

Schematic Design Submittal

FOR

Fort Bend County Libraries Administration Building Richmond, Texas

PROJECT NO. 12010

ISSUE FOR SCHEMATIC DESIGN SUBMITTAL

Document Incomplete: Not intended for permit, bidding or construction
Architect: Ray D. Leiker TX Reg. No. 5591

BAILEY ARCHITECTS
55 WAUGH DRIVE, SUITE 450
HOUSTON, TEXAS 77007
713.524.2155

KELLY R. KALUZA & ASSOCIATES, INC.
Civil Engineers
HOUSTON, TEXAS

SCA CONSULTING ENGINEERS
Structural Engineers
HOUSTON, TEXAS

HENDERSON ENGINEERS, INC
MEP Engineers
HOUSTON, TEXAS

4B TECHNOLOGY GROUP, LLC
IT / Audio Visual Consultants
AUSTIN, TEXAS

KUDELA & WEINHEIMER, L.L.C.
Landscape Consultants
HOUSTON, TEXAS

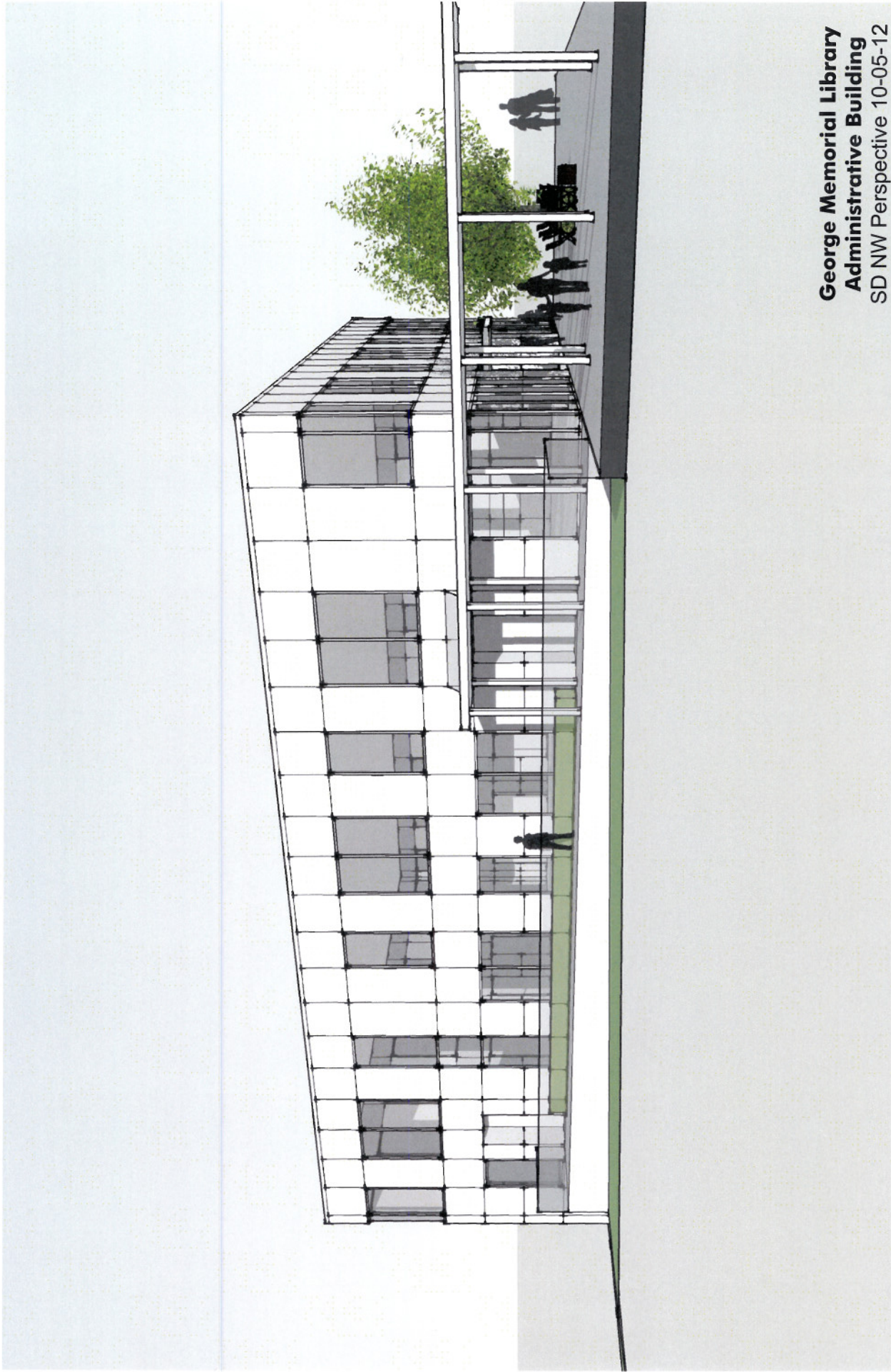
Perspectives



**George Memorial Library
Administrative Building**
SD SW Perspective 10-05-12

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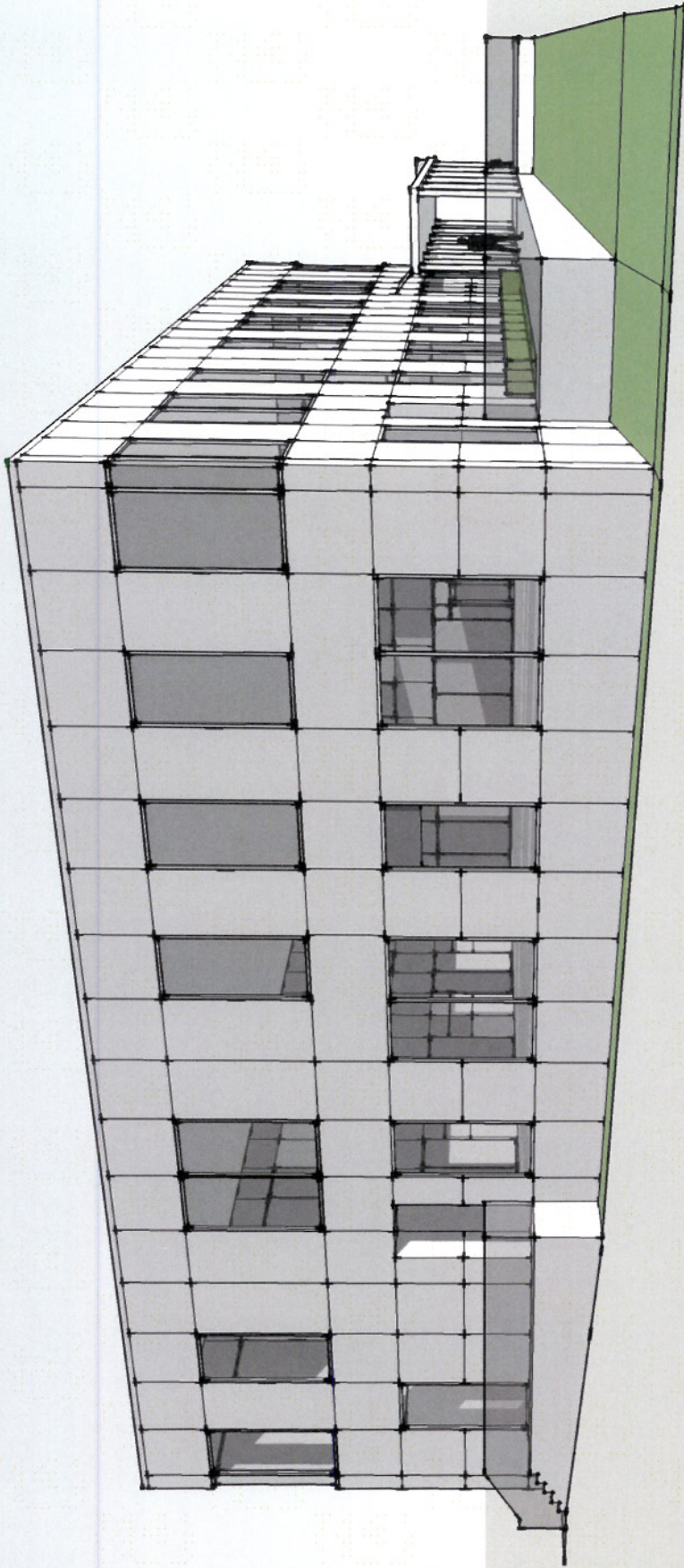
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SD NW Perspective 10-05-12

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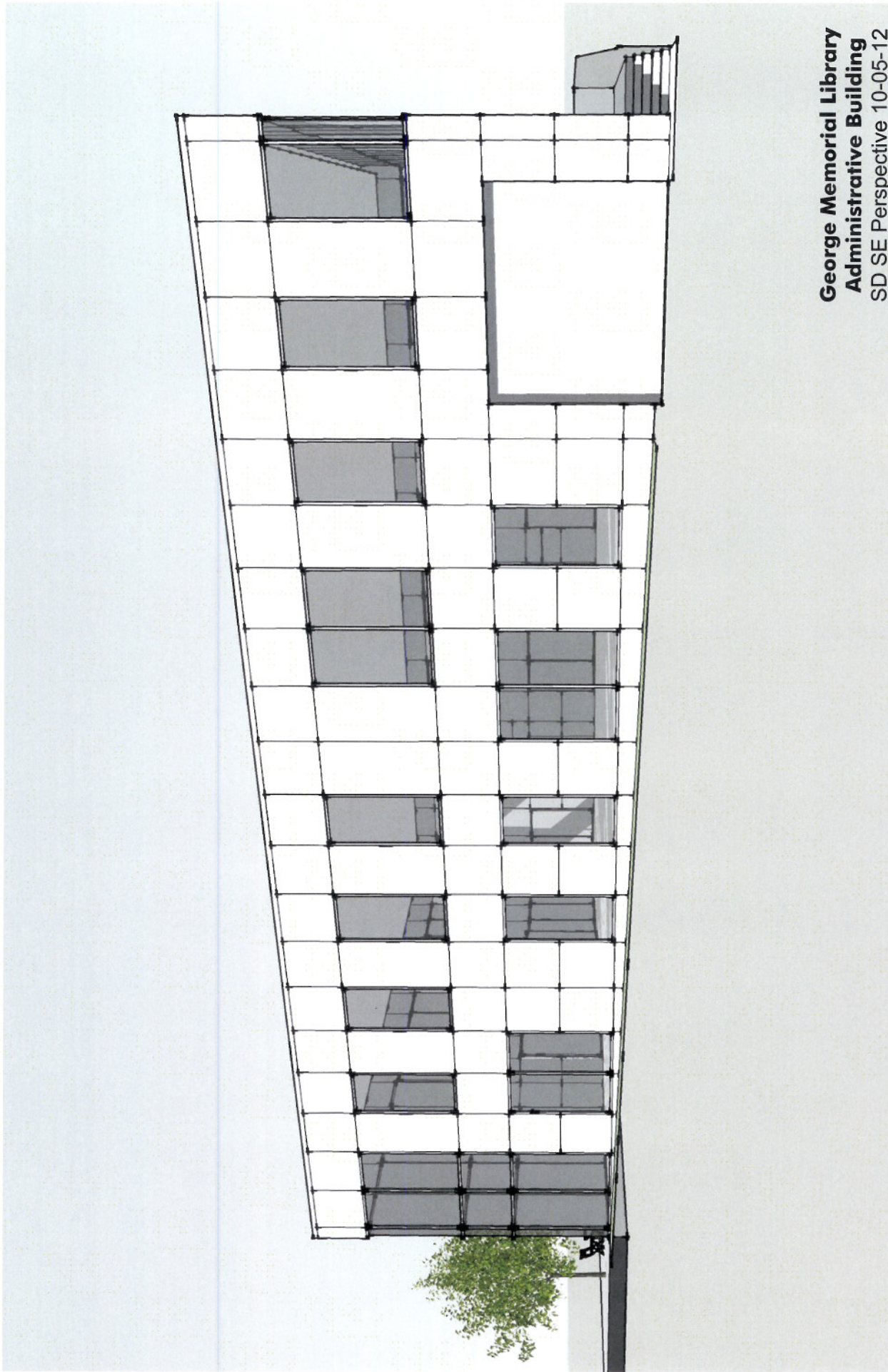
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Administrative Building**
SD SW Perspective 10-05-12

