACCESSIBLE UNIONS FOR CONVENIENT REMOVAL.
3. ALL PLUMBING SHALL COMPLY WITH LOCAL, STATE AND FEDERAL CODES AND AUTHORITIES WITH JURISDICTION OVER THE PROJECT.
4. REFER TO SITE PLAN FOR PLUMBING BEYOND BUILDING.
5. ALL INTERIOR ABOVE GROUND WATER LINES TO BE COPPER, TYPE "L", RIGID, WITH SOLDERED COPPER FITTINGS.
6. ALL HOT WATER PIPING UNDER BUILDING SLABS SHALL BE COPPER, TYPE "K".
7. THE CONTRACTOR SHALL STERILIZE ALL DOMESTIC WATER PIPING IN ACCORDANCE WITH AWWA SPECIFICATIONS.
8. PROVIDE DIELECTRIC UNIONS AT CONNECTIONS INVOLVING DIFFERENT TYPE METALS TO PREVENT ELECTROLYSIS.
9. ALL PIPING EXPOSED TO WEATHER AND/OR UNHEATED SPACES SHALL BE INSULATED WITH 1" NEOPRENE PIPE INSULATION.
10. ALL PLUMBING PIPING IN RETURN AIR PLENUM AND ANY PIPING PENETRATIONS THRU FIRE RATED CHASE WALLS SHALL BE SERVICE WEIGHT CAST-IRON WITH NO HUB JOINTS, PVC NOT ACCEPTABLE. PROVIDE PROPER PIPE SUPPORTS CONNECTED TO BUILDING STRUCTURE.
11. INSTALL FIRE PROOFING AROUND ALL PIPE PENETRATIONS THRU FLOOR AND FIRE WALLS.
12. ALL EXPOSED VENTS TO BE PAINTED TO MATCH ROOF COLOR.
13. ALL FUNNEL DRAINS ARE TO BE VENTED TO THE NEAREST PLUMBING FIXTURE UNLESS SHOWN OTHERWISE.
14. ALL EXTERIOR UNDERGROUND WATER LINES TO BE: - PVC-C900 FOR 4" & LARGER - PVC-SCH.40 FOR 3/4" TO 3"
15. ALL EXPOSED DRAIN PIPES & WATER LINES UNDER LAVS OR SINKS SHALL BE INSULATED.
16. TOP OF GRATING ON ALL FLOOR DRAINS TO BE 3/4" LOWER THAN FINISH FLOOR, ALSO PROVIDE 24"⌀ DISH-AROUND. (UNLESS NOTED OTHERWISE)
17. ALL SANITARY SEWER WASTE AND VENT PIPING SHALL BE SCHEDULE 40-PVC WITH DWV FITTINGS. (UNLESS NOTED OTHERWISE)
18. ALL HOT WATER AND HOT WATER RETURN LINES (IF APPLICABLE) SHALL BE INSULATED WITH 1" NEOPRENE PIPE INSULATION.
5 SANITARY PLUMBING KEYED NOTES
1 REFER TO SITE PLAN FOR CONTINUATION OF SANITARY PIPING.
2 PROVIDE FLOOR CLEAN OUT AS PER DETAIL.
3 CONNECT 3" SANITARY AND 2" VENT LINE TO FLOOR DRAIN, SERVICE SINK OR WATER CLOSET. RE: PLUMBING FIXTURE SCHEDULE.
4 PROVIDE 3" VENT LINE THRU THE ROOF UNLESS NOTED OTHERWISE.
5 CONNECT 3" SANITARY AND 3" VENT LINE TO WATER CLOSET. RE: PLUMBING FIXTURE SCHEDULE.
6 CONNECT 2" SANITARY AND 1 1/2" VENT LINE TO SHOWER OR LAVATORY/SINK. RE: PLUMBING FIXTURE SCHEDULE.
6 FLOOR DRAIN DETAIL
SCALE: N.T.S.
STRAINER
FINISH FLOOR
MEMBRANE
w/TRAP GUARD INSERT
DEEP SEAL "P" TRAP
7 GRADE CLEANOUT DETAIL
SCALE: N.T.S.
IRON FERRULE W/BRASS COUNTERSUNK SCREW PLUGS
FINISHED GRADE
24"x24" CONCRETE COLLAR 2" MIN. ABOVE GRADE
CAST IRON SOIL PIPE RISER
"WYE" BRANCH OR LONG RADIUS "ELL" AS REQ'D.
COMPACTED SUB-GRADE SEE SPEC'S
FLOW
8 FLOOR CLEANOUT DETAIL
SCALE: N.T.S.
WEATHER MEMBRANE
ROUND TOP
FINISHED FLOOR
FILL
ADJUSTABLE CLAMPING COLLAR
HUB JOINT
TRAP GUARD DRAIN INSERT PROTECTION
USED WHEN THE CONNECTING PIPE IS MADE WITH A GASKET CONNECTION
PART NO. TG22G 2" INSERT FITS INSIDE 2" GASKETED PVC,ABS OR CAST IRON PIPE
PART NO. TG33G 3" INSERT FITS INSIDE 3" GASKETED PVC, ABS OR CAST IRON PIPE
PART NO. TG34G 3" INSERT FITS INSIDE 4" GASKETED PVC, ABS OR CAST IRON PIPE
9 TRAP GUARD DRAIN DETAIL
SCALE: N.T.S.
10 PLUMBING FIXTURE SCHEDULE
MARK | DESCRIPTION | PIPE SIZES CW | HW | SAN | VENT
WC-1 | Flush valve type Vitreous China Toilet (Tank Type). Elongated siphone action 17" high bowl. Open Front Seat Less Cover. | 1/2" | --- | 3" | 2"or3"
LV-1 | Wall-Hung Lavatory, Vitreous China w/Faucet. | 1/2" | 1/2" | 2" | 1½"
SH-1 | INSTITUTIONAL RECESS SHOWER RECEPTOR Pressure balance mixing valve and slip resistant floor. | 1/2" | 1/2" | 2" | 1½"
FD-1 | Floor Drain, 6" Dia. Round Top Cast Iron Body & Flashing Collar, Adjustable Strainer Head w/Sediment Bucket & Trap Guard | --- | --- | 3"or4" | 2"or3"
FCO | Floor Cleanout with Access Cover | --- | --- | 2"or3" | ---
NOTE: ALL MANUFACTURERS SELECTED BY OWNER
11 GAS UNIT HEATER CONNECT
SCALE: N.T.S.
REFER TO MECH. DWGS. FOR UNIT HEATER SUPPORT DETAIL
STAINLESS STEEL GAS CONNECTOR (FIELD SUPPLIED) FORMED INTO SMOOTH C-SHAPE
DISCONNECT SWITCH
TOP VIEW
DAYTON
SIDE VIEW
6" DRIP LEG/ SEDIMENT TRAP
BALL VALVE/INLET TAP
MANIFOLD CONTROL BOX MUST BE LOCATED TOWARDS THE LOWER END OF THE HEATER (TOWARDS THE FLOOR)
20°-30°
12 NATURAL GAS RISER DIAGRAM
EXIST. GAS SHUT-OFF VALVE IN ACCESSIBLE LOCATIONS FOR ISOLATING THE EXIST. FIRE STATION FROM THE NEW ADDITION
CONNECT NEW GAS LINE TO EXIST. GAS LINE
±36'-0"
NOTES: 1. ALL NATURAL GAS LINES SHALL BE BLACK IRON SCHD. 40 2. RECENTLY REMODELED NATURAL GAS SUPPLY SYSTEM LOCATED IN THE EXIST. FIRE STATION WAS SIZED TO ACCOMMODATE THIS NEW ADDITION
UH-1 90,000 BTU
UH-2 90,000 BTU
HEATER
1/2" FLEXIBLE CONNECTOR
15'-0"
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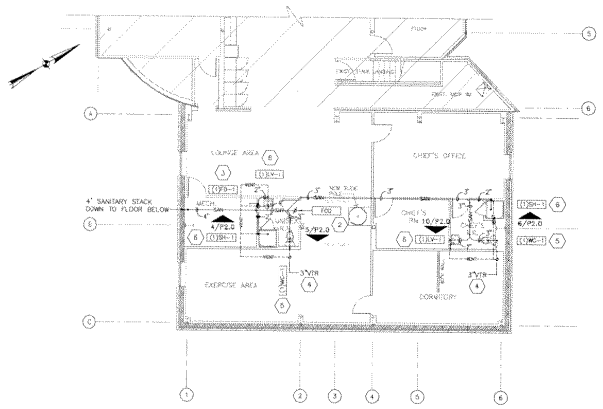
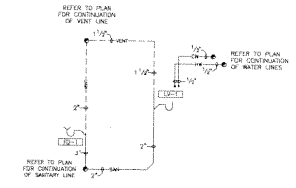
CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
6902 NAVIGATION BLVD., HOUSTON, TEXAS
LAY-SU Architects & Engineers
1st & LEVEL PLBG. PLAN - SANTARY & GAS
P1.0



