HTK ARCHITECTS PA

60% Completion Construction Document Submittal
State of Kansas
New Energy & Service Center

ccr A-012651 / HTK 1410.03
March 10, 2015

Content

60% Complete Construction Drawings- Civil & Architectural (Tab 1)

60% Complete Construction Drawings- Structural (Tab 2)

60% Complete Construction Drawings- Mechanical, Electrical & Plumbing (Tab 3)

60% Complete Specifications (Tab 4)

Product Information Sheets (Tab 5)

900 S Kansas Ave, Topeka, KS 66612 P 785.266.5373 htkarchitects.net

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COTTONWOOD

COTTONWOOD



SPLIT FACE
Bottom Ledge Cottonwood



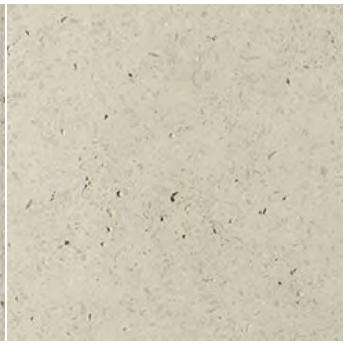
BELT SMOOTHED
Bottom Ledge Cottonwood



HONED
Bottom Ledge Cottonwood



BELT SMOOTHED
Top Ledge Cottonwood



HONED
Top Ledge Cottonwood

Top Ledge Color/Characteristics: Yellow tint and creamy gray with open grain.
Bottom Ledge Color/Characteristics: Creamy white with tight grain.
Features: Cottonwood is our most popular stone. With consistency in quality and color, this stone is extremely versatile and can be fabricated to a variety of styles, finishes, shapes and sizes. Cottonwood is extracted in large blocks and is a great option for panel applications or other projects requiring bigger sizes.

SPECIFICATIONS (ASTM C-568)

Type of Limestone	Compressive Strength (psi) ASTM C170	Modulus of Rupture (psi) ASTM C99	Water Absorption (psi) ASTM C97	Density (lbs./cft.) ASTM C97	Specific Gravity (psi) ASTM C97	Abrasion Resistance (psi) ASTM C241
Cottonwood	6,832	947	3.93%	146.44	2.347	8.2

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Grey Granite

BROWSE OUR BRICK
Styles
Overview
Architectural
Residential
Paving Units

Colors
Overview
Buffs
Browns
Reds
Pinks
Ironspots
Greys

Textures

Phone:
(785)-243-1284

Fax:
(785)-243-1287

E-Mail:
info@cloudceramics.com

Mail:
Cloud Ceramics
P.O. Box 369
Concordia, KS 66901

TEST REPORT-CL BUFF 2013>
MSDS Information>
Cleaning Recommendations>

Textures:

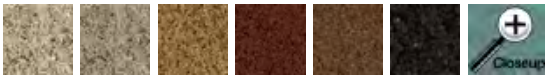
Rockface
Shadowtex
Velour
Vertex
Wiretex

Sizes:

Closure
Kingsize
Modular
Norman
Roman
Utility

[raw]

Grout Selection



CAD-ready texture tile with White grout Download



Click for larger image

[/raw]

Projects that use this brick

How do I place an order?

Colors shown are intended as a guide only and may vary. To ensure color accuracy call for a sample.
All material © 2006 by www.cloudceramics.com. All rights reserved.

info@cloudceramics.com

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CLEMSON UNIVERSITY
THE BISHOP MATERIALS LABORATORY

THE BISHOP MATERIALS LABORATORY
100 Clemson Research Blvd.
Anderson, SC 29625
(864) 656-1094
Fax: (864) 656-1095
www.bishopmaterialslab.com

AASHTO R18 ACCREDITED LABORATORY

Results of Tests on Brick conducted in accordance with ASTM C67-12 Standard Method for Sampling and Testing Brick and Structural Clay Tile

08/23/2013

Name:	Cloud Ceramics 1716 Quail Road Concordia, KS 66901	Plant:	Cloud Ceramics
		Report Number:	KBT-0001
		Sampled Date:	07/09/2013
Phone:	800-880-5986	Lot:	
Fax:		Product Code:	

Sample Description: **Sahara Light Buff, Greystone, Grey Granite, Cocoa Brown, Light Autumn, Driftwood Grey, Browntweed, Kansa Gold Ironspot**

							Test Date
Absorption	**1**	**2**	**3**	**4**	**5**	**Average**	
24 Hour Submersion in Cold Water (%)	6.41	6.45	6.49	6.49	6.51	6.47	07/18/2013
5 Hour Submersion in Boiling Water (%)	8.19	8.17	8.30	8.17	8.20	8.20	
Saturation Coefficient (Ratio of 24H to 5H)	0.78	0.79	0.78	0.79	0.79	0.79	
Compressive Strength	**1**	**2**	**3**	**4**	**5**	**Average**	
psi	10,083	9,137	10,422	10,783	10,560	10,197	07/18/2013
MPa	69.5	63.0	71.9	74.3	72.8	70.3	
Efflorescence	**11**	**12**	**13**	**14**	**15**		
	Not Effloresced	Not Effloresced	Not Effloresced	Not Effloresced	Not Effloresced		08/07/2013
IRA	**6**	**7**	**8**	**9**	**10**	**Average**	
g/min/30 in.²	10.2	10.4	13.4	12.4	12.7	11.8	07/23/2013

The brick represented by the test results shown here comply with the standards listed below:

ASTM C 216 - 12 Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)
Grade: SW, MW, with absorption alternate in section 6.1.2

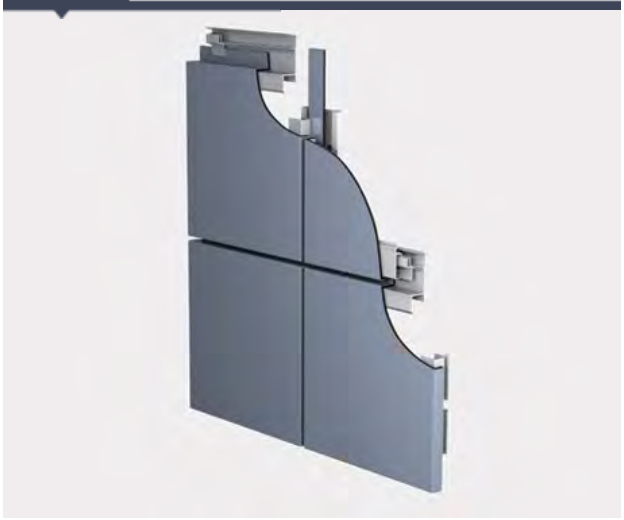
John Sanders, Ph.D., PE, Director

Gary W. Parker, Laboratory Supervisor

Lab Reference: 5162.8972

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Horizontal



NOTE: The documents below are in pdf format. To download the Word document, click here to login to the e-CENTRIA Portal

Product Specifications | Load Span Tables | Green / Sustainability | Product Options | Integrated Options | Coatings | Promo Details | Tech Data Sheets

FormaBond II

FormaBond II metal composite wall panels: 4mm

FormaBond II metal composite wall panels are CENTRIA's installation-ready MCM panel system and is dependable, convenient and adds value to any project. This smooth panel with a sleek, flat design offers crisp corner transitions or soft curves.

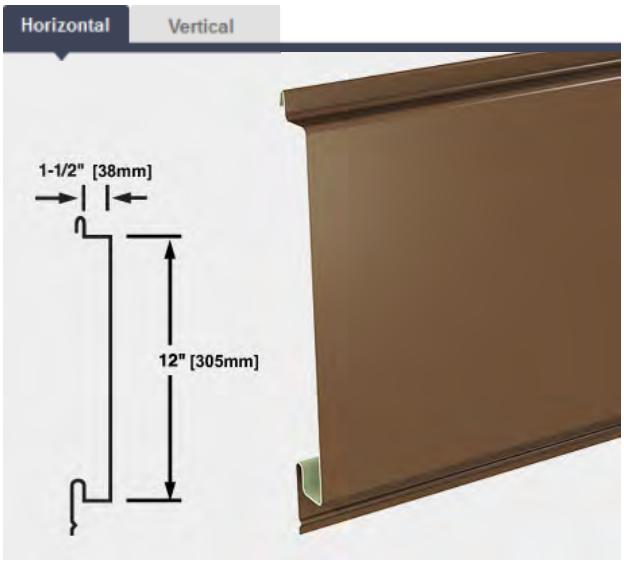
CONTACT CENTRIA

Features:

- **Substrate & Core:**
  - Metal – 0.020" [.5mm] nominal thickness aluminum face and liner
  - Polyethylene and fire rated cores available
  - 4mm panel thickness
  - 2½" [64mm] system thickness
  - Flat MCM panel
- **Joinery**
  - All dry construction
  - High performance drained and back-ventilated system
  - Open side joint allows ventilation behind the rainscreen
  - Drain shelf at top edge of panel minimizes water penetration
  - Metal spline and gasket vertical joint options
- **Surface Finish**
  - Smooth
- **Panel Width:**
  - 6" [152mm] minimum to 60" [1.52m] maximum
- **Panel Length**
  - Up to 180" [4.57m]
- **Panel Reveals**
  - ½" [13mm] Horizontal, ½" [13mm] Vertical
- **Performance**
  - High performance air and water ratings
  - AAMA 508-07
  - AAMA 509-09
- **Coatings**
  - Fluorofinish – Durable PVDF coating system
  - Sundance MICA – 2-coat pearlescent PFDF coating system
  - Sundance AM – 3-coat metallic PVDF coating system

Top ^

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Product Specifications | Load Span Tables | Green / Sustainability | Product Options | Integrated Options | Coatings | Promo Details | Tech Data Sheets

IW Series

Profile Series IW Series Concealed Fastener Profiles IW-10A

IW Series concealed fastener panels have no exposed fasteners for a clean, unbroken aesthetic in a variety of stucco embossed or smooth finishes. Zinc panels are available in smooth, non-embossed finish. The panels also feature a common lock-joint design that makes interesting visual effects possible, as well as the ability to be installed vertically or horizontally.

CONTACT CENTRIA

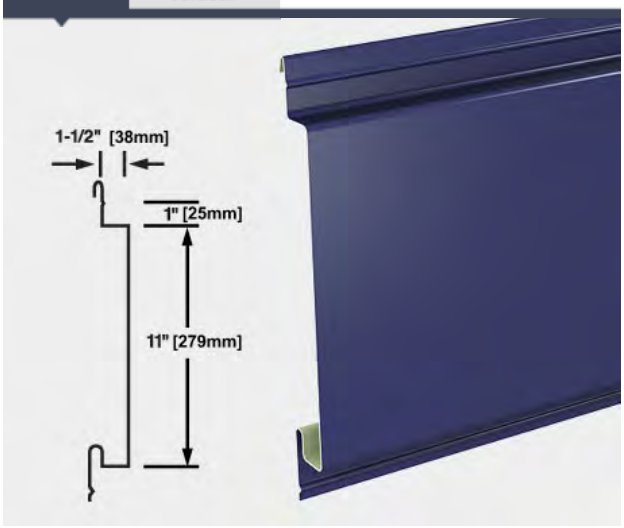
Features:

- **Substrates:**
  - 18 [1.19mm], 20 [.91mm] & 22 [.76mm] gage G90 galvanized steel, Aluminum & Stainless Steel
  - Optional .040" [1mm] & .050" [1.27mm] aluminum
  - Optional .22" [.76mm] gage stainless steel
  - Optional .039" [1mm] zinc
- **Surface Finish:**
  - Smooth – standard
  - Non-directional embossing – optional
  - Smooth only for zinc
- **Panel Depth:**
  - 1 1/2" [38mm]
- **Panel Width:**
  - 12" [305mm]
- **Panel Lengths**
  - 5 ft. [1.52m] to 30 ft. [9.14m] standard
  - 10 ft. [3.05m] maximum for zinc
  - For shorter & longer lengths contact CENTRIA
- **Options**
  - MetalWrap Series insulated composite back-up panels, with our innovative ATMP building envelope science, is the perfect way to enhance overall performance.
  - Profile Series Liner Panels help minimize heat loss or gain, provide a flush appearance to building interiors, and can work as a firewall system.

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Horizontal | Vertical



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Product Specifications | Load Span Tables | Green / Sustainability | Product Options | Integrated Options | Coatings | Promo Details | Tech Data Sheets

IW Series

Profile Series IW Series Concealed Fastener Profiles IW-40A

IW Series concealed fastener panels have no exposed fasteners for a clean, unbroken aesthetic in a variety of stucco embossed or smooth finishes. Zinc panels are available in smooth, non-embossed finish. The panels also feature a common lock-joint design that makes interesting visual effects possible, as well as the ability to be installed vertically or horizontally.

CONTACT CENTRIA

Features:

- **Substrates:**
  - 18 [1.19mm], 20 [.91mm], 22 [.76mm] gage G90 galvanized steel, Aluminum & Stainless Steel
  - Optional .040" [1mm] & .050" [1.27mm] aluminum
  - Optional .22" [.76mm] gage stainless steel
  - Optional .039" [1mm] zinc
- **Surface Finish:**
  - Smooth – standard
  - Non-directional embossing – optional
  - Smooth only for zinc
- **Panel Depth:**
  - 1 1/2" [38mm]
- **Panel Width:**
  - 12" [305mm]
- **Panel Lengths**
  - 5 ft. [1.52m] to 30 ft. [9.14m] standard
  - 10 ft. [3.05m] maximum for zinc
  - For shorter & longer lengths contact CENTRIA
- **Options**
  - MetalWrap Series insulated composite back-up panels, with our innovative ATMP building envelope science, is the perfect way to enhance overall performance.
  - Profile Series Liner Panels help minimize heat loss or gain, provide a flush appearance to building interiors, and can work as a firewall system.

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EnergyGuard™ ISO Sell Sheet
(COMGT318)

Updated: 9/14

Quality You Can Trust…From
North America's Largest Roofing Manufacturer!™

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GAF

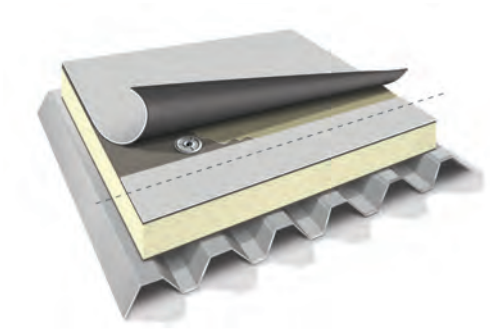
Quality You Can Trust…From North America's Largest Roofing Manufacturer!™

POLYISO INSULATION

Flat Stock and Tapered Boards

gaf.com

EnergyGuard™ POLYISO INSULATION



Description

EnergyGuard™ Polyiso Insulation board is made of glass fiber-reinforced cellulosic felt facers bonded to a core of isocyanurate foam. EnergyGuard™ Polyiso Insulation manufactured in our plants use the latest technology in manufacturing to provide a product of the highest quality.

Features and Benefits

- EnergyGuard™ Polyiso Insulation is designed for use in practically any low- slope roof application, including built-up roofs, modified bitumen, or most single-ply roofing systems
- High insulation value — Superior "LTTR" value compared to any other FM Class I rated product of equivalent thickness at 5.7 per inch
- Meets the requirements of ASTM C1289 Type II, Class 1, Grade 2 (20 PSI), and available in Grade 3 (25 PSI)
- Because of its light weight, this material is easy to handle on the job site and installs faster. Easier cutting in the field provides the installer with simplified fabricating on the roof deck
- Manufactured with EPA-compliant blowing agents containing no CFCs or HCFCs; has zero ozone depletion potential (ODP) and virtually no global warming potential (GWP)
- Available in a variety of thicknesses from 0.5" (12.7 mm) to 4.0" (102 mm) to best suit your needs
- Available in 4' x 4' (1.21 m x 1.21 m) and 4' x 8' (1.21 m x 2.44 m) boards
- Tapered panels are also available for when the roof design requires improved drainage in slopes of 1/16" (1.59 mm), 3/16" (4.76 mm), 1/8" (3.18 mm), 3/8" (9.53 mm), 1/4" (6.35 mm), and 1/2" (12.7 mm)

EnergyGuard™ Polyiso Insulation and Tapered Polyiso Insulation Codes & Compliance

- FM Approved—consult RoofNav.com for specific assemblies
- UL Classified—consult ul.com for specific assemblies
- For additional information contact GAF Technical Services at 1-800-ROOF-411 or technicalquestions@gaf.com

TYPICAL PHYSICAL PROPERTY DATA CHART (POLYISO FOAM CORE ONLY)

PROPERTY	TEST METHOD	VALUE
Compressive Strength	ASTM D1621	≥ 20 PSI
Dimensional Stability (Length + Width)	ASTM D2126	< 2%
Water Absorption	ASTM C209	< 1.5%
Moisture Vapor Transmission	ASTM E96	< 1.5 Perm
Service Temperature		-100° to 250°F (37.8° to 121.1°C)
Flame Spread Index	ASTM E84	< 75*
Smoke Developed Index	ASTM E84	< 200*

*Foam Core

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Flat Stock Physical Characteristics and Shipping Information

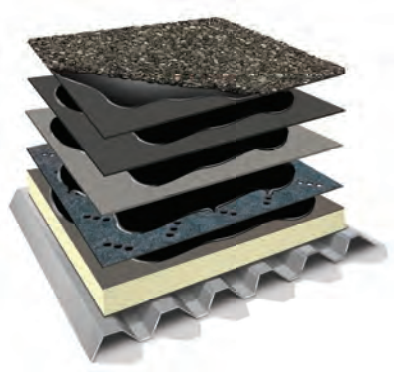
Physical Characteristics			Shipping Information (4' x 4') (1.21 m x 1.21 m)				Shipping Information (4' x 8') (1.21 m x 2.44 m)			
Size*	R-Value	Max Flute Span (in)	Bds/ Bundle	Bds/Truck	Bundles/ Truck	Sq. Ft. Per Truck	Bds/ Bundle	Bds/Truck	Bundles/ Truck	Sq. Ft. Per Truck
1.0" (25.4 mm)	5.6	2 5/8" (66.7 mm)	48	2,304	48	36,864 (3,425 sq. m)	48	1,152	24	36,864 (3,425 sq. m)
1.1" (27.9 mm)	6.2	2 5/8" (66.7 mm)	43	2,064	48	33,024 (3,068 sq. m)	43	1,032	24	33,024 (3,068 sq. m)
1.2" (30.5 mm)	6.7	2 5/8" (66.7 mm)	38	1,824	48	29,184 (2,711 sq. m)	38	912	24	29,184 (2,711 sq. m)
1.3" (33 mm)	7.3	3 5/8" (92 mm)	36	1,728	48	27,648 (2,568 sq. m)	36	864	24	27,648 (2,568 sq. m)
1.4" (35.6 mm)	7.9	4 3/8" (111 mm)	34	1,632	48	26,112 (2,426 sq. m)	34	816	24	26,112 (2,426 sq. m)
1.5" (38.1 mm)	8.6	4 3/8" (111 mm)	32	1,536	48	24,576 (2,283 sq. m)	32	768	24	24,576 (2,283 sq. m)
1.6" (40.6 mm)	9.1	4 3/8" (111 mm)	30	1,440	48	23,040 (2,140 sq. m)	30	720	24	23,040 (2,140 sq. m)
1.7" (43.1 mm)	9.6	4 3/8" (111 mm)	28	1,344	48	21,504 (1,998 sq. m)	28	672	24	21,504 (1,998 sq. m)
1.8" (45.7 mm)	10.2	4 3/8" (111 mm)	25	1,200	48	19,200 (1,784 sq. m)	25	600	24	19,200 (1,784 sq. m)
1.9" (48.3 mm)	10.8	4 3/8" (111 mm)	25	1,200	48	19,200 (1,784 sq. m)	25	600	24	19,200 (1,784 sq. m)
2.0" (51 mm)	11.4	4 3/8" (111 mm)	24	1,152	48	18,432 (1,712 sq. m)	24	576	24	18,432 (1,712 sq. m)
2.1" (53 mm)	12.0	4 3/8" (111 mm)	22	1,056	48	16,896 (1,570 sq. m)	22	528	24	16,896 (1,570 sq. m)
2.2" (56 mm)	12.6	4 3/8" (111 mm)	21	1,008	48	16,128 (1,498 sq. m)	21	504	24	16,128 (1,498 sq. m)
2.3" (58 mm)	13.2	4 3/8" (111 mm)	20	960	48	15,360 (1,427 sq. m)	20	480	24	15,360 (1,427 sq. m)
2.4" (61 mm)	13.8	4 3/8" (111 mm)	20	960	48	15,360 (1,427 sq. m)	20	480	24	15,360 (1,427 sq. m)
2.5" (64 mm)	14.4	4 3/8" (111 mm)	19	912	48	14,592 (1,356 sq. m)	19	456	24	14,592 (1,356 sq. m)
2.6" (66 mm)	15.0	4 3/8" (111 mm)	18	864	48	13,824 (1,284 sq. m)	18	432	24	13,824 (1,284 sq. m)
2.7" (69 mm)	15.6	4 3/8" (111 mm)	17	816	48	13,056 (1,213 sq. m)	17	408	24	13,056 (1,213 sq. m)
2.8" (71 mm)	16.2	4 3/8" (111 mm)	17	816	48	13,056 (1,213 sq. m)	17	408	24	13,056 (1,213 sq. m)
2.9" (74 mm)	16.8	4 3/8" (111 mm)	16	768	48	12,288 (1,142 sq. m)	16	384	24	12,288 (1,142 sq. m)
3.0" (76 mm)	17.4	4 3/8" (111 mm)	16	768	48	12,288 (1,142 sq. m)	16	384	24	12,288 (1,142 sq. m)
3.1" (79 mm)	18.0	4 3/8" (111 mm)	15	720	48	11,520 (1,070 sq. m)	15	360	24	11,520 (1,070 sq. m)
3.2" (81 mm)	18.6	4 3/8" (111 mm)	15	720	48	11,520 (1,070 sq. m)	15	360	24	11,520 (1,070 sq. m)
3.25" (83 mm)	18.9	4 3/8" (111 mm)	14	672	48	10,752 (999 sq. m)	14	336	24	10,752 (999 sq. m)
3.3" (84 mm)	19.2	4 3/8" (111 mm)	14	672	48	10,752 (999 sq. m)	14	336	24	10,752 (999 sq. m)
3.4" (86 mm)	19.9	4 3/8" (111 mm)	14	672	48	10,752 (999 sq. m)	14	336	24	10,752 (999 sq. m)
3.5" (89 mm)	20.5	4 3/8" (111 mm)	13	624	48	9,984 (928 sq. m)	13	312	24	9,984 (928 sq. m)
3.6" (91 mm)	21.1	4 3/8" (111 mm)	13	624	48	9,984 (928 sq. m)	13	312	24	9,984 (928 sq. m)
3.7" (94 mm)	21.7	4 3/8" (111 mm)	12	576	48	9,216 (856 sq. m)	12	288	24	9,216 (856 sq. m)
3.8" (97 mm)	22.3	4 3/8" (111 mm)	12	576	48	9,216 (856 sq. m)	12	288	24	9,216 (856 sq. m)
3.9" (99 mm)	23.0	4 3/8" (111 mm)	12	576	48	9,216 (856 sq. m)	12	288	24	9,216 (856 sq. m)
4.0" (102 mm)	23.6	4 3/8" (111 mm)	12	576	48	9,216 (856 sq. m)	12	288	24	9,216 (856 sq. m)

*Other sizes available upon request

Tapered Physical Characteristics and Shipping Information

Physical Characteristics		Shipping Information (4' x 4') (1.21 m x 1.21 m)				
Slope	Thickness	Size*	Bds/ Bundle	Bds/ Truck	Bundles/ Truck	Sq. Ft. Per Truck
1/8" (3.18 mm)	.5"-1" (12.7 mm - 25.4 mm)	AA	64	3,072	48	49,152 (4,566 sq. m)
	1"-1.5" (25.4 mm - 38.1 mm)	A	38	1,824	48	29,184 (2,711 sq. m)
	1.5"-2" (38.1 mm - 51 mm)	B	26	1,248	48	19,968 (1,855 sq. m)
	2"-2.5" (51 mm - 64 mm)	C	20	960	48	15,360 (1,427 sq. m)
	2.5"-3" (64 mm - 76 mm)	D	16	768	48	12,288 (1,142 sq. m)
	3"-3.5" (76 mm - 89 mm)	E	14	672	48	10,752 (999 sq. m)
	3.5"-4" (89 mm - 102 mm)	F	12	576	48	9,216 (856 sq. m)
1/4" (6.35 mm)	.5"-1.5" (12.7 mm - 38.1 mm)	X	48	2,304	48	36,864 (3,425 sq. m)
	1.5"-2.5" (38.1 mm - 64 mm)	Y	24	1,152	48	18,432 (1,712 sq. m)
	2.5"-3.5" (64 mm - 89 mm)	Z	16	768	48	12,288 (1,142 sq. m)
	1"-2" (25.4 mm - 51 mm)	G	32	1,536	48	24,576 (2,283 sq. m)
	2"-3" (51 mm - 76 mm)	H	19	912	48	14,592 (1,356 sq. m)
	3"-4" (76 mm - 102 mm)	I	12	576	48	9,216 (856 sq. m)
1/2" (12.7 mm)	.5"-2.5" (12.7 mm - 64 mm)	Q	32	1,536	48	24,576 (2,283 sq. m)
	1"-3" (25.4 mm - 76 mm)	XX	22	1,056	48	16,896 (1,570 sq. m)

*Other sizes available upon request



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Firestone
BUILDING PRODUCTS
NOBODY COVERS YOU BETTER.™



Firestone UltraPly™ TPO Products

EXPERIENCE THE ULTIMATE IN COOL ROOFING TECHNOLOGY.

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Firestone UltraPly TPO

Exceptional building performance starts at the top.

Significant reduction in roof's surface temperature. Greater energy efficiency. More indoor comfort and lower electricity bills. It's no surprise that thermoplastic polyolefin (TPO) roofs are the fastest growing, sustainable commercial roofing products available. And with nearly two decades of TPO experience, Firestone proudly stands behind our family of UltraPly TPO products.

Introduced in 1998, our TPO formulation is designed to provide excellent ozone and chemical resistance, ensuring long-term roof performance. Plus, TPO is environmentally friendly, offers superior puncture resistance (especially against hail) and costs less than competitive roofing materials. So you can stay at the top of your game – sustainably.

ULTRAPLY TPO SYSTEM OPTIONS

- Mechanically attached, fully adhered, self-adhered and ballasted systems
- Installed in 8', 10' and 12'4" widths
- Available in white, tan or gray
- Designed for low-slope application

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Att.9A012

TOP FIVE BENEFITS OF ULTRAPLY TPO

See what a partnership with Firestone can bring to your building.



ENHANCED ENERGY EFFICIENCY

- White reflective surface exceeds the EPA's ENERGY STAR® requirements
- White, tan and gray are listed with the Cool Roof Rating Council (CRRC)
- White and tan are compliant with California's Title 24 Energy Efficiency Building Standards and can be used to gain credits with Leadership in Energy and Environmental Design (LEED®) certification

LONG-LASTING PERFORMANCE

- Resists degradation from ultraviolet (UV) radiation and ozone
- Guards against erosion from harmful chemicals and microbial growth
- Performs at more than three times the ASTM International standard for weathering resistance

SUPERIOR DURABILITY AND STRENGTH

- Average thickness over scrim exceeds ASTM D6878 standard on 45-mil, 60-mil and 80-mil
- Provides enhanced puncture, tear and abrasion resistance

LESS ENVIRONMENTAL IMPACT

- Firestone's manufacturing plants are ISO-9001-certified and located to provide nationwide coverage
- Can add LEED® points to the design, construction, operation and maintenance of a commercial building
- Proximity of product availability reduces greenhouse gas emission and contributes to energy conservation
- Does not contain chlorinated or halogenated components

EXCELLENT WIND UPLIFT RESISTANCE

- Firestone Wide-Weld™ TPO seaming technology creates a full-width seam extending on both sides of the seam attachment
- Process allows uplift forces to be distributed uniformly along all edges of the fastening system for improved wind resistance

LEGENDARY WARRANTIES



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Firestone UltraPly TPO Platinum™ Systems

Extend your roof life – and peace of mind.

In addition to long-lasting performance, UltraPly TPO Platinum membrane delivers:

- Exceptional 30-year warranty coverage
- 80-mil thick reinforced membrane
- Mechanical or fully adhered attachments
- Excellent field seams and high-wind ratings
- Chlorine - and halogenate-free components

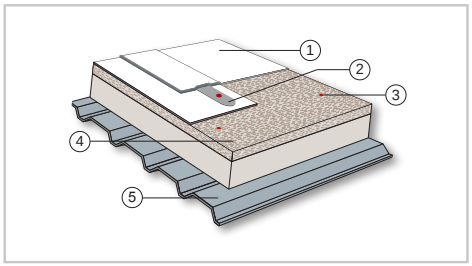
Exceeds EPA's ENERGY STAR® requirements!

PATENTED WIDE-WELD SEAMING TECHNOLOGY

- Superior strength for high-wind areas
- Higher wind uplift ratings than traditional single-weld systems
- Full-width seam distributes uplift forces uniformly

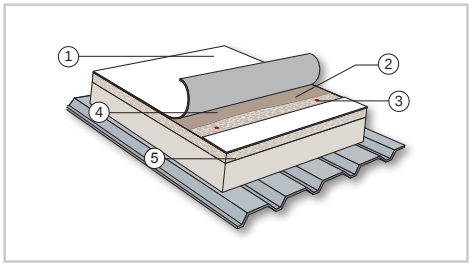
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UltraPly TPO Platinum Products



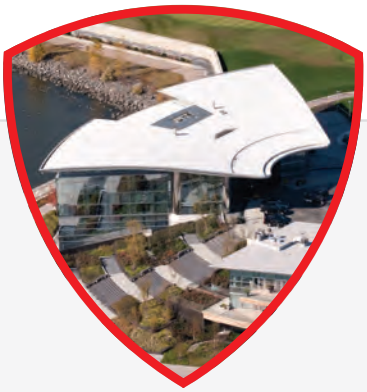
UltraPly TPO Platinum Mechanically Attached

1. Firestone UltraPly TPO Platinum with Wide-Weld Seam Technology
2. Firestone Batten Strip and Fasteners
3. Firestone HailGard™ Fasteners
4. Firestone HailGard Insulation
5. Roof Deck



UltraPly TPO Platinum Fully Adhered

1. Firestone UltraPly TPO Platinum with Wide-Weld Seam Technology
2. Firestone UltraPly TPO Bonding Adhesive
3. Firestone HailGard Fasteners
4. Firestone HailGard Insulation
5. Roof Deck



YOU'RE COVERED.

MULTIPLE TYPES OF PLATINUM WARRANTIES AVAILABLE:

- Puncture: Coverage for incidental punctures
- Puncture/hail: Coverage for punctures of up to 2"-diameter hail
- Puncture/hail/wind: Coverage for punctures, hail and 100-mph wind

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Firestone UltraPly TPO XR

Greater versatility. Easy choice.

Whether you're installing a new roof or covering your existing system, UltraPly TPO XR has your back. Reinforced with eight-ounce, nonwoven polyester fleece, UltraPly TPO XR membrane combines the attributes of UltraPly TPO membrane with a fleeceback material. So you and your building benefit from:



- Three thickness options – XR 100 (45-mil), XR 115 (60-mil) and XR 135 (80-mil)
- Quick and easy installation methods, especially efficient for large areas
- LVOC low-rise foam adhesive options from Firestone (XR Stick™ and I.S.O.Spray™ S Adhesives) specifically designed for use with UltraPly TPO XR membrane
- Superior cut and puncture resistance, enhancing sustainability
- Excellent resistance to microbial growth, environmental pollutants and UV rays
- CRRC-rated and may contribute to LEED® points
- Ideally suited for reroof applications and new construction

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Firestone ReflexEON™ TPO

The bright way to save on energy.

ReflexEON TPO offers high solar reflectivity. Its enhanced formulation provides uncompromised weatherability and durability – year after year.



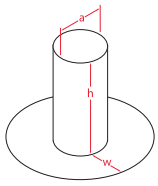
ReflexEON TPO is significantly brighter than standard TPO membrane. That means potentially even lower energy bills!



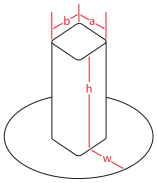
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Plus: Check These Out!

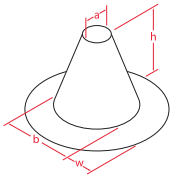
UltraPly TPO Custom Accessories



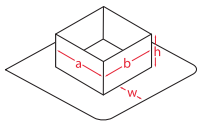
Round Pipe Boot



Square Boot



Coned Boot



Curb Flashing

For building projects with unique roof designs and elements, it pays to have customized UltraPly TPO accessories from a company you can trust. All of our standard and custom made-to-order TPO accessories are branded with the Firestone name and covered in the Firestone warranty. Save time and money with a variety of options designed to enable a professional installation on every project.

THE FIRESTONE DIFFERENCE

PRODUCTS
Choose from single-ply and APP/SBS modified bitumen roofing systems, metal roofing systems, polyiso insulation and a full line of accessories

QUALITY CONTROL
Rest assured knowing that each Firestone manufacturing facility meets or exceeds ISO 9001

EXPERTISE
Expect installation and product support from a wide-ranging network of expert contractors, distributors and sales reps

STABILITY AND INNOVATION
Count on over 100 years of success in rubber and polymer technology

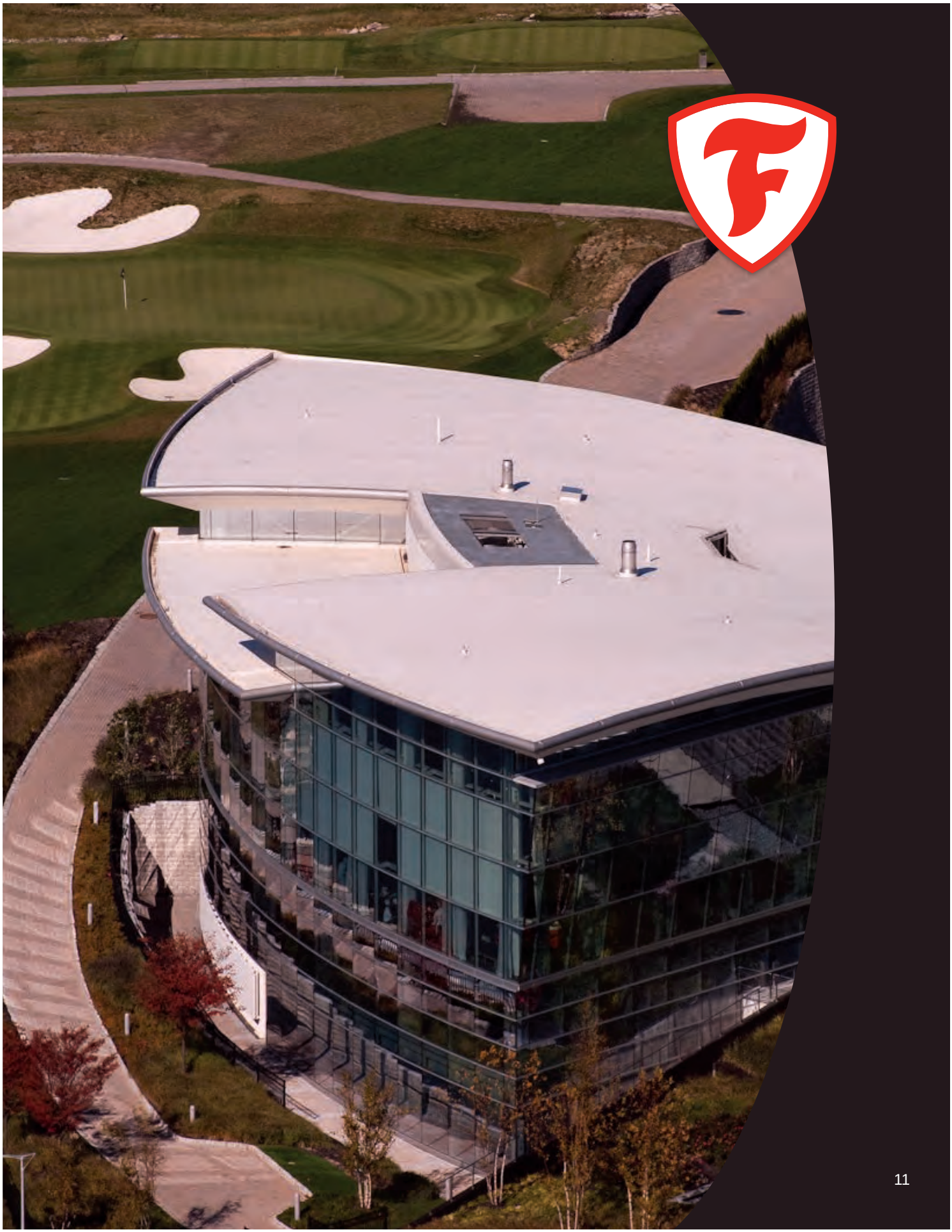
RESOURCES
Access a broad depth of raw materials as part of the world's largest tire and rubber company

R&D COMMITMENT
Benefit from annual investments of millions of dollars in research and development

GREEN FOCUSED
Partner with a company that plays a global role in protecting the environment. Firestone prioritizes recyclability, reflectivity, conservation and sustainability

EnviroReady™ Roofing System — Firestone GREEN — ONE TEAM, ONE PLANET

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Firestone
BUILDING PRODUCTS
NOBODY COVERS YOU BETTER.™

Partnering with Firestone Building Products means superior support that goes beyond the materials you need for your projects. We look at the big picture with you, taking the entire building envelope into consideration, so we can provide you with a complete solution. For exceptionally performing building materials backed by the services, warranty and expertise you need...

Count on Firestone.

For more information, ask your local Firestone sales rep or visit firestonebpco.com.

FIRESTONE BUILDING PRODUCTS
250 WEST 96TH ST., INDIANAPOLIS, IN 46260
CORPORATE OFFICE: (800) 428-4442 • (317) 575-7000

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Note: This brochure is meant only to highlight Firestone's products and specifications. Information is subject to change without notice. ALL products and specifications are listed in approximate weights and measurements. For complete product and detail information, please refer to the Technical Manual. Firestone takes responsibility for furnishing quality materials which meet Firestone's published product specifications. As neither Firestone itself nor its representatives practice architecture, Firestone offers no opinion on, and expressly disclaims any responsibility for, the soundness of any structure on which its products may be applied. If questions arise as to the soundness of a structure or its ability to support a planned installation properly, the owner should obtain opinions of competent structural engineers before proceeding. Firestone accepts no liability for any structural failure or for resultant damages, and no Firestone representative is authorized to vary this disclaimer.

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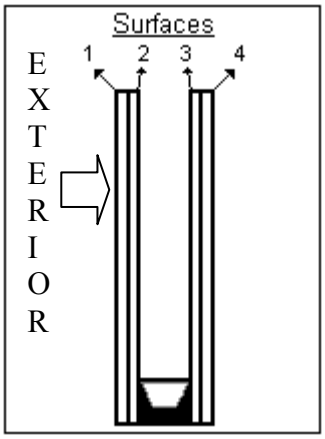
Item #1165 09/13

I.G. UNIT GLASS PERFORMANCE SPECIFICATIONS

Date:
Customer:
Contact:
Project:

Make-up:

¼" BRONZE
½" AIRSPACE
¼" PPG CLEAR SOLARBAN 60 (3)



Transmittance	
Visible Light:	42%
Solar Energy:	20%
Reflectance	
Visible Light (Exterior)	8%
Visible Light (Interior)	9%
Solar Energy:	17%
ASHRAE U-Value	
Winter Nighttime:	.29
Summer Daytime:	.27
Shading Coefficient:	.36
Solar Factor (SHGC):	.31

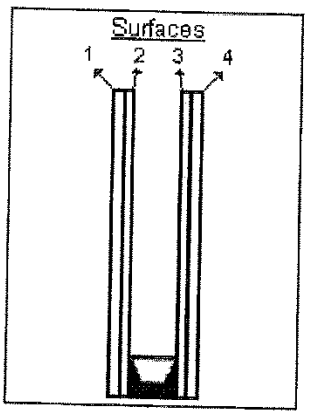
NFRC CENTER OF PANE PERFORMANCES

Spandrel

I.G. UNIT GLASS PERFORMANCE SPECIFICATIONS

Date:
Customer:
Contact:
Project:

Make-up:
¼" CLEAR
½" AIRSPACE
¼" CLR W/ 907 BLACK (3)



Transmittance
Visible Light:
Solar Energy:

Reflectance
Visible Light (Exterior)
Solar Energy:

ASHRAE U-Value
Winter Nighttime: .48
Summer Daytime: .55

Shading Coefficient:
Solar Factor (SHGC):

















PPG ARCHITECTURAL GLASS PERFORMANCE

Comparisons for One-Inch Insulating Glass Units

CERTIFIED cradle to cradle SILVER

PPG is the first glass manufacturer in the U.S. to have its entire collection of architectural glasses ***Cradle to Cradle Certified***™. To learn what that means for architects seeking to design more sustainable buildings or to earn LEED certification for their projects, visit www.ppgideascapes.com/C2C.

Cradle to Cradle™ is a certification mark of MBDC, LLC.

PPG IdeaScapes

Glass • Coatings • Paint

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One-Inch Insulating Glass Unit Comparisons with PPG Glass

Insulating Vision Unit Performance Comparisons — 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites; interior lite clear unless otherwise noted												
Glass Type Outdoor Lite: Coating if Any (Surface) Glass + Indoor Lite: Coating if Any (Surface) Glass	Transmittance[2]			Exterior Reflectance[2]		(BTU/hr•ft²°F) NFRC U-Value[3]		U-Value[4] EN 673 (W/m² °C)	Shading Coeffi-cient[5]	Solar Heat Gain Coeffi-cient[6]	Light to Solar Gain (LSG)[7]
	Ultra-violet %	Visible %	Total Solar Energy %	Visible Light %	Total Solar Energy %	Winter Night-time	Summer Day-time				
Uncoated											
CLEAR Glass + Clear	50	79	61	15	12	0.47	0.50	2.8	0.81	0.70	1.13
STARPHIRE® + *STARPHIRE*	77	84	80	15	14	0.47	0.50	2.8	0.94	0.82	1.02
SOLEXIA® + Clear	25	69	39	13	8	0.47	0.50	2.8	0.57	0.50	1.38
ATLANTICA® + Clear	13	60	29	11	6	0.47	0.50	2.8	0.47	0.41	1.46
AZURIA® + Clear	34	61	28	11	7	0.47	0.50	2.8	0.45	0.39	1.56
PACIFICA® + Clear	12	38	23	7	6	0.47	0.50	2.8	0.41	0.36	1.06
SOLARBLUE® + Clear	25	50	37	9	7	0.47	0.50	2.8	0.56	0.49	1.02
SOLARBRONZE® + Clear	21	47	39	8	7	0.47	0.50	2.8	0.59	0.51	0.92
SOLARGRAY® + Clear	20	40	33	7	7	0.47	0.50	2.8	0.53	0.46	0.87
GRAYLITE® II + Clear	2	8	7	4	4	0.47	0.50	2.8	0.25	0.22	0.36
Coated											
SUNGATE® 400 Low-E Glass											
SUNGATE 400 (2) Clear + Clear	28	76	51	14	16	0.32	0.31	1.8	0.69	0.60	1.27
SUNGATE 400 (2) Starphire + Starphire	39	80	65	14	20	0.32	0.31	1.8	0.78	0.68	1.82
CLEAR + *SUNGATE* 400 (3) Clear	28	76	51	14	17	0.32	0.31	1.8	0.73	0.63	1.21
SOLEXIA + *SUNGATE* 400 (3) Clear	15	66	33	11	9	0.32	0.31	1.8	0.50	0.44	1.50
ATLANTICA + *SUNGATE* 400 (3) Clear	8	58	25	10	7	0.32	0.31	1.8	0.40	0.35	1.66
AZURIA + *SUNGATE* 400 (3) Clear	20	59	25	10	7	0.32	0.31	1.8	0.39	0.34	1.74
PACIFICA + *SUNGATE* 400 (3) Clear	7	37	19	7	6	0.32	0.31	1.8	0.34	0.30	1.23
SOLARBLUE + *SUNGATE* 400 (3) Clear	15	48	31	8	9	0.32	0.31	1.8	0.49	0.42	1.14
SOLARBRONZE + *SUNGATE* 400 (3) Clear	12	46	32	8	10	0.32	0.31	1.8	0.50	0.44	1.05
SOLARGRAY + *SUNGATE* 400 (3) Clear	12	38	27	7	9	0.32	0.31	1.8	0.44	0.39	0.97
GRAYLITE II + *SUNGATE* 400 (3) Clear	1	8	5	4	5	0.32	0.31	1.8	0.17	0.15	0.53
SUNGATE® 500 Low-E Glass											
SUNGATE 500 (2) + Clear	42	74	52	17	14	0.35	0.35	2.0	0.71	0.62	1.19
CLEAR + *SUNGATE* 500 (3) Clear	42	74	52	17	14	0.35	0.35	2.0	0.76	0.66	1.12
SOLEXIA + *SUNGATE* 500 (3) Clear	21	64	33	14	9	0.35	0.35	2.0	0.51	0.44	1.42
ATLANTICA + *SUNGATE* 500 (3) Clear	11	56	25	12	7	0.35	0.35	2.0	0.41	0.36	1.56
AZURIA + *SUNGATE* 500 (3) Clear	29	57	24	12	7	0.35	0.35	2.0	0.40	0.34	1.68
PACIFICA + *SUNGATE* 500 (3) Clear	10	35	19	7	6	0.35	0.35	2.0	0.35	0.31	1.13
SOLARBLUE + *SUNGATE* 500 (3) Clear	21	46	32	10	9	0.35	0.35	2.0	0.51	0.44	1.05
SOLARBRONZE + *SUNGATE* 500 (3) Clear	18	44	33	9	9	0.35	0.35	2.0	0.53	0.46	0.96
SOLARGRAY + *SUNGATE* 500 (3) Clear	17	37	28	8	8	0.35	0.35	2.0	0.47	0.41	0.90
GRAYLITE II + *SUNGATE* 500 (3) Clear	1	7	5	4	4	0.35	0.35	2.0	0.19	0.17	0.41
SUNGATE® 600 Low-E Glass											
CLEAR + *SUNGATE* 600 (3) Clear	38	71	48	17	15	0.33	0.32	1.8	0.75	0.65	1.09
SUNGATE 600 (2) Clear + Clear	38	71	48	16	13	0.33	0.32	1.8	0.66	0.57	1.25
SOLEXIA + *SUNGATE* 600 (3) Clear	20	62	31	14	9	0.33	0.32	1.8	0.51	0.44	1.41
ATLANTICA + *SUNGATE* 600 (3) Clear	10	54	23	12	7	0.33	0.32	1.8	0.40	0.35	1.54
AZURIA + *SUNGATE* 600 (3) Clear	26	55	23	12	7	0.33	0.32	1.8	0.39	0.34	1.62
PACIFICA + *SUNGATE* 600 (3) Clear	10	34	18	7	6	0.33	0.32	1.8	0.34	0.30	1.13
SOLARBLUE + *SUNGATE* 600 (3) Clear	20	45	29	9	9	0.33	0.32	1.8	0.50	0.43	1.05
SOLARBRONZE + *SUNGATE* 600 (3) Clear	16	43	30	9	9	0.33	0.32	1.8	0.52	0.45	0.96
SOLARGRAY + *SUNGATE* 600 (3) Clear	15	36	25	8	8	0.33	0.32	1.8	0.46	0.40	0.90
GRAYLITE II + *SUNGATE* 600 (3) Clear	1	7	5	4	4	0.33	0.32	1.8	0.18	0.16	0.44
SUNGATE® 600 Low-E Glass 4th Surface plus other low-e											
SUNGATE 400 (2) Clear + *SUNGATE* 600 (4) Clear	22	69	43	15	17	0.25	0.23	1.5	0.63	0.55	1.25
SOLARBAN 60 (2) Clear + *SUNGATE* 600 (4) Clear	14	63	29	12	30	0.23	0.21	1.3	0.41	0.36	1.77
SOLARBAN 70XL (2)† + *SUNGATE* 600 (4) Clear	5	58	22	13	53	0.23	0.20	1.2	0.30	0.26	2.23
SOLARBAN 67 (2) Clear + *SUNGATE* 600 (4) Clear	9	48	22	20	34	0.23	0.21	1.3	0.31	0.27	1.78
SOLARBAN z50 (2) *OPTIBLUE* + *SUNGATE* 600 (4) Clear	11	46	23	8	24	0.23	0.21	1.3	0.34	0.29	1.55
SOLARBAN R100 (2) Clear + *SUNGATE* 600 (4) Clear	9	37	17	32	41	0.23	0.21	1.3	0.25	0.22	1.73
SOLARBAN 72 (2) *STARPHIRE* + *SUNGATE* 600 (4) Clear	6	62	24	14	53	0.23	0.20	1.3	0.32	0.28	2.21
SOLARBAN® 60 Solar Control Low-E Glass											
SOLARBAN 60 (2) Clear + Clear	18	70	34	11	28	0.29	0.27	1.6	0.45	0.39	1.79
SOLARBAN 60 (2) *STARPHIRE* + *STARPHIRE*	24	74	39	11	41	0.29	0.27	1.6	0.45	0.41	1.80
SOLARBAN 60 (2) *SOLEXIA* + Clear	10	61	25	9	10	0.29	0.27	1.6	0.37	0.32	1.91
SOLARBAN 60 (2) *ATLANTICA* + Clear	5	53	20	8	7	0.29	0.27	1.6	0.32	0.27	1.96
SOLARBAN 60 (2) *AZURIA* + Clear	13	54	21	8	6	0.29	0.27	1.6	0.32	0.28	1.93
SOLARBAN 60 (2) *PACIFICA* + Clear	5	34	15	6	6	0.29	0.27	1.6	0.26	0.22	1.55
SOLARBAN 60 (2) *SOLARBLUE* + Clear	10	45	21	7	12	0.29	0.27	1.6	0.33	0.28	1.61
SOLARBAN 60 (2) *SOLARBRONZE* + Clear	8	42	21	7	15	0.29	0.27	1.6	0.32	0.28	1.50
SOLARBAN 60 (2) *SOLARGRAY* + Clear	8	35	18	6	12	0.29	0.27	1.6	0.29	0.25	1.40
SOLEXIA + *SOLARBAN* 60 (3) Clear	10	61	25	10	11	0.29	0.27	1.6	0.42	0.37	1.65
ATLANTICA + *SOLARBAN* 60 (3) Clear	5	53	20	9	7	0.29	0.27	1.6	0.36	0.31	1.71
AZURIA + *SOLARBAN* 60 (3) Clear	13	54	21	9	7	0.29	0.27	1.6	0.36	0.31	1.74
PACIFICA + *SOLARBAN* 60 (3) Clear	5	34	15	6	7	0.29	0.27	1.6	0.29	0.25	1.36
SOLARBLUE + *SOLARBAN* 60 (3) Clear	10	45	21	7	13	0.29	0.27	1.6	0.38	0.33	1.36
* *SOLARBRONZE* + *SOLARBAN* 60 (3) Clear	8	42	21	7	16	0.29	0.27	1.6	0.37	0.32	1.31
SOLARGRAY + *SOLARBAN* 60 (3) Clear	8	35	18	7	13	0.29	0.27	1.6	0.33	0.29	1.21
GRAYLITE II + *SOLARBAN* 60 (3) Clear	1	7	4	4	5	0.29	0.27	1.6	0.14	0.13	0.54