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SD SE Perspective 10-05-12

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Plans

ISSUE	DATE	DESCRIPTION
08/11/12	10/10/2012	10/10/2012

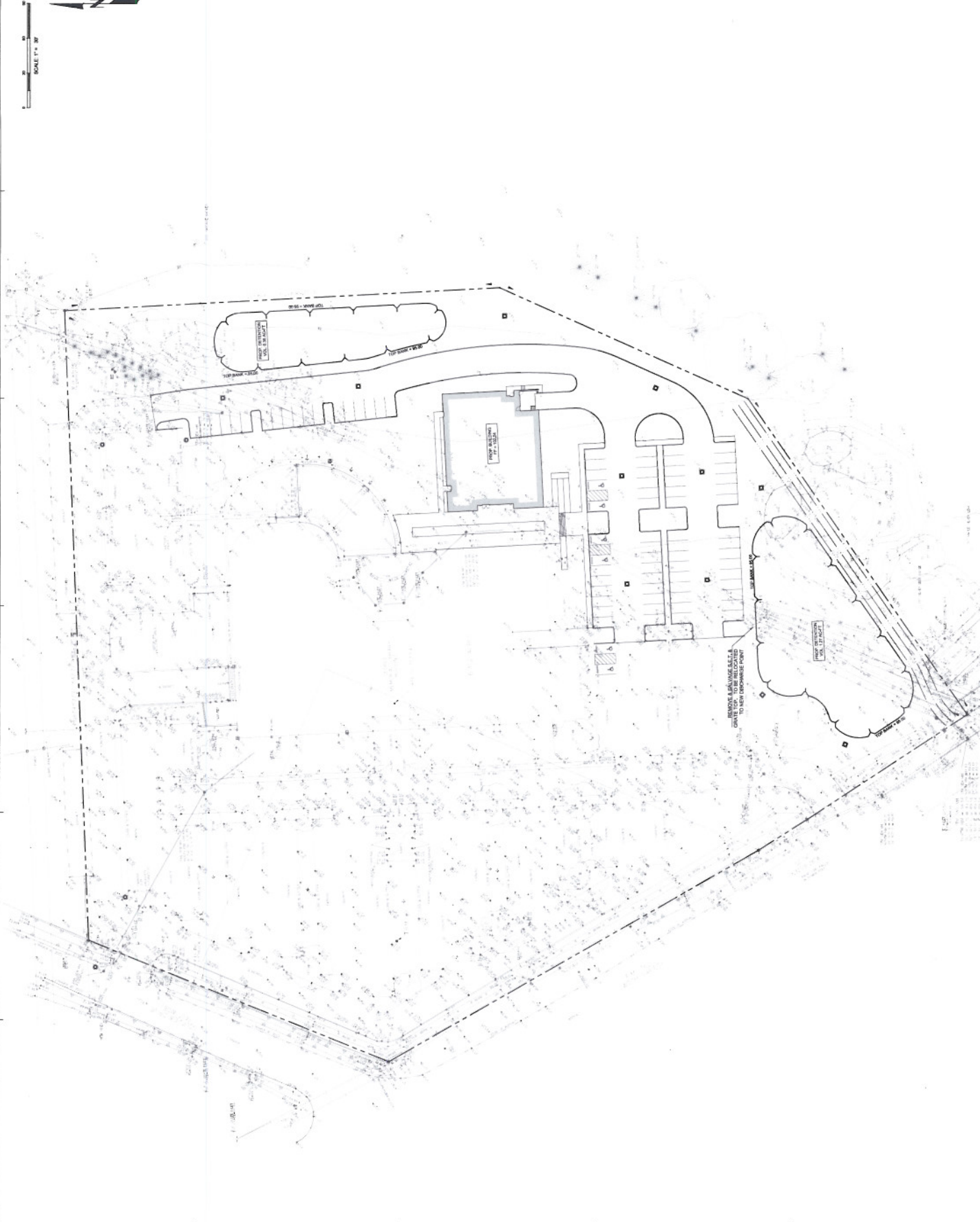
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DATE OF FILE	10/10/2012
DATE OF	10/10/2012
CREATED BY	10/10/2012
COMPILED BY	10/10/2012

Sheet Title:

Civil Site Plan

Sheet No.:

C-101



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 ARCHITECT: RAY D. LEIKER
 PROJECT NO: 1010
 ISSUE DATE: 10/20/12

ADMINISTRATION BUILDING
 PORT BEND COUNTY LIBRARIES
 1001 GOLFWAY DRIVE
 RICHMOND, TEXAS

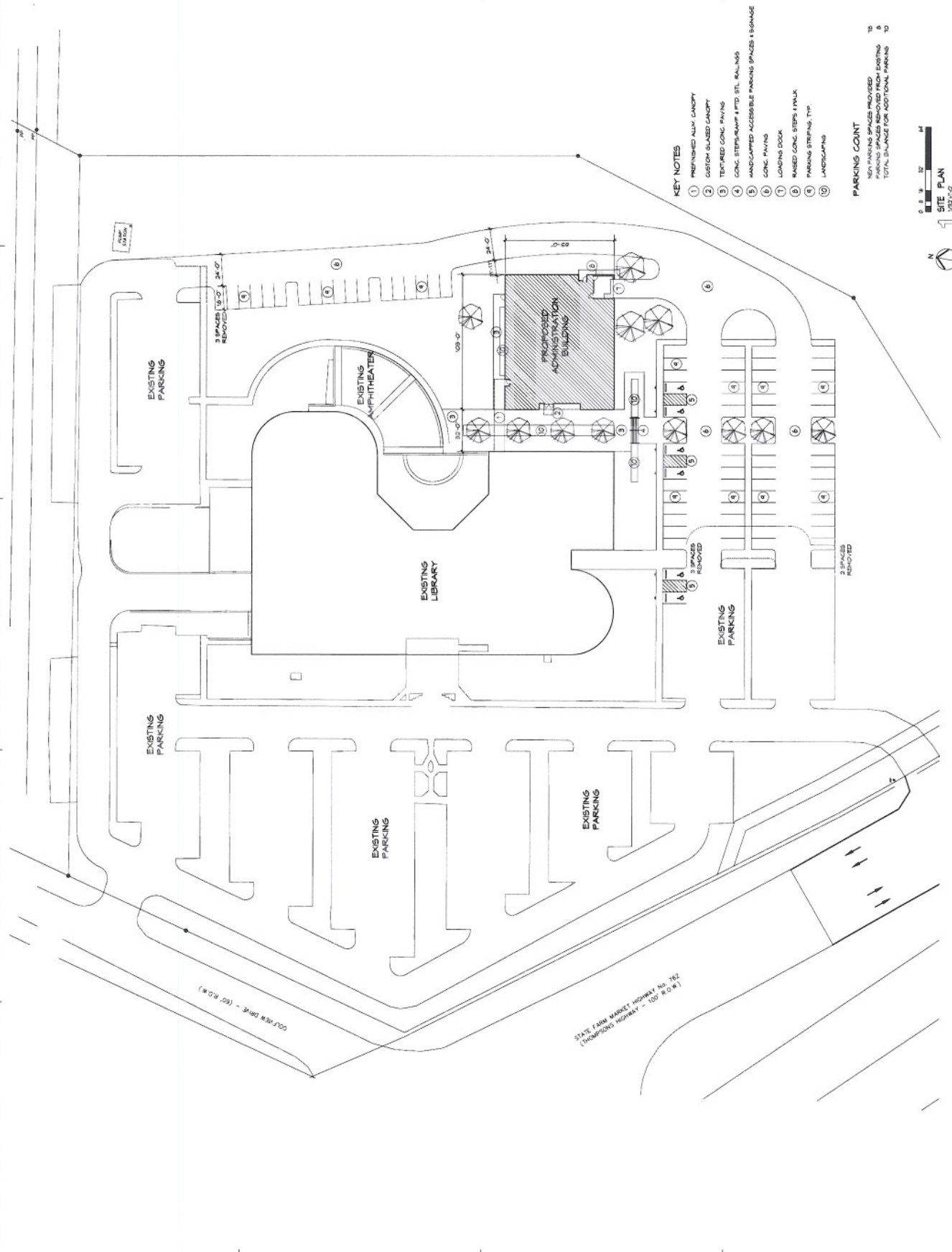
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10/20/12	10/20/12	ISSUED FOR RFP

PROJECT NO: 1010
 OLD BLD FILE:
 DRAWN BY: SM
 CHECKED BY:
 DATE: 10/20/12
 SHEET TITLE:

SITE PLAN

Sheet No.:

A-101



PARKING COUNT
 10 EXISTING SPACES
 10 NEW SPACES
 20 TOTAL SPACES

KEY NOTES

1. PREPARED ALUM CANOPY
2. GUTTER GUARD CANOPY
3. TEXTURED CONG PAVING
4. CONG STEPS/RAMP & FTD STL RAILINGS
5. HANDICAPPED ACCESSIBLE PARKING SPACES & SIGNAGE
6. CONG PAVING
7. LOADING DOCK
8. RAISED CONG STEPS & FULK
9. PARKING STRIPES TYP
10. LANDSCAPING

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 construction.
 Architect: Bailey Architects
 Registration: 5391-17
 Issue Date: 10/29/12

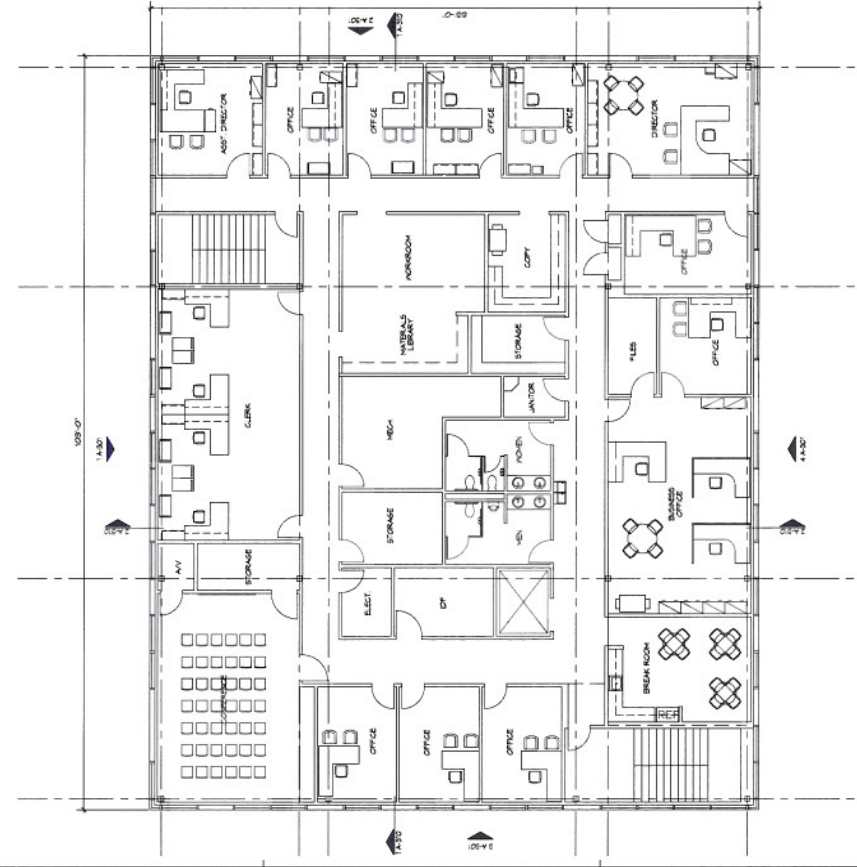
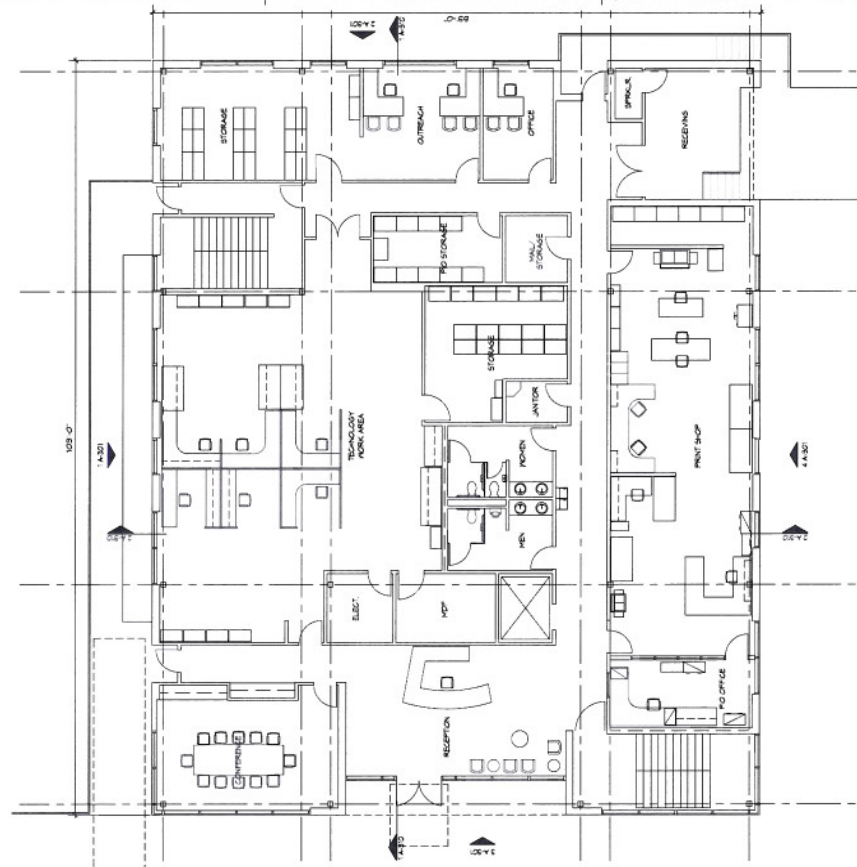
ADMINISTRATION BUILDING
 FORT BEND COUNTY LIBRARIES
 1801 GOLFVIEW DRIVE
 RICHMOND, TEXAS