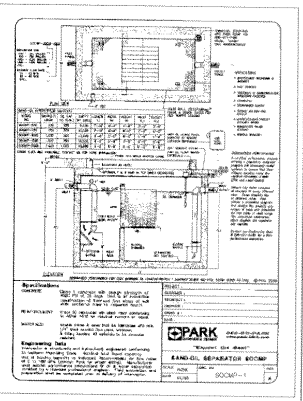
1 2nd LEVEL PLUMBING PLAN - SANITARY SCALE: 1/8" = 1'-0"

1. REFER TO SITE PLAN FOR CONTINUATION OF SANITARY PIPING.
2. PROVIDE FLOOR CLEAN OUT AS PER DETAIL.
3. CONNECT 3" SANITARY AND 2" VENT LINE TO FLOOR DRAIN, SERVICE SINK OR WATER CLOSET. RE: PLUMBING FIXTURE SCHEDULE.
4. PROVIDE 3" VENT LINE THRU THE ROOF UNLESS NOTED OTHERWISE.
5. CONNECT 3" SANITARY AND 3" VENT LINE TO WATER CLOSET. RE: PLUMBING FIXTURE SCHEDULE.
6. CONNECT 2" SANITARY AND 1 1/2" VENT LINE TO SHOWER OR LAVATORY/SINK. RE: PLUMBING FIXTURE SCHEDULE.