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One-Inch Insulating Glass Unit Comparisons with PPG Glass

Insulating Vision Unit Performance Comparisons 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites; interior lite clear unless otherwise noted											
Glass Type Outdoor Lite: Coating if Any (Surface) Glass + Indoor Lite: Coating if Any (Surface) Glass	Transmittance[2]			Exterior Reflectance[2]		(BTU/hr•ft²°F) NFRC U-Value[3]		U-Value[4] EN 673 (W/m²°C)	Shading Coefficient[5]	Solar Heat Gain Coefficient[6]	Light to Solar Gain (LSG)[7]
	Ultra-violet %	Visible %	Total Solar Energy %	Visible Light %	Total Solar Energy %	Winter Night-time	Summer Day-time				
Coated											
***SOLARBAN*® 67 Solar Control Low-E Glass**											
SOLARBAN 67 (2) *CLEAR* + Clear	11	54	24	19	34	0.29	0.27	1.6	0.33	0.29	1.86
SOLARBAN 67 (2) *STARPHIRE* + *STARPHIRE*	15	57	28	20	49	0.29	0.27	1.6	0.34	0.30	1.90
SOLARBAN 67 (2) *SOLEXIA* + Clear	6	47	19	16	13	0.29	0.27	1.6	0.29	0.25	1.88
SOLARBAN 67 (2) *ATLANTICA* + Clear	3	41	15	13	9	0.29	0.27	1.6	0.26	0.22	1.86
SOLARBAN 67 (2) *AZURIA* + Clear	8	42	16	13	9	0.29	0.27	1.6	0.26	0.23	1.83
SOLARBAN 67 (2) *OPTIBLUE* + Clear	8	39	19	12	27	0.29	0.27	1.6	0.28	0.25	1.56
SOLARBAN 67 (2) *PACIFICA* + Clear	3	26	11	8	8	0.29	0.27	1.6	0.21	0.19	1.37
SOLARBAN 67 (2) *SOLARBLUE* + Clear	6	34	16	10	15	0.29	0.27	1.6	0.26	0.22	1.55
SOLARBAN 67 (2) *SOLARBRONZE* + Clear	5	32	15	10	18	0.29	0.27	1.6	0.25	0.22	1.45
SOLARBAN 67 (2) *SOLARGRAY* + Clear	5	27	13	8	14	0.29	0.27	1.6	0.23	0.20	1.35
ATLANTICA + *SOLARBAN* 67 (3) Clear	3	41	15	11	8	0.29	0.27	1.6	0.33	0.29	1.41
AZURIA + *SOLARBAN* 67 (3) Clear	8	42	16	11	8	0.29	0.27	1.6	0.33	0.29	1.45
OPTIBLUE + *SOLARBAN* 67 (3) Clear	8	39	19	10	26	0.29	0.27	1.6	0.39	0.34	1.15
PACIFICA + *SOLARBAN* 67 (3) Clear	3	26	11	7	7	0.29	0.27	1.6	0.27	0.23	1.13
SOLARBLUE + *SOLARBAN* 67 (3) Clear	6	34	16	9	14	0.29	0.27	1.6	0.34	0.30	1.13
SOLARBRONZE + *SOLARBAN* 67 (3) Clear	5	32	15	9	18	0.29	0.27	1.6	0.33	0.29	1.10
SOLARGRAY + *SOLARBAN* 67 (3) Clear	5	27	13	8	14	0.29	0.27	1.6	0.30	0.26	1.04
GRAYLITE II + *SOLARBAN* 67 (3) Clear	0	5	3	4	5	0.29	0.27	1.6	0.14	0.12	0.42
***SOLARBAN*® 70XL Solar Control Low-E Glass†**											
SOLARBAN 70XL (2) + Clear	6	64	25	12	52	0.28	0.26	1.5	0.32	0.27	2.37
SOLARBAN 70XL (2) *SOLEXIA* + Clear	4	58	21	10	13	0.28	0.26	1.5	0.31	0.27	2.15
SOLARBAN 70XL (2) ATLANTICA + Clear	2	51	17	9	8	0.28	0.26	1.5	0.28	0.24	2.13
SOLARBAN 70XL (2) *AZURIA* + Clear	5	52	18	9	7	0.28	0.26	1.5	0.29	0.25	2.08
SOLARBAN 70XL (2) *PACIFICA* + Clear	2	32	12	6	7	0.28	0.26	1.5	0.22	0.19	1.68
SOLARBAN 70XL (2) *SOLARBLUE* + Clear	4	42	17	8	15	0.28	0.26	1.5	0.26	0.23	1.83
SOLARBAN 70XL (2) *SOLARBRONZE* + Clear	3	40	15	7	19	0.28	0.26	1.5	0.25	0.21	1.90
SOLARBAN 70XL (2) *SOLARGRAY* + Clear	3	34	13	6	15	0.28	0.26	1.5	0.23	0.20	1.70
SOLEXIA + *SOLARBAN* 70XL (3)	3	56	20	11	13	0.28	0.26	1.5	0.37	0.32	1.75
ATLANTICA + *SOLARBAN* 70XL (3)	2	49	17	10	8	0.28	0.26	1.5	0.32	0.28	1.75
AZURIA + *SOLARBAN* 70XL (3)	4	49	17	9	8	0.28	0.26	1.5	0.33	0.29	1.69
PACIFICA + *SOLARBAN* 70XL (3)	2	31	12	6	7	0.28	0.26	1.5	0.26	0.22	1.41
SOLARBLUE + *SOLARBAN* 70XL (3)	3	40	16	8	16	0.28	0.26	1.5	0.32	0.27	1.48
SOLARBRONZE + *SOLARBAN* 70XL (3)	3	38	15	8	20	0.28	0.26	1.5	0.30	0.26	1.46
SOLARGRAY + *SOLARBAN* 70XL (3)	2	32	13	7	15	0.28	0.26	1.5	0.27	0.24	1.33
GRAYLITE II + *SOLARBAN* 70XL (3)	0	6	3	4	5	0.28	0.26	1.5	0.13	0.11	0.55
***SOLARBAN*® 72 Solar Control Low-E Glass**											
SOLARBAN 72 (2) *STARPHIRE*††	9	71	28	13	53	0.29	0.27	1.5	0.34	0.30	2.37
***SOLARBAN*® z50 Solar Control Low-E Glass†††**											
SOLARBAN z50 (2) *OPTIBLUE* + Clear	14	51	26	8	23	0.29	0.27	1.6	0.36	0.32	1.59
SOLARBAN z50 (2) *OPTIBLUE* + *OPTIBLUE*	10	37	21	7	22	0.29	0.27	1.6	0.36	0.32	1.16
***SOLARBAN*® R100 Solar Control Low-E Glass**											
SOLARBAN R100 (2) + Clear	12	42	19	32	41	0.29	0.27	1.6	0.27	0.23	1.83
SOLARBAN R100 (2) *STARPHIRE* + *STARPHIRE*	16	44	21	33	57	0.29	0.27	1.6	0.27	0.23	1.91
SOLARBAN R100 (2) *SOLEXIA* + Clear	6	36	15	25	17	0.29	0.27	1.6	0.24	0.21	1.71
SOLARBAN R100 (2) *ATLANTICA* + Clear	3	32	12	20	11	0.29	0.27	1.6	0.22	0.19	1.68
SOLARBAN R100 (2) *AZURIA* + Clear	8	32	12	21	11	0.29	0.27	1.6	0.22	0.19	1.68
SOLARBAN R100 (2) *OPTIBLUE* + Clear	8	30	14	19	31	0.29	0.27	1.6	0.23	0.20	1.50
SOLARBAN R100 (2) *PACIFICA* + Clear	3	20	9	11	9	0.29	0.27	1.6	0.19	0.16	1.25
SOLARBAN R100 (2) *SOLARBLUE* + Clear	6	26	12	15	17	0.29	0.27	1.6	0.22	0.19	1.37
SOLARBAN R100 (2) *SOLARBRONZE* + Clear	5	25	11	15	20	0.29	0.27	1.6	0.21	0.18	1.39
SOLARBAN R100 (2) *SOLARGRAY* + Clear	5	21	10	12	16	0.29	0.27	1.6	0.19	0.17	1.24
***VISTACOOL*® Subtly Reflective Glass**											
VISTACOOL (2) *ATLANTICA* + Clear	11	47	23	20	10	0.47	0.50	2.8	0.41	0.35	1.34
VISTACOOL (2) *AZURIA* + Clear	29	47	22	21	11	0.47	0.50	2.8	0.39	0.34	1.38
VISTACOOL (2) *PACIFICA* + Clear	10	29	19	11	7	0.47	0.50	2.8	0.37	0.32	0.91
VISTACOOL (2) *SOLARGRAY* + Clear	17	31	28	12	9	0.47	0.50	2.8	0.47	0.41	0.76
***SOLARCOOL*® Reflective Glass**											
SOLARCOOL (1) *SOLEXIA* + Clear	7	27	18	37	30	0.47	0.50	2.8	0.32	0.28	0.96
SOLARCOOL (2) *SOLEXIA* + Clear	7	27	19	24	12	0.47	0.50	2.8	0.36	0.31	0.87
SOLARCOOL (1) *AZURIA* + Clear	10	23	11	37	30	0.47	0.50	2.8	0.25	0.21	1.10
SOLARCOOL (2) *AZURIA* + Clear	10	24	12	20	10	0.47	0.50	2.8	0.29	0.25	0.96
SOLARCOOL (1) *PACIFICA* + Clear	4	14	10	36	30	0.47	0.50	2.8	0.24	0.21	0.67
SOLARCOOL (2) *PACIFICA* + Clear	4	15	11	10	7	0.47	0.50	2.8	0.29	0.25	0.60
SOLARCOOL (1) *SOLARBLUE* + Clear	7	19	19	37	30	0.47	0.50	2.8	0.33	0.29	0.66
SOLARCOOL (2) *SOLARBLUE* + Clear	7	20	19	15	11	0.47	0.50	2.8	0.37	0.32	0.63
SOLARCOOL (1) *SOLARBRONZE* + Clear	6	18	21	37	31	0.47	0.50	2.8	0.35	0.31	0.58
SOLARCOOL (2) *SOLARBRONZE* + Clear	6	19	21	14	12	0.47	0.50	2.8	0.40	0.34	0.56
SOLARCOOL (1) *SOLARGRAY* + Clear	6	15	17	36	30	0.47	0.50	2.8	0.32	0.28	0.54
SOLARCOOL (2) *SOLARGRAY* + Clear	6	16	18	11	10	0.47	0.50	2.8	0.36	0.32	0.50
SOLARCOOL (1) *GRAYLITE* II + Clear	0	3	3	36	30	0.47	0.50	2.8	0.17	0.15	0.20
SOLARCOOL (2) *GRAYLITE* II + Clear	0	3	4	5	5	0.47	0.50	2.8	0.22	0.19	0.16

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One-Inch Insulating Glass Unit Comparisons with PPG Glass

Insulating Vision Unit Performance Comparisons 1-inch (25mm) units with 1/2-inch (13mm) airspace and two 1/4-inch (6mm) lites; interior lite clear unless otherwise noted

Glass Type Outdoor Lite: Coating if Any (Surface) Glass + Indoor Lite: Coating if Any (Surface) Glass	Transmittance[2]			Exterior Reflectance[2]		(BTU/hr•ft²°F) NFRC U-Value[3]		U-Value[4] EN 673 (W/m² °C)	Shading Coefficient[5]	Solar Heat Gain Coefficient[6]	Light to Solar Gain (LSG)[7]
	Ultra-violet %	Visible %	Total Solar Energy %	Visible Light %	Total Solar Energy %	Winter Night-time	Summer Day-time				
Coated											
VISTACOOL® (Subtly Reflective) and ***SOLARCOOL***® (Reflective) with ***SUNGATE***® 500 Low-E (3)											
VISTACOOL (2) *ATLANTICA* + *SUNGATE* 500 (3) Clear	9	44	20	21	11	0.35	0.35	2.0	0.35	0.31	1.42
VISTACOOL (2) *AZURIA* + *SUNGATE* 500 (3) Clear	24	44	19	22	11	0.35	0.35	2.0	0.34	0.29	1.52
VISTACOOL (2) *PACIFICA* + *SUNGATE* 500 (3) Clear	9	27	16	11	8	0.35	0.35	2.0	0.31	0.27	1.00
VISTACOOL (2) *SOLARGRAY* + *SUNGATE* 500 (3) Clear	14	29	23	12	10	0.35	0.35	2.0	0.41	0.36	0.81
SOLARCOOL (2) *PACIFICA* + *SUNGATE* 500 (3) Clear	3	14	9	10	7	0.35	0.35	2.0	0.23	0.20	0.70
SOLARCOOL (2) *SOLEXIA* + *SUNGATE* 500 (3) Clear	6	25	15	24	13	0.35	0.35	2.0	0.31	0.27	0.93
SOLARCOOL (2) *AZURIA* + *SUNGATE* 500 (3) Clear	8	22	10	20	10	0.35	0.35	2.0	0.23	0.20	1.10
SOLARCOOL (2) *SOLARBLUE* + *SUNGATE* 500 (3) Clear	6	18	15	15	12	0.35	0.35	2.0	0.32	0.27	0.67
SOLARCOOL (2) *SOLARBRONZE* + *SUNGATE* 500 (3) Clear	5	18	17	14	13	0.35	0.35	2.0	0.34	0.29	0.62
SOLARCOOL (2) *SOLARGRAY* + *SUNGATE* 500 (3) Clear	5	15	14	11	10	0.35	0.35	2.0	0.30	0.26	0.58
SOLARCOOL (2) *GRAYLITE* II + *SUNGATE* 500 (3) Clear	0	3	3	5	5	0.35	0.35	2.0	0.16	0.14	0.21
VISTACOOL® (Subtly Reflective) and ***SOLARCOOL***® (Reflective) with ***SUNGATE***® 600 Low-E (3)											
VISTACOOL (2) *ATLANTICA* + *SUNGATE* 600 (3) Clear	9	42	19	21	10	0.33	0.32	1.8	0.34	0.30	1.40
VISTACOOL (2) *AZURIA* + *SUNGATE* 600 (3) Clear	22	43	18	22	11	0.33	0.32	1.8	0.33	0.29	1.48
VISTACOOL (2) *PACIFICA* + *SUNGATE* 600 (3) Clear	8	27	14	11	8	0.33	0.32	1.8	0.30	0.26	1.04
VISTACOOL (2) *SOLARGRAY* + *SUNGATE* 600 (3) Clear	13	28	21	12	10	0.33	0.32	1.8	0.40	0.35	0.80
SOLARCOOL (2) *PACIFICA* + *SUNGATE* 600 (3) Clear	3	13	8	10	7	0.33	0.32	1.8	0.22	0.19	0.68
SOLARCOOL (2) *SOLEXIA* + *SUNGATE* 600 (3) Clear	6	25	14	24	13	0.33	0.32	1.8	0.29	0.26	0.96
SOLARCOOL (2) *AZURIA* + *SUNGATE* 600 (3) Clear	8	23	10	21	11	0.35	0.33	1.8	0.24	0.21	1.10
SOLARCOOL (2) *SOLARBLUE* + *SUNGATE* 600 (3) Clear	6	18	14	15	12	0.33	0.32	1.8	0.30	0.26	0.69
SOLARCOOL (2) *SOLARBRONZE* + *SUNGATE* 600 (3) Clear	5	17	15	14	13	0.33	0.32	1.8	0.33	0.28	0.61
SOLARCOOL (2) *SOLARGRAY* + *SUNGATE* 600 (3) Clear	5	14	12	11	10	0.33	0.32	1.8	0.29	0.25	0.56
SOLARCOOL (2) *GRAYLITE* II + *SUNGATE* 600 (3) Clear	0	3	2	5	5	0.33	0.32	1.8	0.15	0.13	0.23
VISTACOOL® and ***SOLARCOOL***® with ***SOLARBAN***® 60 Solar Control Low-E (3)											
VISTACOOL (2) *ATLANTICA* + *SOLARBAN* 60 (3) Clear	5	41	16	20	11	0.29	0.27	1.6	0.29	0.25	1.58
VISTACOOL (2) *AZURIA* + *SOLARBAN* 60 (3) Clear	11	42	16	20	11	0.29	0.27	1.6	0.30	0.26	1.62
VISTACOOL (2) *PACIFICA* + *SOLARBAN* 60 (3) Clear	4	26	12	11	9	0.29	0.27	1.6	0.24	0.21	1.24
VISTACOOL (2) *SOLARGRAY* +*SOLARBAN* 60 (3) Clear	7	27	14	11	15	0.29	0.27	1.6	0.28	0.24	1.08
SOLARCOOL (2) *PACIFICA* + *SOLARBAN* 60 (3) Clear	2	13	6	10	8	0.29	0.27	1.6	0.17	0.15	0.87
SOLARCOOL (2) *SOLEXIA* + *SOLARBAN* 60 (3) Clear	3	24	10	24	15	0.29	0.27	1.6	0.22	0.19	1.26
SOLARCOOL (2) *AZURIA* + *SOLARBAN* 60 (3) Clear	4	21	8	19	10	0.29	0.27	1.6	0.19	0.17	1.24
SOLARCOOL (2) *SOLARBLUE* + *SOLARBAN* 60 (3) Clear	3	17	9	14	15	0.29	0.27	1.6	0.21	0.18	0.94
SOLARCOOL (2) *SOLARBRONZE* +*SOLARBAN* 60 (3) Clear	2	17	9	14	18	0.29	0.27	1.6	0.21	0.18	0.94
SOLARCOOL (2) *SOLARGRAY* + *SOLARBAN* 60 (3) Clear	2	14	8	11	14	0.29	0.27	1.6	0.20	0.17	0.82
SOLARCOOL (2) *GRAYLITE* II + *SOLARBAN* 60 (3) Clear	0	3	2	5	5	0.29	0.27	1.6	0.12	0.10	0.30
VISTACOOL® and ***SOLARCOOL***® with ***SOLARBAN***® 70XL Solar Control Low-E (3) †											
VISTACOOL (2) *ATLANTICA* + *SOLARBAN* 70XL (3)	1	38	13	20	11	0.28	0.26	1.5	0.27	0.23	1.65
VISTACOOL (2) *AZURIA* + *SOLARBAN* 70XL (3)	4	38	14	21	12	0.28	0.26	1.5	0.27	0.24	1.58
VISTACOOL (2) *PACIFICA* + *SOLARBAN* 70XL (3)	1	24	9	11	9	0.28	0.26	1.5	0.22	0.19	1.26
VISTACOOL (2) *SOLARGRAY* + *SOLARBAN* 70XL (3)	2	25	10	11	17	0.28	0.26	1.5	0.23	0.20	1.25
SOLARCOOL (2) *SOLEXIA* + *SOLARBAN* 70XL (3)	1	22	8	24	15	0.28	0.26	1.5	0.20	0.17	1.29
SOLARCOOL (2) *AZURIA* + *SOLARBAN* 70XL (3)	1	19	6	19	10	0.28	0.26	1.5	0.18	0.15	1.27
SOLARCOOL (2) *PACIFICA* + *SOLARBAN* 70XL (3)	1	12	4	10	8	0.28	0.26	1.5	0.15	0.13	0.92
SOLARCOOL (2) *SOLARBLUE* + *SOLARBAN* 70XL (3)	1	16	6	14	16	0.28	0.26	1.5	0.18	0.15	1.07
SOLARCOOL (2) *SOLARBRONZE* + *SOLARBAN* 70XL (3)	1	15	6	14	19	0.28	0.26	1.5	0.17	0.15	1.00
SOLARCOOL (2) *SOLARGRAY* + *SOLARBAN* 70XL (3)	1	13	5	11	15	0.28	0.26	1.5	0.16	0.14	0.93
SOLARCOOL (2) *GRAYLITE* II + *SOLARBAN* 70XL (3)	0	3	1	5	5	0.28	0.26	1.5	0.11	0.09	0.33

All performance data calculated using LBNL Window 6.3 software, except European U-value, which is calculated using WinDat version 3.0.1 software. For detailed information on the methodologies used to calculate the aesthetic and performance values in this table, please visit www.ppgideascapes.com or request our Architectural Glass Catalog.

† ***Solarban*** 70XL for annealed applications is applied to ***Starphire*** glass; heat treated applications will require either clear or ***Starphire*** glass depending on manufacturing process.

†† ***Solarban*** 72 ***Starphire*** data based on using ***Starphire*** glass for both interior and exterior lites.

††† ***Optiblue*** is a unique substrate by PPG designed specifically for ***Solarban*** z50 glass.

1. **Data is based on center of glass performance of representative factory production samples. Actual values may vary due to the production process and manufacturing tolerances. All tabulated data is based on NFRC methodology using the LBNL Window 6.3 software. Variations from previously published data are due to minor changes in the LBNL Window 6.3 software versus Version 5.2.**
2. **Transmittance and Reflectance** values based on spectrophotometric measurements and energy distribution of solar radiation.
3. **U-value** is the overall coefficient of heat transmittance or heat flow measured in BTU/hr. • ft² • °F. Lower U-values indicate better insulating performance.
4. **European U-Value** is the overall coefficient of heat transmittance or heat flow measured in Watts/m² • °C, and is calculated using WinDat WIS version 3.0.1 software.
5. **Shading Coefficient** is the ratio of the total amount of solar energy that passes through a glass relative to 1/8-inch (3.0mm) thick clear glass under the same design conditions. It includes both solar energy transmitted directly plus any absorbed solar energy re-radiated and convected. Lower shading coefficient values indicate better performance in reducing solar heat gain. Note: Performance values were calculated using the LBNL Window 6.3 program using NFRC 100-2001 standard winter and summer design condition.
6. **Solar Heat Gain Coefficient (SHGC)** represents the solar heat gain through the glass relative to the incident solar radiation. It is equal to 86% of the shading coefficient.
7. **Light to Solar Gain (LSG) ratio** is the ratio of visible light transmittance to solar heat gain coefficient.

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CURRIES

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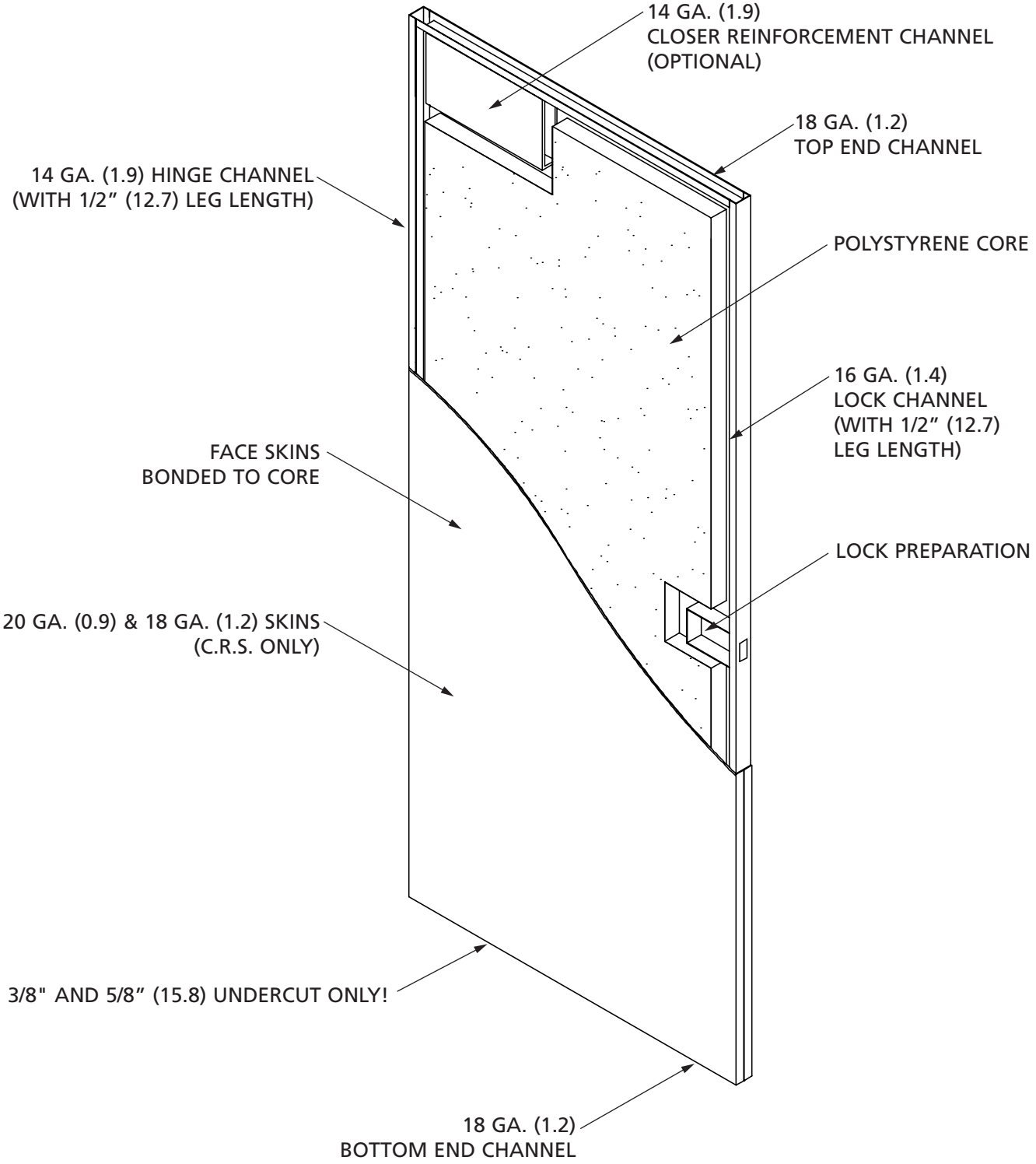
ASSA ABLOY, the global leader
in door opening solutions

607 Door Construction

DOOR TECHNICAL DATA

October, 2009

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Architectural 5-Ply Specification

Technical Manual

June, 2011

Graham® wood doors

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GPD-PC

5-Ply Particleboard Core
WDMA/AWS Extra Heavy Duty
PC-5

Construction

Horizontal Edges:
- Top and bottom rails - structural composite lumber
- Bonded to core
- 1" minimum after factory trim
- No additional blocking required for thru bolted closers
- Optional closer and lock blocks available

Vertical Edges:
- Matching vertical edges
- Bonded to core
- Structural composite lumber (SCL) laminated to a matching hardwood face (standard for Oak, Birch, and Maple)
- Structural composite lumber (SCL) laminated with a matching veneer edge band on veneers other than listed above as standard with optional hardwood stiles face available

Core:
- Conforms to ANSI A208.1
  - Standard LD1 Particleboard Core - 28 lbs/ft^3
  - Optional LD2 available - 32 lbs/ft^3
- Meets requirements of LEED MR4
- Optional to UL 10c (positive pressure) Category "A"

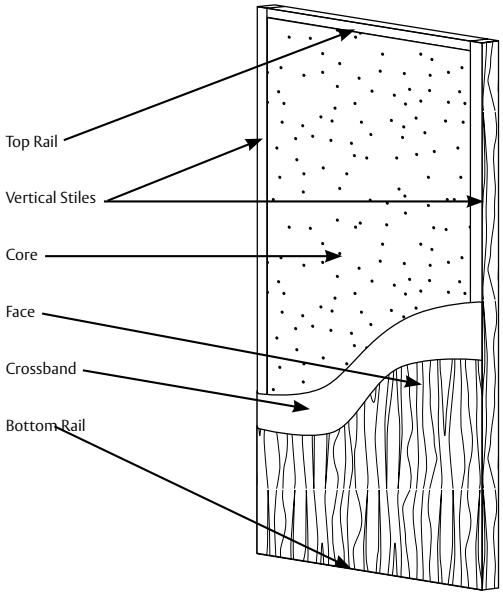
Fire Rating:
- 20 minute fire rating available
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Acoustical Rating:
- Sound Transmission Class (STC) 30 operable with required seals

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty*
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request



Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available
  - MR 4 - Recycled Content (standard)
  - MR 5 - Regional Materials
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
  - IEQ 9 - Enhanced Acoustical Performance (LEED for schools) STC 35 operable (flush door)
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

**Optional blocking required to meet Extra heavy Duty face screw holding standards.*

Graham® wood doors

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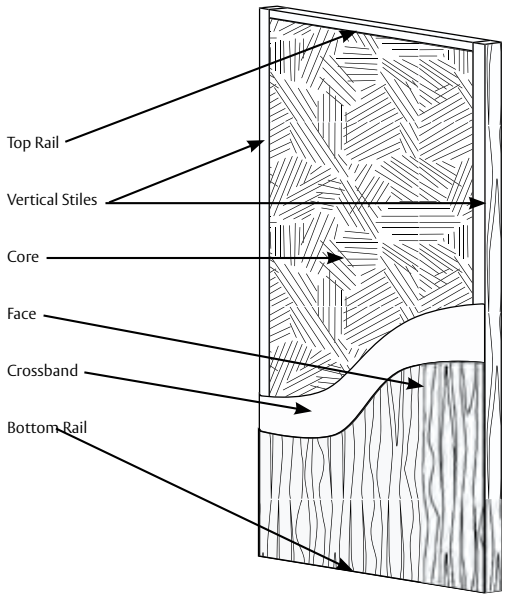
Architectural 5-Ply Specification

Technical Manual

June, 2011

GPD-EC

5-Ply Engineered Composite Lumber Core
WDMA/AWS Extra Heavy Duty
SCLC-5



Construction

Horizontal Edges:
- Top and bottom rails - structural composite lumber
- Bonded to core
- 1" minimum after factory trim
- No additional blocking required for thru bolted closers

Vertical Edges:
- Matching vertical edges
- Bonded to core
- Structural composite lumber (SCL) laminated to a matching hardwood face (standard for Oak, Birch, and Maple)
- Structural composite lumber (SCL) laminated with a matching veneer edge band on veneers other than listed above as standard with optional hardwood stiles face available

Core:
- Structural Composite Lumber
- Meets requirements of LEED MR4
- Contains no added Urea-formaldehyde

Fire Rating:
- 20 minute fire rating available
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Acoustical Rating:
- Sound Transmission Class (STC) 31 operable with required seals

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available
  - MR 4 - Recycled Content (standard)
  - MR 5 - Regional Materials
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
  - IEQ 9 - Enhanced Acoustical Performance (LEED for schools) STC 35 operable (flush door)
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

10

Architectural 5-Ply Specification

Technical Manual

June, 2011

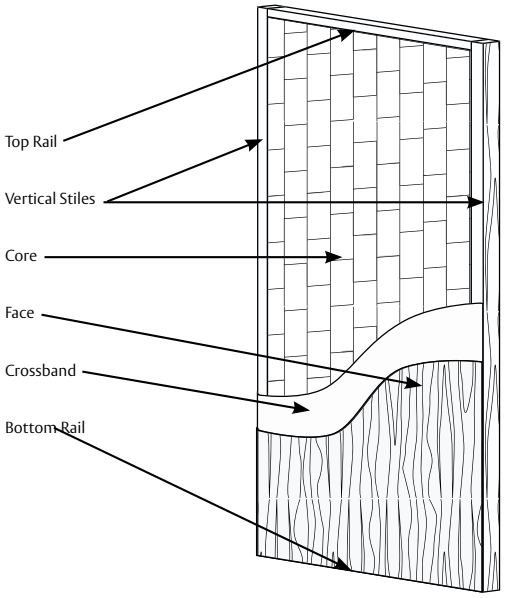
Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-SL

5-Ply Stave Lumber Core
WDMA/AWS Extra Heavy Duty
SCLC-5



Construction

Horizontal Edges:
- Top and bottom rails - structural composite lumber
- Bonded to core
- 1" minimum after factory trim
- No additional blocking required for thru bolted closers

Vertical Edges:
- Matching vertical edges
- Bonded to core
- Structural composite lumber (SCL) laminated to a matching hardwood face (standard for Oak, Birch, and Maple)
- Structural composite lumber (SCL) laminated with a matching veneer edge band on veneers other than listed above as standard with optional hardwood stiles face available

Core:
- Stave Lumber
- Meets requirements of LEED MR4
- Contains no added Urea-formaldehyde

Fire Rating:
- 20 minute fire rating available
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Acoustical Rating:
- Sound Transmission Class (STC) 31 operable with required seals

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available
  - MR 4 - Recycled Content (standard)
  - MR 5 - Regional Materials
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

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2-2-2016
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Architectural 5-Ply Specification

Technical Manual

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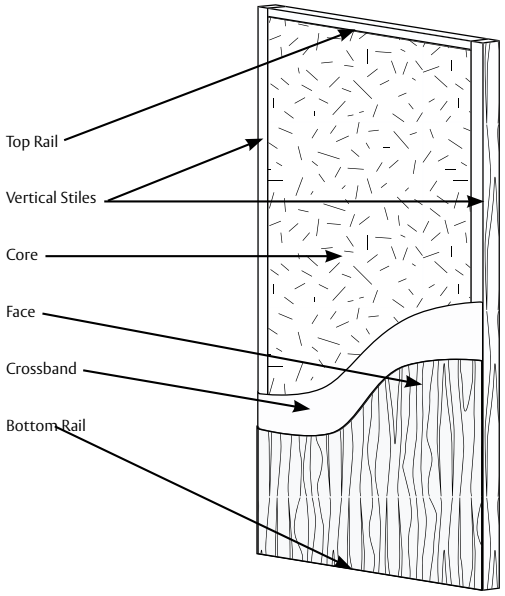
Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-AF

5-Ply Agrifiber Core
WDMA/AWS Extra Heavy Duty
AF-5



Construction

Horizontal Edges:
- Top and bottom rails - structural composite lumber
- Bonded to core
- 1" minimum after factory trim
- No additional blocking required for thru bolted closers

Vertical Edges:
- Matching vertical edges
- Bonded to core
- Structural composite lumber (SCL) laminated to a matching hardwood face (standard for Oak, Birch, and Maple)
- Structural composite lumber (SCL) laminated with a matching veneer edge band on veneers other than listed above as standard with optional hardwood stiles face available

Core:
- Agrifiber
- Conforms to ANSI A208.1
- Contains no added Urea-formaldehyde

Fire Rating:
- 20 minute fire rating available
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Acoustical Rating:
- Sound Transmission Class (STC) 29 operable with required seals

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty*
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available
  - MR 4 - Recycled Content (standard)
  - MR 6 - Rapidly renewable Materials
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

**Optional blocking required to meet Extra heavy Duty face screw holding standards.*

Architectural 5-Ply Specification

Technical Manual

June, 2011

Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-FD 45

5-Ply Fire Core
WDMA/AWS Extra Heavy Duty
FD-5

Construction

Horizontal Edges:
- Top and bottom rails - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core
- No additional blocking required for thru bolted closers
- Optional closer & lock block available

Vertical Edges:
- Matching vertical edges - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core

Core:
- Fire Resistant Composite Core per Graham Label Service Listing
- Contains no added Urea-formaldehyde

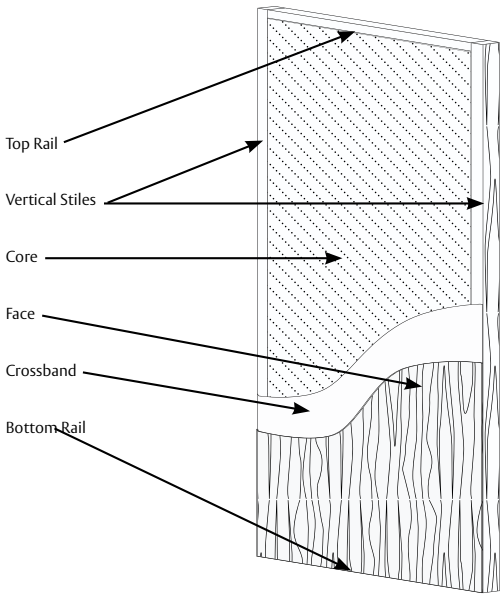
Fire Rating:
- 45 minute fire rating
- 250 degree temperature rise
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty*
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde



Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available**
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

**Optional blocking required to meet Extra heavy Duty face screw holding standards.*
***See graham LEED Documentation*

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Architectural 5-Ply Specification

Technical Manual

June, 2011

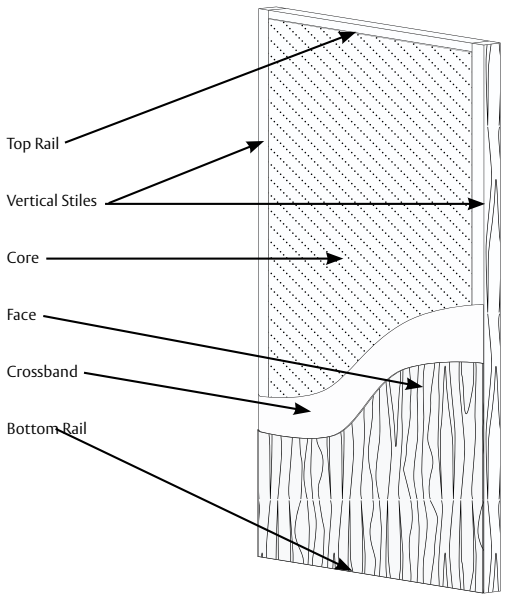
Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-FD 60

5-Ply Fire Core
WDMA/AWS Extra Heavy Duty
FD-5



Construction

Horizontal Edges:
- Top and bottom rails - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core
- No additional blocking required for thru bolted closers
- Optional closer & lock block available

Vertical Edges:
- Matching vertical edges - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core

Core:
- Fire Resistant Composite Core per Graham Label Service Listing
- Contains no added Urea-formaldehyde

Fire Rating:
- 60 minute fire rating
- 250 degree temperature rise
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty*
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available**
  MR 7 - FSC Certified Wood
  IEQ 4.4 - Low-emitting Materials
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

**Optional blocking required to meet Extra heavy Duty face screw holding standards.*
***See graham LEED Documentation*

Architectural 5-Ply Specification

Technical Manual

June, 2011

Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-FD 90

5-Ply Fire Core
WDMA/AWS Extra Heavy Duty
FD-5

Construction

Horizontal Edges:
- Top and bottom rails - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core
- No additional blocking required for thru bolted closers
- Optional closer & lock block available

Vertical Edges:
- Matching vertical edges - wood or composite material, specific configuration to Graham Label Service Listing
- Bonded to core

Core:
- Fire Resistant Composite Core per Graham Label Service Listing
- Contains no added Urea-formaldehyde

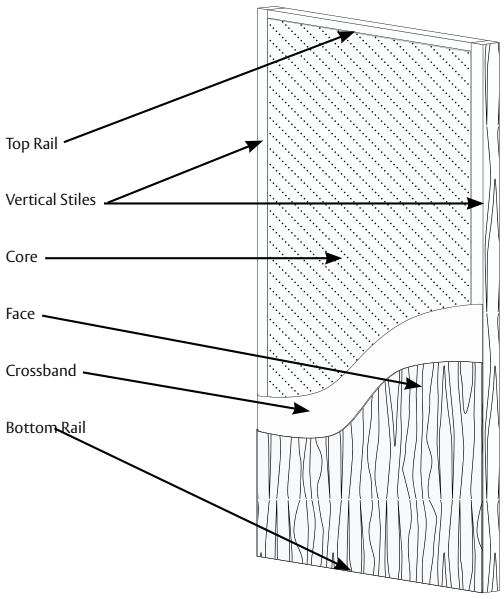
Fire Rating:
- 90 minute fire rating
- 250 degree temperature rise
- Meets UL 10b (neutral pressure) and UL 10c (positive pressure) Category "B" requirements
- Option to UL 10c (positive pressure) Category "A"

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Construction Grade:
- Performance: WDMA/AWS - Extra Heavy Duty*
- Aesthetic: WDMA - Premium Grade

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde



Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish

Certifications and Sustainability:
- Optional LEED 3.0 credits available**
  - MR 7 - FSC Certified Wood
  - IEQ 4.4 - Low-emitting Materials
- California Air Resources Board (CARB)
- GreenGuard - Indoor Air Quality & Children in Schools
- Collaborative for High Performance Schools (CHPS)

Lifetime Warranty

**Optional blocking required to meet Extra heavy Duty face screw holding standards.*
***See graham LEED Documentation*

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Graham® wood doors

ASSA ABLOY

ASSA ABLOY, the global leader in door opening solutions

GPD-HC

5-Ply Hollow Core
HC-5

Construction

Horizontal Edges:
- Top and bottom rails - structural composite lumber
- 1" minimum after factory trim
- No additional blocking required for thru bolted closers

Vertical Edges:
- Matching vertical edges
- Bonded to core
- Structural composite lumber (SCL) laminated to a matching hardwood face (standard for Oak, Birch, and Maple)
- Structural composite lumber (SCL) laminated with a matching veneer edge band on veneers other than listed above as standard with optional hardwood stiles face available

Core:
- Conforms to ASTM C578, Type 1
- Solid Polystyrene Core

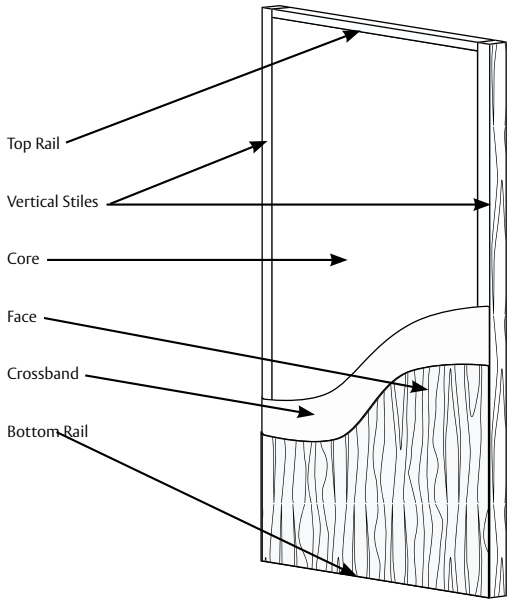
Fire Rating:
- Not available

Adhesive:
- Doors constructed using Type I adhesives which contain no added Urea-formaldehyde

Face Veneer:
- Available in a wide variety of vertical & horizontal grain wood species, Sketch Face, Medium Density Overlay (MDO), and Primed Hardboard
- WDMA/AWS "A" Grade, Book and Running Match, standard
- Slip, Balance, and Center Balance Match available upon request
- WDMA/AWS "AA" Grade available upon request

Crossband:
- 1/16" (1.6 mm) minimum high density engineered wood composite
- Optional with no added Urea-formaldehyde

Finish:
- UV cured factory finish meets or exceeds WDMA TR-6 and Architectural Woodwork Standards (AWS) First Edition - System #9
- Available in 28 standard colors and custom color match
- Available with MicroShield® Antimicrobial finish



5 Year Warranty

rapport™

WITH REVEAL IMAGING™

AMERICAN OLEAN®
FREEDOM OF EXPRESSION™



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rapport™

American Olean's new Rapport glazed porcelain floor and ceramic mosaic tile series captures the popular linear look and fabric-inspired motif in a winning design combination. Rapport features field tile in the must-have 12 x 24 size and four colors, designed to please. Rapport also features a 2 x 4 mosaic produced using the innovative Blend by Reveal™ technology. This technology combines sophisticated graphics and print files in a seamless production process that duplicates the randomness of a hand-mounted, beautifully-blended mosaic.



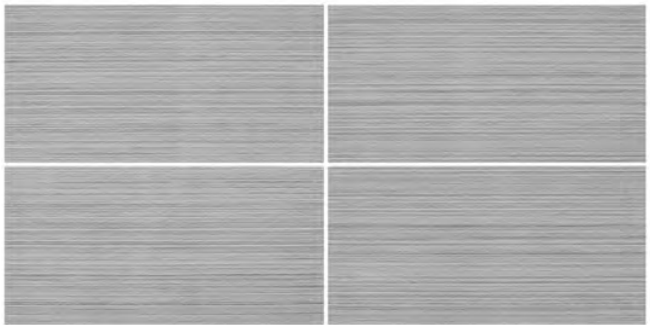
Photo features Harmony Beige in 12 x 24 on floor.

FLOOR TILE

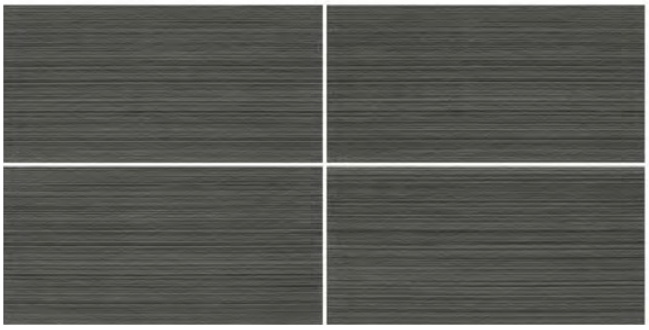
Agreeable White RP03



Harmony Beige RP04



Cordial Gray RP05



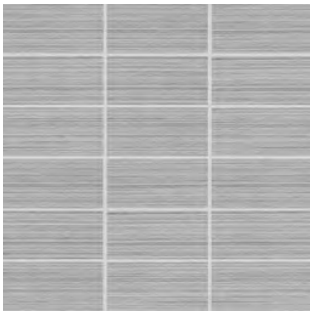
Compatible Charcoal RP06

MOSAIC

Agreeable White RP03



Harmony Beige RP04



Cordial Gray RP05



Compatible Charcoal RP06

SIZES, SHADE VARIATION & PRICING



12 x 24 Floor Tile
(11-13/16" x 23-13/16")
(30.0 cm x 60.48 cm)



2 x 4 Straight-Joint Mosaic
(11-15/16" x 11-15/16" Sheet)
(30.2 cm x 30.2 cm Sheet)



Medium
(V2)

Tile Thickness: Floor 3/8"; Mosaic 1/4"
Recommended Grout Joint: Floor 3/16" (when rectangular size is used in a staggered brick-joint pattern, overlap should not exceed 33%), Mosaic 1/8"
Relative Pricing: Medium

TRIM



Bullnose
P-43C9
3 x 12



Cove Base
P-36C9T
6 x 12



Cove Outcorner
PC-36C9T
6 x 1

Floor Bullnose and Cove trim are intended to coordinate with floor field tile in the standard 90-degree installation position.



PERFORMANCE CHARACTERISTICS

	Dynamic C.O.F. Wet	Moisture Absorption	Breaking Strength	MOH's	Chemical Resistance	Abrasion Resistance
Floor	≥ 0.42	< 0.5%	> 275 lbs.	8.0	Resistant	4
Mosaic	≥ 0.42	< 3.0%	> 250 lbs.	8.0	Resistant	4

A DCOF value of ≥ 0.42 is the new standard for tiles specified for commercial application in standard A137.1–2012, Section 9.6. It replaces the SCOF value of ≥0.60 referenced in ASTM C1028. For more information on the correlation between the two values and about the DCOF AcuTest™, visit www.americanolean.com/dcof.