PROJECT NO.	13193
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DESIGNED BY	10/29/12
DESIGNED FOR	10/29/12
DESIGNED BY	10/29/12
DESIGNED FOR	10/29/12
DESIGNED BY	10/29/12

PROJECT NO.: 13193
 DATE: 10/29/12
 DESIGNED FOR: 10/29/12
 DESIGNED BY: 10/29/12
 DESIGNED FOR: 10/29/12
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 DESIGNED FOR: 10/29/12
 DESIGNED BY: 10/29/12

FLOOR PLANS

Sheet No.:
A-201



Building Elevations

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 ARCHITECT: RAY D. LUDER
 PROJECT: PORT BEND COUNTY LIBRARY
 ISSUE DATE: 10/26/12

PORT BEND COUNTY LIBRARY
 1901 GOLFVIEW DRIVE
 RICHMOND, TEXAS
ADMINISTRATION BUILDING

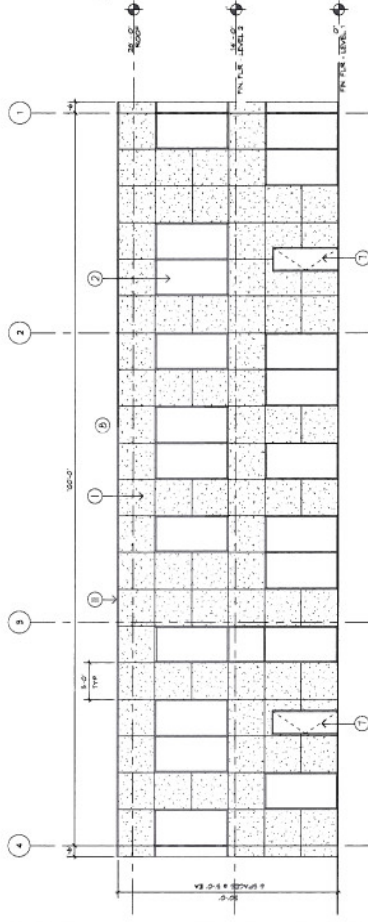
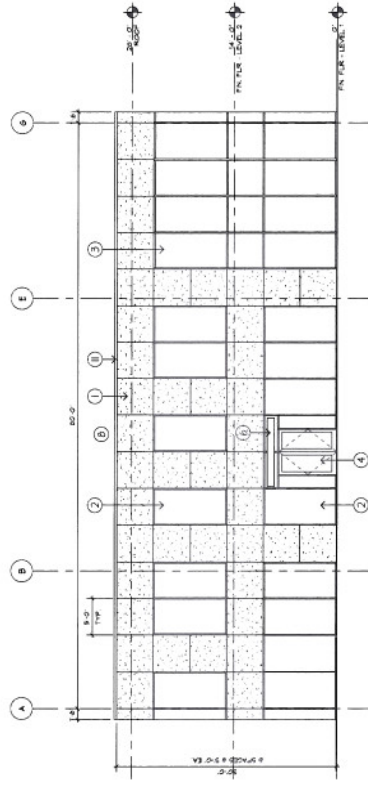
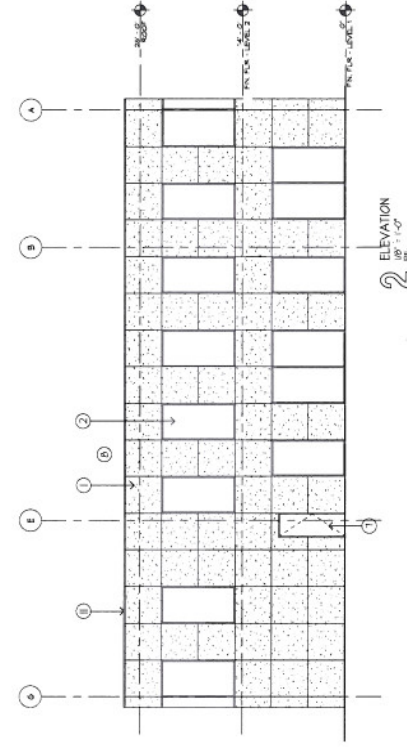
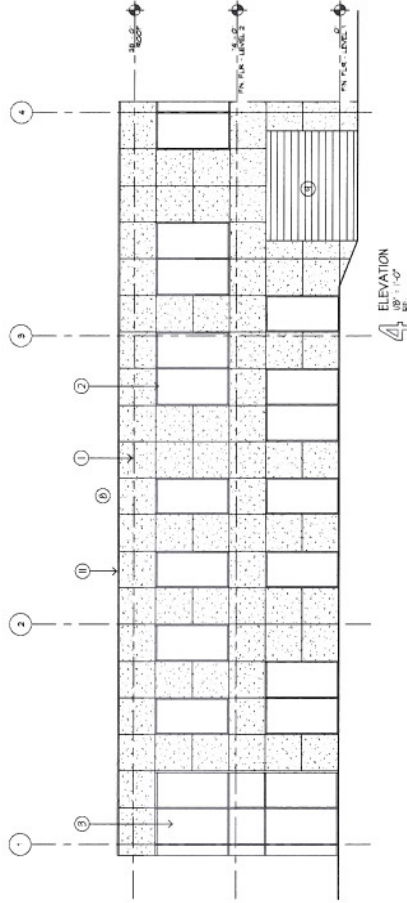
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24 SEP 2012	ISSUED FOR 3D	
PROJECT NO.:	10010	
CAD FILE NAME:		
DESIGNED BY:	SM	
CHECKED BY:		
DATE:		
COMMENTS:	© Bailey Architects - 2012	
SHEET TITLE:	ELEVATIONS	

Sheet No.:

A-301

KEY NOTES

- 1 ARCHITECTURAL PRECAST CONCRETE PANELS
- 2 ALUM. STOREFRONT SYSTEM W/ 1" INSULATED LOWE GLAZING
- 3 ALUM. CURTAINWALL SYSTEM W/ 1" INSULATED LOWE GLAZING
- 4 ALUM. ENTRANCE DOORS
- 5 NOT USED
- 6 CUSTOM GLAZED GLAZING
- 7 PTD. HOLLOW METAL DOOR
- 8 PREFRIGED ALUM. REG. SCREEN LOWER (NOT SHOWN IN IMAGE)
- 9 OVERHEAD SIL. COLLING DOOR
- 10 ST. QUADRANT
- 11 PREFRIGED MYL COATING



Outline Specs

DOCUMENT 00 0110 - TABLE OF CONTENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

Document 00 0101	Project Title Page
Document 00 0110	Table of Contents

PROCUREMENT REQUIREMENTS

Document 00 3132	Subsurface Investigation
Document 00 6536	Project Warranty Form for General Construction
Document 00 6537	Special Project Warranty Form

BIDDING AND CONTRACTING REQUIREMENTS

DOCUMENTS PROVIDED BY FORT BEND COUNTY
Request for Proposals / General Contractor Services –
Fort Bend County University Branch Library
RFP 10-102

DIVISION 1 GENERAL REQUIREMENTS

Section 01 1000	Summary of Work
Section 01 1001	Architectural Facade Mock-Up
Section 01 2513	Product Substitution Procedures
Section 01 3119	Project Meetings
Section 01 3200	Construction Progress Documentation
Section 01 3300	Submittal Procedures
Section 01 4000	Quality Control
Section 01 4529	Testing Laboratory Services
Section 01 5000	Temporary Facilities and Controls
Section 1560	Temporary Tree and Plant Protection
Section 01 6000	Product Requirements
Section 01 7123	Field Engineering
Section 01 7410	Cleaning Up
Section 01 7419	Waste Management and Disposal
Section 01 7700	Closeout Procedures
Section 01 7823	Operation and Maintenance Data
Section 01 7839	Project Record Documents
Section 01 7900	Demonstration and Training

DIVISION 2 SITE/CONSTRUCTION/EXISTING CONDITIONS

Section 02082	Pre-Cast Concrete Manholes
Section 02084	Frames, Grates, Rings and Covers
Section 02086	Adjusting Manholes, Inlets, and Valve Boxes to Grade
Section 02215	Landscape Grading
Section 02221	Removing Existing Pavements, Structures, Wood, and Demolition Debris
Section 02316	Excavation and Backfill for Structures
Section 02317	Excavation and Trenching
Section 02319	Borrow and Embankment
Section 02320	Utility Backfill Materials
Section 02321	Cement Stabilized Sand
Section 02336	Lime Stabilized Subgrade
Section 02337	Lime/Fly-Ash Stabilized Subgrade
Section 02338	Portland Cement Stabilized Subgrade
Section 02378	Rip Rap and Granular Fill
Section 02501	Ductile Iron Pipe and Fittings
Section 02502	Steel Pipe and Fittings
Section 02505	High Density Polyethylene (HDPE) Solid and Profile Wall Pipe

DIVISION 2 SITE/CONSTRUCTION/EXISTING CONDITIONS (CONT'D)

Section 02506	PVC Pipe
Section 02511	Water Mains
Section 02512	Water Tap and Service Line Installation
Section 02513	Wet Connections
Section 02514	Disinfection of Water Lines
Section 02515	Hydrostatic Testing of Pipelines
Section 02520	Fire Hydrants
Section 02521	Gate Valves
Section 02523	Pressure Reducing Valves
Section 02525	Tapping Sleeves and Valves
Section 02526	Water Meters
Section 02531	Gravity Sanitary Sewers
Section 02533	Acceptance Testing for Sanitary Sewers
Section 02611	Reinforced Concrete Pipe
Section 02631	Storm Sewers
Section 02632	Cast-in-Place Inlets, Headwalls, and Wingwalls
Section 02633	Precast Concrete Inlets, Headwalls, and Wingwalls
Section 02711	Hot Mix Asphalt Base Course
Section 02712	Cement Stabilized Base Course
Section 02741	Asphaltic Concrete Pavement
Section 02751	Concrete Paving
Section 02752	Concrete Pavement Joints
Section 02753	Concrete Pavement Curing
Section 02754	Concrete Driveways
Section 02771	Curb, Curb and Gutter, and Headers
Section 02772	Concrete Medians and Directional Islands
Section 02810	Landscape Irrigation
Section 02905	Tree Transplanting
Section 02910	Soil Preparation
Section 02920	Turf and Grasses
Section 02930	Trees Shrubs and Groundcovers
Section 02935	Landscape Maintenance for 90 Days
Section 02936	Landscape Maintenance for 12 Months

DIVISION 3 CONCRETE

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Section 03315	Concrete for Utility Construction
Section 03 3519.13	Special Concrete Finishes
Section 03 4500	Precast Architectural Concrete

DIVISION 4 MASONRY

Section 04 0500	Mortar and Masonry Grout
Section 04 0523	Masonry Accessories
Section 04 4110	Granite
Section 04 2200	Concrete Unit Masonry

DIVISION 5 METALS

Section 05 1200	Structural Steel Framing
Section 05 1213	Architecturally Exposed Structural Steel (AESS)
Section 05 2100	Steel Joist Framing
Section 05 3100	Steel Decking
Section 05 4000	Cold Formed Metal Framing
Section 05 5000	Metal Fabrications
Section 05 5100	Metal Stairs and Railings