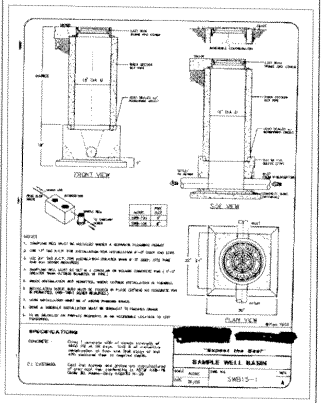
3 SANITARY PLUMBING KEYED NOTES



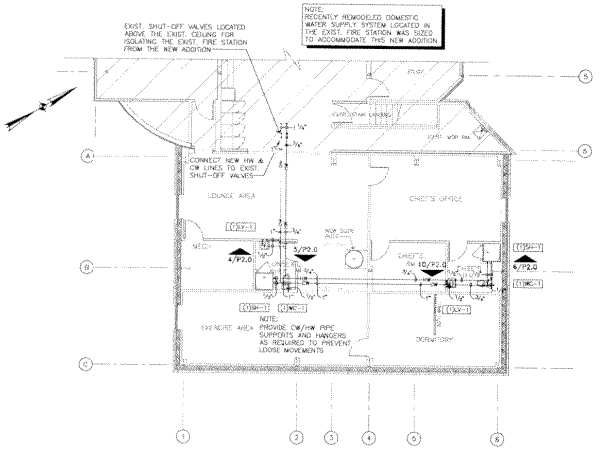
4 RISER DIAGRAM @ UNISEX R.R. SCALE: N.T.S.



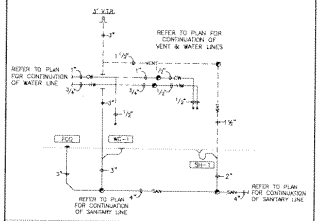
8 SAND-OIL INTERCEPTOR SOCMP-750



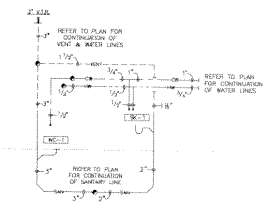
9 SAMPLE WELL BASIN



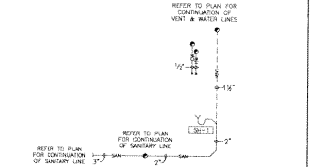
2 2nd LEVEL PLUMBING PLAN - DOMESTIC WATER SCALE: 1/8" = 1'-0"



5 RISER DIAGRAM @ UNISEX R.R. SCALE: N.T.S.



10 RISER DIAGRAM @ CHIEF'S R.R. SCALE: N.T.S.



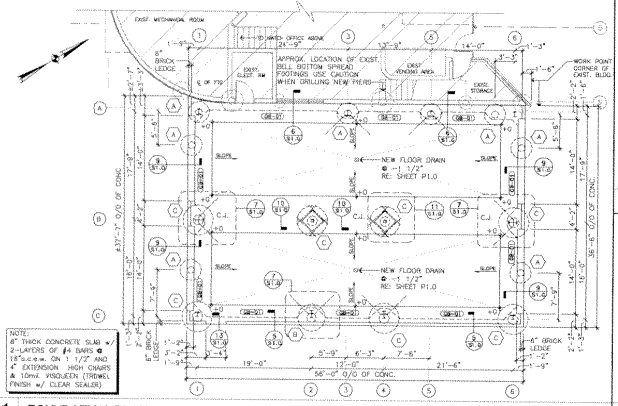
6 RISER DIAGRAM @ CHIEF'S R.R. SCALE: N.T.S.

CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
6902 NAVIGATION BLVD., HOUSTON, TEXAS

LAY-SU Architects & Engineers
HOUSTON, TEXAS 77631
TEXAS ENGINEERING FIRM #F-8205