APPLICATIONS

	INTERIOR			EXTERIOR	
	Residential	Light Commercial	Commercial	Residential	Commercial
Floors/Patios: Covered & Uncovered	●	●	●	●	○
Walls/ Backsplashes	●	●	●	●	●
Countertops	●	●	●	●	●
Pool Linings	●	●	●	●	●
Pool Deckings	○	○	○	○	○

Floor tile suitable for exterior applications in freezing and non-freezing climates when proper installation methods are followed.

Mosaic suitable in non-freezing climates only.

NOTES

Special Installation Requirement: For proper bonding, medium bed mortar should be utilized in installing tiles with a dimensional length size greater than 20 x 20, large rectangles or tiles with greater dimensional thickness than normal. Back buttering tiles of this nature in the installation process will also assure proper coverage for bonding.

Since there is shade variation in all fired ceramic products, the tile and trim supplied for your particular installation may not match these samples. Final selection should be made from actual tiles and trim and not from tile and trim samples or color reproductions. Manufactured in accordance with ANSI A137.1 standards.

Water, oil, grease, etc. create slippery conditions. Floor applications with exposure to these conditions require extra caution in product selection. Not for use on ramps.

For additional information, refer to "Factors to Consider" at http://americanolean.com/factors-to-consider.cfm.

Cleaning Procedures
- Remove loose dust and dirt with a damp cloth or sponge
- Use a neutral, non-abrasive cleaner suitable for ceramic tile
- Remove cleaning solution with a clean, damp sponge or mop

Installation Methods Backing Materials
- Concrete
- Exterior grade plywood
- Cementitious backer board

Setting
- Latex modified thin-set
- Epoxy

Grouting
- Sanded grout
- Sanded cement grout
- Epoxy grout

CERTIFIED PORCELAIN™ TILE 0.5% or less water absorption

PRE CONSUMER RECYCLED MATERIALS

MADE IN THE U.S.A.

REVEAL IMAGING

EXTERIOR PRODUCT

U.S. GREEN BUILDING COUNCIL MEMBER

AMERICAN OLEAN greenworks™ ENVIRONMENTAL LEADERSHIP THAT WORKS

Naturally, many of our products can help you earn LEED™ credits. Visit aogreenworks.com for detailed information.

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DX®/DXL™

10 Year Availability

HRC High Recycled Content



DONN DX/DXL Suspension System/
ECLIPSE Panels with *CLIMAPLUS* Performance

See LEED report tool at **usgdesignstudio.com** for detailed sustainability information.

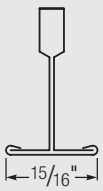
Features and Benefits

– 15/16" exposed tee system. Components for use in general and fire-rated applications.
– Maximum economy and design simplicity.
– Compatible with LOGIX™ Integrated Ceiling Systems.
– DXL™ system features more than 80 UL designs (up to three hours).
– Cross-tee override-ends resist twisting and give a professionally finished look.
– Meets or exceeds all national code requirements, including seismic.
– Proprietary QUICK-RELEASE™ cross tees.
– High recycled content (HRC) available.
– Custom color available.
– ICC-ES evaluated approach to seismic design installations (ICC-ESR-1222).

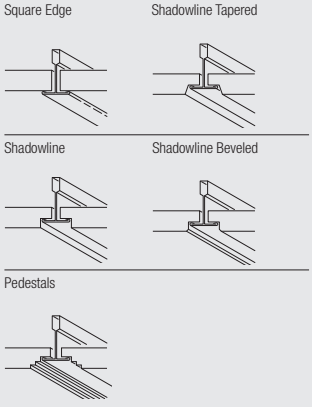
Applications

– Fire-rated, interior general use areas
– LOGIX Integrated Ceiling Systems

Profile



Edge Detail



To order samples, go to usg.com

Standard Colors[4]

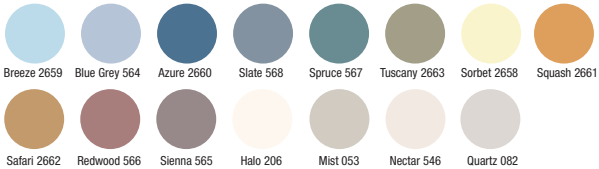


Flat White 050



Parchment 103 | Manila 246 | Beige 142 | Straw 143 | Sandstone 090 | Taupe 107
Charcoal 534 | Flat Black 205 | Silver Satin 002 | Brass 065[13] | Chrome 066[13] | Silvertone 052

Advantage Colors[4]



Breeze 2659 | Blue Grey 564 | Azure 2660 | Slate 568 | Spruce 567 | Tuscany 2663 | Sorbet 2658 | Squash 2661
Safari 2662 | Redwood 566 | Sienna 565 | Halo 206 | Mist 053 | Nectar 546 | Quartz 082

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2-2-2016
Att.9A040

DX®/DXL™

To order samples/literature:
Web: usg.com
E-mail: samplit@usg.com
Fax: 888 874.2348
Technical Services:
800 USG.4YOU (800 874.4968)

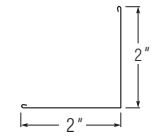
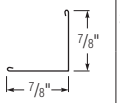
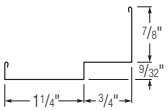
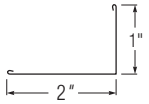
Websites:
usg.com
usgdesignstudio.com
For the most up-to-date technical information:
usgdesignstudio.com

System meets or exceeds load compliance specifications per ASTM C635

		ASTM Class	Length	Height	Item No.	Class	Color	Post Consumer RC	Total RC	Seismic Design Categors[1] IBC	Seismic Design Categors[1] ICC-ES Evaluated Installation	Rated Load[2] 4' Hanger Spacing	Rated Load[2] 5' Hanger Spacing	Rated Load[2] 6' Hanger Spacing[8]
15/16" Tee System	**Main Tee**	Intermediate Duty	**12'** 3600mm	**1-1/2"** 38mm	**DX/[3,4,7,12] DXL24**		Flat White Standard Advantage	up to 39%	up to 47%	A-C	7/8" Molding ACM7 Clip	12 lbs./LF	6.1 lbs./LF	3.6 lbs./LF
					DX/[3,4,12] DXL24HRC			57% HRC	65% HRC					
		Heavy Duty	**12'** 3600mm	**1.64"** 42mm	**DX/[3,4,7,12] DXL26**		Flat White Standard Advantage	up to 39%	up to 47%	A-F	7/8" Molding ACM7 Clip	16 lbs./LF	7.3 lbs./LF	4.9 lbs./LF
					DX/[3,4,12] DXL26HRC			57% HRC	65% HRC					
	Cross Tee 1"		**2'** 600mm	**1"** 25mm	**DX/[3,4,7,12] DXL216**		Flat White Standard Advantage	up to 25%	up to 33%					
					DX/[3,4,12] DXL216HRC			57% HRC	65% HRC					
	Cross Tee 1-1/2"		**4'** 1200mm	**1-1/2"** 38mm	**DX/[3,4,7,12] DXL424**		Flat White Standard Advantage	up to 20%	up to 47%					
					DX/[3,4,12] DXL424HRC			57% HRC	65% HRC					
					DX422[5,7,9]	Class A	Flat White Standard Advantage	up to 25%	up to 33%					
					DX422HRC[5]			57% HRC	65% HRC					
			5' 1500mm	**1-1/2"** 38mm	**DX/[3,4,7,12] DXL524**		Flat White Standard	up to 39%	up to 46%					

HRC **High Recycled Content**
Classified as containing greater than 50% total recycled content. Total recycled content is based on product composition of post-consumer and pre-consumer (post-industrial) recycled content per FTC guidelines.

Firecode®

	Wall Angle	Length	Item No.	Color	Wall Angle	Length	Item No	Color	Post Consumer RC	Total RC
Molding[10]		**10'** 3000mm	**M20SM-2** (up to 65% recycled content) HRC	Flat White		**12'** 3600mm	**M7[8]**	Flat White Standard Advantage	up to 65% HRC	
							M7HRC[8]		57% HRC	65% HRC
	Shadowline[11] 	**10'** 3000mm	**MS274[5]** 2" shelf for seismic (Up to 65% recycled content) HRC	Flat White Custom		**10'** 3000mm	**M20[5]**	Flat White Custom	up to 65% HRC	
							M20HD Heavy Duty		up to 58% HRC	
							M20SM Seismic		up to 65% HRC	

Physical Data/ Footnotes

Product literature and samples
Data sheet: AC3167. Sample flat white – seismic: 271370. Sample flat white: 215673. Sample main tee: 206563. Sample flat black: 205100.

Material
Double-web G30 hot-dipped galvanized steel body and G30 hot-dipped galvanized steel cap.

Recycled content
For details, see LEED report tool at usgdesignstudio.com.

Installation
Must be installed in compliance with ASTM C636, ASTM E580, CISCA and standard industry practices, within all applicable code requirements. Alternative assemblies and installation methods may be utilized when approved by the Authority Having Jurisdiction. USG recommends checking with the Authority Having Jurisdiction prior to designing and installing a suspended ceiling system.

Limitations
Please refer to AX™ or ZXLA™ for exposed suspension systems in non-fire-rated, high humidity applications. Interior applications only. Please refer to SC2561 for more information about exterior ceiling applications.

ICC Evaluation Service, Inc., Report Compliance
Suspension systems manufactured by USG Interiors, LLC, have been reviewed and are approved by listing in ICC-ESR-1222. Evaluation Reports are subject to reexamination, revision and possible cancellation. Please refer to usgdesignstudio.com or 800 USG.4YOU (800 874.4968) for current reports.

L.A. Research Report Compliance
Donn® brand suspension systems manufactured by USG Interiors, LLC, have been reviewed and are approved by listing in the following L.A. Research Report number: 25764.

Code compliance
The information presented is correct to the best of our knowledge at the date of issuance. Because codes continue to evolve, check with a local official prior to designing and installing a ceiling system. Other restrictions and exemptions may apply.

The City of New York BSA and MEA Report Compliance
Donn suspension systems have been approved by listing in one or more of the following City of New York Board of Standards and Appeals, and Department of Building, Material and Equipment Acceptance reports: BSA 618-60-SM, BSA 184-77-SM, BSA 796-81-SM, MEA 366-93-M, MEA 133-95-M, MEA 312-99-M, MEA 123-00-M.

ASTM C635 Standard for Load Compliance
System meets or exceeds load compliance specifications per ASTM C635. Main tees will not deflect more than 1/8" over 48" span (or L/360) in Light Duty, Intermediate Duty or Heavy Duty categories.

Notes
1. All DX®/DXL™ main-tee and cross-tee connections meet IBC requirements for tension and compression strength.
2. Load test data shows uniform load in lbs./LF based on simple span tests in accordance with ASTM C635 deflection limit of L/360.
3. UL fire-rated listing, labeling and follow-up applies only to fire-rated components.
4. Color program for imperial only. Consult Customer Service for custom color and metric-tee colors.
5. Non-fire-rated only.
6. Cross-tee hole punch spacings also available for 20" and 30" modules.
7. Available in metric.
8. DX cross tees available in additional sizes and lengths.
9. Non-fire-rated applications may mix DX and DXL parts.
10. For moldings information, see Perimeter Interface selector.
11. Panels must be specified to be field-cut, field-revealed and to provide widest possible lay-on edge.
12. For DXL, channel moldings are also acceptable in some designs. Check UL Fire Resistance Directory for molding options.
13. Brass and chrome available on limited items.

Notice
We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

Manufactured by USG Interiors, LLC
550 West Adams Street
Chicago, IL 60661

The following are trademarks of USG Interiors, LLC or a related company: AX, CurvaPlus, Donn, DX, DXL, Eclipse, Firecode, Logix, Quick-Release, USG, ZXLA.

Safety First! Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read MSDS and literature before specification and installation.

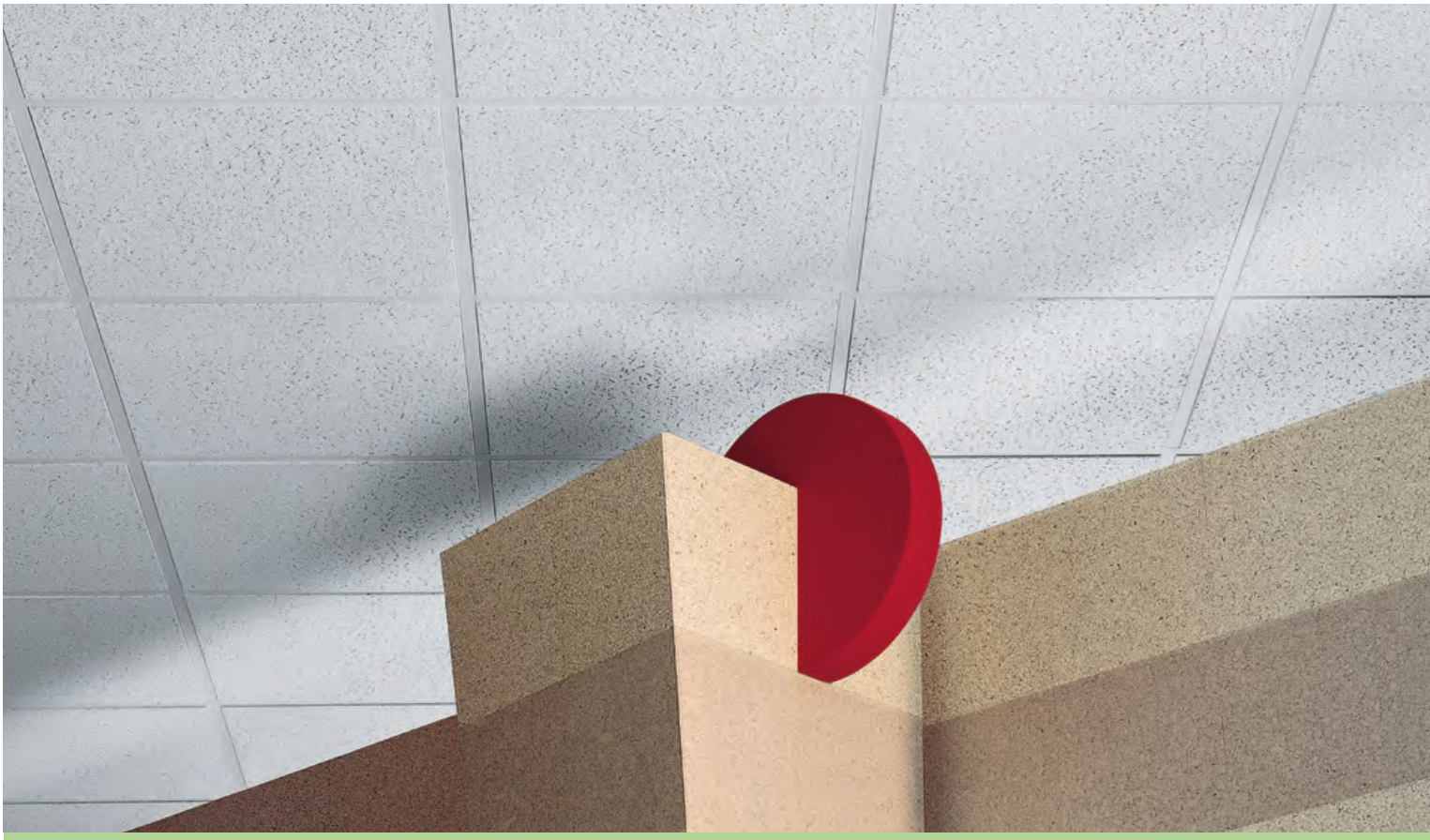
AC3167/rev. 9-14

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Fissured™



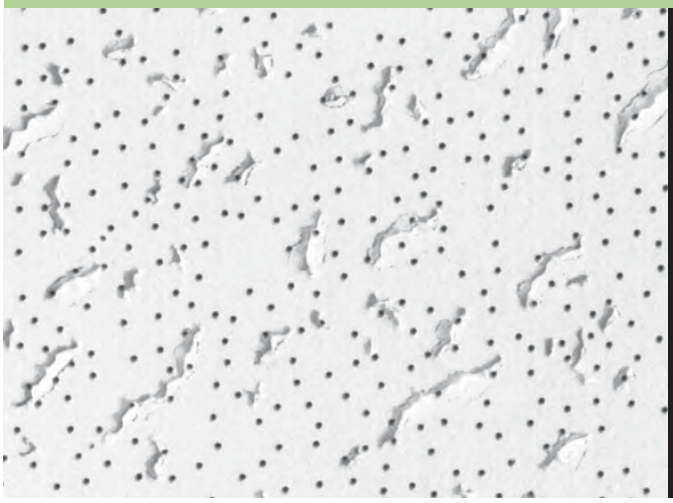
Fissured Panels/
Donn DX/DXL Suspension System

Features and Benefits
- Economical, all-purpose ceiling pattern available in various panel sizes.
- Optional Firecode® product designed to meet life-safety codes.

Applications
- Administrative offices
- Corridors
- Mass merchandisers
- Convenience stores

Substrate
- Water-felted mineral fiber

See LEED report tool at **usgdesignstudio.com** for detailed sustainability information.



Medium-Textured Panel

To order samples, go to usg.com

Flat White
050

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Fissured™

To order samples/literature:
Web: usg.com
E-mail: samplit@usg.com
Fax: 888 874.2348
Technical Services:
800 USG.4YOU (800 874.4968)

Websites:
usg.com
usgdesignstudio.com
For the most up-to-date technical information:
usgdesignstudio.com

	Edge	Panel Size	Class[2]	UL Classified Item No.	NRC	CAC Min.	LR[3]	Color	Grid Options	VOC Emissions	Recycled Content[1]	Panel Cost
Fissured™ Panels	SQ	**2'x2'x5/8"**	Class A	**560**	.55	33	.81	White	A, B, C	Low	24-28%	**$**
		2'x2'x5/8"		**585**	.55	35	.81	White	A	Low	41-49%	**$**
		2'x4'x5/8"	Class A	**562**	.55	35	.81	White	A, B	Low	24-28%	**$**
		2'x4'x5/8"		**586**	.55	35	.81	White	A	Low	41-49%	**$**
	SLT	**2'x2'x5/8"**	Class A	**506**	.55	33	.81	White	D	Low	24-29%	**$**
		2'x4'x5/8"	Class A	**507**	.55	35	.81	White	D	Low	24-29%	**$**

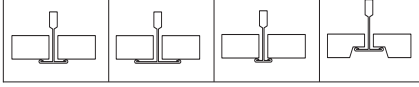
Legend

Low Emissions (VOC)
Low-emitting performance meets CA Specification 01350 (CA Dept. of Health Services Standard Practice for the testing of VOC emissions) and is listed on the CHPS database for low-emitting materials. USG Certificate of Compliance for Low VOC Emissions also available on usg.com.

Firecode®

Grid Profile Options

A	B	C[4]	D
DX®/DXL™	DXW™	Centricitee™ DXT™	DX/DXL



Physical Data/ Footnotes

Product literature
Data sheet: SC1815

ASTM E1264 classification
Type III, Form 2, Pattern CD

ASTM E84 surface burning characteristics
Class A
Flame spread: 25
Smoke developed: 50

Weight
0.61–1.2 lbs./sq. ft. (Class A)
1.14–1.22 lbs./sq. ft. (Firecode)

Thermal resistance
R-1.4 (Class A)
R-1.6 (Firecode)

Maximum backloading
See USG 30-Year Limited Warranty Commercial Applications SC2102.

Maintenance
Can be cleaned easily with a soft brush or vacuum.

Notes
1. For details, see LEED report tool at usgdesignstudio.com.
2. Fire-rated items: see UL design details.
3. LR values are shown as averages.
4. Maximum 2'x2' with SQ edge panels.

Manufactured by USG Interiors, LLC
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Chicago, IL 60661

The following are trademarks of USG Interiors, LLC or a related company: Centricitee, Donn, DX, DXL, DXT, DXW, Firecode, Fissured, USG.

Safety First! Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read MSDS and literature before specification and installation.

SC1815/rev. 11-12
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Access Floor Solutions

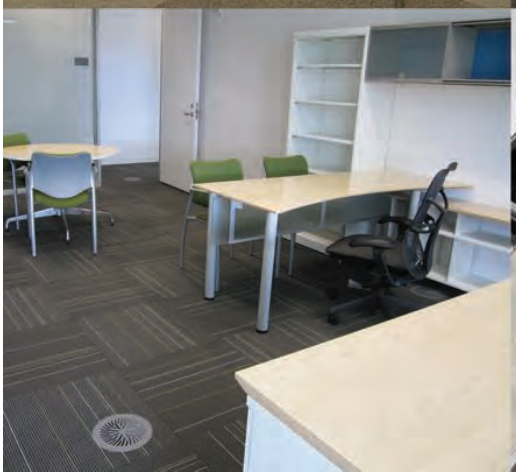
Product Guide















SustainAbility to the Power of Tate®

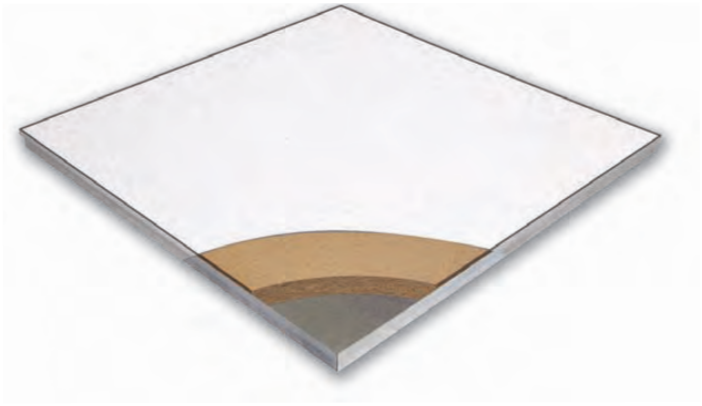
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Woodcore Panels

Woodcore panels consist of high density composite wood core glued to and encased in hot dipped galvanized formed steel sheets. These panels are ULC Listed for flame spread and smoke development and provide excellent rigidity, durability, and acoustic performance.

Panel Features

- Mechanically attached air seal gasket available.
- No added urea formaldehyde wood is available upon request.
- High strength to weight performance.
- Full range of factory laminated finishes.
- Finishes available with Integral Trim® edge.
- Internally grounded.



Woodcore panels are available with several understructure support systems and numerous factory laminated finishes. Fully Interchangeable steel perforated and die cast aluminum grates are also available.Together they meet the needs of a wide range of applications from office environments to data centers, telecommunication, and mission critical facilities.



Owner Occupied: *ABSA, Edmonton, AB, 21,500 ft²*



Government: *Calgary Water Centre, Calgary, AB, 183,000 ft²*

Woodcore Performance Chart

System Performance Criteria* (Tested on Actual Understructure)							
			Static Loads		Rolling Loads		
Panel	Understructure	System Weight (lbs/ft²)	**Design Loads (lbs)**	**Safety Factors (min 2.0)**	10 Passes (lbs)	10,000 Passes (lbs)	Impact Loads (lbs)
WC5000	CornerLock	6.9 (34kg/m²)	**1000 (4.4kN)**	**PASS**	1000 (4.4kN)	700 (3.1kN)	150 (68kg)
WC5000	Snap-Tite/Bolt-Tite	7.4 (36kg/m²)	**1000 (4.4kN)**	**PASS**	1000 (4.4kN)	700 (3.1kN)	150 (68kg)
WC5000	Heavy Duty Stringer	7.6 (37kg/m²)	**1250 (5.6kN)**	**PASS**	1250 (5.6kN)	875 (3.9kN)	150 (68kg)
WC6000	Heavy Duty Stringer	8.3 (41kg/m²)	**1500 (6.7kN)**	**PASS**	1500 (6.7kN)	1050 (4.7kN)	150 (68kg)

**All tests are performed using CISCA's Recommended Test Procedures for Access Floors with the exception of Design Load*

1. Design Load is tested using CISCA's Concentrated Load test method on actual understructure instead of steel blocks. Design Load is determined by taking the lesser value of ultimate load divided by two or the point at which permanent damage begins to occur (yield point).

2. Safety factor is the multiple of Design load to the Ultimate Load. International standards and Tate recommend a minimum of 2.

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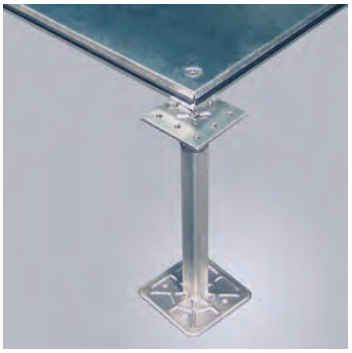
Understructure



Snap-Tite and Bolt-Tite Stringer
understructure system used primarily for gravity held panels with Integral Trim® edge in computer room or equipment rooms. This system allows for quick and easy access to the underfloor area.



Heavy Duty Stringer
The heavy duty stringer is designed for installations requiring additional design and rolling load capacities. Panels are gravity-held in the understructure for fast removal and replacement.



Cornerlock
understructure system with the air seal gasket mechanically attached to the panel. Used primarily for office environments with modular carpet tile.





Renovation: *Christman Headquarters, Lansing, MI, 20,000 ft²*

Tate®

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FreeStyle®

PERSONAL STORAGE LOCKER

Make it up as you go.



Storage Solved®

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MAKE CHANGE SIMPLE





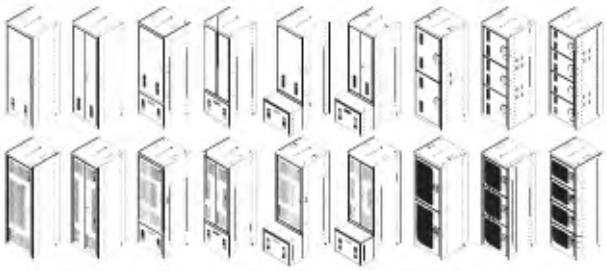


EVERYTHING CHANGES:
PEOPLE. EQUIPMENT. STORAGE REQUIREMENTS.

Here's a locker system that changes just as fast. Start with sizes that fit your space, and configurations that meet your demands. Then include a range of accessories that adapt to your needs. The FreeStyle® personal storage locker from Spacesaver: **the only on-site, end-user reconfigurable locker of its kind**.

Make it your own – it could be the last locker system you'll ever need.

FreeStyle®
PERSONAL STORAGE LOCKER









CHANGE BEGINS WITH A FLEXIBLE RANGE OF SIZES AND OPTIONS

FreeStyle adapts to your needs, and your space, from the start. Here's a system that's available in a full range of dimensions: with three heights from 72* to 90 inches and five widths from 12 to 36 inches.**

FreeStyle is available with an external access drawer or a bench drawer; with single or double, plain or diamond perforated doors; and a broad range of accessories.



* Ask about our ADA compliant locker.

** 2-, 3- and 4-tier lockers available in 12, 18 and 24 inch widths (pictured above).

MAKE CHOICES WITH CONFIDENCE

GET USED TO HAVING OPTIONS: ONE LOCKER OFFERS HUNDREDS OF POSSIBILITIES.

TAKE CHARGE

All full-height lockers are designed for modular plug-and-play electrical components to bring power to lockers for chargers, shavers, laptops and other devices. Add power now or later.

ADJUSTABLE ACCESSORIES

Unique design allows infinite custom configurations and adjustments. Many options are available, including magnetic mirrors, boot trays and standard peg board designed doors.



Document Holder
Door-mounting allows easy access to documents and notebooks.



Modular Shelf
Available in 12" and 24" heights. Add accessories like the file divider kit to further compartmentalize and customize the locker.



Lockable Box Kit
Use this kit and add a lock to store hand guns and other valuables.



Hook Kits
Add single hooks to the side of the modular shelf or a double-hook to the bottom for more hanging storage.



Internal Drawers
6 and 9 inch high drawers offer more custom space, and are available in locking or non-locking configurations.



Adjustable Shelf
Available in standard and heavy duty capacities for storing everything from clothing to ammunition.



3-Hook Bracket
Hook bracket can be moved up and down, and from one side of the locker to another.



EZ Rail™ Element
Innovative engineering offers flexible storage of hanging bins, slat wall accessories and weapons storage components.



Support Rail
Use with Spacesaver weapons storage components or other specialty storage accessories.



Universal Base
Use in conjunction with the EZ Rail or support rail, and with Spacesaver weapons storage components.

Lock Options
Lock options include hasp only for pad lock, keyed lock or combination lock.



Solid Maple Bench
Solid butcher block maple bench provides durability and good looks.



Interlock System
All bench and external access drawers automatically lock and unlock with the door. These drawers feature 200 lb. ball bearing slides.

AIR EXTRACTION READY

All full-height lockers and accessories include a number of standard features, which naturally promote air circulation through the locker. Add air extraction mechanicals now or later.

- **Accessory Spacing:** To promote air flow, all accessories are positioned away from the rear locker panel.
- **Built-in Air Baffle:** Adjustable vent enables lockers to be balanced for air circulation after installation.



Visibility/Circulation
Diamond perforated doors offer visibility as well as natural air circulation and ventilation.



Adjustable Shelf with Integral Garment Hanger
Provides clothing separation for better drying.



Louvered Shelf
For ventilation and drying – great for body armor.



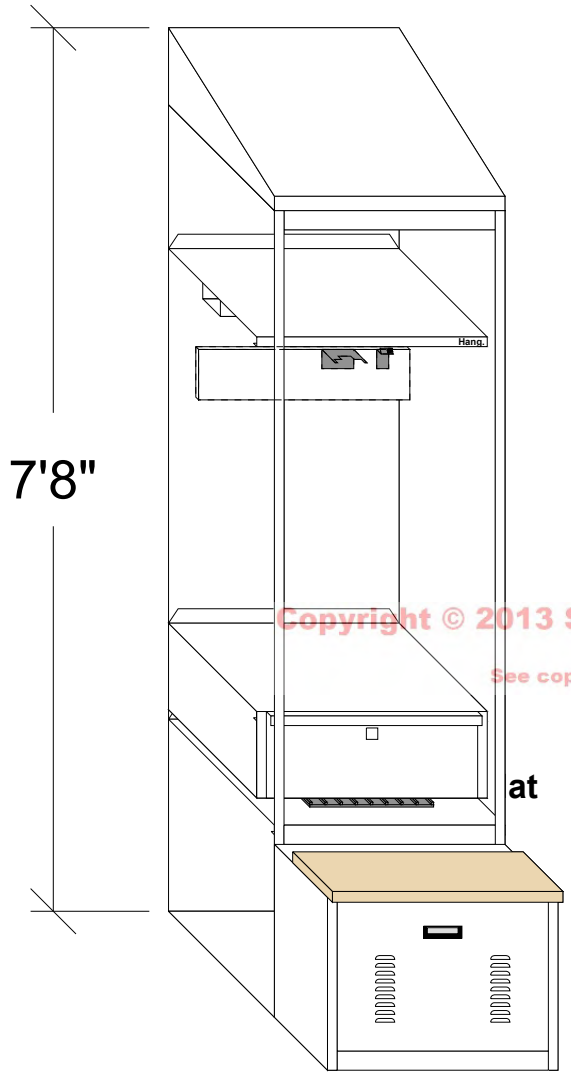
Ventilation Rack
Sliding rack that sits in bench drawer for ventilation.



Louvered Doors and Drawers
Louvers help direct optimal air circulation.



H92"
84"x24" d24"



84" locker with sloped top
storage shelf with hanger bar
weapon support for 9MM and long gun
intermediate shelf with rubber mat
locking storage drawer 9"H
bench with louvered storage drawer
and boot tray

3-phase
2 duplex/locker
2.0 amps/locker

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Printed Date:	05/22/2013	Drawn By:	H. Clark
Scale:	1:18	Sheet:	1 of 3
Salesperson:	REYNOLDS,AARON		

Kansas Dept of Administration
Capital Police Locker Rooms
Topeka, KS

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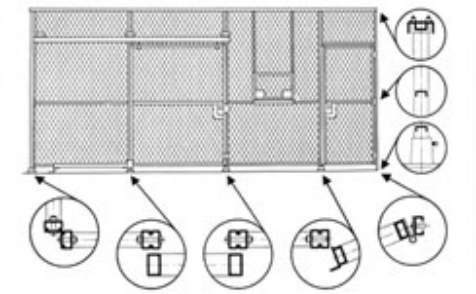
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acorn wire and iron works™

130A - Architectural Specification

typical grouping of no. 130A sections
7'—12' wire mesh partitions
components—nominal sizes
all wire type—no. 130A
Basic all wire type for normal industrial use. 7', 8', 9', 10' and 12' standard heights.
standard panels:
Stock sizes—5' wide, 7', 8', 9', 10' and 12' high. Special
heights up to 12' made to order.
sliding door sections:
Stock sizes—3', 4', 5', 6', 8', and 10' wide. 7'9" headroom
except 6'9"in 7' high partitions. Special sizes made to order.
service window panels:
Stock sizes—24" x 15" standard service window (see page 3)
in standard 5' panels. Special windows and panels made to order.
hinged door sections:
Stock sizes—3', 3'6", and 4' wide. 7' headroom. Special sizes
made to order.
filler panels:
Special width panel to fill out runs where standard 5' wide
panel cannot be used.
Stock sizes—1', 1'6", 2', 2'6", 3'. 3'6", 4', and 4'6" in 7',
8', 9', 10', and 12' heights. Special sizes made to order.
corners and intersections:
Stock sizes—11/4" angle for 90° corner, any height. Clips for
three or four way 90° intersection, any height. 1 5/16" O.D.
pipe post for other than 90° corner.

All panels and door sections are interchangeable standardized
units which can be arranged in any desired combination.
Special sizes and configurations made to order.



CLICK TO ENLARGE

specifications
Partition shall be Acorn 130A as manufactured by Acorn Wire and Iron Works, LLC.

- All wire type constructed of 10 gauge steel wire woven into 11/2" diamond mesh, securely clinched to frames
- Vertical frames to be 11/4" X 5/8" cold rolled 'C' section channels with 1/4" bolt holes 12" o.c.
- Horizontal frames 1" x 1/2" cold rolled channels
- All joints mortised and tenoned
- Center reinforcing bar 1" x 1/2" cold rolled channel tenoned to side frames. All wires passed through center bar
- Woven in stiffener bars; 1-required for 7' and 8' high
- Partition; 2-required for 9' and 10' high partition; 3 required for 12' high partition
- Top capping bar 21/4" x 1" cold rolled channel with 1/4" 'U' bolts 2'4" o.c. May be anchored to walls and or ceilings.
- Corner posts 11/4" x 11/4" angles with 1/4" bolt holes to match partition
- Floor sockets (aluminum) 21/2" high with set screw adjustment
- Sliding door frames 11/2" x 3/4" channel with 11/2" x 1/8" flat bar cover all around. Each door to have two 4 wheel roller bearing hangers, box track, and bottom guide channel
- Hinged door frames 11/4" x 3/4" channel with 11/4" x 1/8" flat bar cover three sides, 13/8" x 3/4" x 1/8" angle riveted to lock side. Each door to have 11/2 pairs butt hinges riveted to both door and hinge bar
- All doors shall have substantial mortise type cylinder locks operated by key outside, recessed knob inside
- All bolts, hardware, and accessories for complete installation to be included
- Field bracing furnished by erector
- Finish, electrostatic sprayed enamel green, gray, black or galvanized.

Specifications are subject to change, please consult your sales rep or visit www.acornwire.com for more details.

CLOSE WINDOW | PRINT PAGE

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"A" "B" "C" "D"

RECESSED DIRECT/INDIRECT

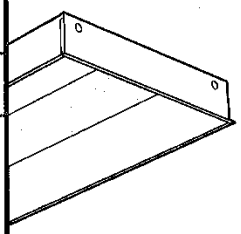
DI

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2x2 | 2x4 LED



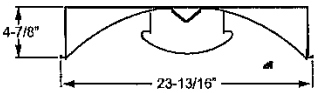
EXAMPLE: DI G - S 2 4 - LED*PH75/840 - AD - OPTIONS - ED*PH - UNV

DI	G	S	2	4	LED*PH75/840	AD	OPTIONS	ED*PH	UNV
SERIES	CEILING TYPE	FIXTURE STYLE	NOM. W.	NOM. L	LED PACKAGE	SHIELDING	OPTIONS	DRIVER	VOLTAGE

DIG-S24-LED__/840-AD

FEATURES

- Acrylic diffuser (standard) shields LEDs from direct view.
- Power and light levels can be custom set to meet energy and design needs.
- Multiple dimming protocols available.
- Rated for 50,000 hours at 70% lumen maintenance (L70).
- Up to 3800 (2' x 2') or 7500 (2' x 4') nominal lumens.
- Minimum 80 CRI; 3000K, 3500K, 4000K CCT.
- Shallow housing depth.
- Aesthetically pleasing slot grid option available.
- This fixture is proudly made in the USA.



Shown with acrylic diffuser (standard)

ORDERING INFORMATION

SERIES

DI	Recessed Direct/Indirect - LED

CEILING TYPE

G	NEMA Type "G"
SG	Screw slot NEMA Type "SS" (earthquake clips included)

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

2	2'	4	4'

LED PACKAGE

EXAMPLE: LED*PH75/840

LUMEN PACKAGE	NOMINAL LUMENS AD	WPR	WPR/ ACRY	WPR/ SPLIT	MINIMUM CRI & CCT
2x2					
LED*PH30/	3,000	2,200	2,100	2,100	830 = 80 CRI, 3000K 835 = 80 CRI, 3500K 840 = 80 CRI, 4000K
LED*PH33/	3,300	2,400	2,300	2,300	
LED*PH36/	3,600	2,500	2,400	2,400	
LED*PH38/	3,800	3,000	2,800	2,700	
2x4					
LED*PH40/	4,000	3,200	3,100	3,100	830 = 80 CRI, 3000K 835 = 80 CRI, 3500K 840 = 80 CRI, 4000K
LED*PH50/	5,000	4,000	3,900	3,900	
LED*PH60/	6,000	4,900	4,800	4,800	
LED*PH75/	7,500	5,800	5,700	5,600	

Additional LED packages ranging from 3,000-3,800 (2x2) and 4,000-7,500 (2x4) lumens available, consult factory.

SHIELDING

See back for shielding details.

AD	Acrylic (standard)
WPR	White perforated round with frosted acrylic side shields
WPR/SPLIT	White perforated round with split and frosted acrylic side shields
WPR/ACRY/ CTR/CLR	White perforated round with center clear acrylic (consult factory for additional colors) and frosted acrylic side shields

OPTIONS

EM/BSL310	Emergency LED driver (nominal 1300 lumens module output in EM mode)
EQCLIPS	Earthquake clips (4 per fixture)

DRIVER

Philips and Lutron drivers available, see back for details.

VOLTAGE

120	120V
277	277V
UNV	120-277V

0.9 Light loss factor

SPECIFICATIONS

Housing – 20-gauge die-formed C.R.S.
Reflector – Precision die-formed C.R.S. with highly reflective non-glare matte white polyester powder coated finish.
Shielding – Frosted, ribbed acrylic standard.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphete-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
LED Module – Philips Fortimo LED light engine.
LED Driver – Constant current, Class 2 driver. Philips and Lutron drivers available, see back for details.
Mounting – NEMA Type "G" standard. NEMA Type "SS" available (earthquake clips included). For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations.
Warranty – 5-year limited fixture warranty, see www.hewilliams.com.

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2x2 | 2x4 LED

IMPORTANT:
Electrostatic sensitive unit. Observe precautions when handling.

PERFORMANCE DATA

LED Package	Average System Wattage
2x2	
LED*PH30	32
LED*PH33	35
LED*PH36	38
LED*PH38	41
2x4	
LED*PH40	42
LED*PH50	50
LED*PH60	62
LED*PH75	80

SHIELDING OPTIONS

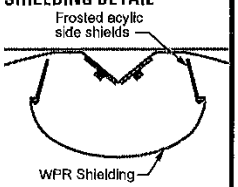

Shown with AD


Shown with WPR


Shown with WPR/SPLIT


Shown with WPR/ACRY/CTR/CLR

SHIELDING DETAIL



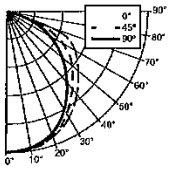
DRIVER OPTIONS

CATALOG #	DESCRIPTION
ED*PH	Philips Xitanium LED driver prewired for non-dimming applications
EDD*PH	Philips Xitanium LED dimming driver prewired for 0-10V controls
EDD*PH*DALI	Philips Xitanium DALI dimming driver
EDSD40*PH	Philips Xitanium 40% step-dimming driver (must specify 120V or 277V)
EDD*PH*MKX	Philips Xitanium Mark X line voltage dimming driver (must specify 120V or 277V)
EDD*LU*HILUME L3D ECO	Lutron Hi-lume® A-Series LED dimming driver for EcoSystem® controls
EDD*LU*HILUME L3D 3WIRE	Lutron Hi-lume® A-Series LED dimming driver for 3-wire controls
EDD*LU*HILUME LTE LINE	Lutron Hi-lume® LED dimming driver for forward phase line voltage controls (120V only)

PHOTOMETRY – 2' x 2'

Catalog #: **DIG-S22-LED*PH38/840-AD**

TEST REPORT INFORMATION
- Test Report #: 101511920CHI-003
- Date: 02/24/14
- Lamp Type: Philips Fortimo LED light engine
- **Rated Lumens: 3834**
- **Watts: 38.9**
- **Lumens Per Watt: 98.6**
- **CRI: 84.2**
- **CCT: 4123K**



CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0°	1366.	1366.	1366.	
5°	1356.	1358.	1363.	129.2
15°	1294.	1309.	1322.	369.0
25°	1173.	1205.	1236.	555.0
35°	1004.	1058.	1110.	661.3
45°	800.	876.	946.	675.0
55°	590.	683.	768.	609.4
65°	390.	496.	618.	489.4
75°	210.	276.	254.	269.8
85°	58.	67.	71.	75.3
90°	4.	3.	2.	

LUMEN SUMMARY

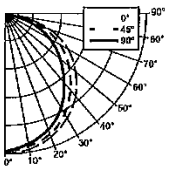
Zone	Lumens	% Fixture
0 - 30	1053.	27.5
0 - 40	1714.	44.7
0 - 60	2999.	78.2
0 - 90	3833.	100.0
Total Luminaire:		
0 - 180	3834.	100.0

IES Spacing Criteria: End = 1.2, Across = 1.4

PHOTOMETRY – 2' x 4'

Catalog #: **DIG-S24-LED*PH75/840-AD**

TEST REPORT INFORMATION
- Test Report #: 101511920CHI-014
- Date: 02/24/14
- Lamp Type: Philips Fortimo LED light engine
- **Rated Lumens: 7511**
- **Watts: 74.7**
- **Lumens Per Watt: 100.6**
- **CRI: 84.5**
- **CCT: 4131K**



CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0°	2574.	2574.	2574.	
5°	2525.	2557.	2611.	243.5
15°	2424.	2471.	2534.	698.2
25°	2220.	2299.	2378.	1059.0
35°	1920.	2049.	2148.	1277.0
45°	1558.	1729.	1848.	1323.0
55°	1168.	1369.	1505.	1211.0
65°	781.	1017.	1198.	985.5
75°	424.	578.	505.	555.9
85°	123.	139.	140.	157.5
90°	8.	6.	5.	

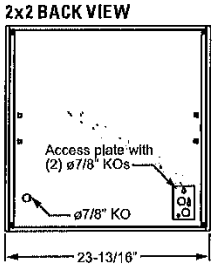
LUMEN SUMMARY

Zone	Lumens	% Fixture
0 - 30	2001.	26.6
0 - 40	3277.	43.6
0 - 60	5811.	77.4
0 - 90	7510.	100.0
Total Luminaire:		
0 - 180	7511.	100.0

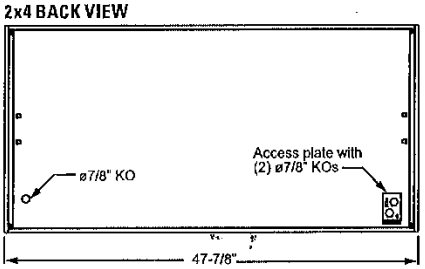
IES Spacing Criteria: End = 1.2, Across = 1.4

FIXTURE DETAILS

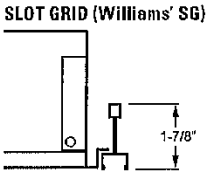
2x2 BACK VIEW



2x4 BACK VIEW



SLOT GRID (Williams' SG)



Screw Slot NEMA Type "SS"

Williams FLUORESCENT LIGHTING

H.E. Williams, Inc. ▪ Carthage, Missouri ▪ www.hewilliams.com ▪ 417-358-4065 ▪ Fax: 417-358-6015

Information contained herein is subject to change without notice.

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2-2-2016
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COOPER LIGHTING - METALUX®

DESCRIPTION

WNLED is a versatile LED wraparound series which can be used in a broad range of commercial and light industrial applications. This high quality luminaire utilizes the latest solid state lighting and electronic driver technology for optimal performance and energy efficiency.

The WNLED is an ideal choice for either general purpose lighting or higher-grade applications. This series can be the illumination solution in commercial, industrial, retail and residential applications.

Catalog #		Type	"F" "G" "H"
Project			
Comments		Date	
Prepared by			

SPECIFICATION FEATURES

Construction
Housing consists of die formed cold rolled steel. Ends formed with the housing for strength and provisions for continuous row aligners. Steel end plates with 7/8" KO and light-seal embossment. Driver cover can be removed by taking out four pan screws.

Controls
Equipped standard with a 0-10V continuous dimming driver that works with any standard 0-10V control/dimmer. Dimming range is 10% to 100%; varies by control device. Combine with energy saving products like occupancy sensors, day lighting controls, and lighting relay panels from Cooper Controls (www.coopercontrol.com) to maximize energy savings.

Electrical
Long-Life LED system coupled with electrical driver to deliver optimal performance. LED's available in 3500K or 4000K with a typical CRI 85. Projected life is 60,000 hours at 70% lumen output. CSA listed. Electronic drivers are available for 120-277V applications. A 0-10V dimming driver is standard.

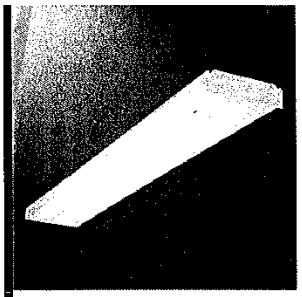
Finish
Multistage iron phosphate pretreatment ensures maximum bonding and rust inhibitor. High reflective paint after fabrication, baked white enamel finish is standard.

Channel/Wireway Cover
Die formed heavy gauge steel. Tight fit for ease of maintenance.

Shielding
Acrylic lens is 100% frost (standard). Sides have inside linear prisms and bottom has pyramidal prisms for low brightness control.

Installation
Fixture may be surface, pendant, or stem mounted. See accessories below for ordering information.

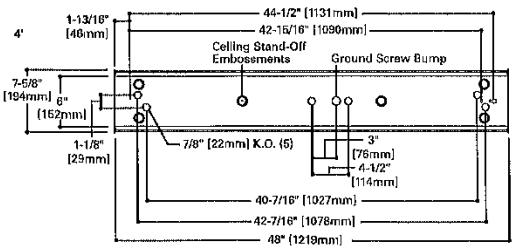
Compliance
CSA Listed. DesignLights™ Consortium Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.