DIVISION 6 WOOD, PLASTICS AND COMPOSITES

Section 06 1000	Rough Carpentry
Section 06 4000	Architectural Woodwork

DIVISION 7 THERMAL AND MOISTURE PROTECTION

Section 07 1600	Elevator Pit Waterproofing
Section 07 1900	Water-Repellent Coating
Section 07 2100	Thermal Insulation
Section 07 2616	Vapor Retarder
Section 07 2726	Vapor-Permeable Fluid-Applied Air Barrier
Section 07 4243	Composite Wall Panels
Section 07 5216	Modified Bitumen Membrane Roof System
Section 07 6000	Flashing and Sheet Metal
Section 07 6500	Through-Wall Flashing
Section 07 7213	Manufactured Curbs
Section 07 7233	Roof Hatches
Section 07 8400	Firestopping
Section 07 9200	Joint Sealants

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Section 08 1100	Hollow Metal Doors and Frames
Section 08 1216	Prefinished Interior Aluminum Frames
Section 08 1400	Wood Doors
Section 08 3100	Access Doors and Panels
Section 08 3300	Overhead Coiling Doors
Section 08 4413	Aluminum Entrances, Framing and Curtain Wall Framing Systems
Section 08 7100	Door Hardware
Section 08 7111	Door Schedule
Section 08 8000	Glazing
Section 08 9119	Extruded Aluminum Louvers

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Section 09 5100	Acoustical Ceilings
Section 09 6500	Resilient Flooring
Section 09 6536	Static-Dissipative Resilient Flooring
Section 09 6813	Carpet Tile
Section 09 9000	Painting and Coating
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Section 10 2113	Metal Toilet Compartments
Section 10 2813	Toilet Accessories
Section 10 4400	Fire Protection Specialties
Section 10 5113	Metal Lockers
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Section 13 4813 Vibration Control Components

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Section 14 2000 Machine Roomless (MRL) Passenger Elevators

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Section 21 1000 Water-Based Fire-Suppression Systems

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Section 22 0015 Coordination
Section 22 0500 Common Work Results for Plumbing
Section 22 0513 Common Motor Requirements for Plumbing Equipment
Section 22 0515 Basic Piping Materials and Methods
Section 22 0516 Expansion Fittings and Loops for Plumbing Piping
Section 22 0519 Meters and Gauges for Plumbing Piping
Section 22 0523 General-Duty Valves for Plumbing Piping
Section 22 0529 Hangers and Supports for Plumbing Piping
Section 22 0533 Hot Water Temperature Maintenance System for Plumbing Piping
Section 22 0553 Identification for Plumbing Piping and Equipment
Section 22 0700 Plumbing Insulation
Section 22 1100 Water Distribution Piping and Specialties
Section 22 1111 Mechanically Joined Plumbing Piping Systems
Section 22 1123 Domestic Water Pumps
Section 22 1300 Sanitary Drainage and Vent Piping and Specialties
Section 22 1329 Sanitary Sewerage Pumps
Section 22 1400 Storm Drainage Piping and Specialties
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Section 22 3200 Domestic Water Filtration Equipment
Section 22 3300 Electric Domestic Water Heaters
Section 22 4000 Plumbing Fixtures
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Section 23 0015 Electrical Coordination for Mechanical Equipment
Section 23 0130_51 HVAC Air Duct Cleaning
Section 23 0500 Common Work Results for HVAC
Section 23 0513 Common Motor Requirements for HVAC Equipment
Section 23 0514 Variable Frequency Drives
Section 23 0529 Hangers and Supports for HVAC Piping and Equipment
Section 23 0550 Vibration Isolation for HVAC Piping and Equipment
Section 23 0553 Identification for HVAC Piping and Equipment
Section 23 0593 Testing, Adjusting, and Balancing for HVAC
Section 23 0700 HVAC Insulation
Section 23 0800 Commissioning of HVAC Systems
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Section 23 3113 Metal Ducts

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Section 23 3416	Centrifugal HVAC Fans
Section 23 3600	Air Terminal Units
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Section 23 7413	Outdoor Packaged Heating and Cooling Units
Section 23 8500	Electric Heating Units

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Section 26 0010	General Electrical Requirements
Section 26 0500	Common Work Results for Electrical
Section 26 0502	Equipment Wiring Systems
Section 26 0504	Provisions for Electrical Utility Service
Section 26 0519	Low-Voltage Electrical Power Conductors and Cables
Section 26 0523	Control-Voltage Electrical Power Cables
Section 26 0526	Grounding and Bonding for Electrical Systems
Section 26 0529	Hangers and Supports for Electrical Systems
Section 26 0533	Raceway and Boxes for Electrical Systems
Section 26 0536	Cable Trays for Electrical Systems
Section 26 0543	Underground Ducts and Raceways for Electrical Systems
Section 26 0553	Identification for Electrical Systems
Section 26 0573	Overcurrent Protective Device Coordination Study
Section 26 0923	Lighting Control Devices
Section 26 2200	Low-Voltage Transformers
Section 26 2413	Switchboards
Section 26 2416	Panelboards
Section 26 2600	Power Distribution Units
Section 26 2726	Wiring Devices
Section 26 2813	Fuses
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Section 26 4313	Surge Protective Devices External to Power Distribution Equipment
Section 26 5100	Interior Lighting
Section 26 5600	Exterior Lighting

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Section 27 0526	Grounding and Bonding for Communications Systems
Section 27 0528	Pathways for Communications Systems
Section 27 0543	Underground Duct and Raceway
Section 27 1100	Communications Equipment Room Fittings
Section 27 1300	Communications Backbone Cabling
Section 27 1500	Communications Horizontal Cabling
Section 27 4100	Audiovisual Systems

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

Section 28 1300	Access Control and CCTV System
Section 28 2300	Video Surveillance
Section 28 3102	Fire Alarm Systems

DIVISION 31 EARTHWORK

Section 31 1013	Site Preparation
Section 31 2316	Excavating, Backfilling and Compacting for Structures
Section 31 3116	Soil Treatment for Termite Control

DIVISION 32 EXTERIOR IMPROVEMENTS

Section 32 0190.13	Landscape Maintenance for 90 Days
Section 32 3132	Fixed Louver Fence and Gate
Section 32 8400	Planting Irrigation
Section 32 9113	Soil Preparation
Section 32 9119	Landscape Grading
Section 32 9200	Turf and Grasses
Section 32 9313	Trees, Shrubs and Groundcover

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End of Table of Contents Document 00 0110

SD Cost Estimate

FORT BEND COUNTY LIBRARIES

ADMINISTRATION BUILDING

George Memorial Library Richmond, Texas

SCHEMATIC DESIGN - Estimated Construction Cost

BAI Project No. 12010

w/ Granite Panels

10/23/12

PROJECT SPECIFICS			ESTIMATE SUMMARY		TOTAL	\$ / SF
BUILDING AREA						
Renovation	N/A		Sitework		188,989	11.20
Ground Floor			Demolition		0	0.00
Elevated Floor (s)			Site Amenities		43,596	2.58
Total Building Area - Sq Ft	16,870	GSF Used for \$ / SF Calcs	Concrete		267,104	15.83
Int. Open to Below	0 SF		Masonry / 3cm Granite Panels		324,537	19.24
Ext. Porches / Balconies	0 SF		Structural Steel		317,105	18.80
Total Structure Area - Sq Ft	16,870	GSF Used for \$ / SF Calcs	Carpentry		28,093	1.67
			Millwork		60,400	3.58
			Insulation		12,600	0.75
			Fireproofing		0	0.00
BUILDING COMPONENTS			Waterproofing		76,700	4.55
Building Pad			Roof / Sheetmetal		65,738	3.90
Foundation / Slab	Slab on Fill		Doors, Frames, and Hardware		58,262	3.45
Structure	Class A, Composite Metal Deck, Joist Roof		Overhead Doors		7,000	0.41
Interior Partitions	Drywall		Glass & glazing		225,711	13.38
Exterior Skin Types (s)	Hand-set 3cm Granite Panels, Curtain Wall		Lath & Plaster		3,375	0.20
Roofing Type (s)	Modified Bitumen		Drywall		110,325	6.54
Floor Finishes	Carpet, VCT, Tile		Acoustical		22,275	1.32
Ceiling Finishes	Acoustical Ceiling		Tile & Terrazzo		18,264	1.08
Wall Finishes	Paint Vinyl Wallcovering		Floor coverings		37,557	2.23
Equipment			Painting / Wall Coverings		21,750	1.29
Furnishings			Specialties / Canopy		50,720	3.01
Elevators	3,500 lbs. 2-Stop elevator		Equipment		16,188	0.96
Fireproofing			Furnishings		8,250	0.49
Fire Protection	Wet Pipe System		Special Constructions		0	0.00
Plumbing			Conveying Systems		45,375	2.69
HVAC			Fire Protection		42,925	2.54
Electrical & Systems			Plumbing		108,180	6.41
Fire Alarm/Security			Site Utilities		278,020	16.48
Data/IT/Access			HVAC		178,275	10.57
			Electrical & special Systems		333,680	19.78
			SUBTOTAL		\$2,950,994	\$175
			General Conditions	236,080	8.00%	13.99
			Insurance	47,216	1.60%	2.80
			G.C. Overhead & Profit	95,907	3.25%	5.69
			Performance & Payment Bonds	29,510	1.00%	1.75
			Resale Tax	0	0.00%	0.00
			Contingency	221,325	7.50%	13.12
			GRAND TOTAL		\$3,581,031	\$212.27

Appendices

MEP Appendix



kansas city phoenix houston new york metro
tampa las vegas manhattan ks dallas bentonville

MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SCHEMATIC DESIGN INTENT

**THE GEORGE MEMORIAL LIBRARY – ADMINISTRATION BLDG, RICHMOND, TEXAS
SEPTEMBER 17, 2012**

GENERAL

This document presents the basic MEP design intent.

1. SCOPE

- A. The MEP conceptual schematic design narrative describes the basis for design of the Heating, Ventilating, Air Conditioning, Plumbing, Electrical, and Fire Protection systems for this project.
- B. The plumbing system will consist of utility connections, fixtures, equipment, waste and vent piping, hot and cold water distribution system, roof drainage system (both primary and secondary piped interior to building), and condensate piping.
- C. The building requires an automatic fire protection sprinkler system per the City of Richmond amendments to the International codes issued as part of Ordinance No. 2008-13.
- D. Criteria for MEP systems contained herein reflect generally accepted industry standards.

2. STANDARDS AND CODES

- A. ASHRAE Handbooks and Standards
- B. 2006 International Building Code
- C. 2006 International Mechanical Code
- D. 2006 International Plumbing Code
- E. 2006 International Fire Code
- F. 2006 International Fuel Gas Code
- G. 2008 National Electrical Code
- H. 2006 International Energy Conservation Code
- I. NFPA – National Fire Protection Association
- J. ADA - 1991

HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

1. DESIGN CONDITIONS

- A. The cooling 0.4% dry bulb and 0.4% wet bulb (non-coincident) outside summer design conditions for Houston, Texas and heating 99.6% dry-bulb will be used for design purposes. These values have been withdrawn from the 2005 ASHRAE Fundamentals Heating and Cooling Design Conditions, Chapter 26, Tables 1A and 1B.

- B. Design Criteria. The following temperatures shall be used in the design of the HVAC systems for the building.

	<u>Heating</u>	<u>Cooling</u>
Ambient Design Temperatures:	27.7°F DB	96.9°F DB, 76.8°F WB
Inside Temperatures:	<u>Winter</u>	<u>Summer</u>
All occupied areas (conditioned)	70°F	75°F, 50% RH
Mechanical Rooms	65°F	80°F
Transformer, Switch-gear and Communications Equipment Rooms	Ventilated	Ventilated

- C. Minimum outside air ventilation rates shall conform to Table 403.3 of the 2006 International Mechanical Code and will be based on the anticipated occupancy of the facility.

<u>Outside Air Quantity</u>	<u>2006 IMC – Table 403.3</u>
Offices	20 cfm/person
Conference/Meeting Rooms	20 cfm/person
Reception	15 cfm/person
Corridor and Utilities	0.05 cfm/sq. ft.
Shipping/Receiving	0.15 cfm/sq. ft.
Storage Rooms	0.15 cfm/sq. ft.

<u>Exhaust Air Quantity</u>	
Toilet/Janitor	75 cfm/fixture
Break Room	Exhaust cfm > supply air to maintain negative pressure to adjacent
Other	As required by Code or ventilation load

- D. Interior Loads For Cooling System Design – Preliminary estimate based on initial block load calculation resulted in approximately 60 tons. See Appendix A for room take-off estimates based on space planning meeting held June 14, 2012 and RTU load Summaries.