2nd LEVEL PLUMBING PLANS & RISERS

P2.0

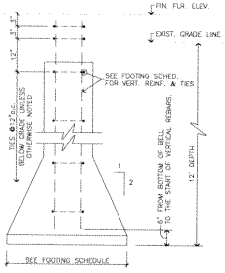


1 FOUNDATION PLAN

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

1. ALL CONCRETE SHALL HAVE SAND AND GRAVEL AGGREGATE TYPE '1' PORTLAND CEMENT AND SHALL HAVE A COMPRESSIVE STRENGTH (f'c) OF 3,000 PSI AT 28 DAYS.
2. ALL CONCRETE REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60, #3 BARS AND SMALLER MAY BE GRADE 40.
3. ALL CONTINUOUS REINFORCEMENT SHALL LAP AT SPLICES BY 36 TIMES ITS BAR DIAMETER OR CALCULATED IN ACCORDANCE WITH ACI-318.
4. ALL REINFORCING BARS FORMED AGAINST GROUND SHALL HAVE A MINIMUM CONCRETE COVER OF 3-INCHES AT BEAMS, 1-3/4-INCHES AT SLABS.
5. PROVIDE CORNER BARS EQUAL IN SIZE AND NUMBER TO THE ONE IT LAPS WITH. CORNER BARS TO BE 3FT. LONG (EACH LEG), IN EXTERIOR FACE OF BEAMS.
6. ADDITIONAL FILL MATERIAL WITHIN THE BUILDING AREA SHOULD BE A SILTY OR SANDY CLAY HAVING A PLASTICITY INDEX (P.I.) OF TEN(10) TO TWENTY(20) AND A LIQUID LIMIT OF 28 OR MORE. FILL MATERIALS SHOULD BE PLACED IN SIX(6) TO EIGHT(8) INCH LOOSE LIFTS AND COMPACTED TO NINETY-FIVE(95) PERCENT OF THEIR MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM D 698). PLEASE REFER TO SOILS REPORT REQUIREMENTS IN THE SPECIFICATIONS.
7. ALL CONCRETE SHALL BE CONSOLIDATED BY VIBRATION, SPADING, OR RODDING TO WORK THE CONCRETE AROUND THE REINFORCEMENT, EMBEDDED ITEMS AND INTO CORNERS OF FORMS, ELIMINATING AIR OR STONE POCKETS WHICH MAY CAUSE HONEYCOMBS. CARE SHALL BE TAKEN TO AVOID OVER VIBRATION AND CAUSE SEGREGATION.
8. CONCRETE CONTRACTOR SHALL VERIFY FOUNDATION DRAWINGS WITH ARCHITECTURAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR COORDINATION.
9. ALL MIXING, TRANSPORTING, PLACING AND CURING OF CONCRETE SHALL BE IN ACCORDANCE WITH ACI-318.
10. PROVIDE POSITIVE DRAINAGE ALLOWING STORM WATER TO SLOPE AWAY FROM THE BUILDING OR CONCRETE PAVED AREAS.
11. STRIP AND REMOVE ALL SURFACE ORGANICS, TOPSOIL AND UNSUITABLE MATERIALS FROM ALL BUILDING AND PAVING AREAS.
12. PROOF ROLL THE SUBGRADE TO DETECT ANY WET, SOFT, OR PUMPING AREAS. TREAT THESE AREAS WITH DRYING OR STABILIZING AGENTS AS NECESSARY, OR REMOVE AND REPLACE THEM WITH A SUITABLE FILL MATERIAL.
13. COMPACT THE SUBGRADE TO A MINIMUM OF NINETY-FIVE(95) PERCENT OF ITS MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM D 698).
14. CONTRACTOR SHALL POUR CONCRETE ON PIERS AND/OR SPREAD FOOTINGS AS SOON AS POSSIBLE TO MINIMIZE THE DANGER OF LEAVING OPEN HOLES ON THE SITE.
15. FOUNDATION DESIGN BASED ON SOILS REPORT BY: ASSOCIATED TESTING LABORATORIES, INC. REFER TO SPECIFICATIONS, IF APPLICABLE, FOR ADDITIONAL INFORMATION.

2 FOUNDATION GENERAL NOTES



BELL FOOTING SCHEDULE

MARK	SHAFT SIZE x BELL SIZE	MAIN REINF.	TIE REINF. SIZE	REMARKS
A	14" x 42"	4-#5	#4	–
B	18" x 54"	4-#6	#4	–
C	20" x 60"	4-#6	#4	–

TIE REINF. LAYOUT

4 BARS

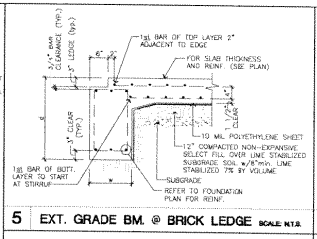
3 BELL FOOTING DET. & SCHEDULE

SCALE: N.T.S.

GRADE BM. SCHEDULE

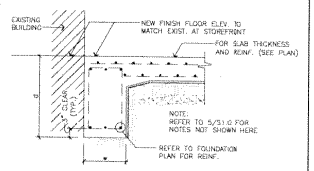
GRADE BEAM #	GR. BEAM SIZE: WIDTH (W)	GR. BEAM SIZE: DEPTH (D)	BOTTOM BARS	TOP BARS	INTERM. BARS	STIRRUP BARS	STIRRUP SPACING TO 4' FROM ℄ FTG.	REMAINING STIRRUP SPACING	REMARKS
GB-01	14"	30"	3-#8	3-#6	–	#3	12"o.c.	24"o.c.	