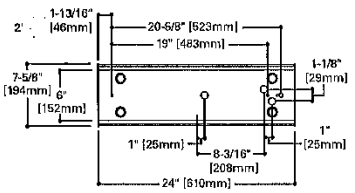


WNLED

Wraparound LED

MOUNTING DATA





WATTAGE

Length	Lumens	Wattage
~~2 ft.~~	~~2700~~	~~32~~
4 ft.	4100	48
4 ft.	5400	65
4 ft.	7000	87

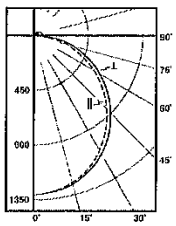
LINEAR DISCONNECT
Safe and convenient means of disconnecting power

Cooper Lighting
by EATON

ADF121999
2014-08-08 09:34:21

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2-2-2016
Att.9A056

PHOTOMETRICS



4WNLED-LD1-41-F-LW-UNV-L835-CD1-U
Electronic Driver
3500K LEDs
Spacing criterion: (II) 1.2 x mounting height, (⊥) 1.3 x mounting height
Test Report: 4WNLED-LD1-41-F-LW-UNV-L835-CD1-U

Candlepower

Angle	Along II	45°	Across ⊥
0	1302	1302	1302
5	1301	1295	1301
10	1282	1280	1287
15	1251	1251	1260
20	1205	1210	1223
25	1148	1159	1174
30	1084	1099	1116
35	1010	1032	1047
40	933	956	971
45	845	875	892
50	755	788	804
55	661	699	715
60	567	604	621
65	468	507	528
70	368	409	429
75	270	313	333
80	173	219	237
85	81	130	148
90	2	48	71

Coefficients of Utilization

Effective floor cavity reflectance 20%

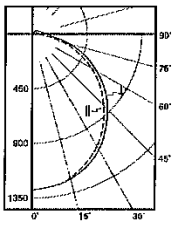
rc	80%				70%				50%			30%			10%			0%
rw	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	118	118	118	118	115	115	116	116	109	109	109	103	103	103	98	98	98	95
1	107	102	97	93	104	99	95	91	94	90	87	89	86	84	85	83	80	78
2	97	88	81	75	94	86	79	74	81	76	71	77	73	69	74	70	67	64
3	88	77	69	62	86	76	67	61	71	65	59	68	62	58	66	60	56	54
4	80	68	59	52	78	66	58	52	63	56	50	60	54	49	58	52	48	46
5	74	61	52	45	71	59	51	44	57	49	43	54	48	42	52	46	42	39
6	68	55	45	39	66	53	45	39	51	44	38	49	42	37	47	41	36	34
7	63	49	41	34	61	48	40	34	46	39	33	45	38	33	43	37	32	30
8	59	45	36	31	57	44	36	30	42	35	30	41	34	29	39	33	29	27
9	55	41	33	27	53	41	33	27	39	32	27	38	31	26	36	30	26	24
10	51	38	30	25	50	37	30	25	36	29	24	35	28	24	34	28	24	22

Zonal Lumen Summary

Zone	Lumens	%Fixture
0-30	1013	24.7
0-40	1659	40.4
0-60	2954	72.0
0-90	3912	95.4
0-180	4102	100.0

Luminance Data

Angle In Deg	Average 0-Deg cd/sm	Average 45-Deg cd/sm	Average 90-Deg cd/sm
45	5143	5326	5429
55	4980	5245	5365
65	4766	5163	5377
75	4490	6205	5638
85	4000	6420	7309



4WNLED-LD1-54-F-UNV-L835-CD1-U
Electronic Driver
3500K LEDs
Spacing criterion: (II) 1.2 x mounting height, (⊥) 1.3 x mounting height
Test Report: 4WNLED-LD1-54-F-UNV-L835-CD1-U

Candlepower

Angle	Along II	45°	Across ⊥
0	1705	1705	1705
5	1703	1694	1704
10	1679	1674	1685
15	1637	1638	1653
20	1576	1585	1600
25	1504	1516	1537
30	1418	1439	1461
35	1324	1349	1370
40	1216	1252	1270
45	1106	1146	1167
50	985	1032	1053
55	864	913	940
60	742	791	811
65	613	863	691
70	482	537	581
75	353	409	433
80	226	288	310
85	107	188	198
90	1	62	92

Coefficients of Utilization

Effective floor cavity reflectance 20%

rc	80%				70%				50%			30%			10%			0%
rw	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	118	118	118	118	115	115	115	115	109	109	109	103	103	103	98	98	98	95
1	107	102	97	93	104	99	95	91	94	90	87	89	86	84	85	83	80	78
2	97	88	81	75	94	86	79	74	81	76	71	77	73	69	74	70	67	64
3	88	77	69	62	85	76	67	61	71	65	59	68	62	58	65	60	56	54
4	80	68	59	52	78	66	58	52	63	56	50	60	54	49	58	52	48	46
5	74	61	52	45	71	59	51	44	57	49	43	54	48	42	52	46	42	39
6	68	55	45	39	66	53	45	39	51	44	38	49	42	37	47	41	36	34
7	63	49	41	34	61	48	40	34	46	39	33	45	38	33	43	37	32	30
8	59	45	36	31	57	44	36	30	42	35	30	41	34	29	39	33	29	27
9	55	41	33	27	53	41	33	27	39	32	27	38	31	26	36	30	26	24
10	51	38	30	25	50	37	30	25	36	29	24	35	28	24	34	28	24	22

Zonal Lumen Summary

Zone	Lumens	%Fixture
0-30	1326	24.7
0-40	2171	40.5
0-60	3865	72.0
0-90	5120	95.4
0-180	5367	100.0

Luminance Data

Angle In Deg	Average 0-Deg cd/sm	Average 45-Deg cd/sm	Average 90-Deg cd/sm
45	6732	6969	7103
55	6483	6851	7054
65	6243	6752	7037
75	5870	6801	7201
85	5284	8296	9679

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (12,000 hours)	Theoretical L70 (Hours)
25°C	80.7%	85,000

Max Ambient temp in compliance with CSA: 40°C

4WNLED - LD1 - 70

ORDERING INFORMATION

SAMPLE NUMBER: 4WNLED-LD1-41-F-UNV-L840-CD1-U

Length
2=2 ft.
4=4 ft.

Series [6]
WNLED=Commercial Wraparound

Lamp Type
LD1=LED 1.0

LED Lumens Output
27=2700 [1]
41=4100 48W
54=5400 65W
70=7000 [2] 97W

Lens
F=Frost Acrylic (standard)

Voltage
347=347V [3]
480=480V [3]
UNV=Universal Voltage 120-277

Options
Emergency
EL=Emergency Installed, 700 Lumens [4], [7], [9]
EL10W=Emergency Installed, 10 Watts [8], [9]

CCT
L835=3500K
L840=4000K

Driver Type
CD=0-10V Dimming Driver
SD=Step-dim (Bi Level) [5]
5LTD=Fifth Light (DALI) Driver [3]

Number of Drivers
1=1 Driver
2=2 Drivers

Packaging
U=Unit Pack

ACCESSORIES

SCF=Fixed Stem Set (Specify Length)
SCS=Swivel Stem Set (Specify Length)
SCA=Adjustable 48" Stem Set
A1B/Spacer-U=Spacer 1-1/2" to 2-1/2" from ceiling (Use 2 per fixture)

NOTES: [1] 2 ft. model. [2] 2 drivers required. [3] 4 ft. model only. [4] EL options are integral. [5] Step-dim only available for 4100 lumen unit. [6] DesignLights™ Consortium Qualified (all lumen packages except 2700 lumen). Refer to www.designlights.org Qualified Products List under Family Models for details. [7] Must specify voltage (120V or 277V) when selecting EL option. [8] For delivered lumens, take lumens per watt of desired fixture and multiply by 10 watts (100 lpW x 10 = 1000 lumens delivered). [9] EL option not available in 2 ft. version.

For complete product data, reference www.cooperlighting.com. Specifications & dimensions subject to change without notice. Consult your Cooper Lighting Representative for availability and ordering information.

Cooper Lighting by EATON

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Eaton's Cooper Lighting Business
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.cooperlighting.com

Specifications and dimensions subject to change without notice.

JCSBC
2-2-2016
Att.9A057

"I"

6" WIDE LINEAR LIGHT – LENS OR LOUVER

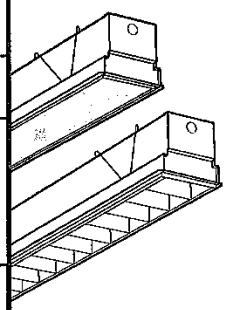
LL6

LED

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

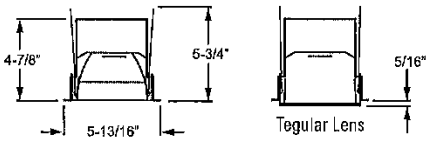


EXAMPLE: LL6 G - 4 - LED*PH34/840 - SWF/AF125 - OPTIONS - ED*PH - UNV

SERIES	CEILING TYPE	NOMINAL LENGTH	LED PACKAGE	SHIELDING	OPTIONS	DRIVER	VOLTAGE
LL6	G	4	LED*PH34/840	SWF/AF125	OPTIONS	ED*PH	UNV

FEATURES

- Designed to deliver subtle area lighting with minimal glare for offices, classrooms, and general applications.
- Flush (F) frame level option with frosted acrylic lens (AF125) creates the appearance of an unobtrusive and simple line of light – a perfect complement to unique design applications.
- Fixture is Armstrong TechZone™ and USG Logix™ ceiling systems compatible.
- Multiple dimming protocols available.
- Rated for 50,000 hours at 70% lumen maintenance (L70).
- Minimum 80 CRI, 3000K, 3500K, and 4000K CCT.
- Quick-wire access plate in back of fixture housing for easy attachment of incoming power supply.
- This fixture is proudly made in the USA.



Flush Louver

SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding –
Door Frame & Lens: Steel door frame with integral torsion springs to secure the frame within the fixture, .125" thick frosted acrylic.
Parabolic Louver: Semi-specular, low-iridescent anodized aluminum with matte white overlay standard, specular and white aluminum available.
Finish – 92% minimum average reflective white powder polyester coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
LED Module – Philips Fortimo LED light engine.
LED Driver – Constant current, Class 2 driver. Philips and Lutron drivers available, see back for details.
Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately. Fixture must be installed prior to Drywall Kit (DFK). Accommodates "NFG" and "SS" without modification (earthquake clips required).
Labels – cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations.
Warranty – 5-year limited fixture warranty, see www.hewilliams.com.

ORDERING INFORMATION

SERIES

LL6	6" Wide Linear Light LED - Lens or Louver

CEILING TYPE

When using in NEMA Type "SS" or "NFG" applications, must specify EQCLIPS option. For flange installations use the Drywall Kit (DFK), see Accessories. Fixture must be installed prior to Drywall Kit (DFK).

G	NEMA Type "G", "SS", and "NFG"

NOMINAL LENGTH

2	2' (lens only)	**4**	4'
3	3' (lens only)	**5**	5'

LED PACKAGE

LENGTH	EXAMPLE: LED*PH34/840			
	CATALOG #	NOMINAL LUMENS LENS	NOMINAL LUMENS LOUVER	MINIMUM CRI & CCT
2'	LED*PH16/[1]	1,600	1,300	**830** = 80 CRI, 3000K
3'	LED*PH26/	2,600	2,200	**835** = 80 CRI, 3500K
4'	LED*PH34/	3,400	2,900	**840** = 80 CRI, 4000K
5'	LED*PH42/	4,200	3,600	

Maximum nominal lumens shown. Lower lumen packages available, consult factory.

SHIELDING

LENS	EXAMPLE: SWF/AF125				
	TYPE/COLOR	LEVEL	/	LENS	
	SW = Steel, white frame	**F** = Flush **T** = Tegular	/	**AF125** =	Frosted acrylic, .125" thick

LOUVER	EXAMPLE: F116S/MWA					
	LENGTH	LEVEL	CELLS	FINISH	/	OVERLAY
	4'	**F** = Flush **T** = Tegular	**116** = 1x16, 16-cell	**S** = Semi-specular aluminum (standard) **M** = Specular aluminum **W** = White aluminum	/	**MWA** = Matte white acrylic overlay
	5'	**F** = Flush **T** = Tegular	**120** = 1x20, 20-cell			

OPTIONS

EM/BSL310	Emergency LED driver (nominal 1300 lumens module output in EM mode), **available in 4' or 5' units only**
EQCLIPS	Earthquake clips (2 per fixture)

ACCESSORIES (Must be ordered separately)

Fixture must be installed prior to Drywall Kit (DFK).

DFK-0624W	Drywall kit, 6" x 24"
DFK-0636W	Drywall kit, 6" x 36"
DFK-0648W	Drywall kit, 6" x 48"
DFK-0660W	Drywall kit, 6" x 60"

DRIVER

Philips and Lutron drivers available, see back for details.

VOLTAGE

120	120V
277	277V
UNV	120-277V

[1] Not available with EDD*PH*DALI, EDSD40*PH, or EDD*PH*MKX.

JCSBC
2-2-2016
Att.9A058

LL6 — 6" WIDE LINEAR LIGHT – LENS OR LOUVER

LED

IMPORTANT:
Electrostatic sensitive unit. Observe precautions when handling.

PERFORMANCE DATA

LED Package	CCT	System Wattage
LED*PH16	3000K	22
	3500K	21
	4000K	20
LED*PH26	3000K	33
	3500K	32
	4000K	32
LED*PH34	3000K	45
	3500K	45
	4000K	44
LED*PH42	3000K	53
	3500K	52
	4000K	52

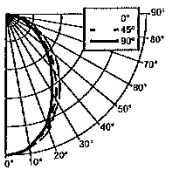
DRIVER OPTIONS

CATALOG #	DESCRIPTION
ED*PH	Philips Xitanium LED driver prewired for non-dimming applications
EDD*PH	Philips Xitanium LED dimming driver prewired for 0-10V controls
EDD*PH*DALI	Philips Xitanium DALI dimming driver
EDSD40*PH	Philips Xitanium 40% step-dimming driver (must specify 120V or 277V)
EDD*PH*MKX	Philips Xitanium Mark X line voltage dimming driver (must specify 120V or 277V)
EDD*LU*HILUME L3D ECO	Lutron Hi-lume® A-Series LED dimming driver for EcoSystem® controls
EDD*LU*HILUME L3D 3WIRE	Lutron Hi-lume® A-Series LED dimming driver for 3-wire controls
EDD*LU*HILUME LTE LINE	Lutron Hi-lume® LED dimming driver for forward phase line voltage controls (120V only)

PHOTOMETRY – Lens

Catalog #: **LL6G-4-LED*PH34/840-SWF/AF125**

TEST REPORT INFORMATION
- Test Report #: 17249.0
- Date: 04/15/13
- Lamp Type: Philips Fortimo LED light engine
- **Rated Lumens: 3537**
- **Watts: 44.1**
- **Lumens Per Watt: 80.1**
- **CRI: 83.0**
- **CCT: 4012K**



CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0°	1718.	1718.	1718.	
5°	1708.	1704.	1702.	162.7
15°	1591.	1567.	1547.	444.7
25°	1379.	1329.	1277.	614.7
35°	1140.	1061.	986.	667.0
45°	879.	791.	717.	614.8
55°	600.	530.	475.	479.1
65°	373.	329.	295.	329.6
75°	185.	161.	146.	173.2
85°	52.	45.	42.	50.8
90°	0.	0.	0.	

LUMEN SUMMARY

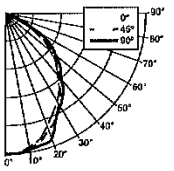
Zone	Lumens	% Fixture
0 - 30	1222.	34.6
0 - 40	1889.	53.4
0 - 60	2983.	84.3
0 - 90	3537.	100.0
Total Luminaire:		
0 - 180	3537.	100.0

IES Spacing Criteria: End = 1.1
Diagonal = 1.1
Across = 1.0

PHOTOMETRY – Louver

Catalog #: **LL6G-4-LED*PH34/840-F116S/MWA**

TEST REPORT INFORMATION
- Test Report #: 17250.0
- Date: 04/15/13
- Lamp Type: Philips Fortimo LED light engine
- **Rated Lumens: 2893**
- **Watts: 44.4**
- **Lumens Per Watt: 65.1**
- **CRI: 82.6**
- **CCT: 3932K**



CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0°	1472.	1472.	1472.	
5°	1464.	1465.	1468.	139.9
15°	1365.	1389.	1422.	394.4
25°	1169.	1225.	1234.	559.8
35°	976.	990.	1024.	624.8
45°	753.	753.	798.	594.3
55°	491.	476.	536.	439.4
65°	58.	138.	177.	123.4
75°	10.	13.	17.	14.0
85°	2.	2.	5.	3.1
90°	0.	0.	0.	

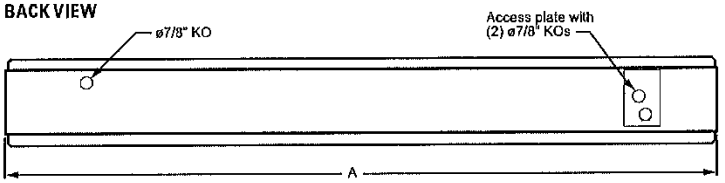
LUMEN SUMMARY

Zone	Lumens	% Fixture
0 - 30	1094.	37.8
0 - 40	1719.	59.4
0 - 60	2753.	95.1
0 - 90	2893.	100.0
Total Luminaire:		
0 - 180	2893.	100.0

IES Spacing Criteria: End = 1.1
Diagonal = 1.1
Across = 1.2

FIXTURE DETAILS

BACK VIEW



Nominal Length	Actual Length (A)
2' Unit	23-15/16"
3' Unit	35-15/16"
4' Unit	47-15/16"
5' Unit	59-15/16"

Williams FLUORESCENT LIGHTING

H.E. Williams, Inc. ▪ Carthage, Missouri ▪ www.hewilliams.com ▪ 417-358-4065 ▪ Fax: 417-358-6015

Information contained herein is subject to change without notice.

JCSBC
2-2-2016
Att.9A059

NEO-RAY™

DESCRIPTION

Driven by performance and a clean aesthetic, the Straight and Narrow Series in LED represents the ultimate in simplicity; a narrow, uniform line of light. Constructed with premium materials with industry leading technology, the Straight and Narrow family availible in configurable runs and individual lengths of 2', 3', 4', 6' and 8'. Fully impatible with Cooper Controls FifthLight DALI and shipped standard with 0-10V dimming, the Straight and Narrow family integrates seamlessly with today's modern building management systems. With virtually unlimited applications, the Straight and Narrow family allows architects and designers the freedom to experiment with their designs without exceeding ever decreasing energy budgets.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction

Housing extruded from premium 6063 aluminum. Nominal 2', 3', 4', 6' or 8' illuminated sections. Used in run configuration and/or individual fixtures. All components are RoHs compliant.

Lens

Available in snap-in or lay-in profiles, two diffusion options are available. Satin white provides the highest aesthetic uniformity while the high transmission lens provides the most superior efficacy.

Finish

Fixture housings are high reflectance white using electrostatically applied polyester powder coat paint.

Electrical

Long-life LED system coupled with electrical driver to deliver optimal performance. LED's are available in 3000K, 3500K or 4000K with a typical CRI ≤ 85. Projected life is 50,000 hours at 70% lumen output. Electronic drivers are available for 120-277V applications

Controls

Equipped standard with a 0-10V continuous dimming driver compatible with most standard dimmming devices (refer to website for specific compatibility reference). Combine with FifthLight DALI and other energy saving products like sensors, daylighting controls and building management systems to maximize energy savings.

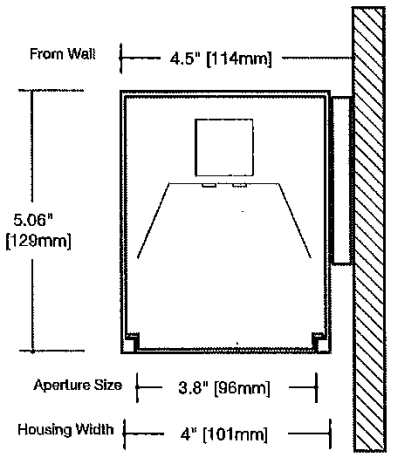
Mounting

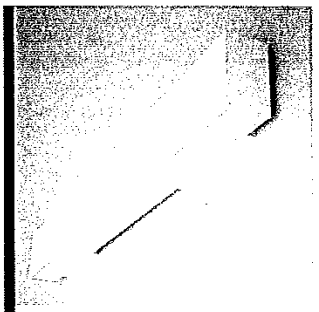
Wall.

Fixture mounts directly to existing structure over a standard electrical junction box(not supplied by Neo-Ray). Blocking provided by others.

Warranty

Five year warranty.





23-DW
Straight & Narrow
LED

Wall
Direct

powered by fifthlight technology

ORDERING INFORMATION

Sample Number: S23-DW-2L35-ETG-4-U-DD-SI-S92-W

S23	D	W	–			–		–		–			–			–			–		

- **Series**: S23 = Series 23
- **Light Output**: D = Direct
- **Mounting**: W = Wall
- **Light Level** (LED (3500K) per foot)
  - 1 = Light Level 1[1] 515 Lumens, 7 Watts, 73 LPW
  - 2 = Light Level 2[1] 650 Lumens, 9.25 Watts, 70 LPW
- **LED Color Temp**: L30 = LED, 3000K; L35 = LED, 3500K; L40 = LED, 4000K
- **Mounting Type**: SR = Sheet Rock
- **Length**: 2 = 2 foot individual; 3 = 3 foot individual; 4 = 4 foot individual; 6 = 6 foot individual; 8 = 8 foot individual; xx = Configurable Run (Specify length in 1ft increments)
- **Driver Options**: DD = 0-10V Dimming; 5LT = FifthLight DALI; LUT = Lutron DALI
- **Circuiting Options**: SI = Single Circuit; DU = Dual Circuit
- **Voltage**: 1 = 120V; 2 = 277V; 3 = 347V(remote transformer); U = Universal Voltage
- **Emergency Options**: EM = Battery Pack[2]; EC = Emergency Circuit
- **Lens Options**: S93 = Satin Lay-in Lens; S93S = Satin Snap-in Lens[3]; S93HT = High Transmission Lay-in Lens; S93HTS = High Transmission Snap-in Lens[3]
- **Color Options**: W = Matte White; S = Silver; XX = Custom Color

NOTES:

Not all options available. Please consult your local Cooper Lighting Representative for availability.
Specifications and dimensions subject to change without notice.

1. Light Level measured at 3500K; add 10% lumen output for 4000K or subtract 10% lumen output for 3000K.
2. Battery packs must be remote mounted
3. For vertical and horizontal in-wall mounting use snap-in lens

Cooper Lighting by EATON

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States

Eaton's Cooper Lighting Business
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800

Specifications and dimensions subject to

ADN130038
4/15/2014

JCSBC
2-2-2016
Att.9A060

"K"

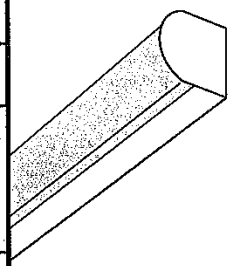
STAIRWELL LIGHT — SLF

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

LED

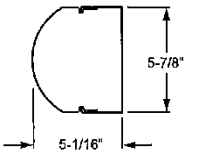


EXAMPLE: **SLF - 4 - LED*PH75/840 - HIA - OPTIONS - ED*PH - UNV**

SERIES | NOMINAL LENGTH | LED PACKAGE | SHIELDING | OPTIONS | DRIVER | VOLTAGE

FEATURES

- Attractive source of direct lighting for use in stairwells and hallways.
- Optional end- or side-mount occupancy sensors provide added energy-efficiency.
- Sleek design for wall or surface-mount applications.
- LEDs are shielded from view by frosted high-impact acrylic lens.
- Heavy-duty 16-gauge C.R.S. spot-welded housing.
- Multiple dimming protocols available.
- Optional system-integrated emergency LED driver available.
- Rated for 50,000 hours at 70% lumen maintenance (L70).
- Minimum 80 CRI; 3000K, 3500K, 4000K CCT.
- Optional tamper-resistant screws available.
- This fixture is proudly made in the USA.



ORDERING INFORMATION

SERIES

SLF Stairwell Light

NOMINAL LENGTH

2 2'
4 4'

LED PACKAGE

See table to right for LED packages.

SHIELDING

HIA Frosted high-impact acrylic
HIA/TP[1] Frosted high-impact acrylic with tamper resistant screws[1]

OPTIONS

For color options, visit the SLF online at hewilliams.com.

EM/BSL310 Emergency LED driver (4' only, nominal 1300 lumens module output in EM mode)
TPSN-8[1] #8, tamper-resistant (snake eyes) tool[1]

OCCUPANCY SENSORS

Factory-installed (120V or 277V only). See back for details.

Passive Infrared (PIR):
OCCSS SBR-10 End-mount sensor
OCCWS FSP-211[2] Side-mount sensor

Ultrasonic:
OCCWS FS-505-PP-___ Side-mount sensor (120V or 277V only, must specify voltage)

DRIVER

Philips, Universal Lighting Technologies, and Lutron drivers available, see back for details.

VOLTAGE

UNV 120-277V

LED PACKAGE

LED packages must be specified with corresponding brand or Lutron LED drivers.

LENGTH	EXAMPLE: LED*PH76/840 LUMEN PACKAGE	NOMINAL LUMENS	MINIMUM CRI & CCT
PHILIPS LED PACKAGES[3]			
2'	LED*PH35/	3,500	**830** = 80 CRI, 3000K **835** = 80 CRI, 3500K **840** = 80 CRI, 4000K
4'	LED*PH75/	7,500	
UNIVERSAL LIGHTING TECHNOLOGIES LED PACKAGES			
2'	LED*UT10	1,000	**830** = 82 CRI, 3000K **835** = 82 CRI, 3500K **840** = 82 CRI, 4000K
	LED*UT13	1,300	
	LED*UT17	1,700	
	LED*UT22	2,200	
	LED*UT26	2,600	
	LED*UT32	3,200	
	LED*UT43	4,300	
	LED*UT45	4,500	
4'	LED*UT21	2,100	**830** = 82 CRI, 3000K **835** = 82 CRI, 3500K **840** = 82 CRI, 4000K
	LED*UT24	2,400	
	LED*UT31	3,100	
	LED*UT43	4,300	
	LED*UT45	4,500	
	LED*UT62	6,200	
	LED*UT86	8,600	
	LED*UT90	9,000	

SPECIFICATIONS

Housing – 16-gauge C.R.S.
Shielding – Frosted high-impact acrylic lens, .100" thick.
Finish – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
LED Module – Philips: Fortimo LED light engine. Universal Lighting Technologies: Everline LED light engine.
LED Driver – Constant current, Class 2 driver. Philips, Universal Lighting Technologies, and Lutron drivers available, see back for details.
Mounting – Wall and surface mount.
Labels – cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations.
Warranty – 5-year limited fixture warranty, see www.hewilliams.com.

1 Tamper-resistant (TPSN-8) tool is required with HIA/TP option, must be ordered separately. Please specify quantity required per project.
2 Optional FSIR-100 remote controller available.
3 Maximum Philips LED lumen packages shown. Lower Philips LED lumen packages available, consult factory.

JCSBC
2-2-2016
Att.9A061

SLF — STAIRWELL LIGHT

LED

IMPORTANT:
Electrostatic sensitive unit. Observe precautions when handling.

PERFORMANCE DATA

Length	LED Package	System Wattage
	PHILIPS	
2'	LED*PH35/830	39
	LED*PH35/835	38
	LED*PH35/840	37
4'	LED*PH75/830	79
	LED*PH75/835	77
	LED*PH75/840	76
	UNIVERSAL LIGHTING TECHNOLOGIES	
2'	LED*UT10	11
	LED*UT13	12
	LED*UT17	15
	LED*UT22	21
	LED*UT26	23
	LED*UT32	30
	LED*UT43	42
	LED*UT45	46
4'	LED*UT21	21
	LED*UT24	23
	LED*UT31	30
	LED*UT43	42
	LED*UT45	46
	LED*UT62	59
	LED*UT86	84
	LED*UT90	92

DRIVER OPTIONS

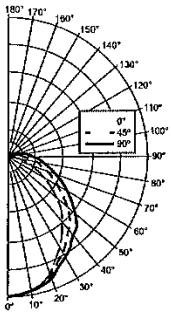
Note: Driver must be compatible with LED package. Specify using table below.

CATALOG #	DESCRIPTION	COMPATIBLE LED PACKAGE	
		LED*PH	LED*UT
ED*PH	Philips Xitanium LED driver prewired for non-dimming applications	•	
EDD*PH	Philips Xitanium LED dimming driver prewired for 0-10V controls	•	
EDD*PH*DALI	Philips Xitanium DALI dimming driver	•	
EDSD40*PH	Philips Xitanium 40% step-dimming driver (must specify 120V or 277V)	•	
EDD*PH*MKX	Philips Xitanium Mark X line voltage dimming driver (must specify 120V or 277V)	•	
ED*UT	ULT driver prewired for non-dimming applications		•
EDSD50*UT	ULT driver prewired for 50% step-dimming applications		•
EDD*UT	ULT driver prewired for 0-10V dimming applications		•
EDDSD*UT	ULT driver prewired for simultaneous step-dimming and 0-10V dimming applications		•
EDD*LU*HILUME L3D ECO	Lutron Hi-lume® A-Series LED dimming driver for EcoSystem® controls	•	•
EDD*LU*HILUME L3D 3WIRE	Lutron Hi-lume® A-Series LED dimming driver for 3-wire controls	•	•
EDD*LU*HILUME LTE LINE	Lutron Hi-lume® A-Series LED dimming driver for forward phase line voltage controls (120V only)	•	•

PHOTOMETRY – PHILIPS

Catalog #: **SLF-4-LED*PH75/840-HIA**

TEST REPORT INFORMATION
- Test Report #: 17257.0
- Date: 04/25/13
- Lamp Type: Philips Fortimo LED light engine
- **Rated Lumens: 7522**
- **Watts: 75.8**
- **Lumens Per Watt: 99.2**
- **CRI: 84.8**
- **CCT: 4016K**



CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	2443.	2443.	2443.	
5	2411.	2411.	2414.	230.2
15	2287.	2316.	2339.	656.0
25	1971.	2045.	2111.	945.4
35	1649.	1789.	1903.	1119.9
45	1314.	1535.	1713.	1181.3
55	903.	1184.	1360.	1030.6
65	569.	855.	1059.	829.2
75	278.	563.	733.	566.2
85	82.	390.	549.	388.6
90	10.	284.	417.	
95	0.	240.	367.	232.9
105	0.	144.	237.	138.4
115	0.	91.	163.	79.1
125	0.	65.	113.	50.3
135	0.	51.	82.	31.9
145	0.	49.	68.	22.8
155	0.	43.	51.	13.8
165	0.	0.	45.	4.9
175	0.	0.	0.	0.0
180	0.	0.	0.	

LUMEN SUMMARY

Zone	Lumens	% Fixture
0 - 30	1832.	24.4
0 - 40	2951.	39.2
0 - 60	5163.	68.6
0 - 90	6948.	92.4
90 - 120	450.	6.0
90 - 130	501.	6.7
90 - 150	555.	7.4
90 - 180	574.	7.6
Total Luminaire:		
0 - 180	7522.	100.0

IES Spacing Criteria:
End = 1.1, Diagonal = 1.2, Across = 1.2

Williams FLUORESCENT LIGHTING

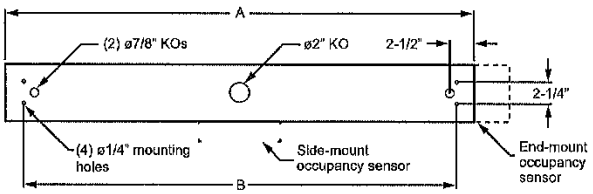
H.E. Williams, Inc. ▪ Carthage, Missouri ▪ www.hewilliams.com ▪ 417-358-4065 ▪ Fax: 417-358-6015

Information contained herein is subject to change without notice.

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2-2-2016
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FIXTURE DETAILS

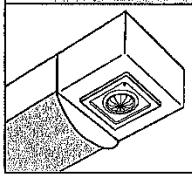
BACK VIEW



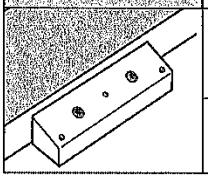
Nom. Length	Actual Length (A)	OCCWS 505/211 Actual Length (B)	OCCSS SBR-10 Actual Length (B)
2'	24-5/8"	22-1/2"	21-3/16"
3'	36-5/8"	34-1/2"	33-3/16"
4'	48-5/8"	46-1/2"	45-3/16"

OCCUPANCY SENSORS

END MOUNT

	SENSOR	DETAILS
	OCCSS SBR-10	Line voltage, passive infrared (PIR) sensor. Must specify 120V or 277V.

SIDE MOUNT

	SENSOR	DETAILS
	OCCWS FSP-211	Digital high/low passive infrared (PIR) integrated sensor. Must specify 120V or 277V. Optional FSIR-100 remote controller available.
	OCCWS FS-505	Line voltage, ultrasonic integrated sensor. Must specify 120V or 277V.

40.

Z5615.258.00.00.00

1.28 GPF Elongated Wall Hung EcoVantage® TAG P-1 &P1-1
Manual Flush Valve Toilet System



Z5615 Series

Suffix Options:

☐ **-RF** Retro-Fit Nut Kit for extending carrier studs from existing wall.

Recommended Trim:

☐ **Z5955SS-EL** Elongated, standard white, open front toilet seat less cover with stainless steel check hinge.

Note: To ensure system performance:
Minumum Running Water Pressure = 25 psi

These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when installed according to these requirements.

EcoVantage® is a registered trademark of Zurn Industries

Z5615 HET Series

- Zurn One HET Toilet System designed for optimal performance between Zurn fixture and Zurn flush valve to save water.
- 1.28 gpf (gallons per flush) 4.8 Lpf
- 20% water savings over standard 1.6 gpf system
- Vitreous china
- Elongated front rim
- 2-1/8" fully glazed trapway
- High efficiency siphon jet flush action
- Zurn product system component compatibility and quality assurance
- Shipping Weight: 40 lbs.

☐ **Engineering Specification: Z5615.258.00.00.00 EcoVantage® High Efficiency Toilet System**
-System comes complete with exposed manual Z6000AV-HET high efficiency flushometer valve and vitreous china wall-hung toilet. The system is designed to perform to industry standards with as little as 1.28 gallons per flush. The EcoVantage® manual valve is an exposed, quiet diaphragm type that is complete with Zurn's AquaVantage® TPE, chloramine resistant, dual seal diaphragm with a clog resistant filtered by-pass. The valve has a non-hold open and no leak handle feature, high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon guard protection. Internal seals are made of chloramine resistant materials. Vitreous china toilet is 1-1/2" top spud with 2-1/8" fully glazed trapway and siphon jet action. Valve and toilet are an engineered system designed to provide optimal performance and 20% water savings over 1.6 gpf conventional toilets.

This space is for Architectural/engineering Approval

See Zurn One Systems for suggested packages.

Zurn Industries, Commercial Fixtures
5900 Elwin Buchanan Drive - Sanford, NC 27330 · Phone: 919-775-2255 · Fax: 919-775-3541 · www.zurn.com

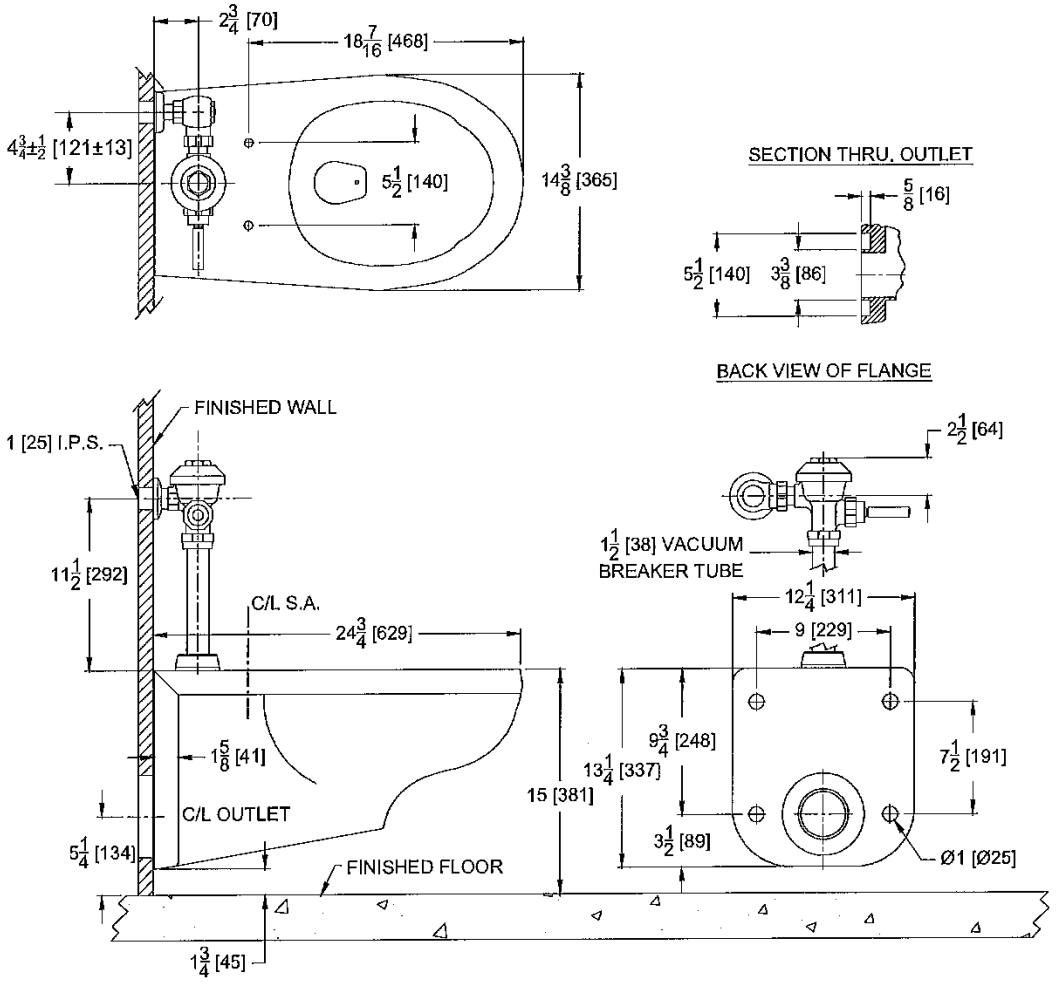
REV. A DWG. NO. 84217 DATE: 08/25/09 C.N. NO. 110122 PRODUCT NO. Z5615.258.00.00.00

Z5615.258.00.00.00

1.28 GPF Elongated Wall Hung EcoVantage® Manual Flush Valve Toilet System Rough-in

TAG _____

Rough-in dimensions for Z5615 Series
- Z5615.258.00.00.00 with top spud



These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when installed according to these requirements.

Note: For ADA compliance, top of seat height should be installed at 17"-19" from finished floor.

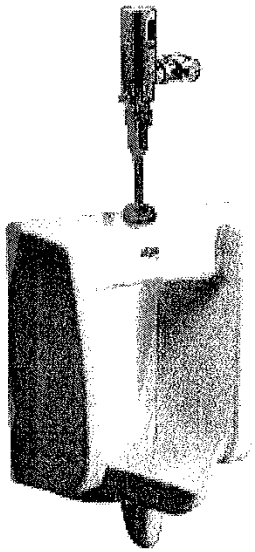
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REV. A DWG. NO. 84217 DATE: 08/25/09 C.N. NO. 110122 PRODUCT NO. Z5615.258.00.00.00

Z5755-U

TAG P2 & P2-1

Omni-Flo™ Top Spud Urinal
0.125 gpf to 1.0 gpf



Z5755 Series *Shown with ZTR6203 Flush Valve

Recommended Trim:

- ☐ **ZTR6203-ULF-LL**
  Sensor Long Life Battery Operated Urinal Flush Valve. 0.125 gpf[0.5 Lpf]
- ☐ **ZTR6203-QRT-LL**
  Sensor Long Life Battery Operated Urinal Flush Valve. 0.25 gpf[1.0 Lpf]
- ☐ **ZTR6203-EWS-LL**
  Sensor Long Life Battery Operated Urinal Flush Valve. 0.5 gpf [1.9 Lpf]
- ☐ **ZTR6203-WS1-LL**
  Sensor Long Life Battery Operated Urinal Flush Valve. 1.0 gpf [3.8 Lpf]

These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when urinal is installed 432mm (17") from finished floor.

ZURN INDUSTRIES, LLC. ♦ COMMERCIAL BRASS OPERATION
5900 ELWIN BUCHANAN DRIVE ♦ SANFORD NC 27330
Phone: 1-800-997-3876 ♦ Fax: 919-775-3541
www.zurn.com
In Canada: ZURN INDUSTRIES LIMITED
3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2
Phone: 905-405-8272 Fax: 905-405-1292

Z5755 Urinal Series

- Zurn Ultra Low Consumption Urinal designed for optimal performance when paired with Zurn flush valve to save water while exceeding industry performance standards
- Based on flush valve it can flush 0.125 gpf [0.5 Lpf] to 1.0 gpf [3.8 Lpf]
- Vitreous china
- Asymmetric backwall resulting in reduced splash back
- Patent Pending
- High efficiency washdown flushing action
- Oversized footprint to make retrofit easy
- 3/4" top spud
- 2" I.P.S. outlet flange and rubber gasket with integral trap
- 14" extended rim for handicap compliance when installed at proper height
- Vandal resistant outlet strainer included

Engineering Specification:

☐ **Z5755 EcoVantage® Urinal**
0.125 gpf [0.5 Lpf] to 1.0 gpf [3.8 Lpf] vitreous china, wall hung, integral trap, washdown urinal complete with 3/4" top spud connection, concealed universal retrofit wall bracket, 2" outlet connection and vandal resistant outlet strainer.

***Replaces Zurn Z5750 and Z5798-U**

Architectural/Engineering Approval

See Zurn One Systems for suggested packages.

The information contained in this document is subject to change without notice.
Please contact Zurn for most up to date information.

EcoVantage® is a registered trademark of Zurn Industries, LLC.

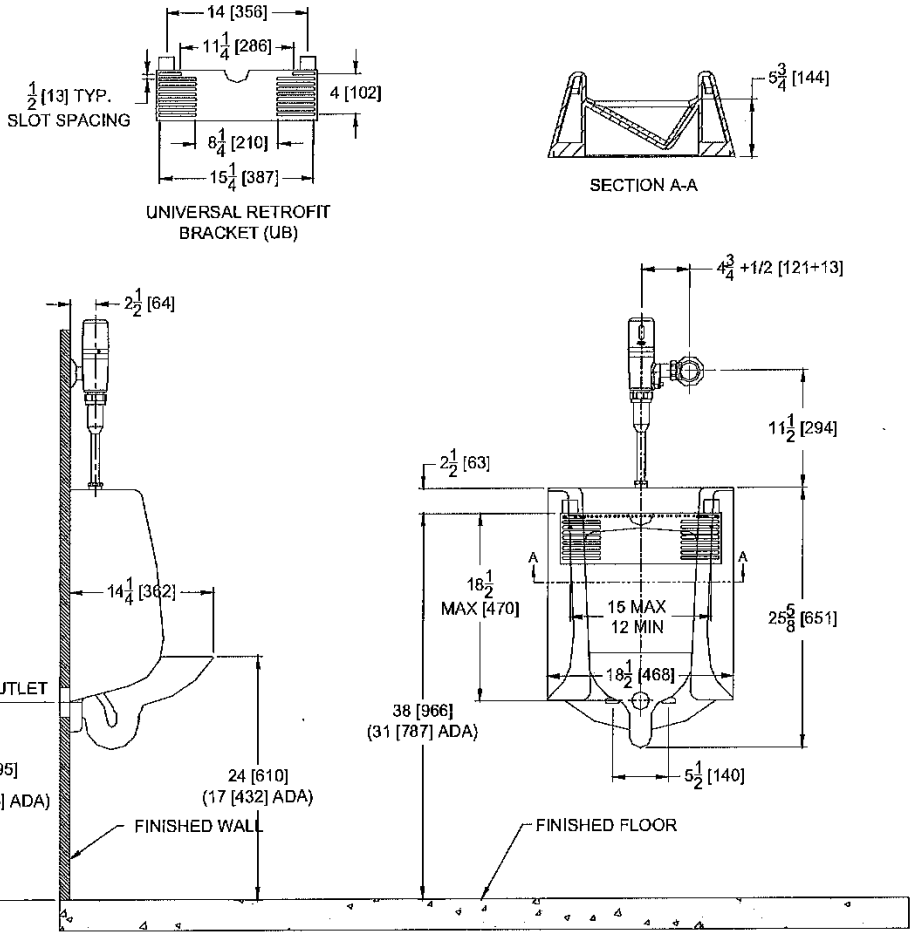
Rev. C
Dwg. No. 312163
Date: 11/26/2014
Product No. Z5755-U

Z5755-U

TAG _____

Omni-Flo™ Top Spud Urinal
0.125 gpf to 1.0 gpf

Rough-in dimensions for Z5755-U Series



These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when urinal is installed 432mm (17") from finished floor.

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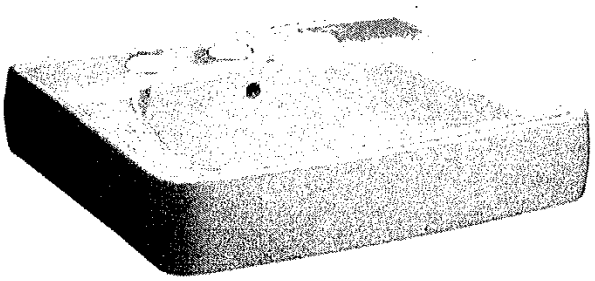
Rev. C
Dwg. No. 312163
Date: 11/26/2014
Product No. Z5755-U

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2-2-2016
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Z5310

20" x 18" Wall Hung Lavatory

TAG P-3 & P3-1



Z5310 Series

Suffix Options:

☐ **-LS** Left Side Soap Hole
☐ **-RS** Right Side Soap Hole

Recommended Trim:

☐ **-Z8743-PC** Grid Strainer
☐ **-Z8700 SERIES** P-Trap
☐ **-Z8800 SERIES** Stop with flexible supplies
☐ **-Z8946-1-NT** ADA trap, stop, and supply protectors

Optional Trim:

☐ **-Z8746-PC** ADA grid Strainer
☐ **-Z8946-3-NT** ADA trap, stop, and supply protectors for offset grid strainers.

These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when lavatory is installed 34" (864mm) from finished floor.

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Phone: 1-800-997-3876 ♦ Fax: 919-775-3541
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In Canada: ZURN INDUSTRIES LIMITED
3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2
Phone: 905-405-8272 Fax: 905-405-1292

Z5310 Series

- 20" [508 mm] x 18" [457 mm]
- Vitreous china
- Faucet holes for single, 4" [102 mm] or 8" [203 mm] centers
- Available with right or left side soap hole punching (Single or 4" centers only)
- Rear overflow
- Wall hung lavatory for use with concealed or exposed arm carrier systems
- Waste: 1-1/4" [32 mm] O.D.
- Depth: 6-3/4" [171 mm]
- Shipping Weight: 35 lbs [16 kg].

Engineering Specification:

☒ **Z5311** 20" [508 mm] x 18" [457 mm] vitreous china wall hung lavatory with rear overflow and single faucet hole. Provided with holes for concealed or exposed arm carrier systems.

☐ **Z5314** 20" [508 mm] x 18" [457 mm] vitreous china wall hung lavatory with rear overflow and 4" [102] center faucet holes. Provided with holes for concealed or exposed arm carrier systems.

☐ **Z5318** 20" [508 mm] x 18" [457 mm] vitreous china wall hung lavatory with rear overflow and 8" [203 mm] center faucet holes. Provided with holes for concealed or exposed arm carrier systems.

Architectural/Engineering Approval

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See Zurn One Systems for suggested packages.

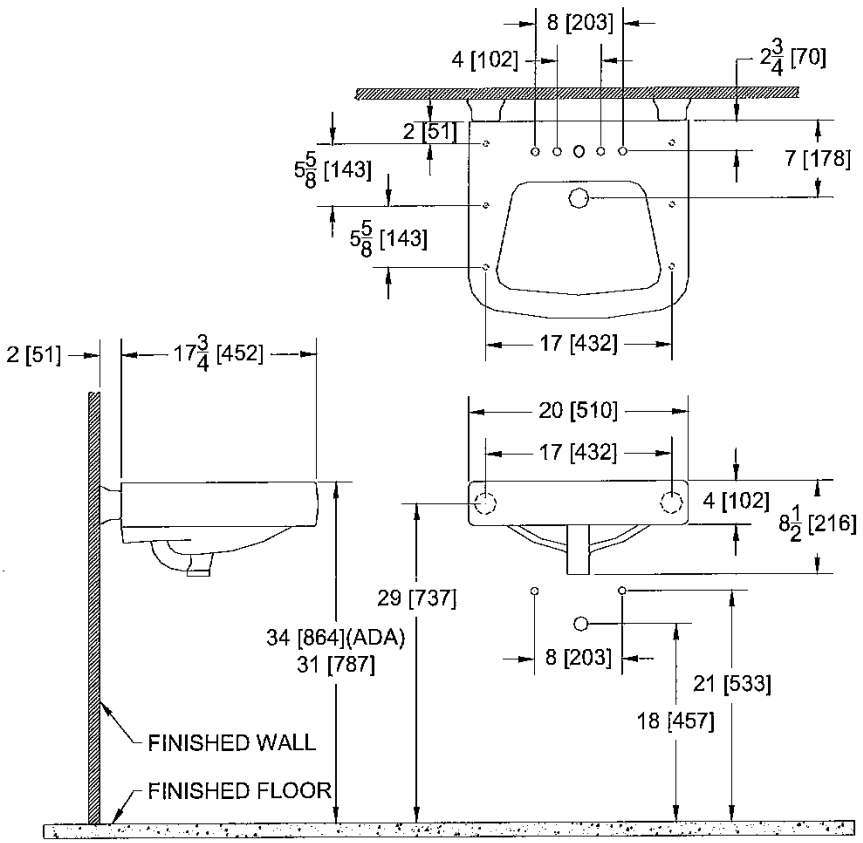
Rev. C
Dwg. No. 80612
Date: 10/19/11
Product No. Z5310

Z5310

20" x 18" Wall Hung Lavatory

TAG _____

Rough-in dimensions for Z5310 Series
- Z5311 Lavatory with single faucet hole.
- Z5314 Lavatory with 4" center faucet holes
- Z5318 Lavatory with 8" center faucet holes



Note: Rough-in for concealed arm carrier, see Zurn Z1231-E2 Rough-in sheet.

These dimensions and specifications are subject to change without notice.

Fixture dimensions meet ANSI/ASME standard A112.19.2 and CAN/CSA B45 requirements.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when lavatory is installed 864mm (34") from finished floor.

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www.zurn.com
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3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2
Phone: 905-405-8272 Fax: 905-405-1292

ZURN

AquaSense®
TAG P-3 & P3-1

Z6930-XL

AquaSense Battery Powered Faucet



ADA DESIGNED

ZURN LEAD FREE PRODUCTS

Engineering Specification

ADA compliant, battery powered, chrome plated sensor faucet for retrofit and new construction.