- E. NC (Noise Criteria) Guidelines for Air System Design

Office/Administration	NC 30 to 35
Conference rooms	NC 25 to 30

- F. Assumed building material insulation factors for the preliminary load calculation will be as follows per the 2006 IECC:

Walls R-value	13 ft ² ·°F·hr/Btu
Roof R-value	15 ft ² ·°F·hr/Btu
Window U-value	0.75
Window Shading coefficient	0.40
Vertical Fenestration Area	40% of above-grade wall
Wall Height	14 ft
Ceiling Height	10 ft

2. HVAC SYSTEMS

A. System Types:

The recommendation that follows is based on budget, available technical capability of maintenance staff, comfort control/capability, energy efficiency, and the desire for roof mounted packaged equipment as outlined in the June 14, 2012 meeting. All systems should use non-CFC and non-HCFC refrigerants. Based on this criterion, we believe the following is best suited for this project.

1. Building to be served by two DX packaged RTUs utilizing variable air volume (approximately 30 tons each). Each RTU dedicated to one floor.
 - a) RTU components: MERV 13 air filtration, DX cooling coil, supply air fan with VFD, and electric or gas (as available) pre-heat coil
 - b) Minimum full load efficiency is 9.5 EER at ARI conditions, but would recommend higher efficiency, lower operating cost equipment if budget allows for first-cost increase
 - c) Single duct, fan powered, series terminal units, with electric re-heat at zone-level for air distribution.
 - d) Plenum return air path
2. A Building Automation System (BAS) shall be included for scheduling and operation of equipment. This control system will be specified to tie into the existing GML controls system and will consist of it's own microprocessor-based panel with unit controllers located at each air system.
3. Based on quantity of outside air, exhaust air, and building pressurization air required, energy recovery (e.g. enthalpy/sensible wheel for outside air pretreatment) is not feasible for this project.

3. AIR DISTRIBUTION SYSTEM:

- A. All conditioned air will be supplied through galvanized steel ductwork conforming to SMACNA Standards. All rectangular supply and return ductwork will be wrapped with 2 inch, 1 lb. density fiberglass insulation for thermal control. Where available, the ceiling plenum will be used for return air. Return air transfer boots or return ductwork will be designed for noise-sensitive rooms.
- B. Double-wall insulated duct will be utilized in areas with exposed ceilings.
- C. A central exhaust system will be designed to serve restrooms, janitor's closets, and other pollutant producing spaces (e.g. Break Room, Print Room).

4. NOISE AND VIBRATION CONTROL

- A. Acoustical and vibration treatment will be provided to help control HVAC system noise.
- B. Vibration isolators and flexible connections will be provided, as required, for RTUs and VAV boxes.
- C. Where walls between rooms do not go to structure, return grilles will have acoustically lined sheet metal boots.
- D. Return air openings through walls to structure will have acoustically lined U-boots.

5. HVAC TEMPERATURE CONTROLS

- A. The temperature controls system will be a microprocessor based, direct digital control (DDC) system to allow 360-day scheduling, night setback, setup, remote monitoring, and troubleshooting for all HVAC components. System will tie into existing controls interface of the GML.

POWER SYSTEM REQUIREMENTS

1. CHARACTERISTICS

- A. The electrical system for the building will be 480Y/277 volts, 3 phase, 4 wire, and 208Y/120 volts, 3 phase, 4 wire, 60 hertz.
- B. Generally the heating, air conditioning and large mechanical equipment will be served at 480 volts, 3 phase. The lighting will be 277 volts. General-purpose receptacles will be 120 volts.

2. ELECTRICAL SOURCE

- A. The utility company providing electrical power to this building will be CenterPoint Energy.
- B. The normal electrical source will be fed from a medium voltage distribution overhead power line.

3. SERVICE ENTRANCE

- A. The electrical service transformer will be pole or pad mounted per utility company requirements. Service transformers will be provided, installed, maintained and owned by the electrical utility.
- B. The secondary aluminum conduits to the building will be underground to the building.
- C. The utility revenue meter will be mounted to a rack system located by the power company service entrance. The utility meter will be a "kilowatt/hour - demand" meter.

4. GROUNDING AND BONDING

- A. Methods of grounding will conform to the requirements of the NEC. All neutral conductors will be solidly grounded.
- B. The electrical service will be bonded to the supply side of the cold water service meter and to a minimum of (3) ground rod electrodes. The rod electrodes will be a 3/4" x 10' long copper clad metallic rods driven into the earth at the exterior of the building.
- C. The resistance of the rod electrode will not exceed 25 ohms. Additional electrodes will be added as required.
- D. A UFER ground will be bonded to the grounding electrode system.
- E. A copper bus bar will be mounted on the main telephone board. This bar will be bonded to the electrical service ground with a bonding conductor sized per ANSI-J-STD-607-A, Commercial Building Grounding and Bonding Requirements for Telecommunications. The bus bar will be for the use of the telephone supplier to ground the telephone system. It will also service as a bonding point for any technology equipment.

5. LOAD CRITERIA

- A. Initially, the electrical service and distribution system will be sized based on the following criteria, however, as the design phase proceeds, the system design and size will be modified to accommodate the actual equipment requirements.

LOAD	VA/SQFT
Lighting Interior	3.5
Lighting Exterior	0.5
General Power	1.0
Computers	3.0
Misc	3.0
Cooling/Heating	10.0
Fans/pumps	1.0

POWER DISTRIBUTION**1. EQUIPMENT ROOMS**

- A. Main Electrical Room
 - 1. All electrical service entrance equipment, lighting and appliance branch circuit panelboards and low voltage transformers for the first floor will be located in the building main electrical room in NEMA 1 enclosures.

B. Electrical closets

1. Additional lighting and appliance branch circuit panelboards will be located on second floor as required in the facility to limit voltage drop and serve loads in specific areas to limit branch circuit lengths.

2. DISTRIBUTION EQUIPMENT

A. General

1. All floor-mounted equipment will be set on a 4" concrete housekeeping pad.
2. All electrical equipment will have adequate interrupting capacity for the load served and will be capable of withstanding the short circuit stresses produced by the system.

B. Circuit Breaker Distribution Panel

1. Circuit breaker distribution panel(s) will be of the dead front, floor or wall mounted, metal enclosed type using circuit breakers as overcurrent protective devices.
2. Circuit breaker distribution panels will feed secondary branch circuit panel boards.

C. Lighting and Appliance panelboards

1. Branch circuit panel boards will be dead front, wall mounted type using circuit breakers as overcurrent protective devices. Branch circuits will be primarily 20 ampere, single phase loads such as lighting and receptacles.

D. Low Voltage Distribution Transformers

1. Transformers will be provided to step 480V power to 208Y/120 volt. The transformers will be energy efficient dry type meeting NEMA TP1 standards.

E. Safety Disconnect Switches

1. Safety disconnect switches shall be heavy duty type.

WIRING SYSTEMS

1. GENERAL

- A. Wiring systems will consist of insulated copper conductors installed in metallic raceways.

2. FEEDERS

- A. Feeders will have an ampacity adequate for the load served and will generally serve larger loads or panels.

3. BRANCH CIRCUITS

- A. Branch circuits will be rated a minimum of 20 amperes, except where lesser ratings are required for specific applications and per code requirements. Branch circuit wiring will be no smaller than #12AWG.

4. VOLTAGE DROP

- A. The combined voltage drop on feeders and branch circuits will not exceed 5 percent. Individual voltage drop on feeders and branch circuits will not exceed the recommendations of the NEC and ASHRAE 90.1.

5. RACEWAYS

- A. Raceways will be sized per the NEC and will not be smaller than 3/4".
- B. Raceways for concealed interior circuits will be electric metallic tubing (EMT).
- C. Raceways for exposed interior circuits will be rigid galvanized steel (RGS) or Intermediate metallic conduit (IMC).
- D. Raceways for underground circuits will be polychlorinated vinyl (PVC) schedule 40 or 80 direct bury with PVC coated IMC bends. All underground conduits will be sized one trade size larger than required by code.

- E. Connections to motors, light fixtures and miscellaneous equipment will be in flexible metal conduit for interior, and liquid tight flexible metal conduit for exterior locations.
- F. MC Cable will not be allowed except for wiring between light fixtures.

WIRING DEVICES

1. GENERAL

- A. Devices will be 20-ampere specification grade. The color will be as directed by the Architect. Cover plates will be nylon and match the device color.

2. RECEPTACLES

- A. Receptacles will be duplex, grounded type.

3. SPECIAL PURPOSE RECEPTACLES

- A. Special purpose receptacles will be used as required. The size and configuration will be determined based on the equipment served.

4. GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES

- A. GFCI receptacles will be 20-ampere specification grade, the same color as normal devices. They will be provided as required by the NEC. Where receptacles are located in exterior, wet locations, they will be provided with a while-in-use weatherproof cover.

5. SWITCHES

- A. Switches will be 20-ampere toggle type. They will be the same color as receptacles.

LIGHTING

1. BASIC CONSIDERATIONS

- A. Generally, all interior lighting will be fluorescent using recessed 2 x 4 direct/indirect fixtures with program start electronic ballasts. Downlights and accent lights will be used where appropriate.
- B. Fluorescent lighting controlled by occupancy sensors will be provided with programmed start electronic ballasts.
- C. Lighting for exposed areas will be wet location rated.
- D. Lighting for the parking lot will be fed from the building.
- E. All enclosed and open office areas will utilize wall or ceiling mounted occupancy sensors for automatic control of room lights.
- F. Site lighting will consist of PSMH light sources.

2. DESIGN CRITERIA

- A. Foot-candle levels shall be based on IES recommended levels.

3. CONTROL

- A. Dual technology occupancy sensors with manual override will be utilized in offices, restrooms, workrooms, storage rooms, etc. Occupancy sensors will consist of passive infrared and ultrasonic technology.
- B. A low voltage lighting control system will be utilized to control interior light fixtures where occupancy sensors are not utilized. The lighting control system will have an astronomical time switch and photocell input to

automatically control interior and exterior light fixtures. Low voltage wall switches will provide occupant control of associated spaces and provide a timed occupant override for after hour use.

- C. Exterior lighting will turn on at dusk via the photocell input and will turn lights off via the time switch as determined by the owner. Selected exterior lights will remain on all night and be turned off with the photocell at sunrise.

LOW VOLTAGE SYSTEMS

1. TELEPHONE SYSTEMS

- A. Conduit and back boxes will be provided for the phone system.
- B. A plywood telephone board will be provided in the main telephone equipment or electrical room to mount telephone equipment. A double duplex receptacle will be mounted on the board.
- C. Additional receptacles will be provided based on the recommendations of the Telecommunication System Consultant.

2. DATA/VIDEO/COMMUNICATIONS

- A. Conduit and back boxes will be provided as required at the direction of 4b Technology.
- B. Power requirements will be provided as required by 4b Technology.

PLUMBING

1. FIXTURES

- A. Plumbing fixtures and their trim will all be commercial grade and will include the following:
 1. 1.6 and 1.1gpf dual-flush, wall-mounted, elongated water closets with Sloan Solis solar powered dual- flush valve with manual override buttons , with open front seats, regular type & handicapped type where shown;
 2. Wall-mounted vitreous china urinals with Sloan Solis solar powered flush valve with manual override button.
 - a) OPTION: "Pint" low-flow urinals to reduce water and sewer usage.
 3. Wall-hung vitreous china lavatories where indicated in toilets, handicapped accessible where shown with auto sensors valves, Sloan Solis solar powered flush valve with manual override button.;
 4. Stainless steel countertop sinks with gooseneck faucets in lounges and elsewhere as shown on plans;
 5. Floor-mounted 24" x 24" one-piece white portland cement janitor's sinks;
 6. Floor drains with 6" diameter nickel bronze tops in toilet rooms;
 7. Floor drains with 8" diameter cast iron tops in mechanical rooms;
 8. Floor drains with 12" diameter cast iron tops in the water service entry room;
 9. Freeze-proof wall hydrants with 3/4" hose connections at several locations around the exterior of the building;
 10. Rooftop drains (area and planter types) with non-ferrous grates, commonly piped to 5'-0" outside the building per city requirements;
 11. Overflow drains piped to discharge on grade per city requirements;

2. PIPING

- A. Piping will all be commercial grade and consist of the following:

1. Underground sanitary waste pipe will be SCH 40 PVC piping and fittings;
2. Underground storm drain pipe will be SCH 40 PVC piping and fittings;
3. Aboveground sanitary waste, vent and storm drain pipe will be no-hub cast iron pipe and fittings;
4. Domestic water service to the building will be ductile iron or Sch 40 PVC;
5. Domestic water piping underground inside the building will be Type K copper tube without joints where possible and with silver-solder joints where required;
6. Domestic hot and cold water inside the building aboveground will be Type L hard copper tube and fittings with lead-free solder joints. Exposed pipe to fixtures will be chrome-plated;
7. Condensate drainpipe will be insulated Type M hard copper tube and DWV fittings.