4 GRADE BEAM SCHEDULE



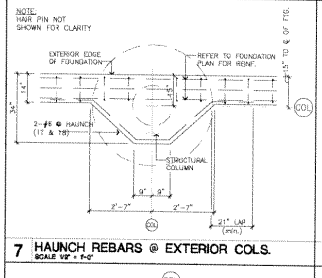
5 EXT. GRADE BM. @ BRICK LEDGE

SCALE: N.T.S.



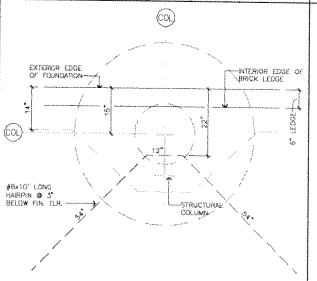
6 GRADE BM. @ EXIST. SLAB

SCALE: N.T.S.



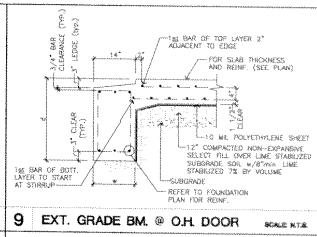
7 HAUNCH REBARS @ EXTERIOR COLS.

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



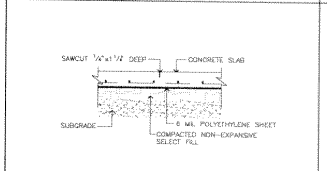
8 TYP. HAIRPIN PLACEMENT DET.

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



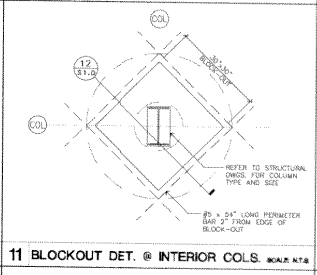
9 EXT. GRADE BM. @ O.H. DOOR

SCALE: N.T.S.



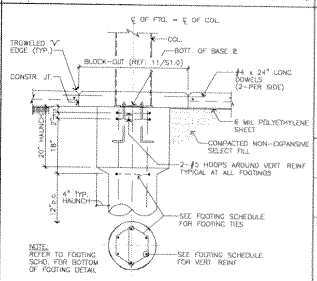
10 TYP. CONTROL JOINT DET.

SCALE: N.T.S.



11 BLOCKOUT DET. @ INTERIOR COLS.

SCALE: N.T.S.



12 BLOCKOUT SECT. @ INTERIOR COLS.

SCALE: N.T.S.

CITY OF HOUSTON FIRE DEPARTMENT
FIRE STATION #20 - ADDITION
6902 NAVIGATION BLVD., HOUSTON, TEXAS

LAY-SU Architects & Engineers
HOUSTON, TEXAS 77063
TEXAS ENGINEERING FIRM #F-5225