- Flow Rate
  - 1.5 gpm Vandal Resistant Aerator
- Occupant Detection
  - Infrared convergence-type proximity sensor
  - Thirty Second Time out feature
- Spout module
  - Chrome Plated Cast Brass
- Also Includes
  - In-line filter
  - 4 "AA" batteries
  - Inlet for a 1/2"[13] ball riser

Flow Control Options

- ☐ **-F** 0.5 gpm/1.9 Lpm Vandal-Resistant Non-Aerated
- ☐ **-J** 1.5 gpm/ 5.7 Lpm Vandal-Resistant Laminar Flow
- ☐ **-K** 1.0 gpm/ 3.8 Lpm Vandal-Resistant Laminar Flow
- ☐ **-L** 1.0 gpm/ 3.8 Lpm Vandal-Resistant Aerator
- ☐ **-M** 0.35 gpm/1.3 Lpm Vandal-Resistant Non-Aerated
- ☐ **-N** 0.5 gpm/ 1.9 Lpm Vandal-Resistant Laminar Flow

Power Supply Choices (Sold Separately)

- ☐ **-ACA** 6 VDC Plug-In Power Converter
- ☐ **-HW6** Hardwired Power Converter

Optional Power Supply Accessories

- ☐ **-CWB** Connector Wire for Hardwire Install
- ☐ **-MJ** Mini Junction Box

NOTE: For Hardwire applications furnish P6000-HW6 power converter. Order P6000-HW6 power converter seperately.
The P6000-HW6 and P6000-MJ will power up to 8 sensor faucets.

Accessories

- ☐ **-ADM** Above Deck Mixer
- ☐ **-ADM-2** Above Deck Mixer w/8" Cover Plate
- ☐ **-CP4** Cover Plate 4"[102] Centers
- ☐ **-CP8** Cover Plate 8"[203] Centers
- ☐ **-DSA** Drug Screening Applications (Hardwired Applications)
- ☐ **-H4** Wrist Blade Handle for ADM
- ☐ **-MT** Mixing Tee
- ☐ **-MV** Temperature Mixing Valve
- ☐ **-SH** Supply Hoses for Mixing Valve
- ☐ **-SSH** Single Stainless Supply Hose (-XL)
- ☐ **-TMV** Thermostatic Mixing Valve for Multiple Faucets
- ☐ **-TMV-1** Thermostatic Mixing Valve for Single Faucets
- ☐ **-_____** Other

Zurn Lead Compliant products (-XL) are manufactured to comply with state laws and local codes that mandate lead content levels less than one quarter of one percent (0.25%) total lead content by weighted average.

Architectural/Engineering Approval

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5900 ELWIN BUCHANAN DRIVE ♦ SANFORD NC 27330
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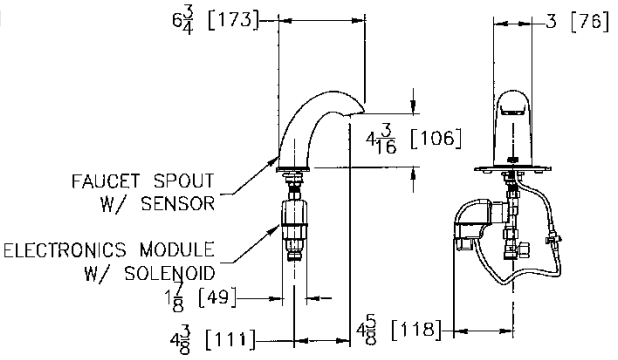
Rev. F
Dwg. No. 310110
Date: 10/10/2014
Product No. Z6930-XL

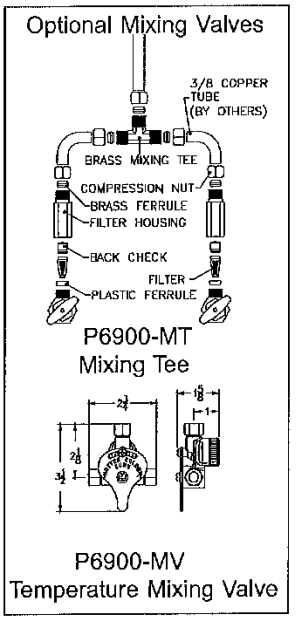
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TYPICAL Z6930

AquaSense Battery Powered Faucet

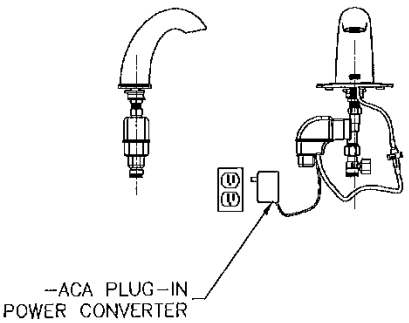
NOTE: Recommended through hole diameter to properly mount the spout/ shank is 1-1/8" to 1-1/4".





TYPICAL Z6930-ACA

AquaSense Plug-In Powered Faucet



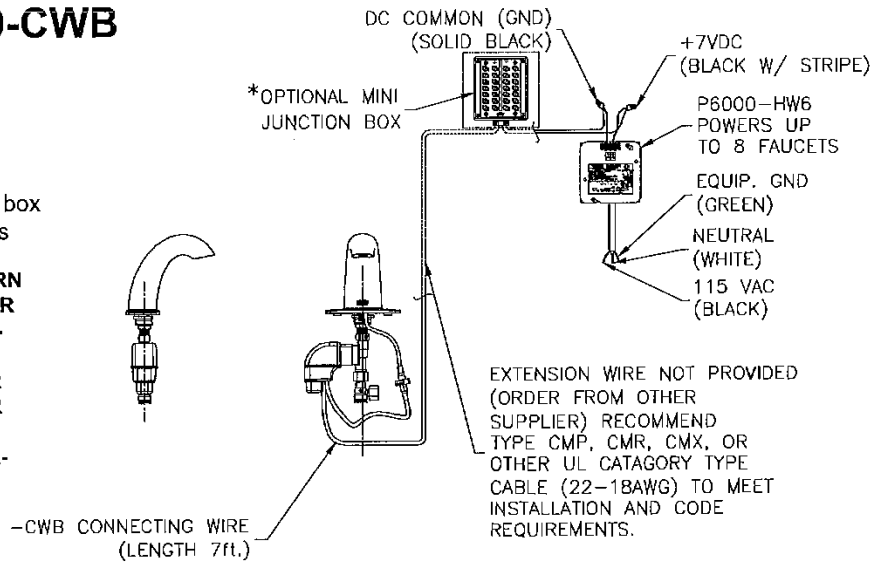
TYPICAL Z6930-CWB

AquaSense Hardwire

Powered Faucet

Optional:
* Optional -MJ mini junction box for connecting up to 8 faucets

NOTE: MUST USE EITHER ZURN P6000-HW6 HARDWIRE POWER CONVERTER OR ZURN P6000-ACA PLUG-IN POWER CONVERTER TO ENSURE PROPER OPERATION. USING A POWER CONVERTER OTHER THAN ZURN MAY RESULT IN OPERATION MALFUNCTION OR UNIT FAILURE.



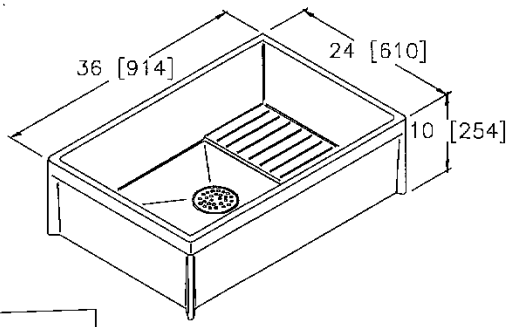
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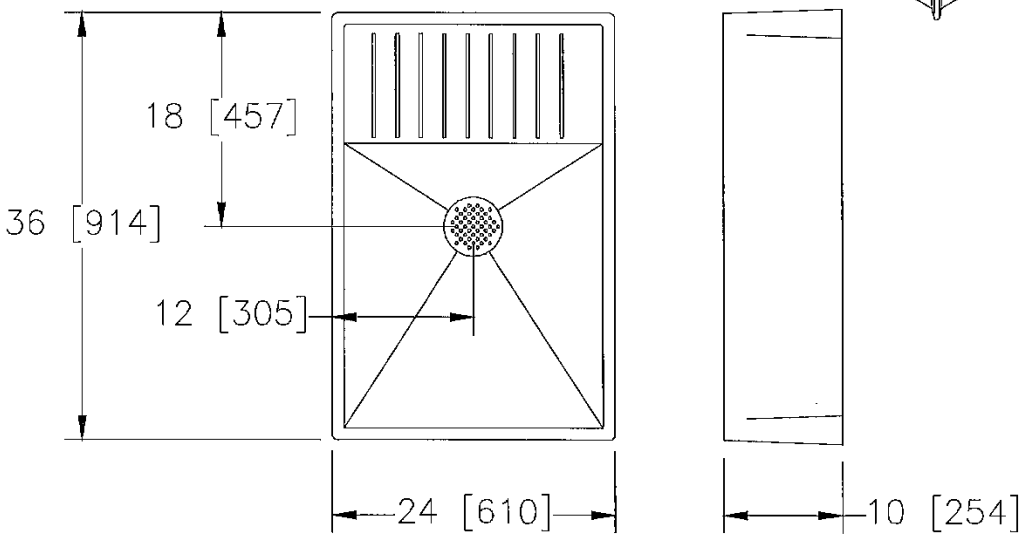
ZURN LIGHT COMMERCIAL LC®

Z1996-36 MOP SERVICE BASIN 36 x 24 [914 x 610]

TAG p-4

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice





Product	Mop Basin Size	Approx. Wt. Lbs. [kg]
__ Z1996-36	36 x 24 x 10 [914 x 610 x 254]	55 [25]

ENGINEERING SPECIFICATION: Z1996-36
24 x 36 x 10 [914 x 610 x 254] Mop Service Basin. Molded high density composite basin with an integrally molded, self-draining mop shelf, PVC drain body, stainless steel strainer and 3 [76] gasketed outlet connection. Certifications: Meets ANSI Z124.6, CSA listed,and IAPMO listed under file # 3561.

OPTIONS

____ -AW White Body
____ -BS Stainless Steel Bumper Guard
____ -BV Vinyl Bumper Guard
____ -HH Hose and Hose Bracket
____ -MH Mop Hanger
____ -NHG PVC Drain Gasket for No-Hub Pipe
____ -PRP Pipe Reducer for PVC Drain
____ -PRS Pipe Reducer for Stainless Steel Drain
____ -SDL Stainless Steel Drain with Dome Strainer, Lint Basket and Locking Nut
____ -SF Service Faucet
____ -WG Wall Guard #20 Gage Type 304 Stainless Steel (2 Panels-Indicate Size)

ZURN INDUSTRIES, LLC ♦ SPECIFICATION DRAINAGE OPERATION ♦ 1801 Pittsburgh Ave. ♦ Erie, PA 16514
Phone: 814\455-0921 ♦ Fax: 814\454-7929 ♦ World Wide Web: www.zurn.com
In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905\405-8272 Fax: 905\405-1292

Rev. K Date: 03/06/13 C.N. No. 128890
Prod./DWG. No. Z1996-36

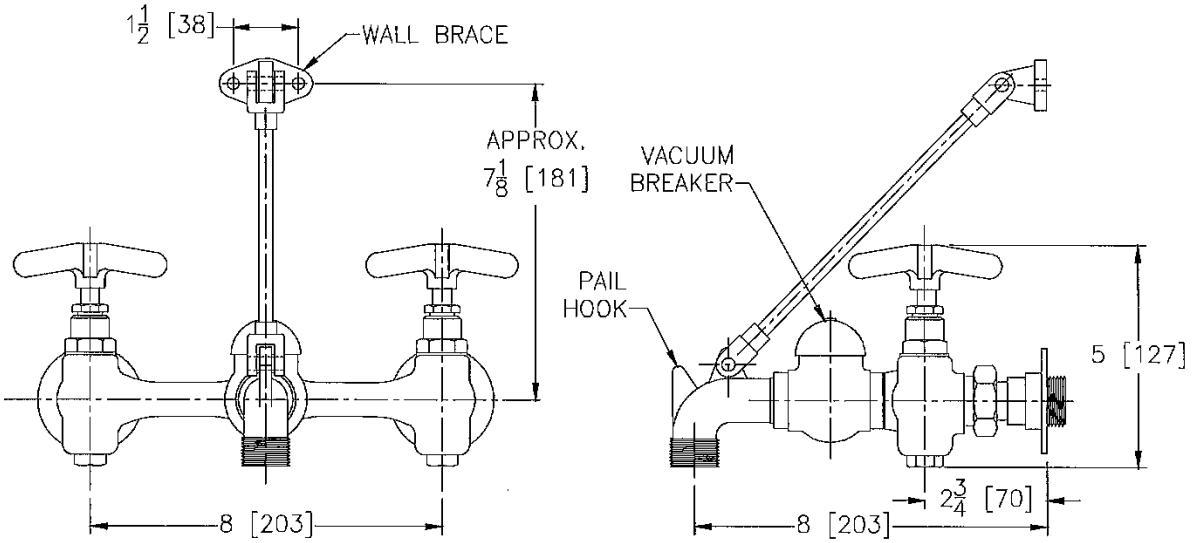
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ZURN LIGHT COMMERCIAL LC®

Z1996-SF Service Sink Faucet

TAG P-4

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



ENGINEERING SPECIFICATION: Z1996-SF

Service Sink Faucet - Chrome plated service faucet, complete with vacuum breaker, integral stops, adjustable wall brace, pail hook, four-arm hot and cold handles and 3/4 [19] hose thread on spout. Water inlets are for 1/2 [13] pipe and are eccentric on an 8 [203] centerline.

NOTE:
CONFORMS TO: ASME A112.18.1-2005/CSA B125.1-2005

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In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905\405-8272 Fax: 905\405-1292

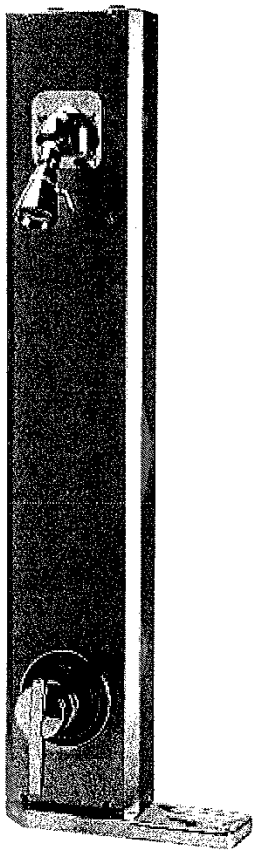
Rev. D Date: 6/29/11 C.N. No. 121502
Dwg. No. 58519 Product No. Z1996-SF

JCSBC
2-2-2016
Att.9A073

AQUA-PANEL SHOWER UNIT

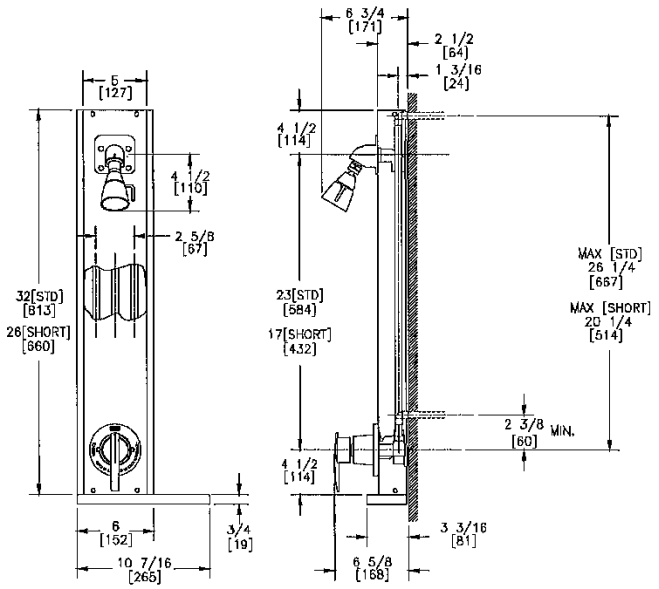
Z7500

TAG p-5



ENGINEERING SPECIFICATIONS: ZURN Z7500

Prefabricated stainless steel shower unit, consisting of the TEMP-GARD pressure balancing shower valve with single bronze stem, stainless steel balancing piston & bottom access integral service stops. Standard with 1/2" copper tubing assembly enclosed by 18 gage stainless steel #4 brushed finish shroud, -i6 chrome plated brass shower head with 2.5 GPM flow control and adjustable spray pattern on institutional bracket, metal stem handle, side mount soap dish & all vandal proof securing screws.



Note: *All dimensions are for reference only. Do not use for pre-plumbing*

OPTIONS (Check/specify appropriate options)

Suffix	Description
__ -i2	Fixed Spray Institutional Shower Head (2.5 GPM) (Other Institutional Shower Heads Available)
__ -i5	Large Brass Shower Head with Adjustable Spray Pattern (2.5 GPM)
__ -1.25	1.25 GPM Shower Head Flow Control
__ -1.5	1.5 GPM Shower Head Flow Control
__ -1.75	1.75 GPM Shower Head Flow Control
__ -2.0	2.0 GPM Shower Head Flow Control
__ -LS	Less Soap Dish
__ -SL	Short Length Shroud 26" (660mm)
__ -TC	Matching Shroud Extension to Cover Thru Ceiling Piping (Specify extension height)
__ -TH	Matching Shroud Cover For Concealed Horizontal Piping (Application drawings available for custom installations)
__ -14	14 Gage Stainless Steel Shroud
__ -16	16 Gage Stainless Steel Shroud

STANDARDS

Tested to meet the following standards for valves and plumbing fittings:
Shower heads meet ANSI A112.18.1
Meets or Exceeds ANSI A117.1M standard for physically handicapped
Valve meets ASSE 1016 - 2005.

ZURN INDUSTRIES, LLC ♦ COMMERCIAL BRASS OPERATION ♦ 2640 SOUTH WORK STREET ♦ FALCONER NY 14733
Phone: 1-800-997-3876 ♦ Fax: 1-919-775-3541 ♦ www.zurn.com
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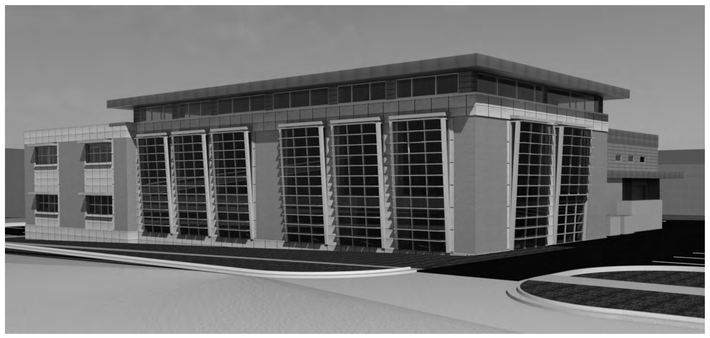
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Rev. D Date: 6/7/11 C.N. No. 127775
Dwg. No. 66252 Product No. Z7500

STATE OF KANSAS ENERGY & SERVICE CENTER

Kansas
Department of Administration





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G201 INFORMATION
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FIRE ALARM

EY101 FIRST FLOOR PLAN- FIRE ALARM
EY102 SECOND FLOOR PLAN- FIRE ALARM
EY201 FIRE ALARM- DETAILS AND SCHEDULES

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DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
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Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
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STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:

DATE: 2-9-15

TITLE SHEET

A-012651

G101

DESIGN DEVELOPMENT
PHASE DOCUMENTS

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JCSBC
2-2-2016
Alt.9A075

GRAPHIC SYMBOLS

E / J — EXPANSION JOINT

C / J — CONTROL JOINT

F — FLOOR COVERING CHANGE

S / C — SAWCUT CONCRETE FLOOR JOINTS- REFERENCE STRUCTURAL DRAWINGS FOR COMPLETE LOCATIONS

100'-0" — NEW FINISH SPOT ELEVATIONS IN FEET AND INCHES (OR ON SITE PLAN IN FEET AND DECIMALS)

100'-0" — EXISTING SPOT ELEVATION

NEW DOOR

EXISTING DOOR

101 (102) — DOOR MARK - REFERENCE DOOR AND FRAME SCHEDULE

LOCATION OF SYMBOL ON PAIR OF DOORS INDICATES THE ACTIVE LEAF

1 — PLAN NOTES

SECTION MARK- 1 = DETAIL NUMBER, 2 = SHEET NUMBER

BUILDING SECTION

WALL SECTION

A — A2.2 — INTERIOR ELEVATION MARKER: A2.2 = SHEET NUMBER, 6 = DETAIL NUMBER

A2.1 6 — BUILDING ELEVATION MARKER: A2.1 = SHEET NUMBER, 6 = DETAIL NUMBER

SIM / 1 / A1.1 — DETAIL MARKS: 1 = DETAIL NUMBER, A1.1 = SHEET NUMBER, SIM = SIMILAR

LEVEL 1 / 0'-0" — ELEVATION MARK IN FEET AND INCHES

WOOD FRAME MARK - REFERENCE FRAME ELEVATIONS.

S1 / A1 — STEEL FRAME MARK - REFERENCE FRAME ELEVATIONS

ALUMINUM FRAME MARK - REFERENCE FRAME ELEVATIONS

7 — GLASS TYPE - REFERENCE GLASS SCHEDULE ON SHEET A50.1

PARTITION MARK - REFERENCE PARTITION SCHEDULE ( ) INDICATES FIRE RATING OF WALL IN HOURS — M12a(3)

TB - 4' MB - 6' — TB-4': TACKBOARD - 4' LENGTH.

MB-6': MARKER BOARD - 6' LENGTH. (NOTE: MOUNT BOTTOM @ 2'-6" A.F.F. U.N.O.)

MR - 4' TS - 6' — TS: TACK STRIP - 6' LENGTH

MR - 4': MAP RAIL 4'-0" MOUNT @ 6'-6" A.F.F.

PS - 5' WB - 6' — PS - 5': ELECTRIC PROJECTION SCREEN, 5'-0" IN LENGTH

WB - 6': INTERACTIVE WHITE BOARD, 6'-0" (OWNER PROVIDED U.N.O.

MASONRY CONTROL JOINT FROM BEARING TO TOP OF WALL. DRYWALL CONTROL JOINT FROM BEARING TO TOP OF WALL. PROVIDE ON BOTH SIDES OF WALL

MASONRY CONTROL JOINT FROM LINTEL BEARING TO TOP OF WALL OR BOND BEAM. DRYWALL CONTROL JOINT FROM TOP OF OPENING TO TOP OF WALL. MASONRY OR DRYWALL CONTROL JOINT FROM BOTTOM OF OPENING TO WALL BEARING. PROVIDE ON BOTH SIDES OF WALL

MASONRY DUMMY CONTROL JOINT. LOCATE SIMILAR TO CONTROL JOINT ABOVE

B5 B6 B5 — CASEWORK DESIGNATION; NUMBER INDICATES UNIT NUMBER IDENTIFIED IN MANUFACTURED CASEWORK SCHEDULE. REFERENCE SPECIFICATIONS.

TI — EQUIPMENT OR FURNISHINGS SHOWN ON FLOOR PLANS. INDICATES FURNISHINGS BY OWNER (N.I.C.) OR FIXED EQUIPMENT PLANS

FURNITURE TAG, WHEN FURNITURE IS INCLUDED IN CONTRACT

LOCKERS: X INDICATES FILLER UNITS

4R-10" — FLOOR DRAIN (ELEVATION IN FEET AND INCHES WHERE INDICATED)

MOP/JANITOR SINK

WATERCLOSET, URINAL, LAVATORY (RESPECTIVELY)

D.F.(2) D.F. — DRINKING FOUNTAIN - REFERENCE PLUMBING

F.E.C. — F.E.C.: FIRE EXTINGUISHER CABINET F.H.C.P: FIRE HOSE CABINET

COLUMN: A1= COLUMN NUMBER (IF NOT SHOWN, COLUMN NUMBER PER GRID)

COLUMN

COLUMN GRID NUMBERS AND/OR LETTERS

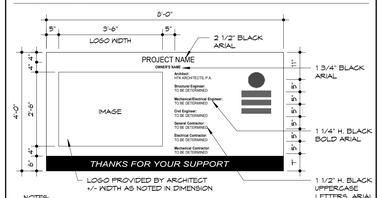
Note: REF. SITE PLAN LEGEND, ROOF PLAN LEGEND AND CEILING PLAN LEGEND FOR ADDITIONAL NOTES AND LEGENDS.

ABBREVIATIONS

NOTE: REFER TO SPECIFICATIONS FOR ADDITIONAL ABBREVIATIONS OF REFERENCED STANDARDS, REGULATORY AGENCIES, ASSOCIATIONS AND OTHERS

A.B	ANCHOR BOLT	MAS.	MASONRY
ABV	ABOVE	MAT., MATL	MATERIAL
AD	ACTUAL DIMENSION, ACCESS DOOR	MAX	MAXIMUM
		MB	MACHINE
ADJ	ADJACENT	MC	MECHANICAL CONTRACTOR
AFF	ABOVE FINISH FLOOR	MDO	MEDIUM DENSITY OVERLAY
AHU	AIR HANDLING UNIT	MECH	MECHANICAL, MECHANISM
ALT	ALTERNATE	MFGR	MANUFACTURER
ALUM	ALUMINUM	MH	MANHOLE
ANCH	ANCHOR	MIN	MINIMUM
∠	ANGLE	MISC	MISCELLANEOUS
ARCH	ARCHITECTURAL	MO	MASONRY OPENING
@	AT	MS	MACHINE SCREW
AVG R	AVERAGE "R" FACTOR FOR INSULATION	MTL	METAL
		N	NORTH
B/C	BACK OF CURB	NA	NOT APPLICABLE
BD	BOARD	NIC	NOT IN CONTRACT
BLDG	BUILDING	NO.#	NUMBER
BM	BEAM	NOM	NOMINAL
BM	BENCH MARK	NTS	NOT TO SCALE
BRG	BEARING	NWCM	NORMAL WEIGHT CONCRETE
BTM	BOTTOM		MASONRY UNIT
BUR	BUILT-UP ROOFING		
		OA	OVERALL
CABT	CABINET	OC(S)	ON CENTER
CB	CATCH BASIN		(STAGGERED, IF 2 ROWS)
CH	COAT HOOK	OD	OVERFLOW DRAIN
CI	CAST IRON	OFF	OFFICE
CIP	CAST-IN-PLACE	OPER	OPERATOR, OPERABLE, OPERATING
CJ	CONTROL JOINT	OPNG	OPENING
CL	CENTER LINE	OTO	OUT-TO OUT
CLG	CEILING	OZ	OUNCE
CMU	CONCRETE MASONRY UNIT		
CMT	CERAMIC MOSAIC TILE	PARTN	PARTITION
CMP	CORRUGATED METAL PIPE	PBD	PARTICLE BOARD
CO	CLEAN OUT	PC	PORTLAND CEMENT, PIECE
COL	COLUMN	PERIM	PERIMETER
CONC	CONCRETE	PL	PLATE
COND	CONDITION	PLAM	PLASTIC LAMINATE
CONST	CONSTRUCTION	PNL	PANEL
CONT	CONTINUOUS, CONTINUE	PWD	PLYWOOD
CR.I	COMMUNICATIONS RISER	PR	PAIR
CTSK	COUNTERSUNK	PSF	POUNDS PER SQUARE FOOT
CUH	CABINET UNIT HEATER	PSI	POUNDS PER SQUARE INCH
		PVMT	PAVEMENT
DBL	DOUBLE		
DF	DRINKING FOUNTAIN	QTY	QUANTITY
DIA	DIAMETER	QT	QUARRY TILE
DIM	DIMENSION		
DR	DOOR	R,IR	REMOVE & REPLACE
DWG	DRAWING	R	RADIUS
DWG(S)	DRAWING (S)	RA	RETURN AIR
DS(O)	DOWNSPOUT (OUTLET)	RCP	REINFORCED CONCRETE PIPE
DTL	DETAIL	RD	ROOF DRAIN
		REF	REFER TO, REFERENCE
E	EAST	REFL	REFLECTED
EA	EACH	REINF	REINFORCING, REINFORCED
EC	ELECTRICAL CONTRACTOR	REQ'D	REQUIRED
EF	EACH FACE	RET	RETURN
EJ	EXPANSION JOINT	RJ	RUSTICATION JOINT
ELEC	ELECTRICAL	RMS	ROOMS
EL, ELEV	ELEVATION	RO	ROUGH OPENING
ENCL	ENCLOSURE	RTU	ROOF TOP UNIT
EQ	EQUAL		
EQUIP	EQUIPMENT	S	SOUTH
EW	EACH WAY	SAN	SANITARY
EXP	EXPANSION	SC	SAWCUT
EXT	EXTERIOR, EXTERNAL	SD	SOAP DISPENSER
EXIST.,EX	EXISTING	SECT	SANITARY
		SF	SQUARE FOOT
FA	FRESH AIR	SFCMU	SPLIT FACE CONCRETE MASONRY UNIT
FD	FLOOR DRAIN		
FE	FIRE EXTINGUISHER	SHT	SHEET
FEC	FIRE EXTINGUISHER CABINET	SIM	SIMILAR
FFCO	FLUSH FLOOR CLEANOUT	SLV	SHORT LEG VERTICAL
FH	FLAT HEAD	SMS	SHEET METAL SCREWS
FHC	FIRE HOSE CABINET	SND	SANITARY NAPKIN DISPENSER
FIN	FINISH	SNR	SANITARY NAPKIN RECEPTACLE
F	FLOWLINE	SPEC	SPECIFICATION
FL,FLR	FLOOR	SQ	SQUARE
FLRG	FLOORING	SS	STAINLESS STEEL
FND	FOUNDATION	STD	STANDARD
FOS	FACE OF STRUCTURE	STL	STEEL
FR	FIRE RATED, FIRE RESISTIVE	STRUCT	STRUCTURAL
FS	FLOOR SINK, FOOD SERVICE	SUSP	SUSPENSION
FT	FEET OR FOOT	SYM	SYMMETRICAL
FV	FIELD VERIFY		
		TB	TACKBOARD
GA	GAUGE	TD	TOWEL DISPENSER & DISPOSER
GALV	GALVANIZED		(PAPER), OR TRENCH DRAIN
GC	GENERAL CONTRACTOR	T & G	TONGUE AND GROOVE
GEN	GENERAL	TEMP	TEMPERED, TEMPORARY
GI	GALVANIZED IRON	TEXT	TEXTURED
GL	GLASS	THK	THICK
GYP	GYPSUM	TLT	TOILET
		TOC	TOP OF CURB OR CONCRETE
HB	HOSE BIBB	TOS	TOP OF SLAB, STEEL OR STRUCTURE
HC	HANDICAPPED (ACCESSIBLE)		
HD	HAND DRYER	TP	TOILET PAPER DISPENSER
HDWE	HARDWARE	TPL	TPO PERSON LOCKER
HD WD	HARD WOOD	TWS	TACTILE WARNING SURFACE
HM	HOLLOW METAL	TX'FR	TRANSFORMER
HT	HEIGHT	TYP	TYPICAL
HORIZ	HORIZONTAL, HORIZONTALLY		
HPL	HIGH PRESSURE LAMINATE	UNO	UNLESS NOTED OTHERWISE
HR	HOUR	US	URINAL SCREEN
HVAC	HEATING VENTILATING & AIR CONDITIONING	V.C.P.	VITEOUS CLAY PIPE
		V.C.T.	VINYL COMPOSITION TILE
ID	INSIDE DIAMETER	VERT.	VERTICAL, VERTICALLY
INSUL	INSULATION	V.W.C.	VINYL WALL COVERING
INT	INTERIOR		
INTERM	INTERMEDIATE	W	WEST
WB	INTERACTIVE WHITE BOARD	W/	WITH
		WC	WATER CLOSET
JB	JUNCTION BOX	WD	WOOD
JT(S)	JOINT(S)	WDW	WINDOW
		W/O	WITH OUT
LB	LOCKER BENCH	WO	WHERE OCCURS
LLV	LONG LEG VERTICAL	WT	WEIGHT
LT WT	LIGHTWEIGHT	WWF	WELDED WIRE FABRIC
LT	LIGHT	WPG	WATERPROOFING
LWCMU	LIGHTWEIGHT CONCRETE MASONRY UNIT		

JOBSITE SIGN



NOTES:

1) COLORS TO BE DETERMINED BY ARCHITECT PRIOR TO PRINTING.

2) PROVIDE ARIAL FONT STYLE FOR ALL TEXT. VERIFY ANY DISCREPANCIES WITH ARCHITECT.

3) PROVIDE ON DOUBLE SIDED "MDO" BOARD OR ALUMINUM. PROVIED GRAPHICS ON ONE SIDE ONLY.

4) 1-COAT ALKYD PRIMER AND 2-COATS LATEX ENAMEL FINISH COLOR ON ALL SIDES AND EDGES.

5) ERECT AND BACK BRACE WITH 4" X 4" PRESSURE-TREATED POSTS. TOP OF SIGN ELEVATION 8'-0" ABOVE GROUND. POSTS SHALL BE SET IN GROUND MIN. OF 24" AND BACK BRACED TO WITH STAND WIND LOADS. ERECT SIGN PLUMB AND LEVEL.

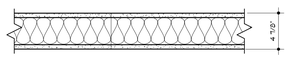
6) REPAIR/ REPLACE SIGN AS REQ'D FROM DAMAGES AND/ OR DETERIORATION AS REQ'D THROUGH OUT PROJECT.

7) LOCATION TO BE DETERMINED BY OWNER.

8) LOGO COLORS TO MATCH OFFICIAL DISTRICT COLORS

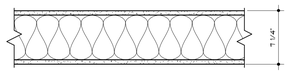
PARTITION TYPES

GYPSUM



G5a — GYPSUM BOARD PARTITION: 3 5/8" METAL STUDS @ 16" OC - COVER EACH SIDE WITH 5/8" GYPSUM BOARDS. EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH ACOUSTICAL INSULATION. FIRE RATED PARTITION - UL #U418

G5c — GYPSUM BOARD PARTITION: 3 5/8" METAL STUDS @ 16" OC - COVER EACH SIDE WITH 5/8" GYPSUM BOARDS. EXTEND PARTITION TO 4" ABOVE CEILING.



G7a — GYPSUM BOARD PARTITION: 6" METAL STUDS @ 16" OC - COVER EACH SIDE WITH 5/8" GYPSUM BOARDS. EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH ACOUSTICAL INSULATION. FIRE RATED PARTITION - UL #U418

G7c — GYPSUM BOARD PARTITION: 6" METAL STUDS @ 16" OC - COVER EACH SIDE WITH 5/8" GYPSUM BOARDS. EXTEND PARTITION TO 4" ABOVE FINISH CEILING

GYPSUM BOARD GENERAL NOTES

1 UNLESS NOTED OTHERWISE, EXTEND GYPSUM BOARD 4" ABOVE FINISHED CEILING ELEVATION.

2 REFER TO SPECIFICATIONS SECTIONS 054000 AND 092216 FOR ADDITIONAL REQUIREMENTS.

3 UNLESS NOTED OTHERWISE, PROVIDE 4" ACOUSTICAL INSULATION IN ALL PARTITIONS.

4 FRAME AROUND DUCTWORK, BACK BRACE AS REQUIRED FOR STABILITY.

5 REFER TO HOLLOW METAL FRAME DETAILS FOR ADDITIONAL DETAIL REQUIREMENTS.

6 EXTEND STUDS TO TOP RUNNER ATTACHED TO STRUCTURE ABOVE, OR BACK BRACE TO STRUCTURE AS NECESSARY TO FULLY STABILIZE THE PARTITIONS.

7 REFER TO COLUMN DETAILS FOR ADDITIONAL DETAIL REQUIREMENTS.

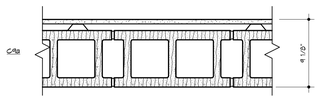
8 REFER TO FINISH SCHEDULE FOR WALL FINISH.

9 ALL PENETRATIONS THROUGH GYPSUM BOARD PARTITIONS EXPOSED TO VIEW WILL BE TRIMMED NEAT AND TRUE AND SEALED.

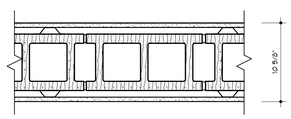
10 WHEN PARTITION EXTENDS TO STEEL BEAM ABOVE, FILL VOIDS BETWEEN DECK AND TOP OF STEEL BEAM WITH ACOUSTICAL INSULATION.

11 WHERE JOISTS PENETRATE PARTITIONS EXTENDING TO STRUCTURE ABOVE, HOLD PARTITIONS 2" CLEAR OF JOIST TO ALLOW FOR DEFLECTION AND FILL VOID WITH ACOUSTICAL INSULATION.

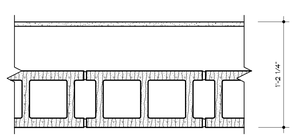
COMPOSITE:



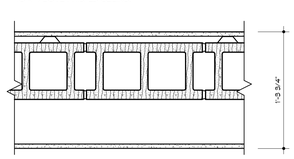
C4a — COMPOSITE PARTITION: 5" LWCMU, UNO FURRED OUT WITH 7/8" METAL STRIPS @24" OC, WITH 5/8" GYPSUM BOARD ON ONE SIDE. EXTEND LWCM. TO DECK AND FILL VOIDS BETWEEN DECK AND BLOCK WITH SAFING INSULATION. EXTEND FURRING AND GYPSUM BOARD TO 4" ABOVE FINISHED CEILING. FIRE RATED PARTITION - UL #U419 (3 HR)



C10a — COMPOSITE PARTITION: 5" LWCMU, UNO FURRED OUT WITH 7/8" METAL STRIPS @24" OC, FINISHED WITH 5/8" GYPSUM BOARD ON BOTH SIDES. EXTEND LWCMU TO DECK AND FILL VOIDS BETWEEN DECK AND BLOCK WITH SAFING INSULATION. EXTEND FURRING AND GYPSUM BOARD TO 4" ABOVE FINISHED CEILING. FIRE RATED PARTITION - UL #U410 (4 HR)

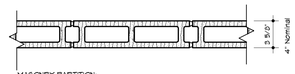


C14a — COMPOSITE PARTITION: 5" LWCMU, UNO FURRED OUT WITH 6" METAL STUDS @24" OC, FINISHED WITH 5/8" GYPSUM BOARD ON ONE SIDE. EXTEND LWCMU TO DECK AND FILL VOIDS BETWEEN DECK AND BLOCK WITH SAFING INSULATION. EXTEND STUDS AND GYPSUM BOARD TO 4" ABOVE FINISHED CEILING.



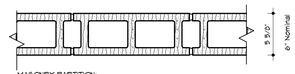
C16a — COMPOSITE PARTITION: 5" LWCMU, UNO FURRED OUT WITH 1-1/2" METAL STRIPS @24" OC, FINISHED WITH 5/8" GYPSUM BOARD ON ONE SIDE AND 2 5/8" METAL STUD @ 24" OC, FINISHED WITH 5/8" GYPSUM BOARD ON THE OPPOSITE SIDE. EXTEND LWCMU TO DECK AND FILL VOIDS BETWEEN DECK AND BLOCK WITH SAFING INSULATION. EXTEND FURRING / STUDS AND GYPSUM BOARD TO 4" ABOVE FINISHED CEILING.

MASONRY:



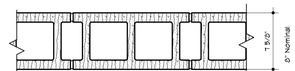
M4a — MASONRY PARTITION: 4" LWCMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

M4b — MASONRY PARTITION: 4" LWCMU, UNO - EXTEND PARTITION TO ONE (1) COURSE ABOVE CEILING. BACKBRACE AS REQUIRED FOR STABILITY.



M6a — MASONRY PARTITION: 6" LWCMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

M6b — MASONRY PARTITION: 6" LWCMU, UNO - EXTEND PARTITION TO ONE (1) COURSE ABOVE CEILING. BACKBRACE AS REQUIRED FOR STABILITY.



M8a — MASONRY PARTITION: 8" LWCMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION. FIRE RATED PARTITION - UL #U401, ALL C.M.U. MUST BEAR UL SYMBOL 4 HR - B-4 C.M.U. 3 HR - C-3 C.M.U. 2 HR - D-2 C.M.U.

M8b — MASONRY PARTITION: 8" LWCMU, UNO - EXTEND PARTITION TO ONE (1) COURSE ABOVE CEILING. BACKBRACE AS REQUIRED FOR STABILITY.

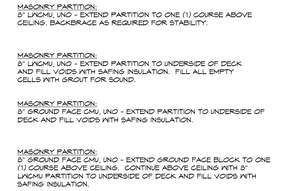
M8c — MASONRY PARTITION: 8" LWCMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION. FILL ALL EMPTY CELLS WITH GROUT FOR SOUND.

M8d — MASONRY PARTITION: 8" GROUND FACE CMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

M8e — MASONRY PARTITION: 8" GROUND FACE CMU, UNO - EXTEND GROUND FACE BLOCK TO ONE (1) COURSE ABOVE CEILING. CONTINUE ABOVE CEILING WITH 8" LWCMU PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

M8f — MASONRY PARTITION: 8" SPLIT FACE C.M.U., U.N.O. - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

M8g — MASONRY PARTITION: 8" SPLIT FACE CMU, UNO - EXTEND GROUND FACE BLOCK TO ONE (1) COURSE ABOVE CEILING. CONTINUE ABOVE CEILING WITH 8" LWCMU PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.



M12a — MASONRY PARTITION: 12" LWCMU, UNO - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION. FIRE RATED PARTITION - UL #U401, ALL C.M.U. MUST BEAR UL SYMBOL 4 HR - B-4 C.M.U. 3 HR - C-3 C.M.U. 2 HR - D-2 C.M.U.

M12b — MASONRY PARTITION: 12" LWCMU, U.N.O. - EXTEND PARTITION TO UNDERSIDE OF DECK AND FILL VOIDS WITH SAFING INSULATION.

MASONRY GENERAL NOTES

1 ALL WALLS TO HAVE STANDARD JOINT REINFORCING 1-4 O.C. MAX.

2 REFER TO FRAME DETAILS ON ARCHITECTURAL DRAWINGS FOR ADDITIONAL DETAIL REQUIREMENTS.

3 REFER TO DIVISION 4 SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.

4 REFER TO DETAILS ON ARCHITECTURAL DETAIL DRAWINGS FOR ADDITIONAL DETAIL REQUIREMENTS.

5 REFER TO FINISH SCHEDULE FOR WALL FINISH.

6 ALL MASONRY PARTITIONS ARE 5' UNLESS NOTED OTHERWISE.

7 REFER TO STRUCTURAL DRAWINGS FOR REINFORCEMENT AND GROUT REQUIREMENTS.

GENERAL NOTES

1) GENERAL CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BETWEEN SPECIFICATIONS AND DRAWINGS, BETWEEN MULTIPLE SPECIFICATION SECTIONS AND/OR BETWEEN MULTIPLE DRAWINGS. THE ARCHITECT WILL DETERMINE WHICH SHALL GOVERN.

2) GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS OF THE JOB SITE INCLUDING UTILITIES AND EXISTING STRUCTURES PRIOR TO BEGINNING WORK AND REPORT ANY DISCREPANCIES TO THE ARCHITECT.

3) GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE STRUCTURE DURING CONSTRUCTION INCLUDING ALL SHORING AND BRACING REQUIRED TO RESIST REQUIRED VERTICAL AND LATERAL FORCES.

4) ALL ARCHITECTURAL FLOOR PLAN DIMENSIONS ARE FROM FACE OF CONCRETE, MASONRY AND FINISHED DRYWALL.

5) MASONRY DIMENSIONS ARE NOMINAL UNLESS INDICATED OTHERWISE.

6) MASONRY PARTITIONS ARE TYPE M8a UNLESS INDICATED OTHERWISE.

7) ALL INTERIOR CONCRETE MASONRY PARTITIONS AND ALL MASONRY BACK-UP FOR EXTERIOR WALLS ARE LWCMU UNLESS NOTED OTHERWISE.

8) HORIZONTAL MASONRY DIMENSIONS FROM OUTSIDE TO OUTSIDE CORNERS ARE ACTUAL. WHEN DIMENSIONS ARE 2'-0" OR LESS, CONSTRUCT ONE JOINT LESS THAN DIMENSION SHOWN.

9) GYPSUM BOARD PARTITIONS ARE TYPE G5a UNLESS INDICATED OTHERWISE.

10) GENERAL CONTRACTOR SHALL PROVIDE 3½" HIGH CONCRETE CURBS AT ALL ELECTRICAL PANELS AND WHERE 2 OR MORE CONDUITS ARE EXPOSED AT THE FLOOR LINE.

11) MECHANICAL /ELECTRICAL CONTRACTOR SHALL SIZE AND GENERAL CONTRACTOR SHALL FORM, DOWEL AND POUR INTERIOR AND EXTERIOR BASES FOR MECHANICAL AND ELECTRICAL EQUIPMENT (3½" AT INTERIOR LOCATIONS AND 5½" AT EXTERIOR LOCATIONS UNLESS INDICATED OTHERWISE). REFER TO GENERAL PROVISIONS OF MECHANICAL SPECIFICATIONS FOR MINIMUM SIZES. UNLESS INDICATED OTHERWISE, REINFORCE WITH 4"x4" - W4.0xW4.0 WWF.

12) NO WALL FINISH OTHER THAN PAINT IS REQUIRED BEHIND CABINETS, CHALKBOARDS, TACKBOARDS, ETC UNLESS WALL BEHIND IS EXPOSED TO VIEW AND/OR WHERE NOTED OTHERWISE.

13) PROVIDE WALL BASE AT ALL CABINETS, SHELVING AND COLUMNS; AND AS SCHEDULED.

14) PROVIDE LINTELS (REF. STRUCTURAL AND MISC. LINTEL SCHEDULE) FOR ALL OPENINGS IN MASONRY WALLS FOR FIRE EXTINGUISHER CABINETS, LOUVERS, GRILLES, DOORS, ETC.

15) GROUT SMOOTH ALL CONCRETE COLUMNS AND WALLS PRIOR TO PAINTING. GROUT CONCRETE TO BE PAINTED WITH DRYWALL COMPOUND. CONCRETE COLUMNS AND WALLS SCHEDULED NOT TO BE PAINTED, GROUT WITH CEMENTITIOUS MATERIAL TO MATCH CONCRETE.

16) CONTINUE CONTROL JOINTS, INCLUDING SEALANTS, ABOVE CEILING ELEVATIONS FOR FULL HEIGHT OF WALL OR PARTITION.

17) CONSTRUCT ALL MASONRY PARTITIONS THAT EXTEND TO THE UNDERSIDE OF STRUCTURE WITH A ¾" CLEARANCE AROUND ALL STRUCTURE AND FILL VOIDS WITH SAFING INSULATION, UNLESS NOTED OTHERWISE.

18) PROVIDE 2x6 FIRE-RETARDANT TREATED BLOCKING IN GYPSUM BOARD PARTITIONS BEHIND CASEWORK; BLOCK AT TOP OF BASE UNITS, TOP & BOTTOM OF WALL UNITS, TOP AND MID-HEIGHT OF TALL UNITS. PROVIDE 2x6 FIRE-RETARDANT TREATED BLOCKING IN GYPSUM BOARD PARTITIONS BEHIND GRAB BARS, DOOR STOPS, WALL-MOUNTED SHELVING, WALL-MOUNTED TVS AND OTHER LOCATIONS AS SPECIFIED OR NOTED. CUT TO FIT SNUGLY BETWEEN STUDS & KERF AT STUD FLANGES TO FIT FIRMLY TO BACK OF DRYWALL.

19) REFER TO STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR REINFORCING STEEL IN MASONRY WALLS AND POURED CONCRETE.

20) REFER TO CODE COMPLIANCE PLANS FOR FIRE RATINGS OF PARTITIONS AND SMOKE BARRIER LOCATIONS. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION OF PARTITIONS AND BARRIERS TO COMPLY WITH RATINGS INDICATED.