3. EQUIPMENT

- A. Equipment will all be commercial grade and consist of the following:
 1. Localized hot water heaters will be used to eliminate the need for a recirculation loop, aqua-stat, and pump. Hot water will be delivered at 120F;
 2. Domestic hot water recirculation pump;
 3. Domestic water service entrance with main service shut-off valve, reduced pressure backflow preventer, pressure reducing valve assembly, and hose bibb;
 4. Water heaters shall be provided with expansion tanks;
 5. Due to water pressures recorded near the site (see Appendix B), a booster pump will be required unless tank type toilets can be utilized;

4. INSULATION

- A. The domestic hot water distribution pipe will be insulated with 1" fiberglass with all-service jacket.

FIRE PROTECTION

1. FIRE ALARM

- A. No fire alarm system will be provided as the building is fully sprinkled and is Group B occupancy with less than 500 occupants.

2. FIRE SPRINKLER

- A. Complete automatic sprinkler protection complying with NFPA 13 and fed from the underground water system shall be provided throughout all areas of the building.
- B. The underground water supply to the fire sprinkler system will be provided with a double check backflow preventer. A backflow test header will be provided to permit the full flow test of the system through the backflow preventer. The backflow test header will be provided with a supervised control valve that is normally closed.
- C. A Siamese Wye 2 1/2" fire department connection for manually supplying the sprinkler system will be provided in a location acceptable to the responding personnel. The connection will be provided with a 30-degree down angle fitting.
- D. The sprinkler heads provided in all areas with ceilings shall be concealed type sprinkler heads with white escutcheons/covers.
- E. Sprinkler heads in areas without ceilings and in non-common areas such as mechanical and storage rooms will be chrome or brass finish sprinklers.
- F. Sprinkler piping 2-1/2 inch and larger shall be schedule-10 steel piping listed for fire protection. Sprinkler piping 2 inch and smaller will be schedule-40 steel piping listed for fire protection. Any piping used for dry systems or installed on the exterior of the building shall be externally galvanized.

BUDGET COST ESTIMATE

Discussions were held with a general contractor and several sub-contractors in an effort to put a budget number together for the MEPF systems described herein. Similar buildings were used as a comparison for square foot costing in an effort to quantify numbers. A more detailed budget estimate can be performed once the Design Development documents are complete.

1. HVAC

- A. Cost estimate for system described is \$170,000

2. ELECTRICAL

- A. Cost estimate for system described is \$200,000 (includes basic lighting package described herein only, no specialty lighting)

3. PLUMBING

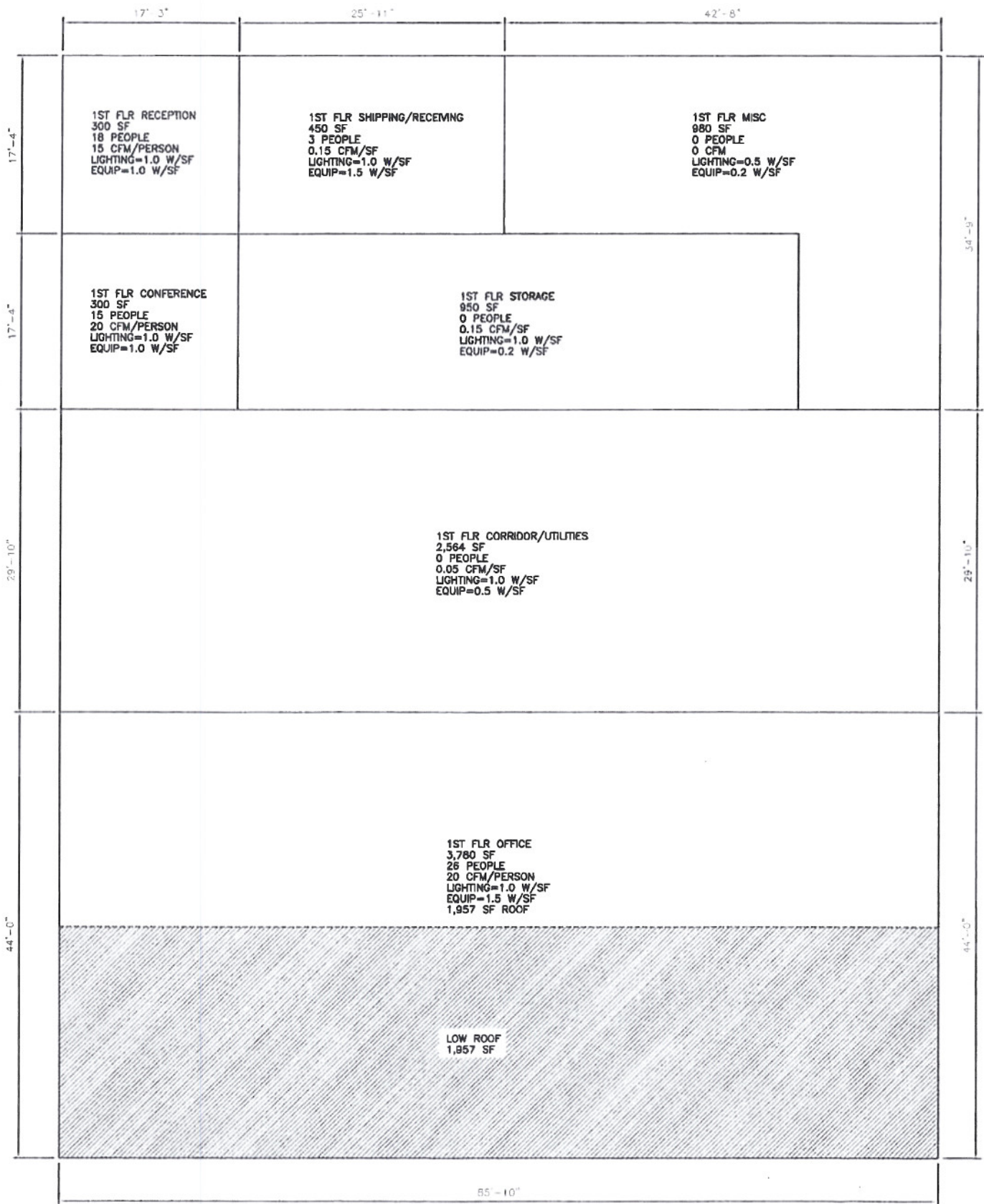
- A. Cost estimate for system described with booster pump and break tank is \$80,000
- B. Cost savings to remove the domestic water booster pump and break tank is -\$15,000