SEAL: STATE OF TEXAS — R. LAY-SU — 46373 — 04/16/10

NO.	DATE	REMARKS
1	04/16/10	PERMITTING

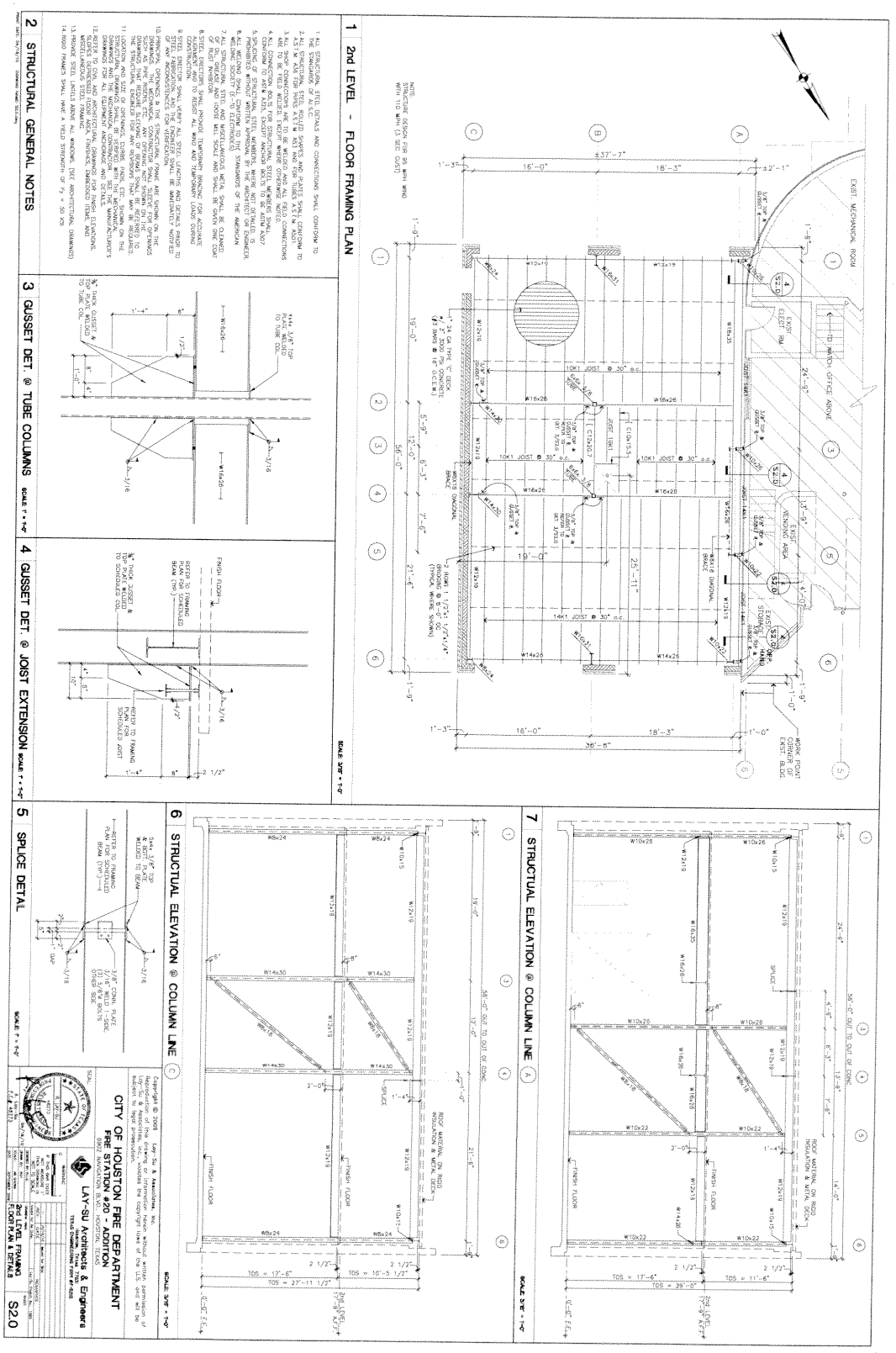
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DRAWN BY: R.L.S. | CHKD BY: R.L.S. | DRAWING NAME: S1.0.dwg | PRINT DATE: 04/16/10

SCALE: AS SHOWN | DATE: SEPTEMBER 2009

FOUNDATION PLAN & DETAILS

SHEET: S1.0



A PDF version of the Structural Drawings can also be viewed on the following web Link
https://purchasing.houstontx.gov/buyer/BidDocumentManager.aspx?id=C23654

SECTION C
BUILDING WAGE SCALE

A PDF version of tits Building Wage Scale can be viewed on the following web link
https://purchasing.houstontx.gov/buyer/BidDocumentManager.aspx?id=C23654

GENERAL CONDITIONS

A PDF version of the General Conditions can be viewed on the following web link:
https://purchasing.houstontx.gov/buyer/BidDocumentManager.aspx?id=C23654

Document 00800

SUPPLEMENTARY CONDITIONS

The following Paragraphs amend and supplement the 2005 edition of General Conditions. Unaltered portions of General Conditions remain in effect.

ARTICLE 3 - THE CONTRACTOR

3.5 *LABOR*: *Insert the following Paragraph 3.5.3.1.1.*

3.5.3.1.1 Contractor shall make good faith efforts to comply with the City ordinances regarding Minority and Women Business Enterprises (MWBE) and Persons with Disabilities Business Enterprises (PDBE) participation goals which are as follows:

.1 the MWBE goal is 0 percent, and

.2 the PDBE goal is 0 percent.

3.28 *CONTRACTOR DEBT*

3.28.1 IF CONTRACTOR, AT ANY TIME DURING THE TERM OF TITS AGREEMENT, INCURS A DEBT, AS THE WORD IS DEFINED IN SECTION 15-122 OF THE HOUSTON CITY CODE OF ORDINANCES, IT SHALL IMMEDIATELY NOTIFY CITY CONTROLLER IN WRITING. IF CITY CONTROLLER BECOMES AWARE THAT CONTRACTOR HAS INCURRED A DEBT, IT SHALL IMMEDIATELY NOTIFY CONTRACTOR IN WRITING. IF CONTRACTOR DOES NOT PAY THE DEBT WITHIN 30 DAYS OF EITHER SUCH NOTIFICATION, CITY CONTROLLER MAY DEDUCT FUNDS IN AN AMOUNT EQUAL TO THE DEBT FROM ANY PAYMENTS OWED TO CONTRACTOR UNDER TITS AGREEMENT, AND CONTRACTOR WAIVES ANY RECOURSE THEREFORE.