MATERIALS

EARTH

SAND

GRANULAR FILL / DRAINAGE MATERIAL

ASPHALT PAVING

CONCRETE (ELEVATION/SECTION)

PRECAST CONC./P.C. PLASTER/CUT STONE

GROUT

LIGHT WEIGHT OR NORMAL WEIGHT CONCRETE MASONRY UNIT AS NOTED

INSULATION - FOUNDATION

INSULATION - WALL

STEEL

WOOD FRAMING OR BLOCKING

FINISH WOOD

PLYWOOD

TILE

INSULATION - ROOF

INSULATION - BATT

GLASS (ELEVATION/SECTION)

GYPSUM BOARD (ELEVATION/SECTION)

PARTICLE BOARD

ACOUSTICAL CEILING PANEL OR TILE

STONE (ELEVATION/SECTION)

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (8x, 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1 Concrete Structure	081110	-1 Steel Door
	-2 Concrete Floor Slab		-2 Steel Frame
	-3 Vapor Barrier		-3 Frame Anchor
	-4 Welded Wire Fabric		-4 Louver
	-5 Steel Reinforcing Bar		-5 Mission Guard
	-6 Radiator Joint	081416	-1 Flush Wood Door
	-7 Waterstop	083113	-1 Access Door
	-8 Dovetail Anchor		-2 Access Door Frame
	-9 Sidewalk	083323	-1 Overhead Coiling Door
	-10 Premolded Joint Filler		-2 Coiling Counter Door
035300	-1 Concrete Topping	083613	-1 Sectional Overhead Door
042000	-1 Face Brick		-2 Sectional Overhead Door
	-2 Concrete Masonry Unit - Normal Weight (")		Track
	-3 Concrete Masonry Unit - Lightweight (")	084113	-3 Weatherstripping
	-4 Wire Reinforcing		-1 Aluminum Entrance Door
	-5 Metal Tie/Anchor		-2 Aluminum Entrance Frame
	-6 Through Wall Flashing		-3 Sunshade
	-7 Control Joint Strip	084413	-1 Glazed Aluminum Curtain Wall
	-8 Bond Beam (")	085113	-1 Threshold
	-9 Compressible Filler		-2 Aluminum Window
	-10 Weephole		-3 Aluminum Sill
	-11 Drainage Material		-4 Glass Stop
	-12 Termination Bar		-5 Wall Anchor
044300	-1 Stone Masonry	085200	-1 Aluminum Cover
	-2 Anchor	088355	-1 Glazing (as scheduled)
	-3 Stone Jamb		Security Glazing (as scheduled)
	-4 Stone Sill	089000	-1 Louvers and Vents
	-5 Belt Course	092216	-1 Steel Stud (")
047200	-1 Cast Stone		-2 Steel Stud Runner (")
051200	-1 Steel Beams		-3 Furring Channel
	-2 Steel Column	092900	-1 Gypsum Board (")
	-3 Steel Tube		-2 Fire Rated Gypsum Board (")
	-4 Steel Channel		-3 Cementitious Tile Backer Panel
052100	-1 Steel Joist		-4 Metal Suspension System
	-2 Joist - Extended End		-5 Acoustical Sealant
	-3 Joist - Ceiling Extension		-6 Acoustical Insulation (")
053100	-1 Metal Decking		-7 Metal Edge Trim
	-3 Steel Composite Decking		-8 Auxiliary Support Framing
	-4 Floor Closure Strips		-9 Metal Control Joint
054000	-1 Structural Steel Studs		-10 High Impact Gypsum Board
	-2 Structural Steel Joists		-11 Concrete Interior Framing Compound
	-3 "C" Closure	093000	-1 Ceramic Mosaic Tile
055000	-1 Steel Angle		-2 Glazed Wall Tile
	-4 Steel Channel		-3 Quarry Tile
	-5 Steel Lintel		-4 Porcelain Floor Tile
	-6 Steel Plate		(" x ")
	-7 Steel Pipe		-5 Tile Base
	-8 Steel Plate		-6 Tile Cap
	-9 Steel Ladder		-7 Setting Bed
	-10 Steel Sidewalk Trenchdrain Cover	095113	-1 Acoustical Panel (X) (F = Fire Rated)
055100	-1 Steel Stairs		-2 Ceiling Suspension System
	-2 Steel Stair Stringer		-3 Edge Mold Trim
	-3 Steel Stair Plate		-4 Auxiliary Support Framing
055213	-1 Steel Pipe Handrail	096513	-1 Resilient Tile Flooring
	-2 Steel Pipe Guardrail		-2 Resilient Wall Base
	-3 Steel Handrail Rail Bracket		-3 Edge Strip
055500	-2 Steel Grating		-4 Tactile Warning Surface
061000	-1 Steel Frame		-5 Resilient Stair Tread
	-2 Wood Nailer (")		-6 Resilient Stair Riser
	-3 Wood Blocking (")		-7 Resilient Stringer Skirt
	-4 Wood Countertop (")		-8 Resilient Stair Nose
	-5 Plywood (")	096716	-1 Carpet Tile
	-6 MDO Felt	096800	-1 Interior Architectural Woodwork
	-7 1"8 Felt	098113	-1 Exterior Painting
	-8 Sheathing (")	098123	-1 Staining and Transparent Finishing
	-9 Cement Board	099000	-1 Painting
064116	-1 Interior Architectural Woodwork		-2 Signage
	-2 Plastic Laminate	102113	-1 Toilet Partition
	-3 Solid Surface Laminate		-2 Urinal Screen
	-4 Particle Board	102223	-1 Wire Mesh Partitions
	-5 Plywood	102800	-1 Impact-Resistant Cornerguard
	-6 3mm Edge Molding		-2 Impact-Resistant Chairrail
	-7 Solid Wood Blocking	102900	-1 Tissue Dispenser
	-8 Hardwood		-2 Framed Mirror
	-9

GENERAL INFORMATION:

LOCATION: State of Kansas Energy & Service Center 7th & Van Buren St. Topeka, KS 66603

PHONE: 785.289.4083

OWNER INFORMATION: State of Kansas 900 SW Jackson St. Suite 600 Topeka, KS 66612

REASON FOR SUBMITTAL: New Construction

RESPONDING FIRE AUTHORITIES HAVING JURISDICTION: Topeka Fire Department; Kansas State Fire Marshal

PROJECT DESCRIPTION:

New energy & service center building housing capital complex boilers, chillers, electrical switchgear, emergency HVAC, boiler & electrical shops and offices, and central warehouse facilities

DATE DEVELOPED: 01/02/15

REGISTERED DESIGN PROFESSIONAL:

HTK Architects, PA
900 S. Kansas Ave., Suite 200
Topeka, KS 66612
PH: 785.266.5373
FAX: 785.266.5270

APPLICABLE CODES

Unless otherwise noted, each building or portion shall be in compliance with the following codes: KSA 31-133 and KSA 2003 Sup. 31-134 require that all occupied structures conform to the basic life safety requirements. Most buildings, near or existing, have one or more deviations from one of the following codes:

A) Existing occupied buildings shall have hazardous conditions which slow speedy exits.
B) New construction and changes in use are subject to greater life safety requirements.

Local Building Inspector: State of Kansas

2006- International Building Code
2006- International Fire Code
2010- ADAABA
Kansas State Boiler Code KSA 44-918
2006- Uniform Plumbing Code
2006- International Fuel Gas Code
NFPA 10- 2007
2006- International Energy Code
NFPA 101- 2006
NFPA 13- 2007
NFPA 70- 2008 (NEC)
NFPA 25- 2008

OCCUPANCY (Section 303) CLASSIFICATION AND AREA

OVERALL BUILDING: New Construction

OCCUPANCY: B, S-1, A-2 (crew room), F-1 (shop)

CONSTRUCTION CLASSIFICATION TYPE: II B

BUILDING AREA: ALLOWABLE = 9,500 SF PER FLOOR
SPRINKLER INCREASE (506.3) = 200%
FRONTAGE = 62.4%
ALLOWABLE AREA WITH INCREASES
ACTUAL - As = 9,500 + 95 + 95 = 19,000 SF
ALLOWABLE AREA WITH INCREASES = 19,570 SF

B - 28,669 SF
S-1 - 20,357 SF
A-2 - 2,958 SF
F-1 - 0 SF

ACTUAL - 2nd Floor: 11,666 SF
B - 7,141 SF
S-1 - 3,160 SF
A-2 - 1,487 SF

BUILDING HEIGHT: ALLOWABLE HEIGHT STORIES(FT.) = 2/55 FT
ACTUAL HEIGHT = 29 FT
ALLOWABLE 2 STORIES ACTUAL 2 STORY

GENERAL BUILDING LIMITATIONS:

Structural Frame: Table 601
Bearing walls: Exterior: 0 HR
Bearing walls: Interior: 0 HR
Nonbearing exterior walls & partitions (Separation > 30 feet): 0 HR
Floor construction including supporting beams & joists: 0 HR
Roof construction including supporting beams & joists: 0 HR

ACTIVE LIFE SAFETY SYSTEMS:

Sprinkler System: Throughout Building Provided
Fire Alarm: Manual & Smoke Detection - Audible/Visual Devices
Throughout Building Provided
Emergency Lights: Throughout Exit Paths/Generator

PASSIVE LIFE SAFETY SYSTEMS:

Corridor Ratings: NOT REQUIRED
Stairwells: 1 HR - PROVIDED
Shaft Enclosures: REQUIRED
Occupancy Separations: NOT REQUIRED
Area Separation Walls: NOT REQUIRED

Storage Over 100 SF:

Fireproofing
Exit Passageway:

AUTOMATIC FIRE SUPPRESSION SYSTEM: RESIST PASSAGE OF SMOKE: NOT REQUIRED
SMOKE BARRIERS: REQUIRED; PROVIDED @ 1 LEVEL, RM 101

PLUMBING FIXTURE COUNT:

PLUMBING FIXTURES FOR ASSEMBLY BASED ON IBC METHOD PROVIDED PER TABLE 2902.1 OF THE 2006 IPC. ASSUMING 50% MALE AND 50% FEMALE.

A2 (Dine Room) ASSEMBLY OCCUPANTS: **99** OCCUPANTS

	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountain	Service Sink
Men's and Women's Lavatories: 1:200	1	1	1	1	1	1	1
Men's and Women's Drinking Fountains 1:500							

B - BUSINESS: 111 OCCUPANTS

	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountains	Service Sink
Men's Water Closets: 1:25 for first 50 and 1:50 for remaining	1	1	1	1	0	0.2	1
Men's Lavatories: 1:40							
Women's Lavatories: 1:40 for first 80 / 1:80 for remaining							
Drinking Fountains 1:100							

	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountains	Service Sink
50/25+8=50	3	3	2	2	2	1.11	1
45/40							

F-1 INDUSTRIAL 21 OCCUPANTS

	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountains	Service Sink
Men's Water Closets 1:50						Women's Water Closets 1:50	
Men's and Women's Lavatories 1:40						Drinking Fountains 1:100	
	1	1	1	1	0	21/100	1
	1	1	1	1		1	

S-1 STORAGE 8 OCCUPANTS

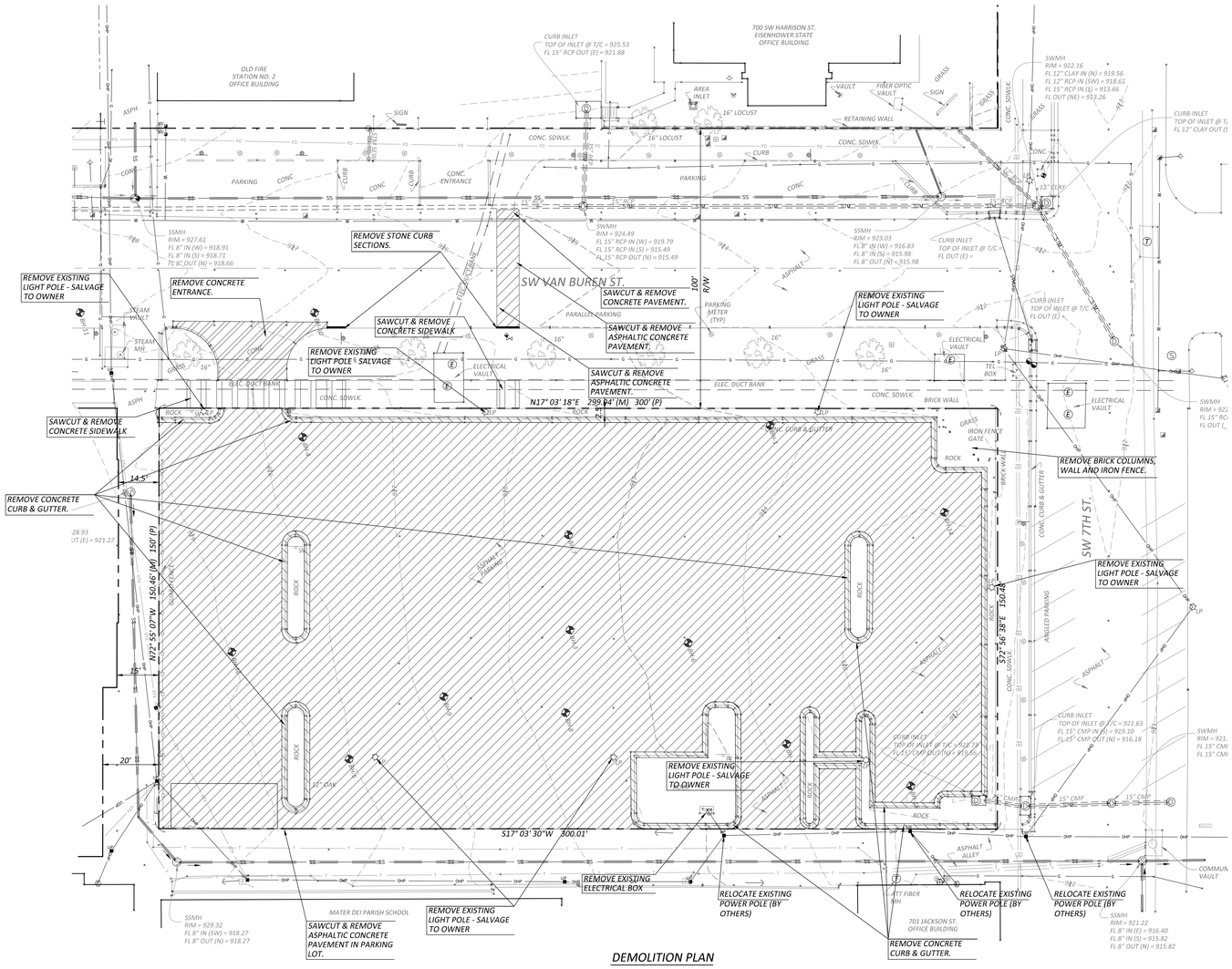
	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountain	Service Sink
	1	1	1	1	0	8/100	1
	1	1	1	1		1	

	Unisex WCs	Unisex Lavatories	Unisex Showers
PLUMBING FIXTURES PROVIDED:	1	1	1
	1	1	1

	Men's WCs	Women's WCs	Men's Lavatories	Women's Lavatories	Unisex No. more than 6Ft.	Drinking Fountain	Service Sink
	4	6	6	6	4	2	2

CODE SYMBOL LEGEND

SYMBOL	DESCRIPTION	PROTECTIVE ELEMENTS
	EXIT EXTERIOR	
	EXIT (INTERIOR illuminated exit sign) EXIT (INTERIOR non-illuminated exit sign)	SHOW ON PACKS
	FIRE EXTINGUISHER	
	EXIT PATH	
	FIRE DEPARTMENT CONNECTION	
	STAIRCASE	Show Rated
	FIRE CONTAINMENT (FIRE RATED PENETRATION EXIT PATH)	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. Non-passage of Smoke
	PROTECTED EXIT PATH	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. Non-passage of Smoke
	PROTECTED EXIT PATH (Occupancy and Horizontal Exit where applicable)	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. Fire & Smoke Ratings
	PROTECTED EXIT PATH (Occupancy and Horizontal Exit where applicable)	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. 1 Hr wall rated up to the ceiling
	PROTECTED EXIT PATH (Occupancy and Horizontal Exit where applicable)	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. 1 Hr wall rated up to the ceiling
	PROTECTED EXIT PATH (Occupancy and Horizontal Exit where applicable)	Sprinkled and Audiomatic Smoke Detection Throughout Exit Path. 1 Hr wall rated full floor to floor



DEMOLITION PLAN

GENERAL NOTES:

1. *ALL CONSTRUCTION METHODS AND MATERIALS USED IN THE CONSTRUCTION OF THE IMPROVEMENTS COVERED BY THESE PLANS SHALL BE IN ACCORDANCE WITH THE KANSAS DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR STATE ROAD & BRIDGE CONSTRUCTION", LATEST EDITION AND SPECIAL PROVISIONS, SUPPLEMENTED WITH THE SPECIFICATIONS NOTED ON THIS SHEET AND ALL APPLICABLE CITY CODES, ORDINANCES AND STANDARD TECHNICAL DESIGN AND DRAWING DETAILS ON FILE AT THE CITY OF TOPEKA, KANSAS.*
2. *THE LOCATION OF ALL OVERHEAD AND UNDERGROUND UTILITIES MAY VARY FROM WHAT IS INDICATED IN THESE PLANS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE UTILITY OWNER TO LOCATE AND FLAG ALL UNDERGROUND UTILITIES WHETHER INDICATED OR NOT. NO EXCAVATION WILL BE PERMITTED IN THE AREA OF UNDERGROUND UTILITIES UNTIL ALL SUCH UTILITIES HAVE BEEN LOCATED AND IDENTIFIED TO THE SATISFACTION OF ALL PARTIES AND THEN ONLY WITH EXTREME CARE TO AVOID ANY POSSIBILITY OF DAMAGE TO THE UTILITY.*
3. *THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL PERMITTING AND FEES THROUGH THE CITY OF TOPEKA DEVELOPMENT SERVICES DEPARTMENT.*

Horz.: 1"=20'
0 20'

SBB
Schmidt, Beck & Boyd
Engineering / Surveying
1415 SW Topeka Blvd.
Topeka, KS 66612
Ph: (785) 215-8630

HTK ARCHITECTS PA
900 S. KANSAS AVE. TOPEKA KANSAS 66612 P. 785.266.3373
9300 W. 110TH ST. STE. 150 OVERLAND PARK KANSAS 66210 P. 913.663.3373
WWW.HTKARCHITECTS.NET

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ??

DATE: 2-09-15 DRAWN BY: CHECKED BY: REV:

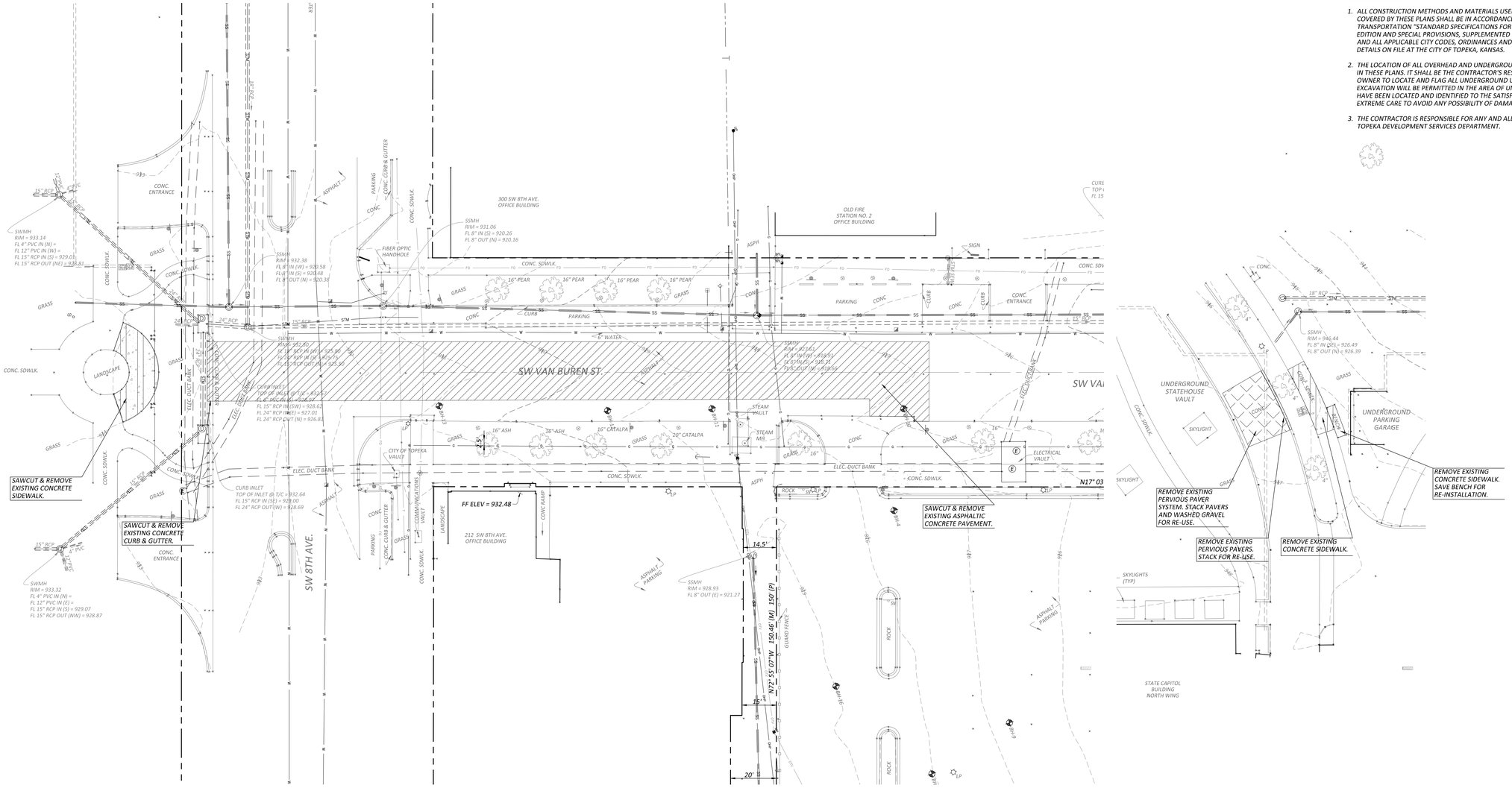
DEMOLITION PLAN - SITE

A-012651

C050

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A078



DEMOLITION PLAN

Horz.: 1"=20'
0 20'

SBB
Schmidt, Beck & Boyd
Engineering / Surveying
1415 SW Topeka Blvd.
Topeka, KS 66612
Ph: (785) 215-8630

GENERAL NOTES:

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3. *THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL PERMITTING AND FEES THROUGH THE CITY OF TOPEKA DEVELOPMENT SERVICES DEPARTMENT.*

HTK ARCHITECTS PA
900 S. KANSAS AVE. 9200 W. 110TH ST. STE. 150
TOPEKA KANSAS 66612 OVERLAND PARK KANSAS 66210
P. 785-266-3373 P. 913-663-3373
WWW.HTKARCHITECTS.NET

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
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DEMOLITION PLAN - TUNNEL

A-012651

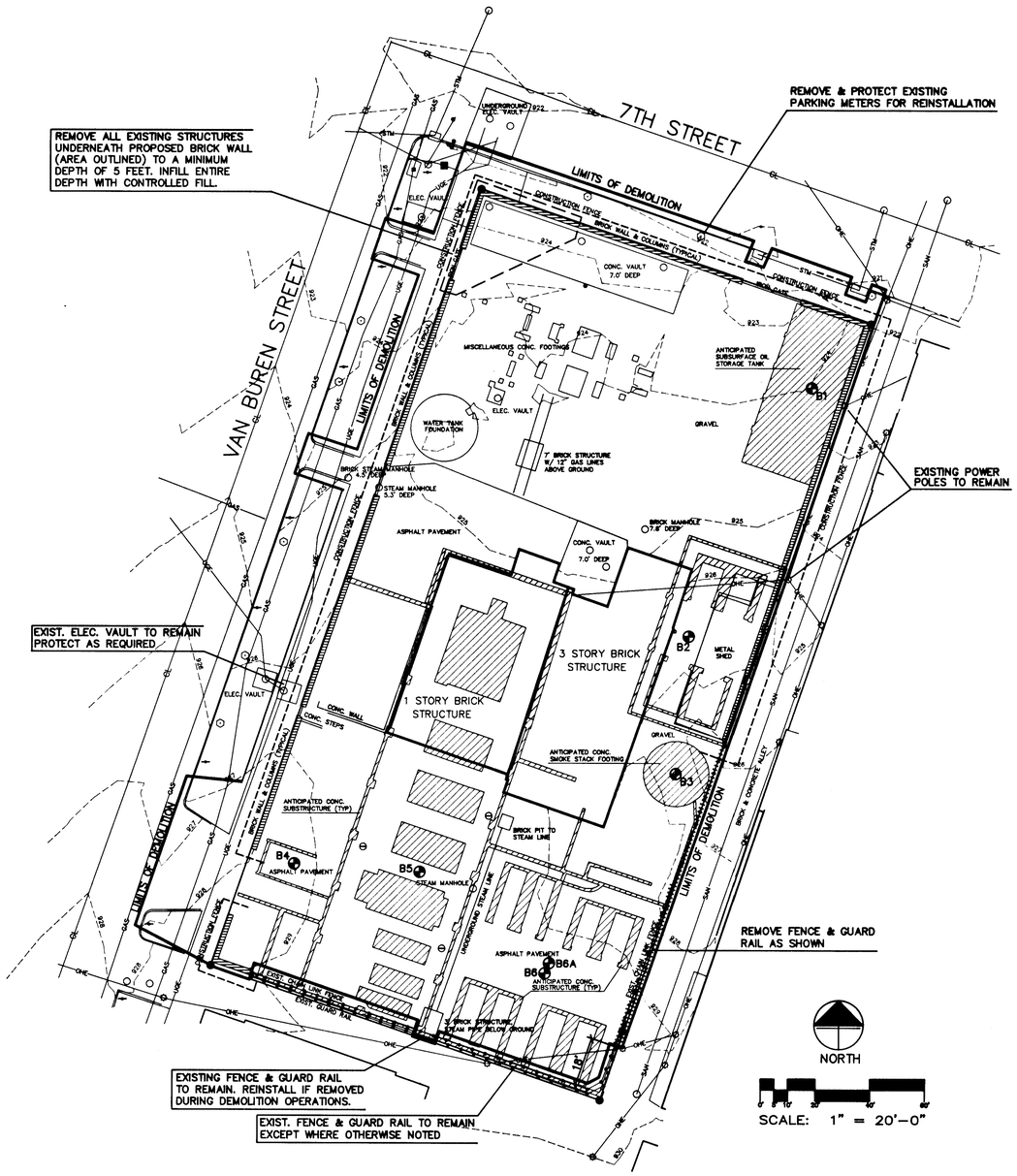
C051

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Alt:9A079

GENERAL NOTES:

1. THE DRAWING ON THIS SHEET IS FROM A PREVIOUS PROJECT THAT INCLUDED THE DEMOLITION OF SITE IMPROVEMENTS ON THIS PROPERTY PRIOR TO THE PARKING LOT CONSTRUCTION.
2. THE DRAWING IS FOR INFORMATION ONLY IN ORDER TO IDENTIFY POTENTIAL SUBSURFACE CONDITIONS.



DEMOLITION NOTES:

1. ALL PAVEMENT, BUILDINGS, FOUNDATIONS, AND OTHER STRUCTURES WITHIN THE AREA DESIGNATED AS THE LIMITS OF DEMOLITION SHALL BE DEMOLISHED AND DISPOSED OF IN ACCORDANCE WITH THE SPECIFICATIONS
2. EXISTING SITE ELEMENTS AND TOPOGRAPHIC INFORMATION GATHERED AS PER SURVEY PERFORMED BY LANDPLAN ENGINEERING, P.A. OF LAWRENCE, KANSAS, APRIL 1989.
3. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR NOTIFYING ALL UTILITY OWNERS FOR FIELD LOCATIONS OF UTILITIES PRIOR TO ANY DEMOLITION OPERATIONS.
4. CONTRACTOR SHALL EXCAVATE ALL AREAS WITHIN PROPERTY TO A MINIMUM DEPTH OF 2 FEET BELOW FINISHED PARKING LOT GRADE. ANY SLABS ENCOUNTERED DURING EXCAVATION SHALL HAVE HOLES BROKEN IN THEM TO ALLOW FOR SUBSURFACE DRAINAGE. ANY SUBSURFACE VOIDS ENCOUNTERED DURING EXCAVATION SHALL BE FILLED AND COMPACTED PER SPECIFICATIONS AT NO EXTRA COST.
5. CONTRACTOR SHALL BACKFILL EXCAVATION AREA WITH APPROVED MATERIAL AS PER SPECIFICATIONS.
6. CONTRACTOR SHALL NOTIFY OWNER IMMEDIATELY IF PETROLEUM PRODUCTS OR OTHER HAZARDOUS MATERIALS ARE ENCOUNTERED.
7. CONTRACTOR SHALL INSTALL CONSTRUCTION FENCE ALONG LINE DESIGNATED AS "CONSTRUCTION FENCE" DURING THE DEMOLITION OF THE PERIMETER BRICK WALL. THE EAST AND SOUTH ALLEYS SHALL REMAIN OPEN AT ALL TIMES.

LEGEND

- OHE — OVERHEAD ELECTRIC LINE (KPL GAS SERVICE)
- UGE — UNDERGROUND ELECTRIC LINE (KPL GAS SERVICE)
- GAS — GAS LINE (KPL GAS SERVICE)
- SAN — SANITARY SEWER
- STM — STORM SEWER
- POWER POLE
- MANHOLE
- SIGN
- PARKING METER
- ANTICIPATED CONCRETE SUBSTRUCTURE
- B2 — BORING LOCATION

Scanning America DWG_LABEL FM003400

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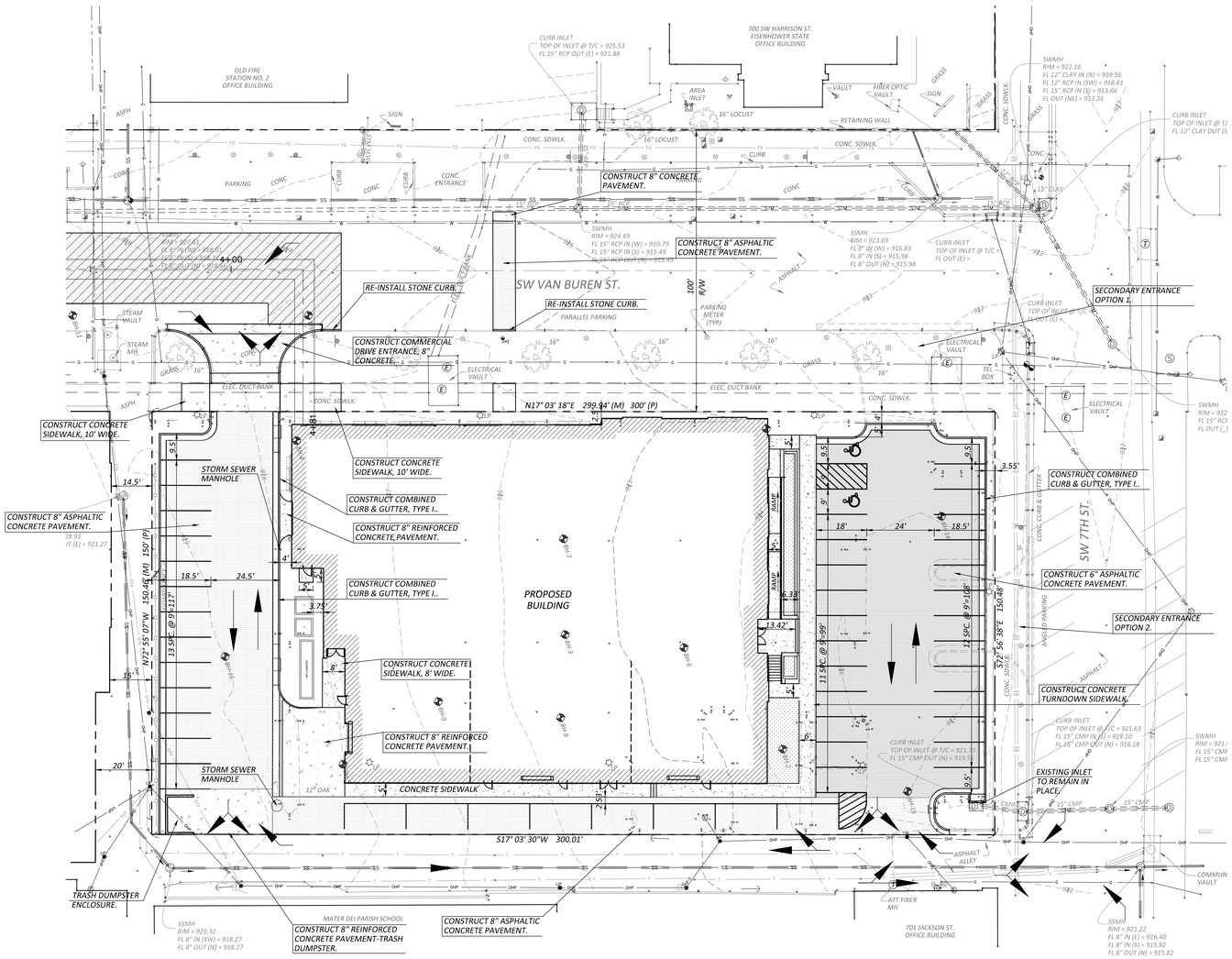
HISTORICAL DRAWING

A-012651

C053

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A080



SITE PLAN

1. A possible second entrance at the north parking lot from Van Buren St is in discussion with the State and City of Topeka.
2. A trash enclosure will be located at the south parking lot, east end.
3. Fuel tanks will be located in the south parking lot drive lane.
4. A second sewer service line location.

GENERAL NOTES:

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3. *THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL PERMITTING AND FEES THROUGH THE CITY OF TOPEKA DEVELOPMENT SERVICES DEPARTMENT.*
4. *A SECONDARY ENTRANCE WILL BE CONSTRUCTED WITH 8" CONCRETE ENTRANCE PAVEMENT IN EITHER OPTION 1 OR OPTION 2 LOCATION.*
5. *ALL PAVEMENT WITHIN THE VAN BUREN AND 8TH AVE. RIGHT OF WAY SHALL BE REPLACED IN ACCORDANCE WITH THE CITY OF TOPEKA PAVEMENT REPAIR DETAILS.*
6. *ALL STONE CURB SHALL BE SALVAGED FROM THE DEMOLITION PROCESS AND RE-INSTALLED. STONE CURB SHALL BE REMOVED AND REPLACED TO THE NEAREST JOINT.*
7. *THE CONTRACTOR SHALL PROVIDE ADEQUATE TRAFFIC CONTROL FOR THE CLOSURE OF 8TH AVENUE AND VAN BUREN DURING THE CONSTRUCTION OF THE UTILITY TUNNEL PORTION OF THE PROJECT. DETOUR ROUTING SHALL BE PROVIDED PER THE CITY OF TOPEKA STANDARD DRAWINGS.*

LEGEND

	SECTION CORNER
	FOUND CORNER AS NOTED
	SET 1/2"x24" REBAR W/ LS 919 CAP
BM	*BENCH MARK*
U/E	*UTILITY EASEMENT*
D/E	*DRAINAGE EASEMENT*
D&U/E	*DRAINAGE & UTILITY EASEMENT*
(M)	*MEASURED*
(P)	*PLATTED*
WM	*WATER METER*
WV	*WATER VALVE*
SV	*SPRINKLER VALVE*
FH	*FIRE HYDRANT*
GM	*GAS METER*
GV	*GAS VALVE*
	TELEPHONE PEDESTAL
	TELEPHONE MANHOLE
	TRANSFORMER/JUNCTION CABINET
	TV PEDESTAL
PP	*POWER POLE*
	GUY WIRE
LP	*LIGHT POLE*
	ELECTRIC MANHOLE
EM	*ELECTRIC METER*
TSL	*TRAFFIC SIGNAL LIGHT*
TSB	*TRAFFIC SIGNAL BOX*
TSM	*TRAFFIC SIGNAL MANHOLE*
CO	*CLEAN OUT*
	STEEL PIPE BOLLARD
	SIGN
	TREE (DECIDUOUS)
	STUMP
	BUSH OR SHRUB
RD	*ROOF DRAIN*
W	*WATER LINE*
UGP	*UNDERGROUND POWER LINE*
OHP	*OVERHEAD POWER LINE*
G	*GAS LINE*
T	*TELEPHONE CABLE*
FO	*FIBER OPTIC LINE*
CATV	*CABLE TELEVISION LINE*
TS	*TRAFFIC SIGNAL LINE*
SS	*SANITARY SEWER LINE*
	STORM SEWER LINE
	AREA INLET
X	*EXISTING FENCE*
8	*DENOTES NUMBER OF PARKING STALLS*
925	*EXISTING GROUND ELEVATION*

LEGEND

TRAFFIC CIRCULATION ARROW

LEGEND

- *6" ASPHALTIC CONCRETE PAVEMENT (SEE SH. C___ FOR TYPICAL SECTION)*
- *8" ASPHALTIC CONCRETE PAVEMENT (SEE SH. C102 FOR TYPICAL SECTION)*
- *8" REINFORCED CONCRETE PAVEMENT - (SEE SH. C___ FOR TYPICAL SECTION)*
- *4" CONCRETE SIDEWALK OR TURNDOWN SIDEWALK (SEE PLAN)*

Horz.: 1"=20'

0 20'

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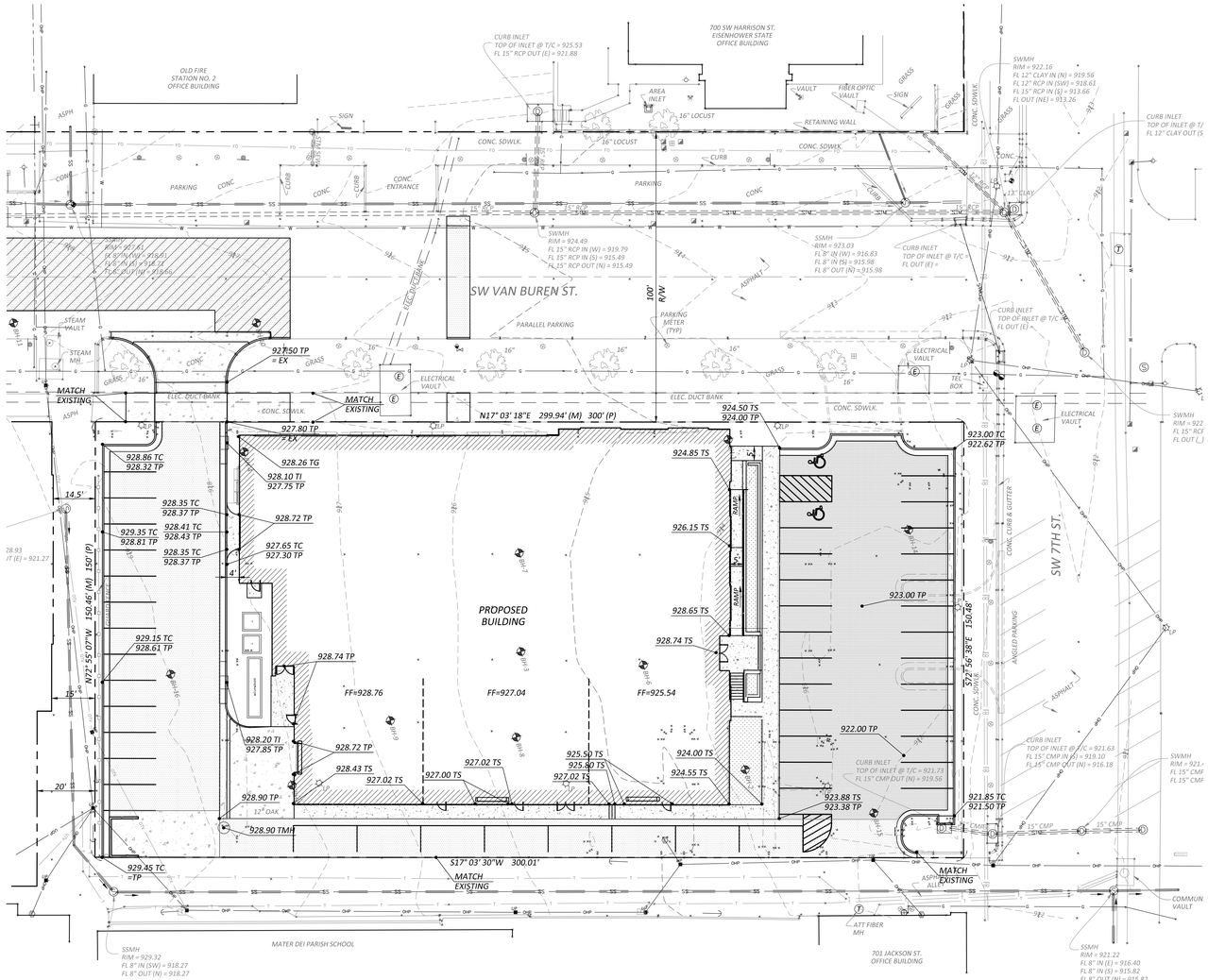
SITE PLAN

A-012651

C100

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A081



SITE PLAN

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ABBREVIATIONS

FF	-	FINISHED FLOOR
TC	-	TOP OF CURB
TI	-	TOP OF INLET
TMH	-	TOP OF MANHOLE
TP	-	TOP OF PAVEMENT
TS	-	TOP OF SIDEWALK

Horz.: 1"=20'
0 20'

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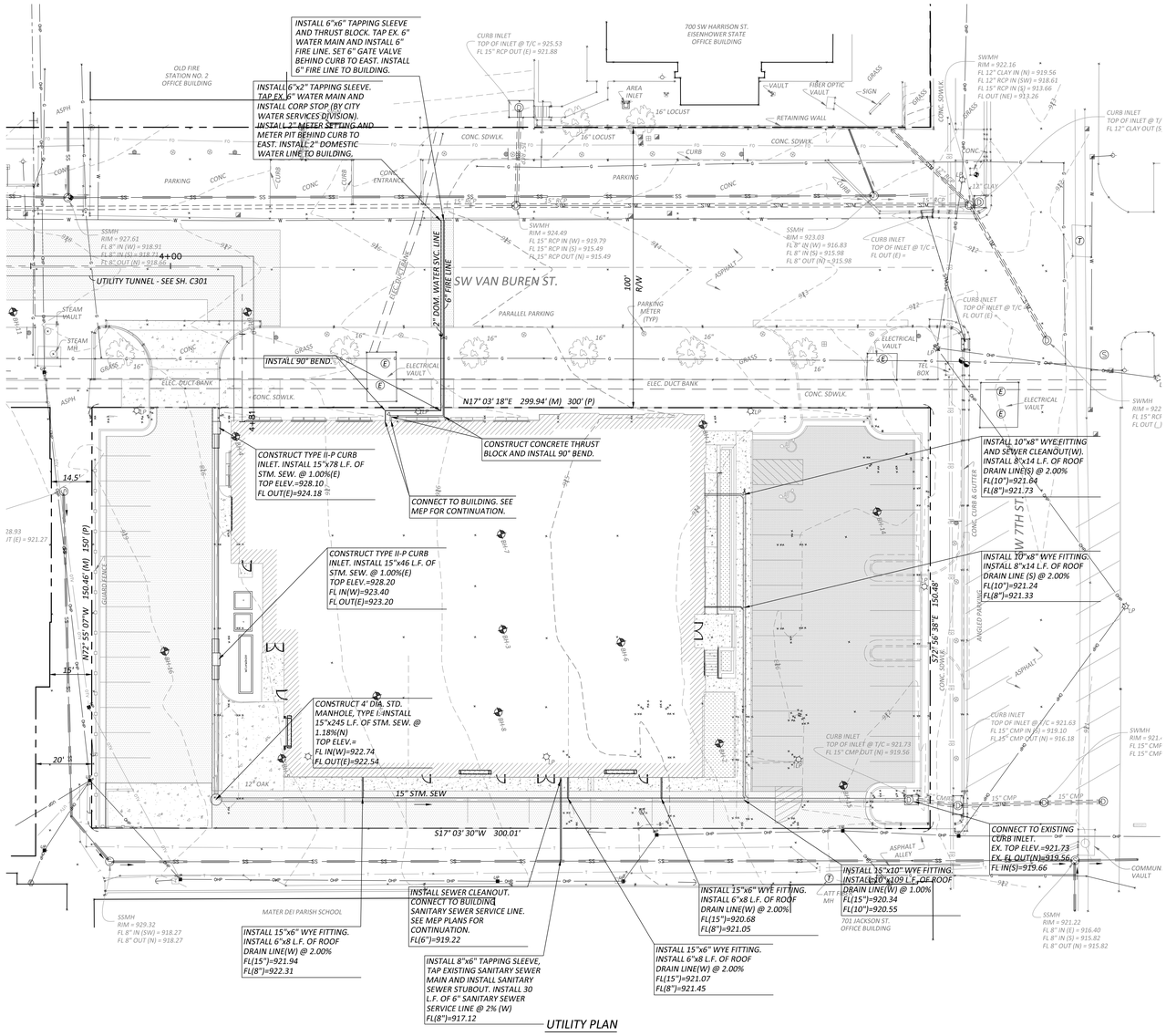
GRADING PLAN

A-012651

C200

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Alt:9A082



UTILITY PLAN

GENERAL NOTES:

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0 20'

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9300 W. 110TH ST. STE. 150 OVERLAND PARK KANSAS 66210 P. 913.663.5373
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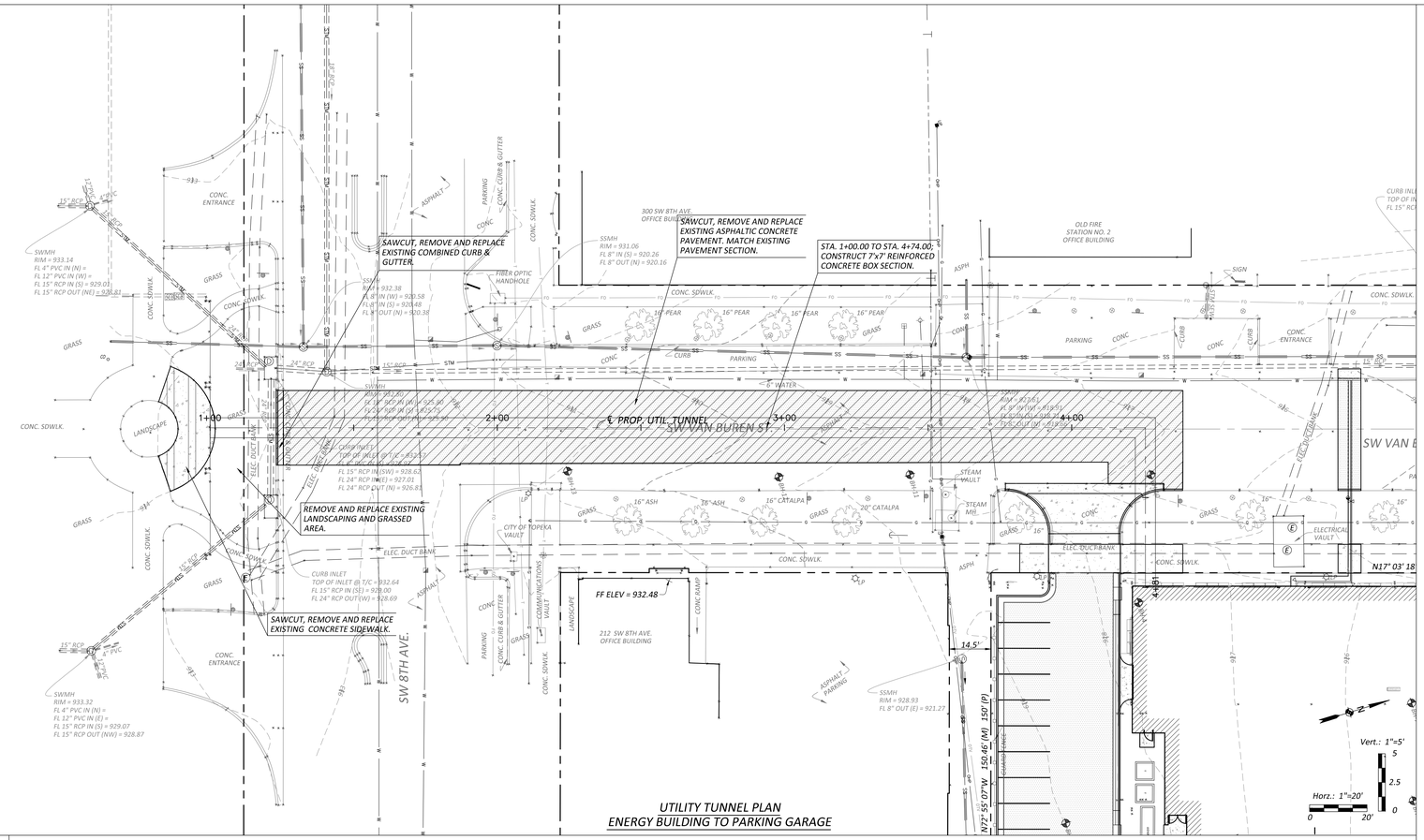
UTILITY PLAN