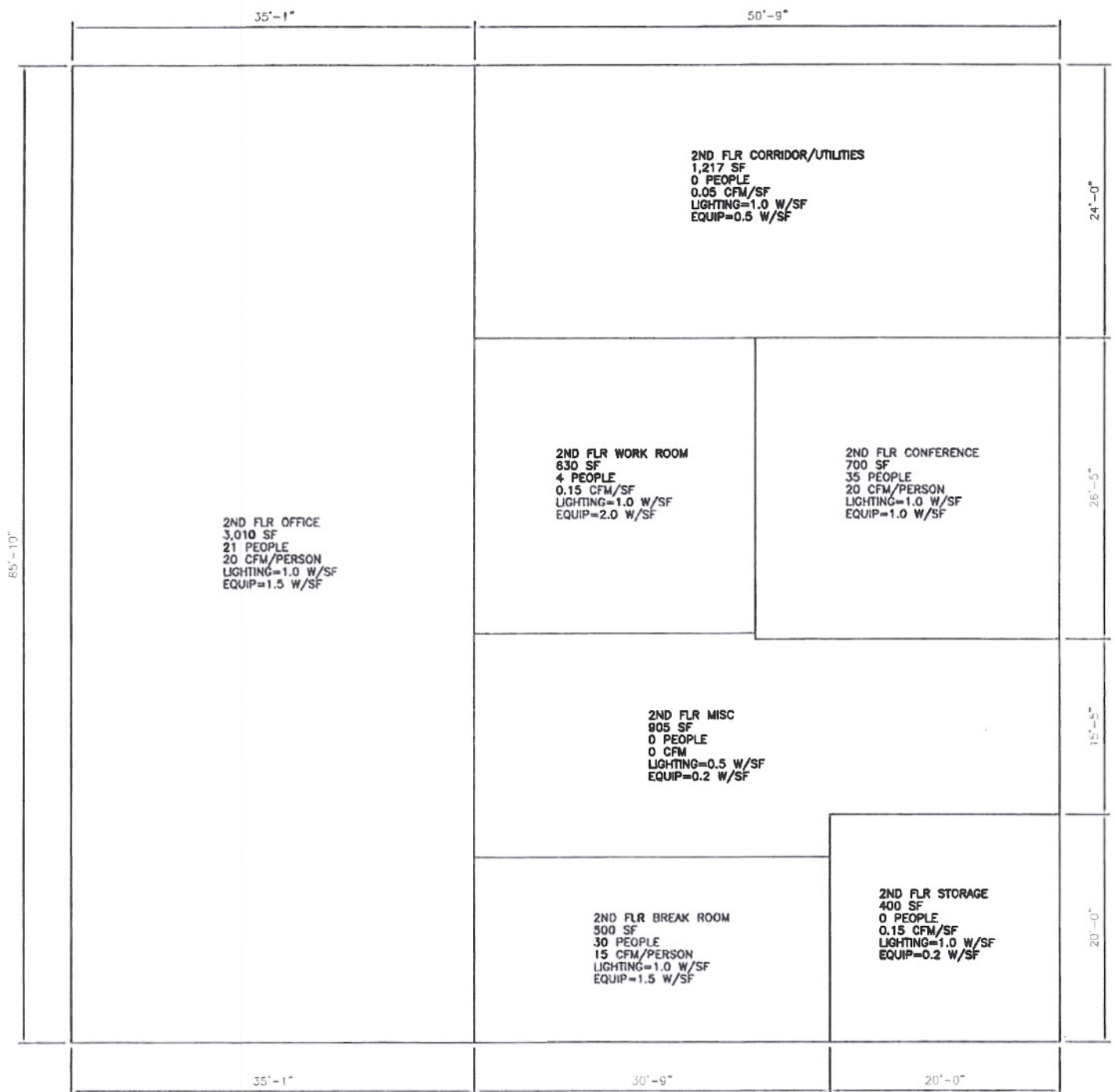
4. FIRE SPRINKLER

- A. Cost estimate for system described is \$20,000

5. FIRE ALARM

- A. Cost estimate for system described is \$35,000





System Checksums

By HEI

RTU-1

Parallel Fan Powered VAV, Htg Coil on Mixing Box Outlet

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time: Outside Air: OADBWB/HR: 94 / 76 / 105				Mo/Hr: 9 / 16 OADB: 94				Mo/Hr: Heating Design OADB: 28				SADB			
Sens. + Lat.		Plenum		Net Percent		Space Percent		Space Peak		Coil Peak		Cooling		Heating	
Btu/h		Btu/h		Btu/h		Btu/h		Btu/h		Btu/h		cfm		°F	
Envelope Loads															
Sky/ite Solar		0		0		0		0		0		54.2		81.1	
Sky/ite Cond		0		0		0		0		0		73.6		68.9	
Roof Cond		0		0		0		0		-5,381		73.6		68.9	
Glass Solar		71,299		10,695		4		0		0		76.7		51.6	
Glass/Door Cond		33,088		33,088		11		71,299		-66,620		0		0.0	
Wall Cond		4,864		9,099		3		33,088		-10,498		0		0.0	
Partition/Door		0		0		0		4,864		-5,565		0		0.0	
Floor		0		0		0		0		0		0		0.0	
Adjacent Floor		0		0		0		0		0		0		0.0	
Infiltration		0		0		0		0		0		0		0.0	
Sub Total ==>		109,250		124,180		42		109,250		-82,499		1,428		1,272	
Internal Loads															
Lights		24,120		30,150		10		24,120		0		3,024		3,024	
People		31,000		31,000		11		15,500		0		9,177		3,024	
Misc		29,396		29,396		10		29,396		0		1,428		1,272	
Sub Total ==>		84,517		90,547		31		69,017		0		0		0	
Ceiling Load															
Ventilation Load		4,672		-4,672		0		4,672		-3,128		0		0	
Adj Air Trans Heat		0		81,696		28		0		0		0		0	
Dehumid. Ov Sizing		0		0		0		0		0		0		0	
Ov/Undr Sizing		0		0		0		0		1,511		0		0	
Exhaust Heat		0		-2,535		-1		0		-4,662		0		0	
Sup. Fan Heat		0		0		0		0		0		0		0	
Ret. Fan Heat		0		0		0		0		0		0		0	
Duct Heat Pkup		0		0		0		0		0		0		0	
Underflr Sup Ht Pkup		0		0		0		0		0		0		0	
Supply Air Leakage		0		0		0		0		0		0		0	
Grand Total ==>		198,438		13,754		100.00		182,938		-75,313		-146,020		100.00	
COOLING COIL SELECTION															
Total Capacity		Sens Cap.		Coil Airflow		Enter DBWB/HR		Leave DBWB/HR		Gross Total		Glass		Heating Coil Selection	
ton		MBh		cfm		°F		°F		Btu/h		ft² (%)		Capacity Coil Airflow Ent Lvg	
24.5		293.9		9,177		76.7		63.4		9,324		9,324		-132.4 6,048 61.6 81.1	
0.0		0.0		0		0.0		0.0		0		0		0 0.0 0.0	
0.0		0.0		0		0.0		0.0		0		0		0 0.0 0.0	
0.0		0.0		0		0.0		0.0		0		0		0 0.0 0.0	
Total		24.5		293.9						1,957		0		Humidif 0.0 0.0 0.0	
										5,442		2,177		Opt Vent 0.0 0.0 0.0	
										0		0		Total -174.9	
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By HEI

Parallel Fan Powered VAV, Htg Coil on Mixing Box Outlet

[illegible]

Project Name: 1250378 load-SD.trc
Dataset Name:

PROJECT:	GML Administration (flush valve toilets)		 8325 LENEXA DRIVE LENEXA, KS 66214 www.hel-esp.com
LOCATION:	Richmond Tx		
CLIENT:	Bailey Architects		
JOB NUMBER:	1250000378		
DATE:	August 31, 2012		
CALCULATED BY:	Kenny George		

1. START-UP INFORMATION

Elevation of Flow Test ⁽⁴⁾ :	0	Feet	City Static:	58	PSI
Tap Line Material ¹ :	CU		City Residual:	56	PSI
Tap Line Size to Water Meter ¹ :	1.959	Inch	City Flow:	1188	GPM
Tap Line Length to Water Meter:	20	Feet	Mechanical Flow:	0	GPM
Service Line Material ¹ :	CU				
Service Line Size to Building ¹ :	3.1	Inch			
Service Line Length to Building:	55	Feet			
Total System FU's:	103	FU			
Total System Flow:	73	GPM			
Elevation of Lowest Floor of Building:	0	FT			
Elevation of Most Remote Flush Valve:	14	FT			
Minimum Pressure Required at Most Remote Fixture ³ :	35	PSI			
Developed Length to Most Remote Fixture:	60	FT			

2. PRESSURE AT FINISH FLOOR

	Tap Line	Service Line
A. Hazen-Williams Constant :	135	135
Copper:	135	135
Ductile Iron:	125	125
B. Velocity at Tap & In Tap Line:	7.8	FPS
C. Velocity in Service Line:	3.1	FPS
D. Tap and Service Line Losses:	2.4	PSI
E. Elevation Change:	0.0	PSI
F. Safety Factor:	5.00	PSI
G. Meter Loss ⁽⁴⁾ :	5.0	PSI
H. Backflow Loss ⁽⁴⁾ :	12.0	PSI
I. Water Filter Loss ⁽⁴⁾ :	0.0	PSI
J. Softener Loss ⁽⁴⁾ :	0.0	PSI
K. Flowing Pressure:	33.64	PSI

3. SYSTEM REQUIREMENTS

A. Elevation Change to Most Remote Flush Valve:	6.06	PSI
B. Minimum Pressure Required at Most Remote Fixture:	35.00	PSI
C. Available Pressure for Friction Loss: (If Negative, Provide Booster Pump):	-7.42	PSI
D. Tolerable Friction Pressure Loss: (Refer to pressure charts)	-12.37	PSI / 100'

4. NOTES

¹ COPPER TUBE SIZES

3/4"	0.745
1"	0.995
1-1/4"	1.245
1-1/2"	1.481
2"	1.959

Use Type "K" soft annealed copper for 2" and smaller
Use cement lined ductile iron for 3" and larger

CEMENT LINED DUCTILE IRON

3"	3.1
4"	4.05
6"	6.15

REMEMBER: DO NOT USE COPPER FOR 2-1/2" AND LARGER FOR WATER SERVICE LINES!

² Use pressure drop data from manufacturer's pressure drop charts.

³ Use: 15 PSI for Flush Tank Water Closets
25 PSI for Flush Valve Water Closets
35 PSI for HET (1.28 gpf) water closets
45 PSI for Premium Shower Heads
25 PSI for Economy Shower Heads

⁴ go to <http://store.usgs.gov> Tag the "Map Locator" in the upper left corner Zero in to where the fire hydrant is. Change the map from "MAP" mode to "TOPO" mode for fire hydrant elevation!

DOMESTIC WATER SERVICE ANALYSIS

PROJECT:		GML Administration (flush valve toilets)										 8275 LINDA AVE LUBBOCK, TX 79414 www.hend-eng.com			
LOCATION:		Richmond Tx													
CLIENT:		Bailey Architects													
JOB NUMBER:		1250000378													
DATE:		August 31, 2012													
CALCULATED BY:		Kenny George													
FIXTURE TYPE		QTY	D.F.U. (EA)	TOTAL D.F.U.	HOT S.F.U. (EA)	COLD S.F.U. (EA)	COMBINED S.F.U. (EA)	TOTAL S.F.U. (HOT)	TOTAL S.F.U. (COLD)	TOTAL SERVICE S.F.U.					
BATHROOM GROUP (1.6 GPF FLUSH TANK)			5.0	0.0	1.50	2.70	3.60	0	0	0.0					
BATHROOM GROUP (3.5 GPF FLUSH TANK)			6.0	0.0	3.00	6.00	8.00	0	0	0.0					
BATHTUB (PRIVATE)			2.0	0.0	1.00	1.00	1.40	0	0	0.0					
BIDET			1.0	0.0	1.50	1.50	2.00	0	0	0.0					
PRIVATE CLOTHES WASHER RESIDENTIAL			2.0	0.0	1.00	1.00	1.40	0	0	0.0					
PUBLIC CLOTHES WASHER RESIDENTIAL			3.0	0.0	3.00	3.00	4.00	0	0	0.0					
CLINICAL SERVICE SINK			6.0	0.0	1.50	8.00	8.00	0	0	0.0					
DISHWASHER (RESIDENTIAL)		1	2.0	2.0	1.40	0.00	1.40	1.4	0	1.4					
DRINKING FOUNTAIN		4	0.5	2.0	0.00	0.25	0.25	0	1	1.0					
PRIVATE SINK (BAR, KITCHEN OR BREAKROOM)		1	2.0	2.0	1.00	1.00	1.40	1	1	1.4					
PUBLIC SINK (KITCHEN OR BREAKROOM)			2.0	0.0	3.00	3.00	4.00	0	0	0.0					
SINK (FLUSHING RIM)			6.0	0.0	3.00	3.00	4.00	0	0	0.0					
SINK (WASH FOUNTAIN PER HEAD)			2.0	0.0	1.00	1.00	1.40	0	0	0.0					
PRIVATE LAVATORY			1.0	0.0	0.50	0.50	0.70	0	0	0.0					
PUBLIC LAVATORY		8	1.0	8.0	1.00	1.00	1.40	8	8	11.2					
SERVICE SINK (MOP BASIN)		1	3.0	3.0	2.25	2.25	3.00	2.25	2.25	3.0					
PRIVATE LAUNDRY TUB			2.0	0.0	2.00	2.00	3.00	0	0	0.0					
FLOOR DRAIN		5	2.0	10.0	0.00	0.00	0.00	0	0	0.0					
SHOWER (PUBLIC - EACH HEAD)			2.0	0.0	3.00	3.00	4.00	0	0	0.0					
SHOWER (PRIVATE- ONE HEAD)			2.0	0.0	1.00	1.00	1.40	0	0	0.0					
URINAL (1.0 GPF)		2	2.0	4.0	0.00	5.00	5.00	0	10	10.0					
URINAL (0.125 GPF)			1.0	0.0	0.00	1.00	1.00	0	0	0.0					
URINAL - WATERLESS			0.5	0.0	0.00	0.00	0.00	0	0	0.0					
WALL HYDRANT			0.0	0.0	0.00	5.00	5.00	0	0	0.0					
WALL HYDRANT - NON-FREEZE		3	0.0	0.0	0.00	5.00	5.00	0	15	15.0					
PRIVATE / PUBLIC WC (1.6 GPF FLUSHOMETER TANK)			4.0	0.0	0.00	2.00	2.00	0	0	0.0					
PRIVATE WATER CLOSET (1.6 GPF FLUSH TANK)			3.0	0.0	0.00	2.20	2.20	0	0	0.0					
PUBLIC WATER CLOSET (1.6 GPF FLUSH TANK)			4.0	0.0	0.00	5.00	5.00	0	0	0.0					
PRIVATE WATER CLOSET (1.6 GPF FLUSH VALVE)			3.0	0.0	0.00	6.00	6.00	0	0	0.0					
PUBLIC WATER CLOSET (1.6 GPF FLUSH VALVE)		6	4.0	24.0	0.00	10.00	10.00	0	60	60.0					
PUBLIC WATER CLOSET (3.5 GPF FLUSH VALVE)			6.0	0.0	0.00	10.00	10.00	0	0	0.0					
MISC. CONTINUOUS FLOW (GPM)		1	0.13	0.1	0.00	0.13	0.13	0	0.1333	0.1					
SPECIALTY KITCHEN EQUIP.															
COMMERCIAL WASHER EXTRACTOR			6.0	0.0	7.50	7.50	10.00	0	0	0.0					
DISPOSER (2" TRAP)			3.0	0.0	0.00	2.00	2.00	0	0	0.0					
DISPOSER (3" TRAP)			5.0	0.0	0.00	2.00	2.00	0	0	0.0					
PRE-SCRAPPER			2.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (BAR) (1-1/2" IW)			2.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (DUMP) (1-1/2" IW)			2.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (HAND) (1-1/2" IW)			2.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (PREP / VEGGIE) (2" IW)			3.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (2 COMPARTMENT) (2" IW)			3.0	0.0	1.50	1.50	2.00	0	0	0.0					
SINK (3 COMPARTMENT) (2" IW)			3.0	0.0	3.00	3.00	4.00	0	0	0.0					
DISHWASHER (RESTAURANT) (2" IW)			3.0	0.0	6.00	0.00	6.00	0	0	0.0					
ICE MACHINE (3/4" IW)			0.5	0.0	0.00	1.00	1.00	0	0	0.0					
COFFEE MAKER (3/4" IW)			0.5	0.0	0.00	0.50	0.50	0	0	0.0					
TEA MAKER (3/4" IW)			0.5	0.0	0.00	0.50	0.50	0	0	0.0					
CAPPUCCINO MACHINE (3/4" IW)			0.5	0.0	0.00	0.50	0.50	0	0	0.0					
KETTLE (2" IW)			3.0	0.0	1.50	1.50	2.00	0	0	0.0					
CARBONATOR			0.5	0.0	0.00	0.50	0.50	0	0	0.0					
HOT FOOD TABLE (3/4" IW)			0.5	0.0	0.75	0.75	1.00	0	0	0.0					
DIPPER WELL (3/4" IW)			0.5	0.0	0.00	0.75	0.75	0	0	0.0					
TOTAL UNITS:		32		55.1				12.7	97.4	103.1					

2006 IPC FIXTURE LOADING

PROJECT:	GML Administration (tank type toilets)		
LOCATION:	Richmond Tx		
CLIENT:	Bailey Architects		
JOB NUMBER:	1250000378		
DATE:	August 31, 2012		
CALCULATED BY:	Kenny George		