ARTICLE 8 - TIME

8.1 *PROGRESS AND COMPLETION: Delete Paragraph 8.1.6. and replace with the following 8.1.6.*

8.1.6.1 Contractor shall credit the City by Change Order for inspection services for overtime work or work performed on Sundays or Legal Holidays. The amount Contractor credits the City will be **$50.00 per hour** per inspector for inspection services.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 *UNIT PRICE WORK*: *Delete Section 9.1 in its entirety and insert the following Section 9.1.*

9.1 References to Unit Prices in individual Specification sections are not applicable to the Contract. Include payment for portions of the Work required by these sections in the Stipulated Price for the Contract.

9.12 LIQUIDATED DAMAGES: Insert the following Paragraph 9.12.1.1.

9.12.1.1 The amount of liquidated damages provided in General Conditions Paragraph 9.12.1payable by Contractor or Surety for each and every day of delay beyond Contract Time, are $1,000.00 per day.

ARTICLE 11 - INSURANCE AND BONDS

11.2 *INSURANCE TO BE PROVIDED BY CONTRACTOR: Delete Paragraph 11.2.8. and replace with the following 11.2.8.*

11.2.1.4 Contractor shall provide Owners and Contractor's Protective Liability Insurance only if the contractor's bid price is equal to or greater than $100,000.00.

11.2.8 *Endorsement of Primary Insurance:* Each policy except Workers' Compensation Insurance must contain an endorsement that the policy is primary insurance to any other insurance available to additional insured with respect to claims arising under the Contract.

CITY OF HOUSTON -- BIDDER'S BOND

(Must be in an amount at least 10% of the bid. If the bid is upon alternates tits bond must be for at least 10% of the highest amount for which the bidder offers to do any or all the work bid upon.)

THE STATE OF TEXAS §
§ KNOW ALL MEN BY
THESE PRESENTS:
COUNTY OF HARRIS §

THAT WE, _____ as principal and the other subscriber hereto as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Houston, a municipal corporation in the sum of $_____ Dollars ($_____).

The condition of tits obligation is that: ---

WHEREAS, the said principal is submitting to the City of Houston its or its bid for the doing for the City of Houston of certain work and construction of which the following is a brief description, to-wit: ---

Bid No. S50-C23654

Facility Improvements at Fire Station No. 20 (Phase 2)

in accordance with the plans and specifications for such work upon which such bid is made, to which plans and specifications reference is made for a more full description of the work and construction referred to.

NOW, THEREFORE, if the said bidder is awarded the contract for such work, the said bidder will, within the time provided in the specifications, enter into a contract with the City therefore upon the form and to the purpose and intent provided in the specifications, will furnish insurance as required in the specifications and will furnish a good and sufficient construction surety bond executed by said bidder and one corporate surety organized under the laws of the State of Texas or authorized to do business in the State of Texas and having a fully paid up capital stock of not less than $100,000.00 and duly licensed and qualified by the Board of Insurance Commissioners of the State of Texas, which bond shall be for an amount equal to 100 percent of the contract price and shall be conditioned in accordance with the requirements stated in the specifications upon which such bid is being submitted.

In the event said bidder is unable or fails to execute said contract for the work proposed to be done, is unable or fails to furnish insurance as specified or is unable or fails to furnish said construction bond in the amount and condition as aforesaid, the undersigned principal and surety shall be liable to said City of Houston for the full amount of tits obligation which is here and now agreed upon and admitted as the amount of the damages which will be suffered by the City of Houston on account of the failure of such bidder to so comply with the terms of tits bid.

Executed tits _____day of _____, A.D. 2008.

PRINCIPAL

By_____

By_____

_____
Surety

ONE-YEAR MAINTENANCE BOND

THAT WE, _____, as Principal, hereinafter called Contractor, and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Houston, a municipal corporation, in the sum of $_____, for the payment of which sum well and truly to be made to the City of Houston and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF TITS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about tits day executed a Contract in writing with the City of Houston for _____

_____,

all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of tits instrument as fully and completely as if set out in full herein.

NOW THEREFORE, if the said Contractor shall comply with the provisions of Paragraph 11.5.1 of the General Conditions, and correct work not in accordance with the Contract documents discovered within the established one-year period, then tits obligation shall become null and void, and shall be of no further force and effect; otherwise, the same is to remain in full force and effect.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually received or, if earlier, on the third day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other party at the address prescribed in the Contract documents, or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

IN WITNESS THEREOF, the said Contractor and Surety have signed and sealed tits instrument on the respective dates written below their signatures and have attached current Power of Attorney.

ATTEST, SEAL: (if a corporation)

WITNESS: (if not a corporation)

Name of Contractor

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS:

(SEAL)

_____
Full Name of Surety

_____
Address of Surety for Notice

_____

_____
Telephone Number of Surety

By: _____
Name:
Title:
Date:

By: _____
Name:
Title: Attorney-in-Fact
Date:

Tits Ordinance or Contract has been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. The Legal Department has not reviewed the content of these documents.

_____ _____
Legal Assistant Date

PERFORMANCE BOND

THAT WE, _____, as Principal, (the "Contractor"), and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Houston (the "City"), a municipal corporation, in the penal sum of $_____ for the payment of which sum, well and truly to be made to the City, its successors and assigns, Contractor and Surety do bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

THE CONDITIONS OF TITS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about tits day executed a Contract in writing with the City for _____

_____,

all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of tits instrument as fully and completely as if set out in full herein.