A-012651

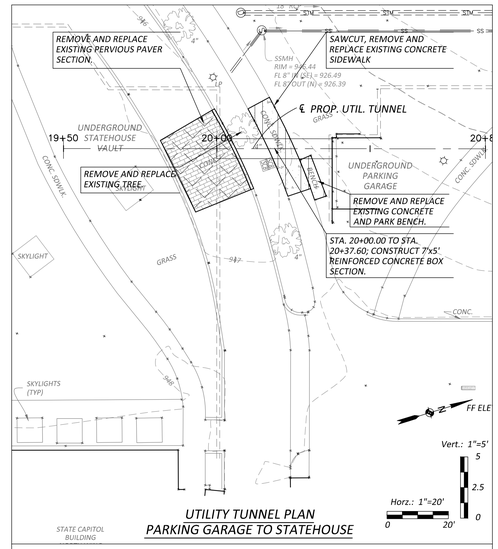
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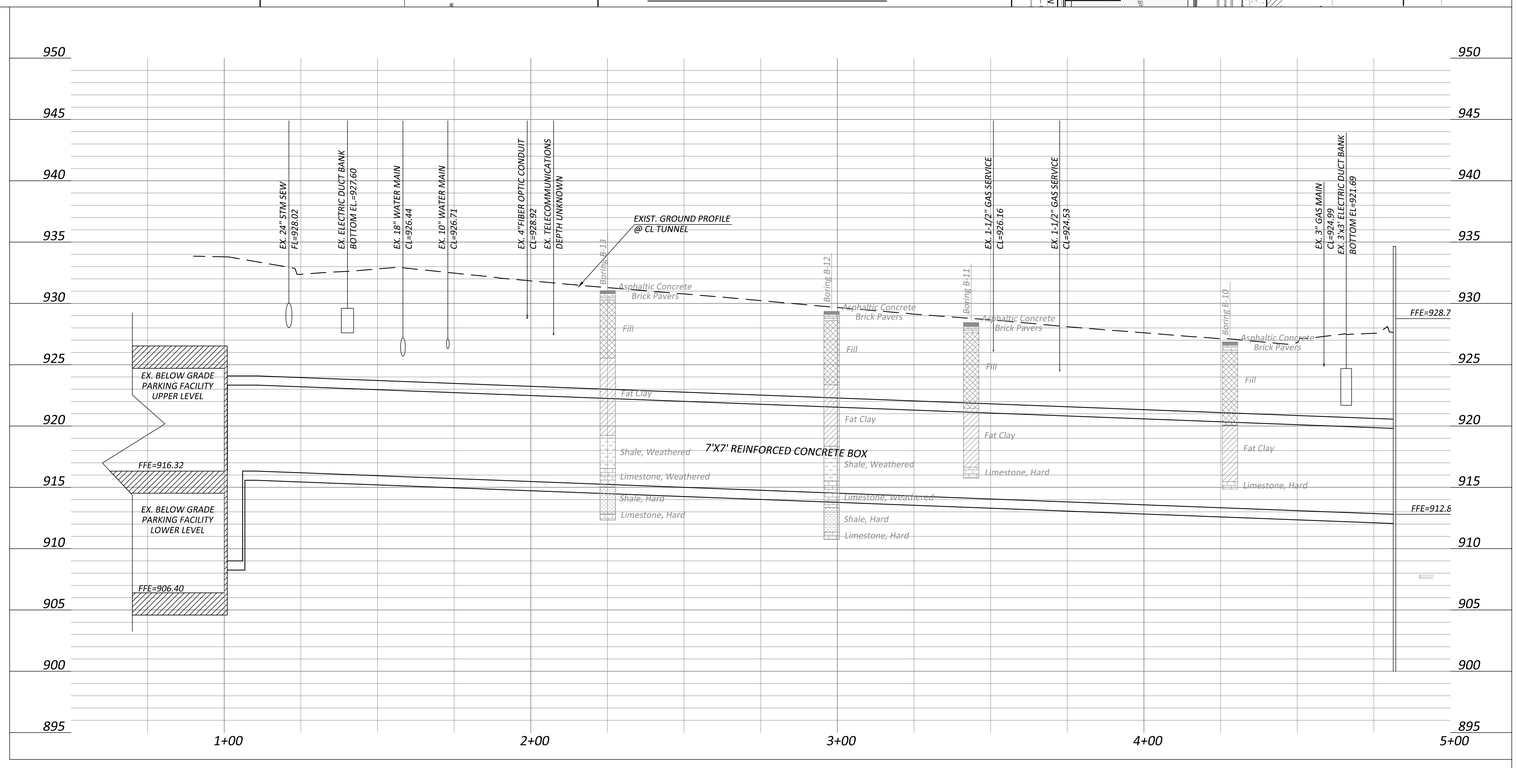
JCSBC
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Att.9A083

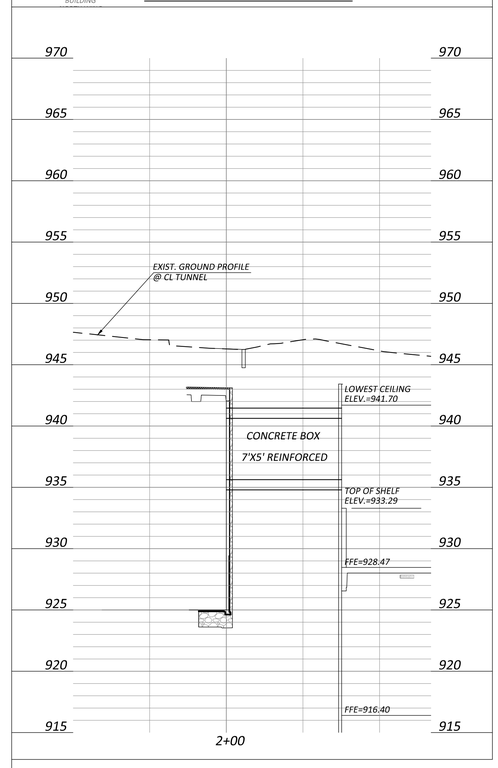


UTILITY TUNNEL PLAN
ENERGY BUILDING TO PARKING GARAGE



UTILITY TUNNEL PLAN
PARKING GARAGE TO STATEHOUSE





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TUNNEL PLAN & PROFILE

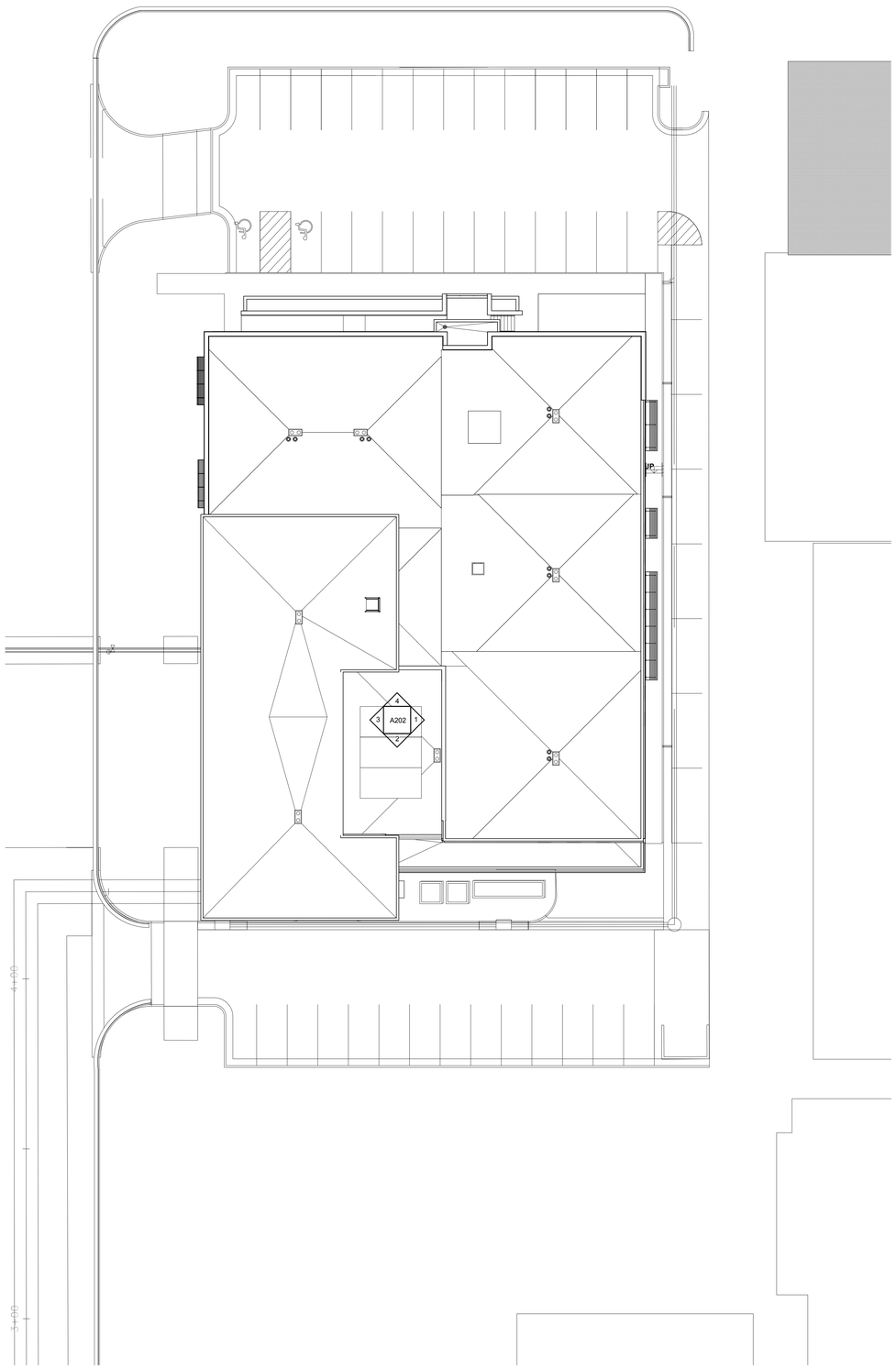
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C301

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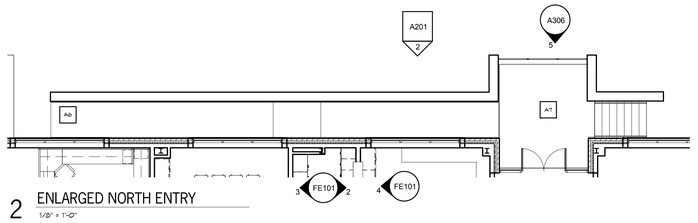
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JCSBC
2-2-2016
Att.9A084

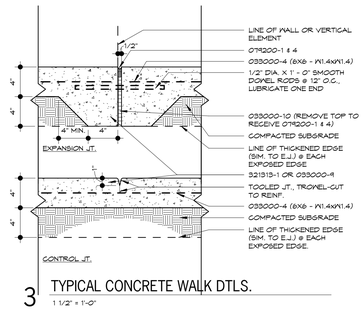


1 SITE PLAN
1/16" = 1'-0"

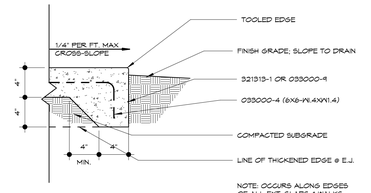
NORTH



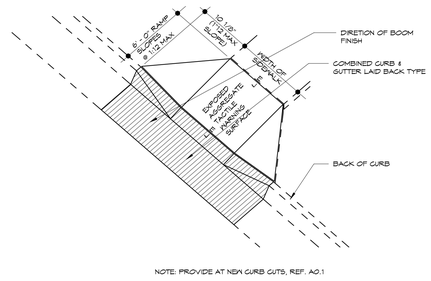
2 ENLARGED NORTH ENTRY
1/8" = 1'-0"



3 TYPICAL CONCRETE WALK DTLS.
1 1/2" = 1'-0"

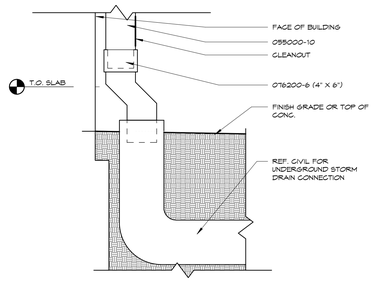


4 TYPICAL THICKENED EDGE
1 1/2" = 1'-0"

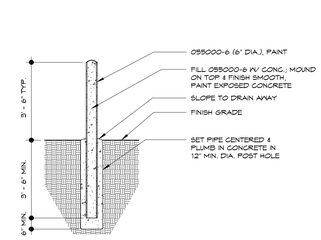


NOTE: PROVIDE AT NEW CURB CUTS, REF. A0.1

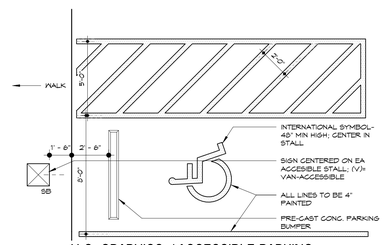
5 SIDEWALK HANDICAP RAMP
1 1/2" = 1'-0"



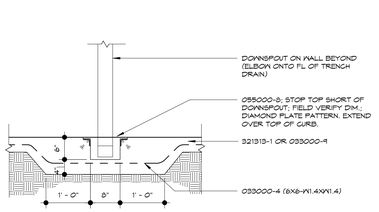
6 DOWNSPOUT BOOT
1 1/2" = 1'-0"



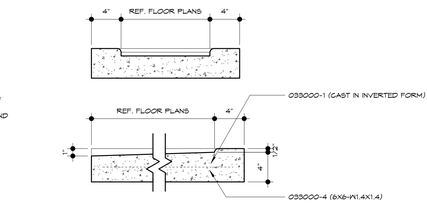
7 STEEL BOLLARD
1 1/2" = 1'-0"



8 H.C. GRAPHICS / ACCESSIBLE PARKING
1/4" = 1'-0"



9 SIDEWALK TRENCH DRAIN
3/4" = 1'-0"



10 CONCRETE SPLASHBLOCK
1 1/2" = 1'-0"

SITE PLAN NOTES

GENERAL: COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS, REF. FE SHEET FOR EQUIP. COORDINATION

1 XXXXX
2 XXXXX
3 XXXXX
4 XXXXX

SITE PLAN LEGEND

- CONCRETE
- BRICK PAVERS
- ASPHALT
- LIGHT BOLLARD
- PEDESTRIAN LIGHT POLE
- 100.72 SPOT ELEVATION
- FF FINISH FLOOR
- TREE
- CONTOUR LINE
- G GAS
- W WATER
- O FENCE

GENERAL SITE NOTES

1) ALL UTILITY INFORMATION SHOWN HEREIN IS BASED ON THE INFORMATION AVAILABLE. THE CONTRACTOR SHALL VERIFY ALL UTILITY DEPTHS & LOCATIONS PRIOR TO CONSTRUCTION. ANY DAMAGE CAUSED BY THE CONTRACTOR'S CONSTRUCTION OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

2) ALL GROUND SURFACES SHALL VARY UNIFORMLY BETWEEN INDICATED ELEVATIONS. GRADING PLAN REFLECTS TOP OF TURF OR PAVEMENT ELEVATIONS U.N.O.

3) AFTER CONSTRUCTION COMPLETION, STAGING, PARKING, AND STORAGE AREA SHALL BE RESTORED TO THE PRE-CONSTRUCTION CONDITIONS. ANY DAMAGE TO OR REMOVAL OF EXISTING CONDITIONS OCCURRING ON-SITE DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER.

4) CARE SHALL BE EXERCISED TO PRESERVE AND/OR PROTECT EXISTING TREES AND VEGETATION OUTSIDE OF AREAS TO BE GRADED. ANY NECESSARY REPAIR OF THESE AREAS DAMAGED BY THE GENERAL CONTRACTOR AND/OR HIS ASSIGNEES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PERFORMED TO THE SATISFACTION OF THE OWNER.

5) CONTRACTOR SHALL PROVIDE AND MAINTAIN POSITIVE DRAINAGE DURING CONSTRUCTION.

6) THE CONTRACTOR IS RESPONSIBLE FOR THE PROVISION OF ALL MATERIALS, TOOLS, EQUIPMENT AND LABOR NECESSARY TO CONTROL EROSION, SILTATION AND DISCHARGES OF FILL MATERIAL (SEDIMENT) INTO DOWNSTREAM SYSTEMS OR RECEIVING CHANNELS. THIS SHALL BE REQUIRED DURING ALL PHASES OF CONSTRUCTION AND UNTIL SUITABLE GROUND COVER IS ESTABLISHED FOR ALL DISTURBED AREAS. IF ANY METHOD OF CONTROL FAILS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.

7) ALL METHODS AND MEANS OF CONSTRUCTION PERFORMED ON THIS PROJECT SHALL CONFORM TO THE DESIGN CRITERIA AND STANDARD TECHNICAL SPECIFICATIONS FOR THE CITY OF TOPEKA AND SHAWNEE COUNTY, KANSAS, CURRENT EDITION. THE MORE STRINGENT REQUIREMENT SHALL APPLY FOR DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND THE SAID SPECIFICATIONS.

8) ALL DISTURBED AREAS SHALL BE SEEDED, FERTILIZED AND MULCHED WITHIN 14 DAYS OF THE COMPLETION OF WORK IN EACH AREA IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.

9) CONTRACTOR SHALL LIMIT SITE DISTURBANCE TO ALL PRACTICAL EXTENTS, TO THOSE AREAS SHOWN FOR CONSTRUCTION OPERATIONS.

10) OWNER SHALL PROVIDE REQUIRED GEOTECHNICAL MATERIALS AND CONSTRUCTION TESTING. CONTRACTOR SHALL COORDINATE WITH AND NOTIFY GEOTECHNICAL ENGINEER OF REQUIRED TESTING SCHEDULE.

11) SIX (6) FOOT CHAIN LINK PERIMETER FENCING AND ROCK SURFACING IS REQUIRED FOR ANY STORAGE, STAGING OR PARKING.

12) ALL DRIVE LANES ON THE SCHOOL CAMPUS, OUTSIDE OF THE AREA OF THE CONSTRUCTION FENCING SHALL BE KEPT CLEAR FOR SCHOOL TRAFFIC. THE SCHEDULE OF CONSTRUCTION DELIVERIES SHALL BE COORDINATED WITH THE OWNER IN ORDER TO AVOID BEFORE AND AFTER SCHOOL TRAFFIC.

13) ALL CONCRETE SIDEWALKS SHALL HAVE A SLOPE NO GREATER THAN 1:12.

HTK ARCHITECTS PA
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TOPEKA KANSAS 66612
T 785.266.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone: 785-296-8899
FAX: 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

ARCHITECTURAL SITE PLAN

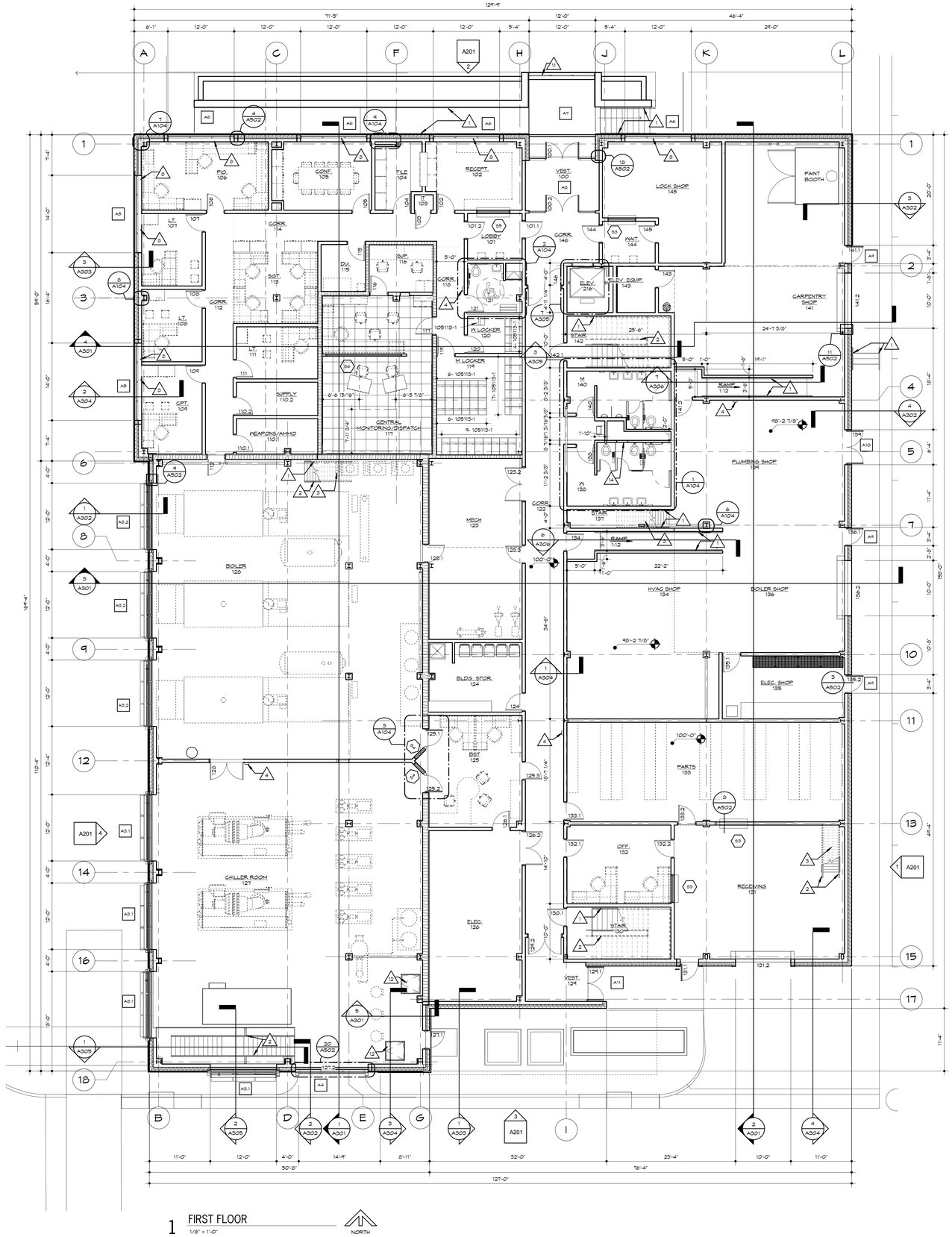
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DESIGN DEVELOPMENT PHASE DOCUMENTS

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JCSBC
2-2-2016
Alt.9A085



1 FIRST FLOOR
1/8" = 1'-0"

NORTH

ROOM FINISH SCHEDULE-FIRST FLOOR

ROOM MARK	ROOM NAME	FLOOR	BASE	WALLS NORTH (or TYP.)	WALLS EAST	WALLS SOUTH	WALLS WEST	CEILING	NOTES
100	VEST.	NOM	RB	LTX	LTX	LTX	LTX	TYPE 1	
101	LOBBY	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
102	RECEPT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
103	IT	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
104	FILE	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
105	CONF.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
106	FIO.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
107	LT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
108	LT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
109	CPT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
110.1	WEAPONS/AMMO	SC	RB	LTX	LTX	LTX	LTX	TYPE 1	
111	LT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
112	CORR.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
113	SGT.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
114	CORR.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
115	DU.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
116	SUP.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
117	CENTRAL MONITORING/DISPATCH	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	1
118	CORR.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
119	M LOCKER	PT	RB	EPX	EPX	EPX	EPX	TYPE 1	
120	N LOCKER	PT	RB	EPX	EPX	EPX	EPX	TYPE 1	
121	T.	PT	PT	EPX	EPX	EPX	EPX	TYPE 1	
122	CORR.	SC	RB	LTX	LTX	LTX	LTX	STR	
123	MECH	SC	RB	LTX	LTX	LTX	LTX	STR	
124	BLDG. STOR.	SC	RB	LTX	LTX	LTX	LTX	STR	
125	SGT	SC	RB	LTX	LTX	LTX	LTX	TYPE 1	
126	ELEC.	SC	RB	LTX	LTX	LTX	LTX	STR	
127	CHILLER ROOM	SC	RB	EPX	EPX	EPX	EPX	STR	
128	BOILER	SC	RB	EPX	EPX	EPX	EPX	STR	
129	VEST.	NOM	RB	LTX	LTX	LTX	LTX	TYPE 1	
130	STAIR	VCT, RTR	RB	LTX	LTX	LTX	LTX	TYPE 1	
131	RECEIVING	SC	RB	LTX	LTX	LTX	LTX	STR	
132	OFF.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
133	PARTS	SC	RB	LTX	LTX	LTX	LTX	STR	
134	HVAC SHOP	SC	RB	LTX	LTX	LTX	LTX	STR	
135	ELEC. SHOP	SC	RB	LTX	LTX	LTX	LTX	STR	
136	BOILER SHOP	SC	RB	LTX	LTX	LTX	LTX	STR	
137	STAIR	VCT, RTR	RB	LTX	LTX	LTX	LTX	TYPE 1	
138	N	PT	PT	EPX	EPX	EPX	EPX	TYPE 1	
139	PLUMBING SHOP	SC	RB	LTX	LTX	LTX	LTX	STR	
140	M	PT	PT	EPX	EPX	EPX	EPX	TYPE 1	
141	CARPENTRY SHOP	SC	RB	LTX	LTX	LTX	LTX	STR	
142	STAIR	VCT, RTR	RB	LTX	LTX	LTX	LTX	TYPE 1	
143	ELEV. EQUIP.	SC	RB	LTX	LTX	LTX	LTX	STR	
144	WAT.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
145	LOCK SHOP	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
146	CORR.	SC	RB	LTX	LTX	LTX	LTX	STR	

ARCHITECTURAL PLAN NOTES

GENERAL: COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS, REF. FE SHEET FOR EQUIP. COORDINATION

1. HANDRAIL; REF. XAXXX
2. RAILING; REF. XAXXX
3. METAL SHIP LADDER
4. FIRE EXTINGUISHER CABINET; 104413-1
5. REF. CIVIL FOR LANDING, STAIR, & RAMP (N.I.C.)
6. LINE OF SOFFIT, ROOF OVERHANG, OR FLOOR ABOVE.
7. KNOX BOX LOCATION.
8. HORIZONTAL BLINDS. 122113-1
9. ROOF HATCH/LADDER; REF XAXXX. COORDINATE EXACT LOCATION WITH JOINTS AND MEP EQUIPMENT.
10. PROVIDE EXPANSION JOINT COVER.
11. DECORATIVE RAILING. REF. XAXXX.
12. SIDEWALK HATCH.
13. WIRE MESH PARTITION.
14. PROVIDE 24" X 24" ACCESS PANEL.

ROOM FINISH SCHEDULE LEGEND

FLOOR
- SC SEALED CONCRETE
- VCT VINYL COMPOSITION TILE
- PT PORCELAIN TILE
- CPT CARPET
- RTR RUBBER TREADS AND RISERS
- NOM WALK-OFF MAT

WALL BASE
- RB RESILIENT BASE (4" HIGH)
- PT PORCELAN TILE (6" HIGH)

WALLS
- LTX PAINT
- EPX EPOXY PAINT
- PWT PORCELAN WALL TILE

CEILING
- STR PAINT EXPOSED STRUCTURE
- LAY LATEX ENAMEL PAINT ON GYPSUM SOFFITS
- TYPE 1 SUSPENDED 2 x 2 ACOUSTIC LAY-IN PANEL

ROOM FINISH SCHEDULE NOTES

1.
2.

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F 913.663.3379
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
T 785.266.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-0899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 2-9-15 DRAWN BY: CHECKED BY: REV:

FIRST FLOOR

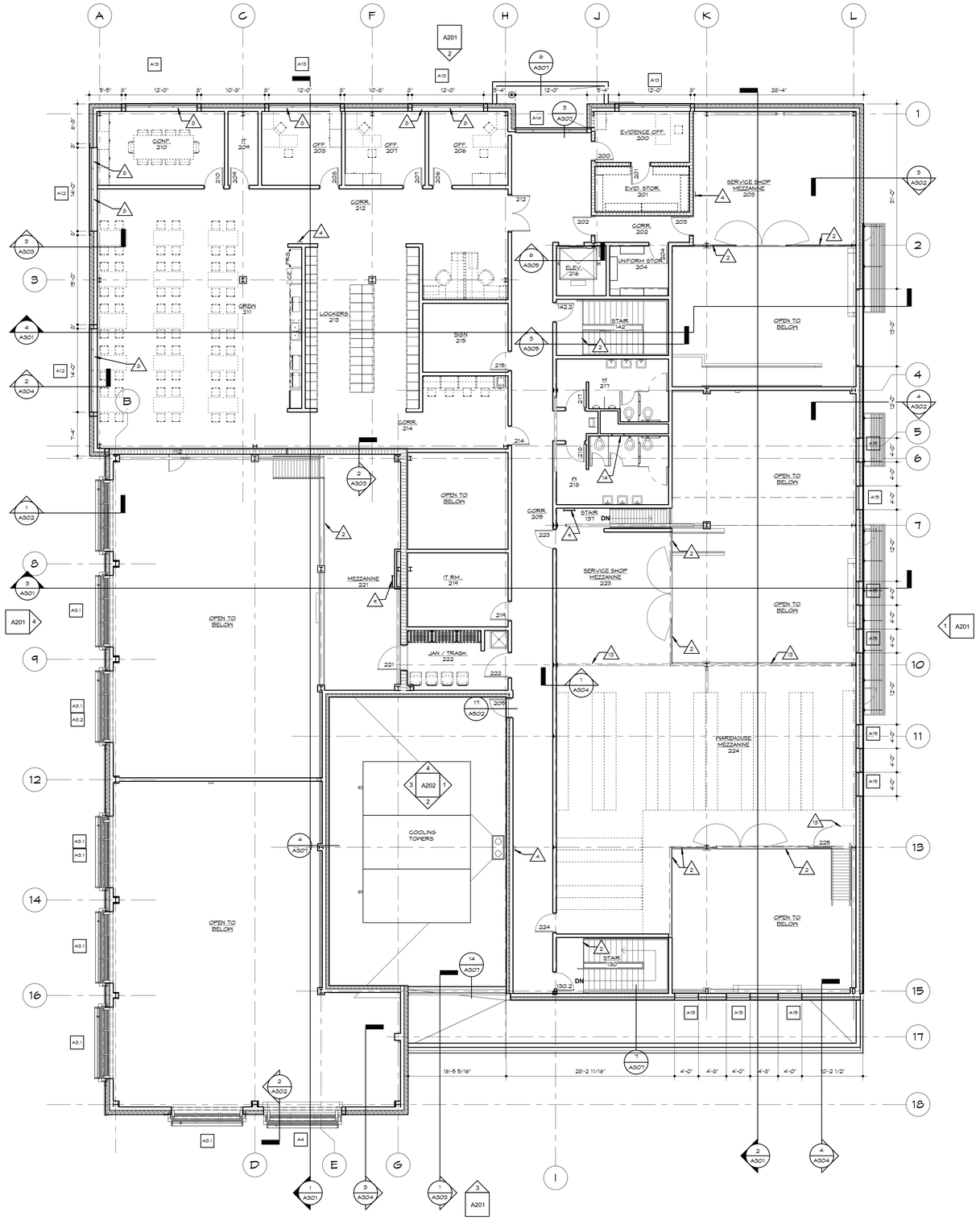
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DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
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ROOM FINISH SCHEDULE-SECOND FLOOR

ROOM MARK	ROOM NAME	FLOOR	BASE	WALLS NORTH (or TYP)	WALLS EAST	WALLS SOUTH	WALLS WEST	CEILING	NOTES
200	EVIDENCE OFF.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
201	EVID. STOR.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
202	CORR.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
203	SERVICE SHOP MEZZANINE	SC	RB	LTX	LTX	LTX	LTX	STR	
204	UNIFORM STOR.	VCT	RB	LTX	LTX	LTX	LTX	STR	
205	CORR.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
206	OFF.	SC	RB	LTX	LTX	LTX	LTX	TYPE 1	
207	OFF.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
208	OFF.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
209	IT	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
210	CONF.	CPT	RB	LTX	LTX	LTX	LTX	TYPE 1	
211	GREEN	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
212	CORR.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
213	LOCKERS	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
214	CORR.	VCT	RB	LTX	LTX	LTX	LTX	TYPE 1	
215	SIGN	SC	RB	LTX	LTX	LTX	LTX	TYPE 1	
216	ELEV.	CPT	O	O	O	O	O	O	
217	M	PT	PT	EPX	EPX	EPX	EPX	TYPE 1	
218	W	PT	PT	EPX	EPX	EPX	EPX	TYPE 1	
219	IT RM.	SC	RB	LTX	LTX	LTX	LTX	TYPE 1	
221	MEZZANINE	SC	RB	LTX	LTX	LTX	LTX	STR	
222	JAN. / TRASH.	SC	RB	LTX	LTX	LTX	LTX	STR	
223	SERVICE SHOP MEZZANINE	SC	RB	LTX	LTX	LTX	LTX	STR	
224	WAREHOUSE MEZZANINE	SC	RB	LTX	LTX	LTX	LTX	STR	

ARCHITECTURAL PLAN NOTES

GENERAL: COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS, REF. FE SHEET FOR EQUIP. COORDINATION

1. HANDRAIL, REF. XAXXX
2. RAILING, REF. XAXXX
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6. LINE OF SOFFIT, ROOF OVERHANG, OR FLOOR ABOVE.
7. KNOX BOX LOCATION.
8. HORIZONTAL BLINDS, 122113-1
9. ROOF HATCH/LADDER; REF XAXXX, COORDINATE EXACT LOCATION WITH JOINTS AND MEP EQUIPMENT.
10. PROVIDE EXPANSION JOINT COVER.
11. DECORATIVE RAILING; REF. XAXXX.
12. SIDEWALK HATCH.
13. WIRE MESH PARTITION.
14. PROVIDE 24" X 24" ACCESS PANEL.

ROOM FINISH SCHEDULE LEGEND

FLOOR
- SC SEALED CONCRETE
- VCT VINYL COMPOSITION TILE
- PT PORCELAIN TILE
- CPT CARPET
- RTR RUBBER TREADS AND RISERS
- WOM WALK-OFF MAT

WALL BASE
- RB RESILIENT BASE (4" HIGH)
- PT PORCELAIN TILE (6" HIGH)

WALLS
- LTX PAINT
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CEILING
- STR PAINT EXPOSED STRUCTURE
- LAX LATEX ENAMEL PAINT ON GYPSUM SOFFITS
- TYPE 1 SUSPENDED 2 x 2 ACOUSTIC LAY-IN PANEL

ROOM FINISH SCHEDULE NOTES

1.

2.

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

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STATE OF KANSAS
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DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

SECOND FLOOR

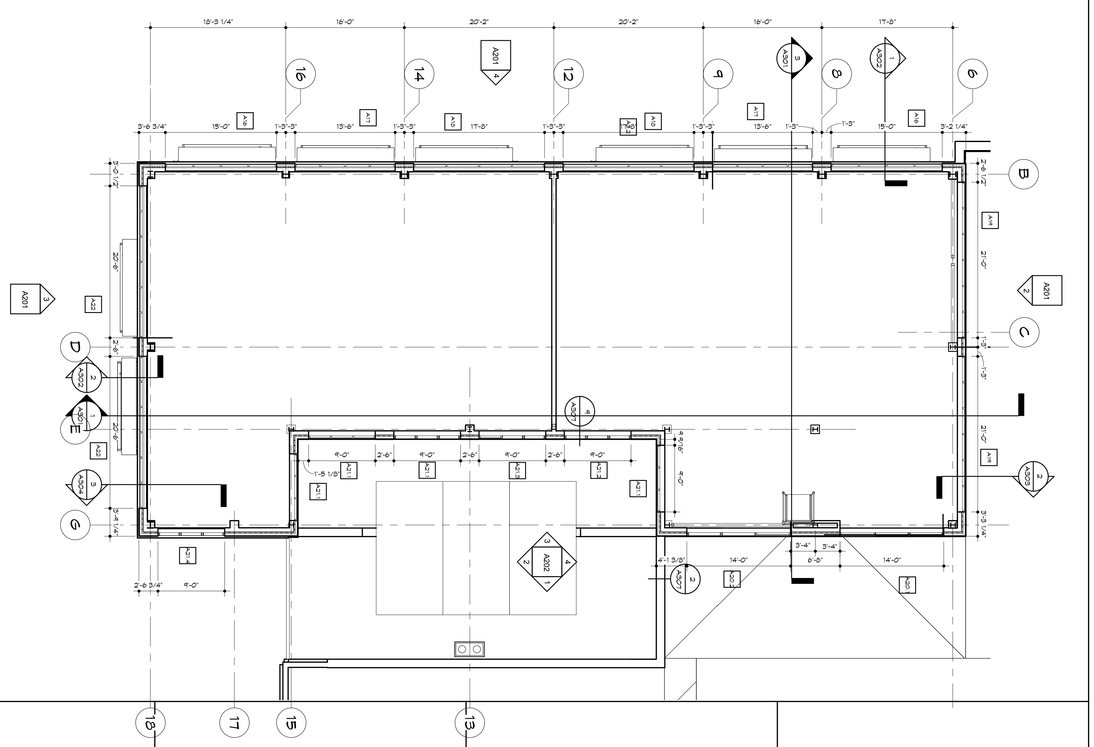
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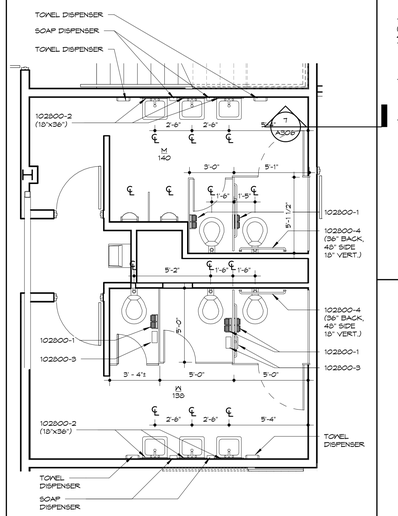
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DESIGN DEVELOPMENT PHASE DOCUMENTS

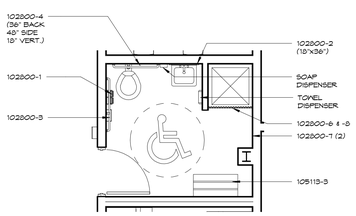
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2-2-2016
Att.9A087

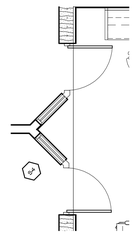

1 CLERESTORY
1/8" = 1'-0"
NORTH
16
14
12
9
8
6
B
C
D
E
G
16
17
15
13
A201
A502
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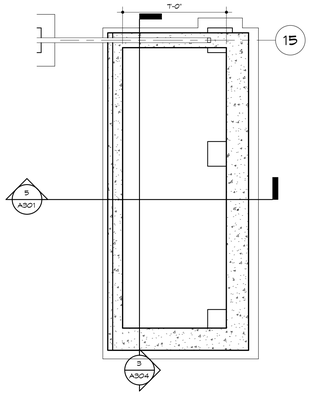
1 ENLARGED RESTROOMS
1/4" = 1'-0"



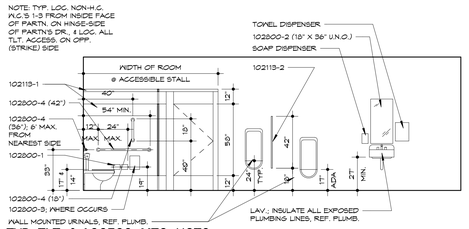
2 T. 121
1/4" = 1'-0"



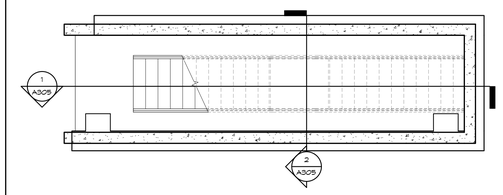
3 DOORS BETWEEN BST AND MECHANICAL ROOMS
1/4" = 1'-0"



5 MECHANICAL PIT
1/4" = 1'-0"



TYP. TLT. & ACCESS. MTG. HGTS.

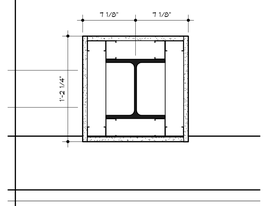


4 TUNNEL LEVEL
1/4" = 1'-0"

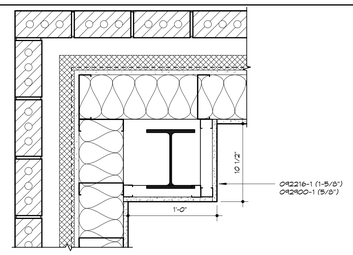
KEYNOTES

Note: Keynotes are drawn from a master list. # may not be sequentially numbered. Sizes (Ex: 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

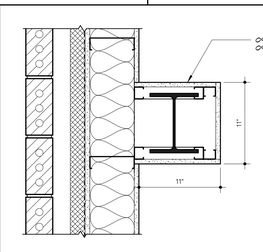
030000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet/Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-A	Sidewalk
	-10	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Weep Hole
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-2	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"Z" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Lintel
	-6	Steel Pipe
	-7	Steel Plate
	-8	Steel Plate
	-9	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	¼ Wood Continuous (")
	-4	Plywood (")
	-5	1"X3" Felt
	-6	1"X5" Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	High Pressure Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Handwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Fiber Blanket
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Interior Liner Panel
	-3	Trim
	-4	Z-Flurring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072128	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
076200	-1	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Pre-Finished Gravel Stop
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077129	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Make where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Master Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Aluminum Sill
	-3	Insect Screen
	-4	Lamb Anchor
	-5	Mullion Cover
088000	-1	Glazing (as scheduled)
088853	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-5	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nosing
096816	-1	Carpet Tile
096900	-1	Access Flooring
099113	-1	Exterior Painting
099123	-1	Interior Painting
099300	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102800	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107800	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Motor Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Trim
	-4	Granular Drainage Course
	-5	Subbase Course



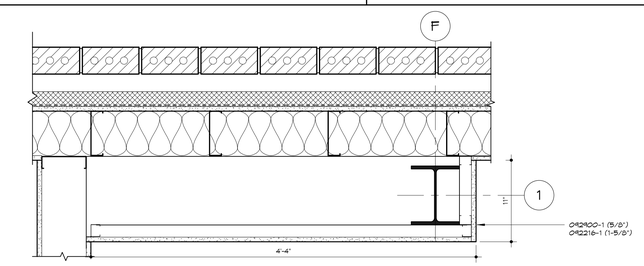
6 TYP. COLUMN
1 1/2" = 1'-0"



7 TYP. COLUMN AT CORNER
1 1/2" = 1'-0"



8 TYP. COLUMN AT WALL
1 1/2" = 1'-0"



9 COLUMN F1
1 1/2" = 1'-0"

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www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
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FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

ENLARGED FLOOR PLANS

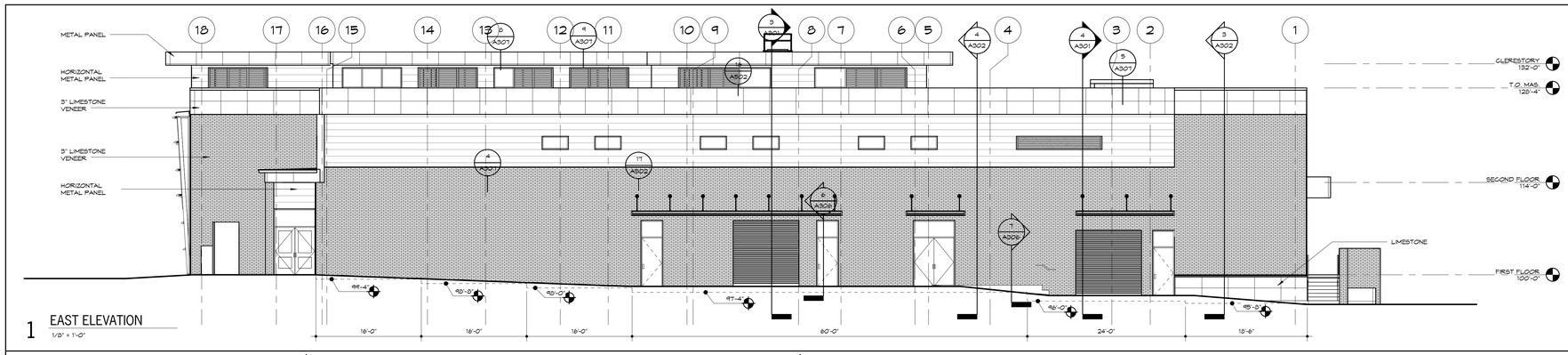
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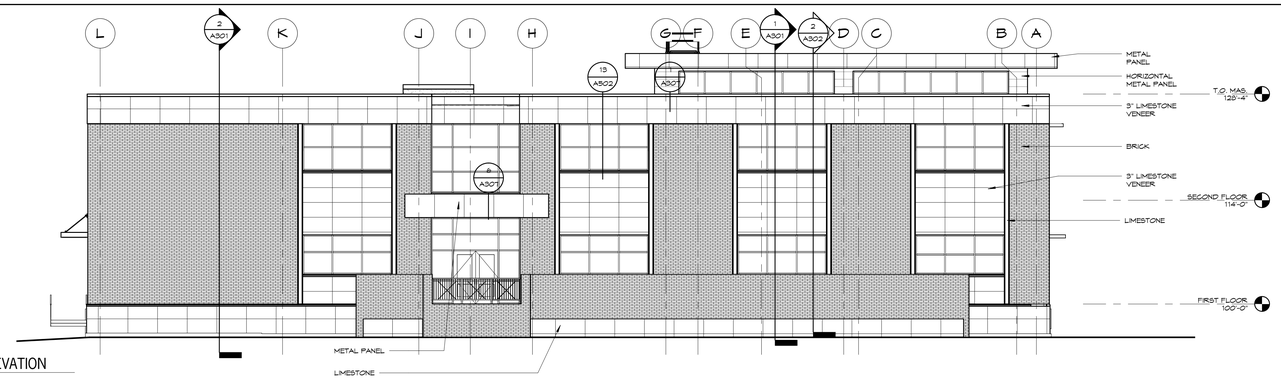
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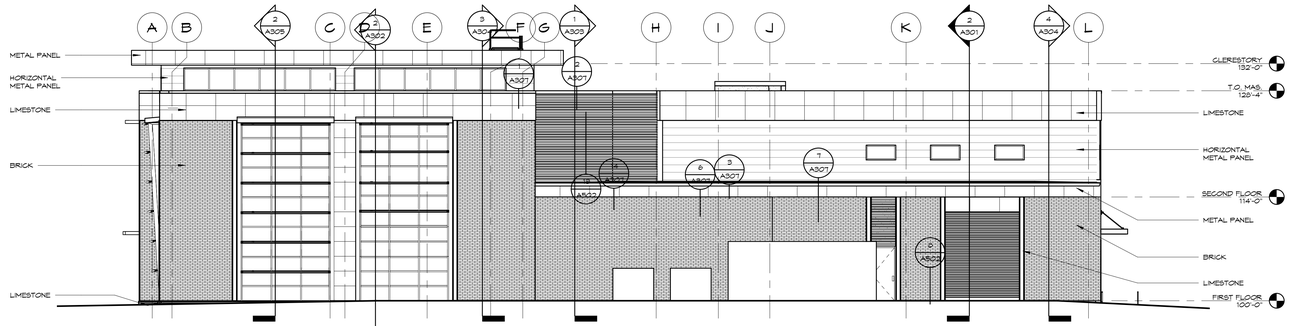
JCSBC
2-2-2016
An.9A089



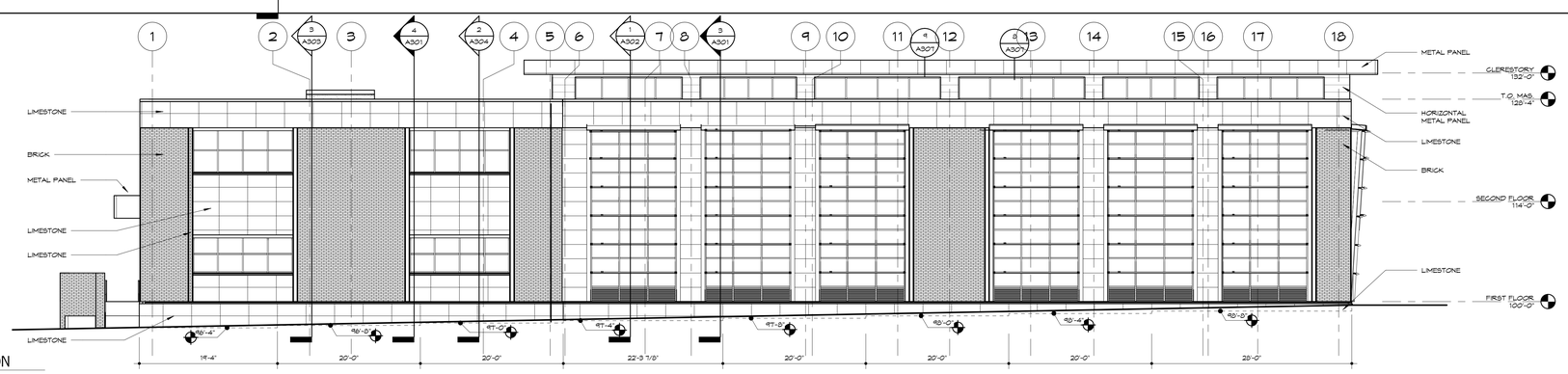
1 EAST ELEVATION
1/8" = 1'-0"



2 NORTH ELEVATION
1/8" = 1'-0"



3 SOUTH ELEVATION
1/8" = 1'-0"



4 WEST ELEVATION
1/8" = 1'-0"

KEYNOTES

Note: Keynotes are drawn from a master list, it may not be sequentially numbered. Sizes (8x, 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