8835 LINCOLN DRIVE LINCOLN, TX 42114
www.hel-eng.com

1. START-UP INFORMATION	Elevation of Flow Test ⁽⁴⁾ : Tap Line Material ¹ : Tap Line Size to Water Meter ¹ : Tap Line Length to Water Meter: Service Line Material ¹ : Service Line Size to Building ¹ : Service Line Length to Building: Total System FU's: Total System Flow: Elevation of Lowest Floor of Building: Elevation of Most Remove Flush Valve Minimum Pressure Required at Most Remote Fixture ³ : Developed Length to Most Remote Fixture:	0 Feet CU 1.481 Inch 20 Feet CU 1.959 Inch 55 Feet 73 FU 38 GPM 0 FT 14 FT 15 PSI 60 FT	City Static: 58 PSI City Residual: 56 PSI City Flow: 1188 GPM Mechanical Flow: 0 GPM										
2. PRESSURE AT FINISH FLOOR	A. Hazen-Williams Constant : Copper: Ductile Iron: B. Velocity at Tap & In Tap Line: C. Velocity in Service Line: D. Tap and Service Line Losses: E. Elevation Change: F. Safety Factor: G. Meter Loss ⁵ : H. Backflow Loss ⁴ : I. Water Filter Loss ⁴ : J. Softener Loss ⁴ : K. Flowing Pressure:	135 125 7.1 FPS 4.0 FPS 3.0 PSI 0.0 PSI 5.00 PSI 5.0 PSI 12.0 PSI 0.0 PSI 0.0 PSI 33.04 PSI	Service Line Hazen-Williams Constant : 135 Copper: 135 Ductile Iron 125										
3. SYSTEM REQUIREMENTS	A. Elevation Change to Most Remote Flush Valve: B. Minimum Pressure Required at Most Remote Fixture: C. Available Pressure for Friction Loss: (If Negative, Provide Booster Pump): D. Tolerable Friction Pressure Loss: (Refer to pressure charts)												
4. NOTES	¹ COPPER TUBE SIZES <table style="width: 100%; border: none;"> <tr><td style="width: 20%;">3/4"</td><td style="width: 80%;">0.745</td></tr> <tr><td>1"</td><td>0.995</td></tr> <tr><td>1-1/4"</td><td>1.245</td></tr> <tr><td>1-1/2"</td><td>1.481</td></tr> <tr><td>2"</td><td>1.959</td></tr> </table> Use Type "K" soft annealed copper for 2" and smaller Use cement lined ductile iron for 3" and larger REMEMBER: DO NOT USE COPPER FOR 2-1/2" AND LARGER FOR WATER SERVICE LINES! ² Use pressure drop data from manufacturer's pressure drop charts. ³ Use: 15 PSI for Flush Tank Water Closets 25 PSI for Flush Valve Water Closets 35 PSI for HET (1.28 gpf) water closets 45 PSI for Premium Shower Heads 25 PSI for Economy Shower Heads ⁴ go to http://store.usgsgov Tag the "Map Locator" in the upper left corner. Zero in to where the fire hydrant is. Change the map from "MAP" mode to "TOPO" mode for fire hydrant elevation!			3/4"	0.745	1"	0.995	1-1/4"	1.245	1-1/2"	1.481	2"	1.959
3/4"	0.745												
1"	0.995												
1-1/4"	1.245												
1-1/2"	1.481												
2"	1.959												

PROJECT:	GML Administration (tank type toilets)									
LOCATION:	Richmond Tx									
CLIENT:	Bailey Architects									
JOB NUMBER:	1250000378									
DATE:	August 31, 2012									
CALCULATED BY:	Kenny George									
FIXTURE TYPE	QTY	D.F.U. (EA)	TOTAL D.F.U.	HOT S.F.U. (EA)	COLD S.F.U. (EA)	COMBINED S.F.U. (EA)	TOTAL S.F.U. (HOT)	TOTAL S.F.U. (COLD)	TOTAL SERVICE S.F.U.	2006 IPC FIXTURE LOADING
BATHROOM GROUP (1.6 GPF FLUSH TANK)		5.0	0.0	1.50	2.70	3.60	0	0	0.0	
BATHROOM GROUP (3.5 GPF FLUSH TANK)		6.0	0.0	3.00	6.00	8.00	0	0	0.0	
BATHTUB (PRIVATE)		2.0	0.0	1.00	1.00	1.40	0	0	0.0	
BIDET		1.0	0.0	1.50	1.50	2.00	0	0	0.0	
PRIVATE CLOTHES WASHER RESIDENTIAL		2.0	0.0	1.00	1.00	1.40	0	0	0.0	
PUBLIC CLOTHES WASHER RESIDENTIAL		3.0	0.0	3.00	3.00	4.00	0	0	0.0	
CLINICAL SERVICE SINK		6.0	0.0	1.50	8.00	8.00	0	0	0.0	
DISHWASHER (RESIDENTIAL)	1	2.0	2.0	1.40	0.00	1.40	1.4	0	1.4	
DRINKING FOUNTAIN	4	0.5	2.0	0.00	0.25	0.25	0	1	1.0	
PRIVATE SINK (BAR, KITCHEN OR BREAKROOM)	1	2.0	2.0	1.00	1.00	1.40	1	1	1.4	
PUBLIC SINK (KITCHEN OR BREAKROOM)		2.0	0.0	3.00	3.00	4.00	0	0	0.0	
SINK (FLUSHING RIM)		6.0	0.0	3.00	3.00	4.00	0	0	0.0	
SINK (WASH FOUNTAIN PER HEAD)		2.0	0.0	1.00	1.00	1.40	0	0	0.0	
PRIVATE LAVATORY		1.0	0.0	0.50	0.50	0.70	0	0	0.0	
PUBLIC LAVATORY	8	1.0	8.0	1.00	1.00	1.40	8	8	11.2	
SERVICE SINK (MOP BASIN)	1	3.0	3.0	2.25	2.25	3.00	2.25	2.25	3.0	
PRIVATE LAUNDRY TUB		2.0	0.0	2.00	2.00	3.00	0	0	0.0	
FLOOR DRAIN	5	2.0	10.0	0.00	0.00	0.00	0	0	0.0	
SHOWER (PUBLIC - EACH HEAD)		2.0	0.0	3.00	3.00	4.00	0	0	0.0	
SHOWER (PRIVATE - ONE HEAD)		2.0	0.0	1.00	1.00	1.40	0	0	0.0	
URINAL (1.0 GPF)	2	2.0	4.0	0.00	5.00	5.00	0	10	10.0	
URINAL (0.125 GPF)		1.0	0.0	0.00	1.00	1.00	0	0	0.0	
URINAL - WATERLESS		0.5	0.0	0.00	0.00	0.00	0	0	0.0	
WALL HYDRANT		0.0	0.0	0.00	5.00	5.00	0	0	0.0	
WALL HYDRANT - NON-FREEZE	3	0.0	0.0	0.00	5.00	5.00	0	15	15.0	
PRIVATE / PUBLIC WC (1.6 GPF FLUSHMETER TANK)		4.0	0.0	0.00	5.00	5.00	0	0	0.0	
PRIVATE WATER CLOSET (1.6 GPF FLUSH TANK)		3.0	0.0	0.00	2.00	2.00	0	0	0.0	
PUBLIC WATER CLOSET (1.6 GPF FLUSH TANK)	6	4.0	24.0	0.00	5.00	5.00	0	30	30.0	
PRIVATE WATER CLOSET (1.6 GPF FLUSH VALVE)		3.0	0.0	0.00	6.00	6.00	0	0	0.0	
PUBLIC WATER CLOSET (1.6 GPF FLUSH VALVE)		4.0	0.0	0.00	10.00	10.00	0	0	0.0	
PUBLIC WATER CLOSET (3.5 GPF FLUSH VALVE)		6.0	0.0	0.00	10.00	10.00	0	0	0.0	
MISC. CONTINUOUS FLOW (GPM)	1	0.13	0.1	0.00	0.13	0.13	0	0.1333	0.1	
SPECIALTY KITCHEN EQUIP.										
COMMERCIAL WASHER EXTRACTOR		6.0	0.0	7.50	7.50	10.00	0	0	0.0	
DISPOSER (2" TRAP)		3.0	0.0	0.00	2.00	2.00	0	0	0.0	
DISPOSER (3" TRAP)		5.0	0.0	0.00	2.00	2.00	0	0	0.0	
PRE-SCRAPPER		2.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (BAR) (1-1/2" IW)		2.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (DUMP) (1-1/2" IW)		2.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (HAND) (1-1/2" IW)		2.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (PREP / VEGGIE) (2" IW)		3.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (2 COMPARTMENT) (2" IW)		3.0	0.0	1.50	1.50	2.00	0	0	0.0	
SINK (3 COMPARTMENT) (2" IW)		3.0	0.0	3.00	3.00	4.00	0	0	0.0	
DISHWASHER (RESTAURANT) (2" IW)		3.0	0.0	6.00	0.00	6.00	0	0	0.0	
ICE MACHINE (3/4" IW)		0.5	0.0	0.00	1.00	1.00	0	0	0.0	
COFFEE MAKER (3/4" IW)		0.5	0.0	0.00	0.50	0.50	0	0	0.0	
TEA MAKER (3/4" IW)		0.5	0.0	0.00	0.50	0.50	0	0	0.0	
CAPPUCCINO MACHINE (3/4" IW)		0.5	0.0	0.00	0.50	0.50	0	0	0.0	
KETTLE (2" IW)		3.0	0.0	1.50	1.50	2.00	0	0	0.0	
CARBONATOR		0.5	0.0	0.00	0.50	0.50	0	0	0.0	
HOT FOOD TABLE (3/4" IW)		0.5	0.0	0.75	0.75	1.00	0	0	0.0	
DIPPER WELL (3/4" IW)		0.5	0.0	0.00	0.75	0.75	0	0	0.0	
TOTAL UNITS:	32		55.1				12.7	67.4	73.1	

City of Richmond, Texas
281-342-0559

Date	May 1, 2012		
Hydrant Location	Golview Drive & Thompson Rd. FM 762		
Residual Location	Static	58	Residual
			56

$$Q = 29.84cd^2\sqrt{p}$$

c	d	p	Discharge	Est Flow at:	Est. Residual
0.95	2.5	45	1188.53 Gallons Per Minute	5828.2	20

c = coefficient of discharge (See Figure Below)

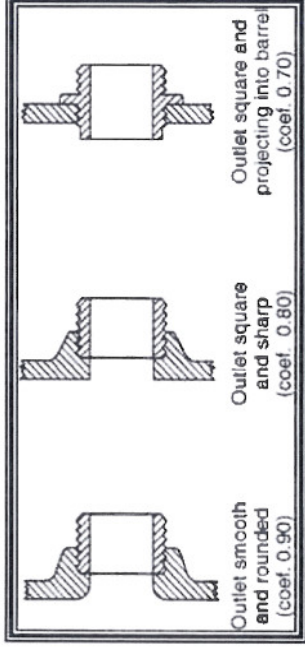
d = diameter of the outlet in inches

p = pitot pressure (velocity head) in psi

GPM	PSI
------------	------------

#NUM!

15



$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

If flow tubes (stream straighteners) are being utilized, a coefficient of 0.95 is suggested unless the coefficient of the tube is known.

City of Richmond, Texas
281-342-0559

Date	May 1, 2012		
Hydrant Location	Thompson Rd. (FM 762) just south of Library		
Residual Location	Static	58	Residual
			56

$$Q = 29.84ad^2\sqrt{p}$$

c	d	p	Discharge	Est Flow at:	Est. Residual
0.95	2.5	45	1188.53 Gallons Per Minute	5828.2	20

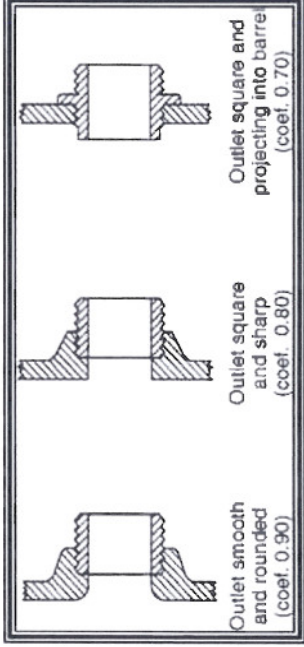
c = coefficient of discharge (See Figure Below)

d = diameter of the outlet in inches

p = pitot pressure (velocity head) in psi

#NUM!

15



$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

If flow tubes (stream straighteners) are being utilized, a coefficient of 0.95 is suggested unless the coefficient of the tube is known.

Structural Appendix