NOW THEREFORE, if the said Contractor shall faithfully and strictly perform the Contract in all its terms, provisions, and stipulations in accordance with its true meaning and effect, and in accordance with the Contract documents referred to therein and shall comply strictly with each and every provision of the Contract and with tits Bond, then tits obligation shall become null and void and shall have no further force and effect; otherwise the same is to remain in full force and effect. Should the Contractor fail to faithfully and strictly perform the Contract in all its terms, including but not limited to the indemnifications thereunder, the Surety shall be liable for all damages, losses, expenses and liabilities that the City may suffer in consequence thereof, as more fully set forth herein.

It is further understood and agreed that the Surety does hereby relieve the City or its representatives from the exercise of any diligence whatever in securing compliance on the part of the Contractor with the terms of the Contract, and the Surety agrees that it shall be bound to take notice of and shall be held to have knowledge of all acts or omissions of the Contractor in all matters pertaining to the Contract. The Surety understands and agrees that the provision in the Contract that the City will retain certain amounts due the Contractor until the expiration of 30 days from the acceptance of the Work is intended for the City's benefit, and the City will have the right to pay or withhold such retained amounts or any other amount owing under the Contract without changing or affecting the liability of the Surety hereon in any degree.

It is further expressly agreed by Surety that the City or its representatives are at liberty at any time, without notice to the Surety, to make any change in the Contract documents and in the Work to be done hereunder, as provided in the Contract, and in the terms and conditions thereof, or to make any change in, addition to, or deduction from the Work to be done hereunder; and that such changes, if made, shall not in any way vitiate the obligation in tits Bond and undertaking or release the Surety there from.

It is further expressly agreed and understood that the Contractor and Surety will fully indemnify and save harmless the City from any liability, loss, cost, expense, or damage arising

out of Contractor's performance of the Contract.

If the City gives Surety notice of Contractor's default, Surety shall, within 45 days, take one of the following actions:

1. Arrange for Contractor, with consent of the City, to perform and complete the Contract; or

2. Take over and assume completion of the Contract itself, through its agents or through independent contractors, and become entitled to the payment of the balance of the Contract Price.

If the Surety fails to take either of the actions set out above, it shall be deemed to have waived its right to perform and complete the Contract and receive payment of the balance of the Contract Price and the City shall be entitled to enforce any remedies available at law, including but not limited to completing the Contract itself and recovering any cost in excess of the Original Contract Price from the Surety.

Tits Bond and all obligations created hereunder shall be performable in Harris County, Texas. Tits Bond is given in compliance with the provisions of Chapter 2253, Texas Government Code, as amended, which is incorporated herein by tits reference.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually received or, if earlier, on the third day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other Party at the address prescribed in the Contract documents, or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

EXECUTED in multiple originals tits_____ day of_____, 20_____.

ATTEST/SEAL: (if a corporation)
WITNESS: (if not corporation)

_____
(Name of Principal)

_____
(Address of Principal)

By: _____
Name:
Title:
Date:

By: _____
Name:
Title:
Date:

ATTEST/SEAL
SURETY WITNESS:

_____
(Name of Surety)

_____
(Address of Surety)

By: _____
Name:
Title:
Date:

By: _____
Name:
Title:
Date:

REVIEWED:

Tits Bond has been reviewed as to form by the undersigned Paralegal and has been found to meet established Legal Department criteria.

_____
Date

_____
Paralegal

STATUTORY PAYMENT BOND

THAT WE, _____, as Principal, hereinafter called Contractor and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound unto the City of Houston, a municipal corporation, in the sum of $_____ for the payment of which sum, well and truly to be made to the City of Houston, and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF TITS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about tits day executed a contract in writing with the City of Houston for _____ _____, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of tits instrument as fully and completely as if set out in full herein;

NOW, THEREFORE, if the said Contractor shall pay all claimants supplying labor and materials to him or a Subcontractor in the prosecution of the Work provided for in the Contract, then, tits obligation shall be void; otherwise the same is to remain in full force and effect;

PROVIDED HOWEVER, that tits Bond is executed pursuant to the provisions of Chapter 2253, Texas Government Code, as amended, and all liabilities on tits Bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

IN WITNESS THEREOF, the said Contractor and Surety have signed and sealed tits instrument on the respective dates written below their signatures and have attached current Power of Attorney.

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

_____
Name of Contractor

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS:

(SEAL)

_____
Full Name of Surety

_____
Address of Surety for Notice

_____

_____
Telephone Number of Surety

By: _____
Name:
Title:
Date:

By: _____
Name:
Title: Attorney-in-Fact
Date:

Tits Ordinance or Contract has been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. The Legal Department has not reviewed the content of these documents.

_____ _____
Legal Assistant Date