- 033000 -1 Concrete Structure
- -2 Concrete Floor Slab
- -3 Vapor Barrier
- -4 Welded Wire Fabric
- -5 Steel Reinforcing Bar
- -6 Reglet/Reglet Joint
- -7 Waterstop
- -9 Dovetail Anchor
- -A Sidewalk
- -10 Premolded Joint Filler
- 033500 -1 Concrete Topping
- 042000 -1 Face Brick
- -2 Concrete Masonry Unit - Normal Weight (")
- -3 Concrete Masonry Unit - Lightweight (")
- -4 Wire Reinforcing
- -5 Metal Tie/Anchor
- -6 Through Wall Flashing
- -7 Control Joint Strip
- -9 Bond Beam (")
- -A Compressible Filler
- -10 Weep Hole
- -11 Cavity Drainage Material
- -12 Reinforcing Bar
- 044500 -1 Stone Masonry Anchor
- -3 Stone Jamb
- -4 Stone Sill
- -5 Belt Course
- -6 Cast Stone
- 047200 -1 Steel Beams
- 051200 -1 Steel Column
- -2 Steel Tube
- -3 Steel Channel
- -4 Steel Joist
- 052100 -1 Joist - Extended End
- -2 Joist - Ceiling Extension
- -3 Metal Decking
- 053100 -1 Steel Composite Decking
- -2 Flexible Closure Strips
- 054000 -1 Structural Steel Studs
- -2 Structural Steel Joists
- -3 "Z" Closure
- 056000 -1 Steel Angle
- -4 Steel Channel
- -5 Steel Lintel
- -6 Steel Pipe
- -7 Steel Tube
- -8 Steel Plate
- -9 Steel Ladder
- -10 Steel Sidewalk Trenchdrain Cover
- 059100 -1 Steel Stairs
- -2 Steel Stair Stringer
- -3 Steel Embed Plate
- 055213 -1 Steel Pipe Handrail
- -2 Steel Pipe Guardrail
- -3 Steel Handrail Wall Bracket
- 055500 -1 Steel Grating
- -2 Steel Frame
- 061000 -1 2x Wood Nailer (")
- -2 2x Wood Blocking (")
- -3 ¼ Wood Continuous (")
- -4 Plywood (")
- -5 15O Felt
- -6 #15 Felt
- -7 Sheathing (")
- -9 Cement Board
- 064116 -1 Interior Architectural Woodwork
- -2 High Pressure Laminate
- -3 Cabinet Liner Laminate
- -4 Particle Board
- -5 Plywood
- -6 3mm Edge Molding
- -7 Solid Wood Blocking
- -8 Handwood
- -9 Steel Tube/Lug Frame
- -10 Door Hinge
- -11 Door/Drawer Pull
- -12 Magnetic Catch
- -13 Drawer
- -14 Shelf Supports
- -15 Countertop
- -16 Solid-Surfacing Material
- 071113 -1 Bituminous Dampproofing
- 071326 -1 Self-Adhering Sheet Waterproofing
- 072100 -1 Foundation Wall or Under Slab Insulation (R-)
- -2 Cavity Wall Insulation (R-)
- -3 Building Insulation - Unfaced (R-)
- -4 Building Insulation - Faced (R-)
- -5 Sill Sealer
- -6 Batting Insulation
- 072413 -1 Exterior Insulation and Finish System
- 074213 -1 Metal Wall Panel (Type 1)
- -2 Interior Liner Panel
- -3 Trim
- -4 Z-Furring (")
- -5 Metal Wall Panel (Type 2)
- -6 Metal Soffit Panel
- 072126 -1 Fluid Applied Membrane Air Barrier
- -2 Flashing Tape
- 075423 -1 Thermoplastic Polyolefin (TPO) Roofing
- -2 Roof Insulation Flat
- -3 Roof Insulation Tapered
- -4 Roof Expansion Joint
- -5 Coverboard
- -6 Walkway Protection Board
- 076200 -1 Sheet Metal Flashing and Counterflashing
- -2 Pre-Finished Roof Edge
- -3 Pre-finished Coping
- -4 Sheet Metal Ridge
- -5 Sheet Metal Gutter
- -6 Sheet Metal Downspout
- -7 Sheet Metal Scupper
- 077124 -1 Roof Expansion Joint
- 077200 -1 Roof Hatch-Ladder
- 078413 -1 Penetration Firestopping
- 078446 -1 Fire-Resistive Joint Systems
- 079200 -1 Sealant - Rake where required
- -2 Joint Filler
- -3 Gasket
- -4 Backer Rod
- 079500 -1 Expansion Control
- 081113 -1 Steel Door
- -3 Steel Frame
- -3 Frame Anchor
- -4 Louver
- -5 Master Guard
- 081416 -1 Flush Wood Door
- 083113 -1 Access Door
- -2 Access Door Frame
- 083323 -1 Overhead Coiling Door
- -2 Coiling Counter Door
- 083613 -1 Sectional Overhead Door
- -2 Sectional Overhead Door Track
- -5 Weatherstripping
- 084113 -1 Aluminum Entrance Door
- -2 Aluminum Entrance Frame
- -3 Sunshade
- 084413 -1 Glazed Aluminum Curtain Wall
- -2 Threshold
- 085113 -1 Aluminum Window
- -2 Aluminum Sill
- -3 Insect Screen
- -4 Mullion
- -5 Aluminum Cover
- 088000 -1 Glazing (as scheduled)
- 088355 -1 Security Glazing (as scheduled)
- 089000 -1 Louvers and Vents
- 092216 -1 Steel Stud (")
- -2 Steel Stud Runner (")
- -3 Furring Channel
- 092900 -1 Gypsum Board (")
- -2 Fire Rated Gypsum Board (")
- -3 Cementitious Tile Backer Panel
- -4 Metal Suspension System
- -5 Acoustical Sealant
- -6 Acoustical Insulation (")
- -7 Metal Edge Trim
- -8 Auxiliary Support Framing
- -A Metal Control Joint
- -10 High Impact Gypsum Board
- -11 Concrete Interior Finishing Compound
- 093000 -1 Ceramic Mosaic Tile (" x ")
- -2 Glazed Wall Tile (" x ")
- -4 Porcelain Floor Tile (" x ")
- -5 Tile Base
- -6 Tile Cap
- -7 Setting Bed
- 095113 -1 Acoustical Panel (X) (F = Fire Rated)
- -2 Ceiling Suspension System
- -3 Edge Mold Trim
- -4 Auxiliary Support Framing
- 096513 -1 Resilient Tile Flooring
- -2 Resilient Wall Base
- -3 Edge Strip
- -4 Tactile Warning Surface
- -5 Resilient Stair Tread
- -6 Resilient Stair Riser
- -7 Resilient Stringer Skirt
- -8 Resilient Stair Nose
- 096813 -1 Carpet Tile
- 096900 Access Flooring
- 099113 -1 Exterior Painting
- 099123 -1 Interior Painting
- 099600 -1 Staining and Transparent Finishing
- 101400 -1 Signage
- 102113 -1 Toilet Partition
- -2 Urinal Screen
- 102213 -1 Wire Mesh Partitions
- 102600 -1 Impact-Resistant Cornerguard
- -2 Impact-Resistant Chairrail
- 102800 -1 Tissue Dispenser
- -2 Framed Mirror
- -3 Sanitary Napkin Disposer
- -4 Grab Bar
- -5 Shower Seat
- -6 Shower Curtain Rod
- Coat/Robe Hook
- -7 Shower Curtain
- 104413 -1 Fire Extinguisher Cabinet
- -2 Fire Hose Cabinet
- 104416 -1 Fire Extinguisher
- 105113 -1 Personal Locker
- -2 Locker
- -3 ADA Bench
- 105613 -1 Metal Storage Shelving
- 107500 -1 Flagpole
- 122113 -1 Horizontal Louver Blinds
- 122413 -1 Roller Window Shades
- 142400 -1 Hydraulic Elevator
- 311000 -1 Site Clearing
- 312000 -1 Earth Moving
- -2 Interior Fill
- -3 Exterior Fill
- -4 Granular Drainage Course
- -5 Subbase Course

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DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-2311
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: DWB CHECKED BY: CHK REV:
DATE: 2-9-15

BUILDING ELEVATIONS

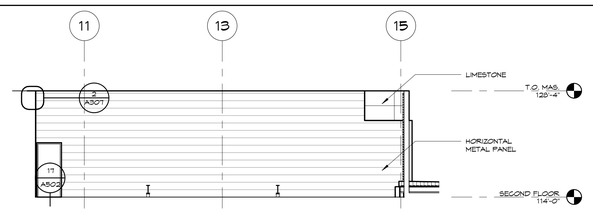
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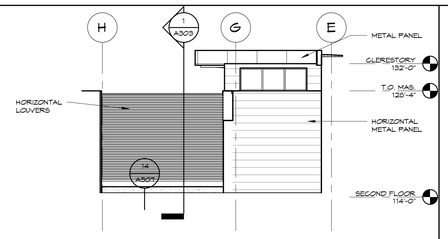
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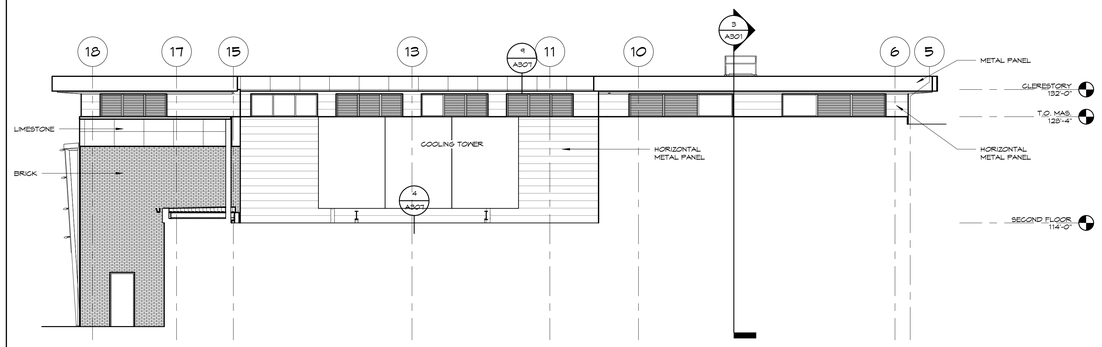
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2-2-2016
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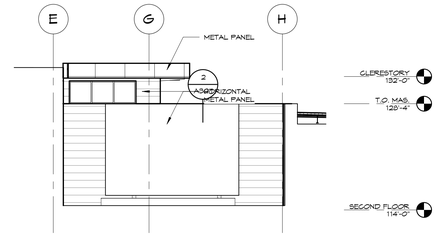
1 COOLING TOWER EAST
1/8" = 1'-0"



2 COOLING TOWER SOUTH
1/8" = 1'-0"



3 COOLING TOWER WEST
1/8" = 1'-0"



4 COOLING TOWER NORTH
1/8" = 1'-0"

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

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P 785.266.4373
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DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
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FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???
DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

BUILDING ELEVATIONS AND INTERIOR ELEVATIONS

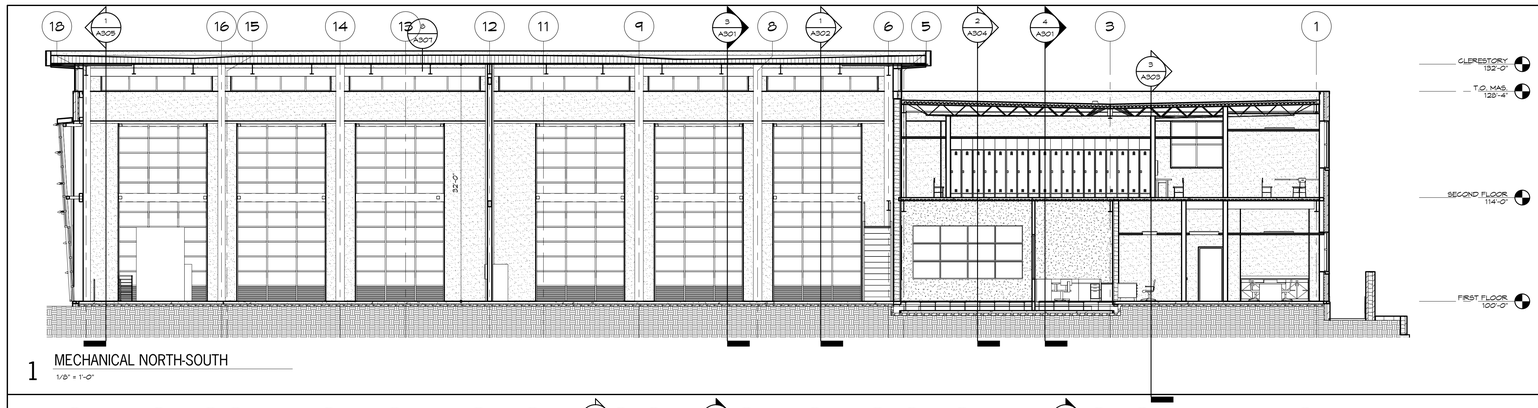
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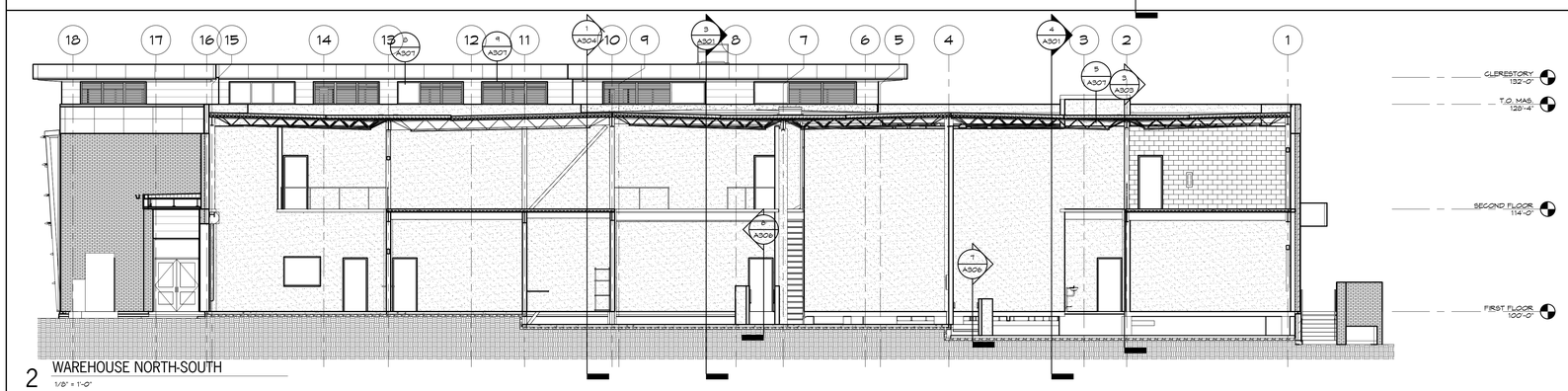
DESIGN DEVELOPMENT PHASE DOCUMENTS

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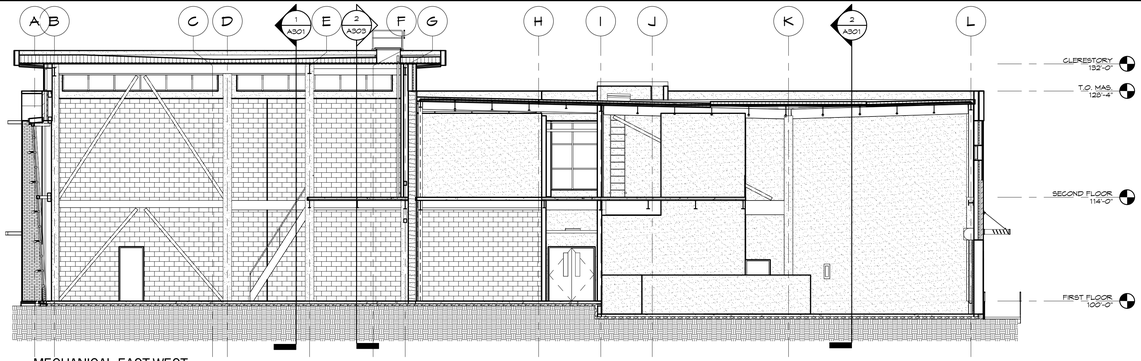
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2-2-2016
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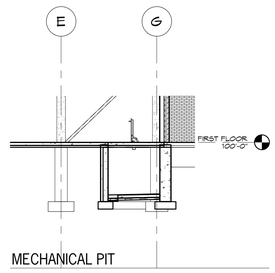
1 MECHANICAL NORTH-SOUTH
1/8" = 1'-0"



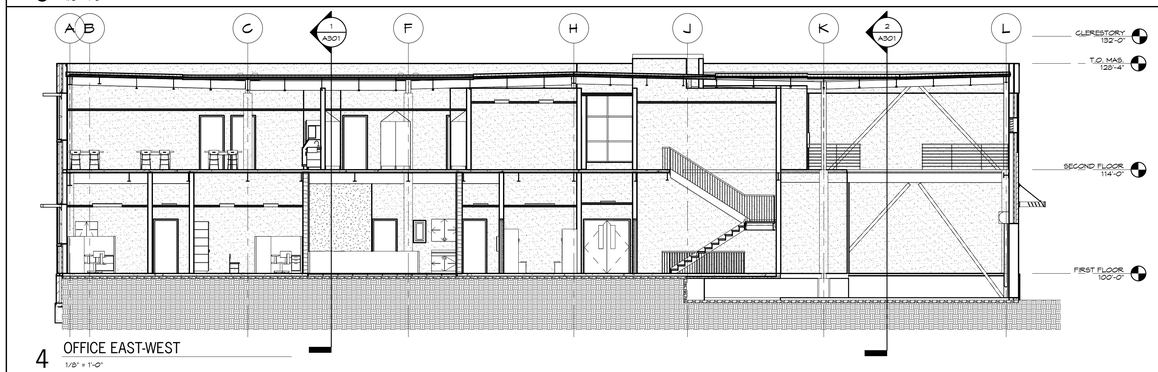
2 WAREHOUSE NORTH-SOUTH
1/8" = 1'-0"



3 MECHANICAL EAST-WEST
1/8" = 1'-0"



5 MECHANICAL PIT
1/8" = 1'-0"



4 OFFICE EAST-WEST
1/8" = 1'-0"

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (Ex. 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet/Joint Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-A	Sidewalk
	-10	Premolded Joint Filler
033300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-A	Compressible Filler
	-10	Weep Hole
	-11	Spray Drainage Material
	-12	Lintel Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-2	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"Z" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Lintel
	-6	Steel Pipe
	-7	Steel Tube
	-9	Steel Plate
	-A	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Tread Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	1x Wood Continuous (")
	-4	Plywood (")
	-5	1"X0 Felt
	-6	1"X5 Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	High Pressure Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Handwood
	-A	Steel Tube-Lug Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Sill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Interior Liner Panel
	-3	Trim
	-4	Z-Furring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072726	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-3	Roof Insulation Flat
	-4	Roof Insulation Tapered
	-A	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
076200	-1	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077124	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078449	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Make where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Plaster Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Aluminum Sill
	-3	Insect Screen
	-4	Mullion
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088053	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-A	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile (" x ")
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x") (F - Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
096813	-1	Carpet Tile
096900	-1	Access Flooring
099113	-1	Exterior Painting
099123	-1	Interior Painting
099600	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102800	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
109113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

HTK ARCHITECTS PA
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OVERLAND PARK, KANSAS 66210
P 913.663.3373
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
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www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone: 785-296-8899
FAX: 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???
DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

BUILDING SECTIONS

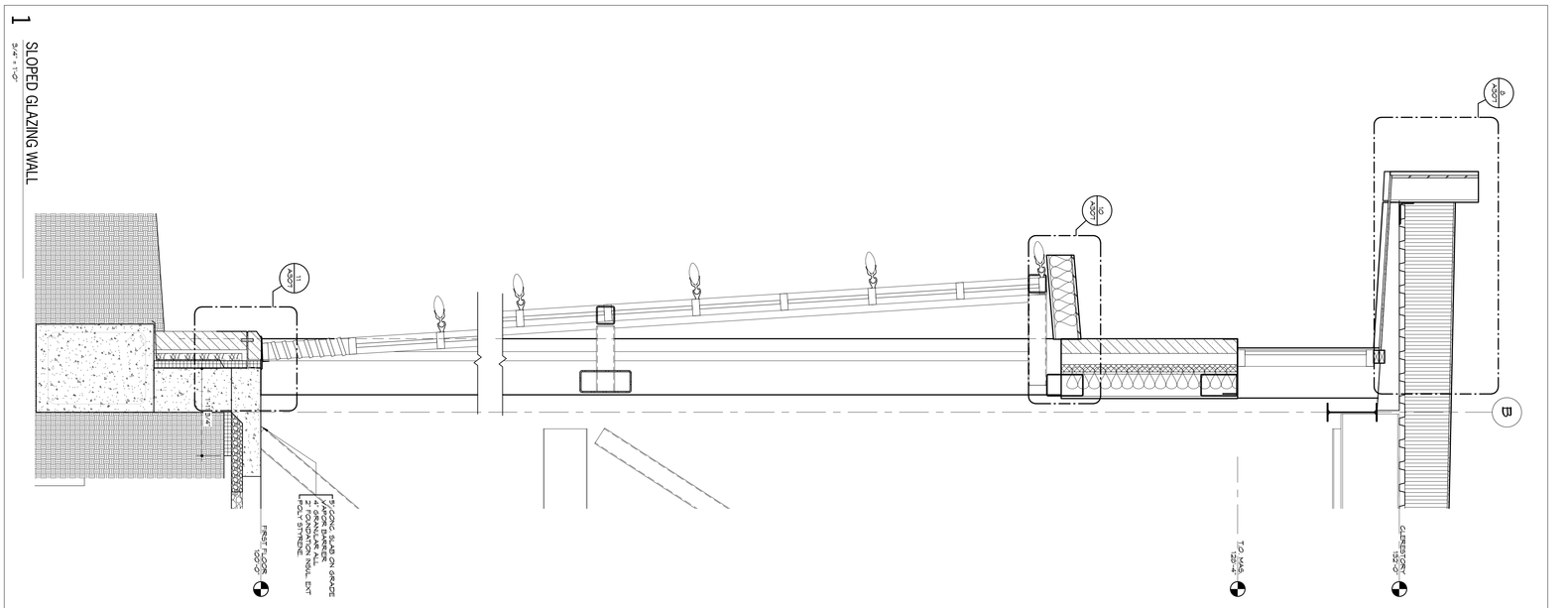
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DESIGN DEVELOPMENT PHASE DOCUMENTS

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NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN INTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS, ELEVATIONS, SECTIONS LOCATED ON THIS SHEET, PRECEDING SHEETS AND FOLLOWING SHEETS FOR APPLICABLE NOTES NOT SHOWN

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KEYNOTES

NOTE: Keynotes are drawn from a master list; may not be sequentially numbered. Sizes, materials, locations, and/or may differ from size, material specified.

03000000	1	Concrete
03100000	1	Concrete Form Ties
03150000	1	Concrete Accessories
03200000	1	Concrete Reinforcing
	2	Concrete Reinforcing
	3	Concrete Reinforcing
03300000	1	Concrete Slab Finish
	2	Concrete Slab Finish
	3	Concrete Slab Finish
03350000	1	Concrete Finishing
03400000	1	Precast Concrete
03410000	1	Precast Structural Concrete
03450000	1	Architectural Precast Concrete
04000000	1	Masonry
04200000	1	Unit Masonry
04220000	1	Concrete Unit Masonry
04230000	1	Reinforced Unit Masonry
04400000	1	Stone
	2	Stone
	3	Stone
04410000	1	Stone Cladding
04420000	1	Stone Assemblies
	2	Stone Assemblies
	3	Stone Assemblies
04430000	1	Stone Veneer
	2	Stone Veneer
	3	Stone Veneer
04450000	1	Stone Masonry Restoration and Cleaning
	2	Stone Masonry Restoration and Cleaning
	3	Stone Masonry Restoration and Cleaning
04500000	1	Refractory Masonry
04550000	1	Refractory Brick Masonry
04810000	1	Unit Masonry Assemblies
04820000	1	Adobe Unit Masonry
04830000	1	Glass Unit Masonry
04840000	1	Glass Block Curtain Walls
04850000	1	Glass Unit Masonry Accessories
04900000	1	Masonry Restoration and Cleaning
	2	Masonry Restoration and Cleaning
	3	Masonry Restoration and Cleaning
05000000	1	Metals
05010000	1	Maintenance of Metals
05050000	1	Common Work Results for Metals
05090000	1	Metal Fastenings
05100000	1	Structural Metal Framing
	2	Structural Metal Framing
	3	Structural Metal Framing
05120000	1	Structural Steel Framing
	2	Structural Steel Framing
	3	Structural Steel Framing
05150000	1	Wire Rope Assemblies
05160000	1	Structural Cables
05210000	1	Steel Joist Framing
	2	Steel Joist Framing
	3	Steel Joist Framing
05300000	1	Metal Decking
	2	Metal Decking
	3	Metal Decking
05310000	1	Steel Decking
	2	Steel Decking
	3	Steel Decking
05400000	1	Cold-Formed Metal Framing
	2	Cold-Formed Metal Framing
	3	Cold-Formed Metal Framing
05410000	1	Load-Bearing Metal Studs
	2	Load-Bearing Metal Studs
	3	Load-Bearing Metal Studs
05420000	1	Cold-Formed Metal Joists
	2	Cold-Formed Metal Joists
	3	Cold-Formed Metal Joists
05500000	1	Metal Fabrications
	2	Metal Fabrications
	3	Metal Fabrications
05510000	1	Metal Stairs
	2	Metal Stairs
	3	Metal Stairs
05520000	1	Metal Railings
	2	Metal Railings
	3	Metal Railings
05530000	1	Metal Gratings
	2	Metal Gratings
	3	Metal Gratings
05540000	1	Metal Floor Plates
	2	Metal Floor Plates
	3	Metal Floor Plates
05550000	1	Metal Castings
	2	Metal Castings
	3	Metal Castings
05580000	1	Formed Metal Fabrications
	2	Formed Metal Fabrications
	3	Formed Metal Fabrications
05590000	1	Metal Expansion Control
	2	Metal Expansion Control
	3	Metal Expansion Control
06000000	1	Wood, Plastics, and Composites
06050000	1	Common Work Results for Wood, Plastics, and Composites
06100000	1	Rough Carpentry
	2	Rough Carpentry
	3	Rough Carpentry
06110000	1	Wood Framing
	2	Wood Framing
	3	Wood Framing
06120000	1	Structural Panels
	2	Structural Panels
	3	Structural Panels
06130000	1	Heavy Timber Construction
	2	Heavy Timber Construction
	3	Heavy Timber Construction
06150000	1	Wood Decking
	2	Wood Decking
	3	Wood Decking
06160000	1	Sheathing
	2	Sheathing
	3	Sheathing
06170000	1	Shop-Fabricated Wood Trusses
	2	Shop-Fabricated Wood Trusses
	3	Shop-Fabricated Wood Trusses
06180000	1	Glued-Laminated Construction
	2	Glued-Laminated Construction
	3	Glued-Laminated Construction
06190000	1	Wood Trusses
	2	Wood Trusses
	3	Wood Trusses
06200000	1	Finish Carpentry
	2	Finish Carpentry
	3	Finish Carpentry
06400000	1	Architectural Woodwork
	2	Architectural Woodwork
	3	Architectural Woodwork
06410000	1	Custom Architectural Woodwork
	2	Custom Architectural Woodwork
	3	Custom Architectural Woodwork
06420000	1	Wood Paneling
	2	Wood Paneling
	3	Wood Paneling
06430000	1	Stairs and Railings
	2	Stairs and Railings
	3	Stairs and Railings
06440000	1	Ornamental Woodwork
	2	Ornamental Woodwork
	3	Ornamental Woodwork
06450000	1	Wood Trim
	2	Wood Trim
	3	Wood Trim
06460000	1	Wood Casework
	2	Wood Casework
	3	Wood Casework
06500000	1	Structural Plastics
	2	Structural Plastics
	3	Structural Plastics
06600000	1	Plastic Fabrications
	2	Plastic Fabrications
	3	Plastic Fabrications
07000000	1	Thermal and Moisture Protection
07050000	1	Common Work Results for Thermal and Moisture Protection
07100000	1	Dampproofing and Waterproofing
	2	Dampproofing and Waterproofing
	3	Dampproofing and Waterproofing
07110000	1	Dampproofing
	2	Dampproofing
	3	Dampproofing
07120000	1	Built-Up Bituminous Membrane Waterproofing
	2	Built-Up Bituminous Membrane Waterproofing
	3	Built-Up Bituminous Membrane Waterproofing
07130000	1	Sheet Waterproofing
	2	Sheet Waterproofing
	3	Sheet Waterproofing
07140000	1	Fluid-Applied Waterproofing
	2	Fluid-Applied Waterproofing
	3	Fluid-Applied Waterproofing
07150000	1	Sheet Waterproofing
	2	Sheet Waterproofing
	3	Sheet Waterproofing
07160000	1	Cementitious Waterproofing
	2	Cementitious Waterproofing
	3	Cementitious Waterproofing
07170000	1	Bentonite Waterproofing
	2	Bentonite Waterproofing
	3	Bentonite Waterproofing
07180000	1	Traffic Coatings
	2	Traffic Coatings
	3	Traffic Coatings
07190000	1	Water Repellents
	2	Water Repellents
	3	Water Repellents
07200000	1	Thermal Insulation
	2	Thermal Insulation
	3	Thermal Insulation
07210000	1	Building Insulation
	2	Building Insulation
	3	Building Insulation
07220000	1	Roof and Deck Insulation
	2	Roof and Deck Insulation
	3	Roof and Deck Insulation
07240000	1	Exterior Insulation and Finish Systems
	2	Exterior Insulation and Finish Systems
	3	Exterior Insulation and Finish Systems
07250000	1	Weather Protection Barrier
	2	Weather Protection Barrier
	3	Weather Protection Barrier
07260000	1	Vapor Retarders
	2	Vapor Retarders
	3	Vapor Retarders
07270000	1	Air Barriers
	2	Air Barriers
	3	Air Barriers
07300000	1	Steep Slope Roofing
	2	Steep Slope Roofing
	3	Steep Slope Roofing
07310000	1	Shingles and Shakes
	2	Shingles and Shakes
	3	Shingles and Shakes
07320000	1	Roof Tiles
	2	Roof Tiles
	3	Roof Tiles
07400000	1	Roofing and Siding Panels
	2	Roofing and Siding Panels
	3	Roofing and Siding Panels
07410000	1	Metal Roof Panels
	2	Metal Roof Panels
	3	Metal Roof Panels
07420000	1	Metal Wall Panels
	2	Metal Wall Panels
	3	Metal Wall Panels
07460000	1	Siding
	2	Siding
	3	Siding
07500000	1	Membrane Roofing
	2	Membrane Roofing
	3	Membrane Roofing
07510000	1	Built-Up Bituminous Roofing
	2	Built-Up Bituminous Roofing
	3	Built-Up Bituminous Roofing
07520000	1	Modified Bituminous Membrane Roofing
	2	Modified Bituminous Membrane Roofing
	3	Modified Bituminous Membrane Roofing
07530000	1	Elastomeric Membrane Roofing
	2	Elastomeric Membrane Roofing
	3	Elastomeric Membrane Roofing
07540000	1	Thermoplastic Membrane Roofing
	2	Thermoplastic Membrane Roofing
	3	Thermoplastic Membrane Roofing
07550000	1	Protected Membrane Roofing
	2	Protected Membrane Roofing
	3	Protected Membrane Roofing
07560000	1	Fluid-Applied Roofing
	2	Fluid-Applied Roofing
	3	Fluid-Applied Roofing
07570000	1	Traffic Coatings
	2	Traffic Coatings
	3	Traffic Coatings
07600000	1	Flashing and Sheet Metal
	2	Flashing and Sheet Metal
	3	Flashing and Sheet Metal
07610000	1	Sheet Metal Flashing and Trim
	2	Sheet Metal Flashing and Trim
	3	Sheet Metal Flashing and Trim
07620000	1	Sheet Metal Flashing and Trim
	2	Sheet Metal Flashing and Trim
	3	Sheet Metal Flashing and Trim
07630000	1	Sheet Metal Flashing and Trim
	2	Sheet Metal Flashing and Trim
	3	Sheet Metal Flashing and Trim
07650000	1	Flexible Flashing
	2	Flexible Flashing
	3	Flexible Flashing
07700000	1	Roof Specialties and Accessories
	2	Roof Specialties and Accessories
	3	Roof Specialties and Accessories
07710000	1	Roof Specialties
	2	Roof Specialties
	3	Roof Specialties
07720000	1	Roof Accessories
	2	Roof Accessories
	3	Roof Accessories
07760000	1	Pedestrian Traffic Coatings
	2	Pedestrian Traffic Coatings
	3	Pedestrian Traffic Coatings
07800000	1	Fire and Smoke Protection
07810000	1	Applied Fireproofing
	2	Applied Fireproofing
	3	Applied Fireproofing
07820000	1	Fire-Resistive Coatings
	2	Fire-Resistive Coatings
	3	Fire-Resistive Coatings
07840000	1	Firestopping
	2	Firestopping
	3	Firestopping
07850000	1	Smoke Seals
	2	Smoke Seals
	3	Smoke Seals
07900000	1	Joint Protection
	2	Joint Protection
	3	Joint Protection
07910000	1	Preformed Joint Seals
	2	Preformed Joint Seals
	3	Preformed Joint Seals
07920000	1	Joint Sealants
	2	Joint Sealants
	3	Joint Sealants
07950000	1	Expansion Control
	2	Expansion Control
	3	Expansion Control
08000000	1	Openings
08050000	1	Common Work Results for Openings
	2	Common Work Results for Openings
	3	Common Work Results for Openings
08100000	1	Doors and Frames
	2	Doors and Frames
	3	Doors and Frames
08110000	1	Steel Doors and Frames
	2	Steel Doors and Frames
	3	Steel Doors and Frames
08120000	1	Aluminum Doors and Frames
	2	Aluminum Doors and Frames
	3	Aluminum Doors and Frames
08130000	1	Sliding Doors
	2	Sliding Doors
	3	Sliding Doors
08140000	1	Wood Doors
	2	Wood Doors
	3	Wood Doors
08150000	1	Special Doors
	2	Special Doors
	3	Special Doors
08160000	1	Composite Doors
	2	Composite Doors
	3	Composite Doors
08170000	1	Integrated Door Assemblies
	2	Integrated Door Assemblies
	3	Integrated Door Assemblies
08200000	1	Doors and Frames
	2	Doors and Frames
	3	Doors and Frames
08210000	1	Wood Doors
	2	Wood Doors
	3	Wood Doors
08300000	1	Special Doors
	2	Special Doors
	3	Special Doors
08310000	1	Access Doors and Panels
	2	Access Doors and Panels
	3	Access Doors and Panels
08330000	1	Coiling Doors and Grilles
	2	Coiling Doors and Grilles
	3	Coiling Doors and Grilles
08340000	1	Special Function Doors
	2	Special Function Doors
	3	Special Function Doors
08350000	1	Folding Doors and Grilles
	2	Folding Doors and Grilles
	3	Folding Doors and Grilles
08360000	1	Panel Doors
	2	Panel Doors
	3	Panel Doors
08370000	1	Curtain Doors
	2	Curtain Doors
	3	Curtain Doors
08380000	1	Traffic Doors
	2	Traffic Doors
	3	Traffic Doors
08390000	1	Multiple Doors
	2	Multiple Doors
	3	Multiple Doors
08400000	1	Entrances, Storefronts, and Curtain Walls
	2	Entrances, Storefronts, and Curtain Walls
	3	Entrances, Storefronts, and Curtain Walls
08410000	1	Entrances and Storefronts
	2	Entrances and Storefronts
	3	Entrances and Storefronts
08420000	1	Automatic Entrances
	2	Automatic Entrances
	3	Automatic Entrances
08430000	1	Storefronts
	2	Storefronts
	3	Storefronts
08440000	1	Curtain Walls
	2	Curtain Walls
	3	Curtain Walls
08450000	1	Translucent Wall and Roof Assemblies
	2	Translucent Wall and Roof Assemblies
	3	Translucent Wall and Roof Assemblies
08460000	1	Automatic Door Operators
	2	Automatic Door Operators
	3	Automatic Door Operators
08470000	1	Special Entrances
	2	Special Entrances
	3	Special Entrances
08500000	1	Windows
08510000	1	Steel Windows
	2	Steel Windows
	3	Steel Windows
08520000	1	Aluminum Windows
	2	Aluminum Windows
	3	Aluminum Windows
08530000	1	Plastic Windows
	2	Plastic Windows
	3	Plastic Windows
08540000	1	Special Windows
	2	Special Windows
	3	Special Windows
08550000	1	Metal Window Assemblies
	2	Metal Window Assemblies
	3	Metal Window Assemblies
08560000	1	Composite Windows
	2	Composite Windows
	3	Composite Windows
08570000	1	Window Accessories
	2	Window Accessories
	3	Window Accessories
08600000	1	Roof Windows and Skylights
08610000	1	Roof Windows
	2	Roof Windows
	3	Roof Windows
08620000	1	Unit Skylights
	2	Unit Skylights
	3	Unit Skylights
08630000	1	Metal-Framed Skylights
	2	Metal-Framed Skylights
	3	Metal-Framed Skylights
08650000	1	Special Skylights
	2	Special Skylights
	3	Special Skylights
08700000	1	Hardware
08710000	1	Door Hardware
	2	Door Hardware
	3	Door Hardware
08720000	1	Door Hardware
	2	Door Hardware
	3	Door Hardware
08730000	1	Weatherstripping
	2	Weatherstripping
	3	Weatherstripping
08740000	1	Special Door Hardware
	2	Special Door Hardware
	3	Special Door Hardware
08750000	1	Window Hardware
	2	Window Hardware
	3	Window Hardware
08760000	1	Keying
	2	Keying
	3	Keying
08790000	1	Hardware Sets
	2	Hardware Sets
	3	Hardware Sets
08800000	1	Glazing
08810000	1	Glass Glazing
	2	Glass Glazing
	3	Glass Glazing
08820000	1	Plastic Glazing
	2	Plastic Glazing
	3	Plastic Glazing
08830000	1	Mirrors
	2	Mirrors
	3	Mirrors
08840000	1	Special Glazing
	2	Special Glazing
	3	Special Glazing
08850000	1	Glazing Accessories
	2	Glazing Accessories
	3	Glazing Accessories
08900000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08910000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08920000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08930000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08940000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08950000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08960000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08970000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08980000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls
08990000	1	Glazed Curtain Walls
	2	Glazed Curtain Walls
	3	Glazed Curtain Walls

WALL SECTIONS

A-01.2651

A302

DESIGN DEVELOPMENT
PHASE DOCUMENTS

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 2-9-15 DRAWN BY: Author CHECKED BY: Checker REV:

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

HTK PROJECT NUMBER:
• 1410.03

DATE:
• 2-9-15

REVISED DATE:
• 12.18.14
• 3.10.15

DESIGN DEVELOPMENT PHASE

HTK ARCHITECTS PA
900 S. KANSAS AVE., SUITE 200
TOPEKA KANSAS 66612
P 785.266.5373
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
P 913.663.5373
www.htkarchitects.com

X:\SHARE
2-9-15 DD SET
Att:5/1093

ARCHITECTS PA
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900 S. KANSAS AVE., SUITE 200 TOPEKA, KANSAS 66612 P 785.266.3373
9300 W 110TH ST. STE. 150 OVERLAND PARK, KANSAS 66210 P 913.663.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 2.18.14
- 2.9.15
- 3.10.15

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DATE: 2-9-15 DRAWN BY: Author CHECKED BY: Checker REV:

WALL SECTIONS

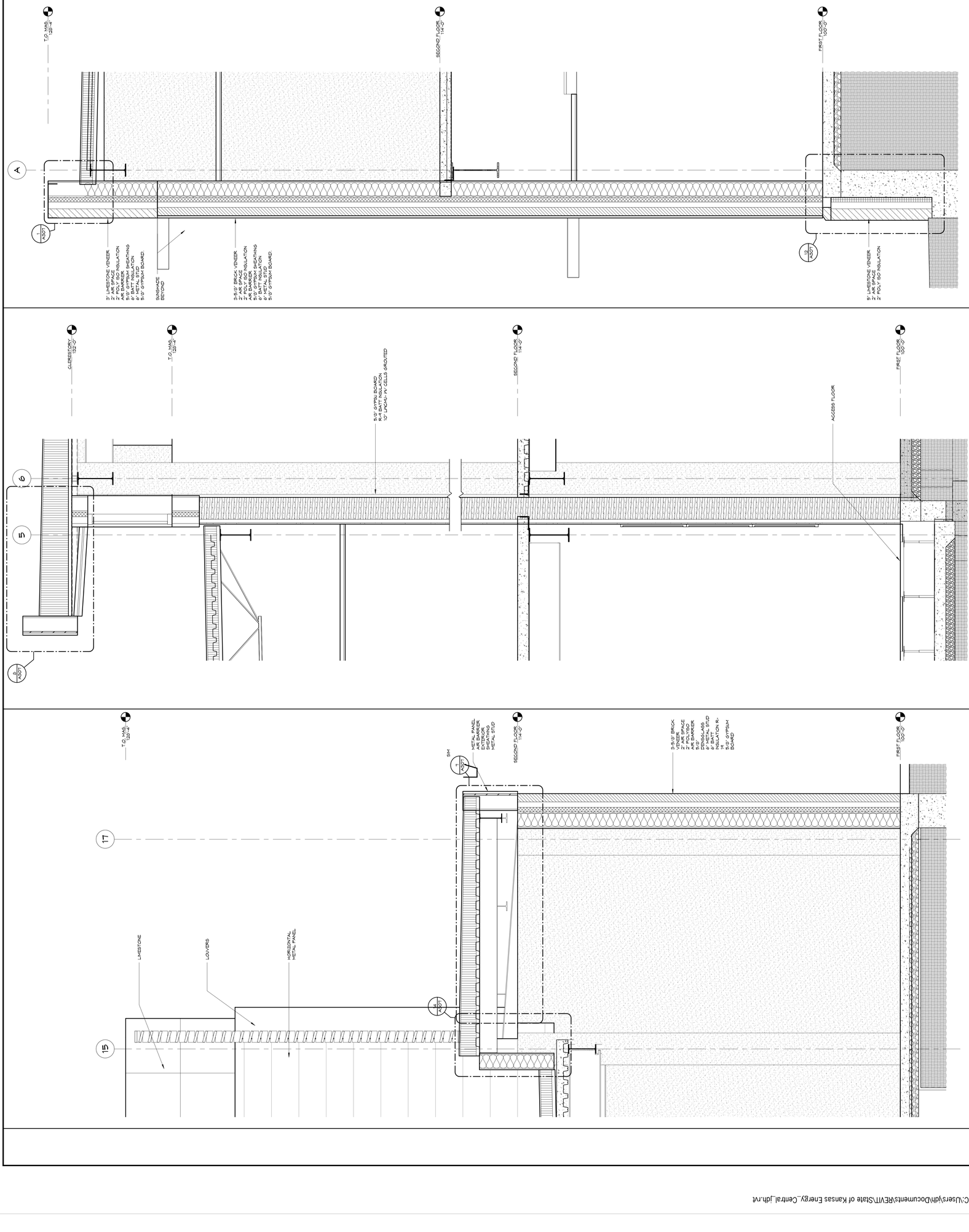
A-012651

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DESIGN DEVELOPMENT PHASE DOCUMENTS

KEYNOTES

Note	Description						
030000	-1	Concrete Structure	061113	-1	Steel Stair		
	-2	Concrete Slab		-2	Steel Rail		
	-3	Vapor Barrier		-3	Frame, Anchor		
	-4	Slab Reinforcing Bar		-4	Tread		
	-5	Slab Reinforcing Bar	061418	-1	Platform Support		
	-6	Perimeter Insulation	061813	-1	Access Door Frame		
	-7	Sidewalk	083323	-1	Overhead Coiling Door		
	-8	Concrete Control Joint Filler	083619	-1	Sectional Overhead Door		
030000	-1	Concrete Topping		-2	Sectional Overhead Door		
030000	-2	Concrete Masonry Unit - Reinforced Wall	084113	-1	Aluminum Entrance Door		
	-3	Concrete Masonry Unit - Horizontal Reinforcing		-2	Aluminum Storefront Framing		
	-4	Concrete Control Joint	084413	-1	Glazed Aluminum Curtain Wall		
	-5	Concrete Control Strip		-2	Threshold		
	-6	Compressible Filler	085113	-1	Aluminum Window		
	-7	Cavity Drainage Material		-2	Aluminum Sill		
	-8	Concrete Topping		-3	Wall Anchor		
044000	-1	Stone Veneer	085313	-1	Jamb Anchor		
	-2	Stone Coping		-2	Sliding Window		
	-3	Stone Sill	087100	-1	Door Hardware, Refer to Schedule		
047200	-1	Cast Stone	088000	-1	Glazing (As Scheduled)		
051200	-1	Steel Beam	088300	-1	Mirror, Refer to Schedule		
	-2	Steel Column	092900	-1	Steel Stud (__")		
	-3	Steel Plate		-2	Furring Channel (__")		
	-4	Steel Angle		-3	Furring Channel (__")		
052100	-1	Steel Joist	093900	-1	Fire Rated Septum Board		
	-2	Steel Joist Girder		-2	Gypsum Board		
	-3	Steel Deck		-3	Cementitious Tile Backer Board		
	-4	Steel Joist Extended End		-4	Tile Base		
053100	-1	Steel Decking		-5	Acid Sealer		
	-2	Steel Decking Extension		-6	Acid Sealer		
	-3	Steel Decking Opening		-7	Acoustical Insulation (__")		
	-4	Steel Connection Plate		-8	Acoustical Insulation (__")		
054000	-1	Structural Steel Studs		-9	Acoustical Insulation (__")		
	-2	Structural Steel Joists		-10	Galvanized Metal Furring		
	-3	Steel Angle	093000	-1	Ceramic Mosaic Tile		
	-4	Steel Angle		-2	Ceramic Tile		
055000	-1	Steel Lintel	095000	-1	Glazed Wall Tile		
	-2	Steel Plate		-2	Tile Base		
	-3	Steel Tube		-3	Tile Sill		
	-4	Steel Ladder		-4	Porcelain Floor Tile		
	-5	Steel Guardrail, Handrail		-5	Tile Base		
055100	-1	Steel Stringer	096513	-1	Resilient Tile Flooring		
	-2	Steel Tread		-2	Resilient Base		
	-3	Steel Pipe Handrail		-3	Resilient Base and Accessories		
	-4	Steel Pipe Guardrail		-4	Resilient Stair Tread		
055500	-1	Steel Miscellaneous Metal Brackets	096519	-1	Resilient Tile Flooring		
	-2	Steel Frame		-2	Resilient Base		
055500	-2	2x Wood Blocking (__")		-3	Resilient Stair Tread		
061000	-1	2x Wood Blocking (__")		-4	Resilient Stair Riser		
	-2	Plywood (__")		-5	Resilient Stair Nosing		
	-3	Sheathing		-6	Resilient Stair Accessories		
	-4	Insulating (__")	096813	-1	Access Flooring		
	-5	Interior Architectural Millwork	096819	-1	Access Flooring		
	-6	Fenestration Assembly	096825	-1	Access Flooring		
	-7	High Pressure Laminate	096829	-1	Interior Paving		
	-8	Plastic Laminate	097300	-1	Glazed Polyester Transparent Finishing		
	-9	Particle Board	101000	-1	Toilet Partition		
	-10	Wood Trim	101419	-1	Interior Signage		
061000	-1	Stair Edge Molding	102113	-1	Wire Mesh Partitions		
	-2	Stair Nosing Molding	102225	-1	Folding Panel Partitions		
	-3	Hardwood	102600	-1	Corrugated		
	-4	Wood Blocking Frame		-2	Corrugated Sunscreen Channel		
	-5	Door Hinge		-3	Tissue Dispenser		
	-6	Door Closer, Pull	102800	-1	Toilet Accessories		
	-7	Magnetic Catch		-2	Sanitary Napkin Disposal		
	-8	Door Stop		-3	Soap Dish		
	-9	Shelf Supports		-4	Shower Seat		
	-10	Wood Backing		-5	Shower Curtain Rod		
	-11	Wood Furring	104413	-1	Solid Metal Toilet Partitions		
071113	-1	Bituminous Dampproofing	107113	-1	Fire Extinguisher Cabinet		
071119	-1	Fluid Applied Waterproofing	107500	-1	Flagpole		
071123	-1	Membrane Waterproofing	107519	-1	Flagpole Flagpole Bracket		
071300	-1	Self Adhering Sheet Waterproofing or under slab vapor barrier		-2	Flagpole Flagpole Mounting		
072100	-1	Batt Insulation (__")	108419	-1	Kone Window Shading		
	-2	Batt Insulation (__")	127500	-1	Casework		
	-3	Batt Insulation (__")	132413	-1	Pre-Engineered Steel Building		
	-4	Batt Insulation - Inlaid	133419	-1	Metal Building Insulation		
072400	-1	Exterior Insulation and Finish System	312323	-1	Fill Compacted		
074213	-1	Metal Wall Panel (Type 1) Horizontal Liner Panel	312500	-1	Erosion Control Blanket		
	-2	Metal Wall Panel (Type 2)	312000	-1	Earthwork		
	-3	Metal Wall Panel (Type 3)		-2	Fill		
	-4	Z-Furring (__") (Type 2)		-3	Grading		
	-5	Metal Soffit Panel		-4	Subgrade Drainage Course		
077129	-1	Manufactured Specialties Air Barrier		-5	Retaining Wall		
078413	-1	Penetration Firestopping					
	-2	Thermoplastic Polyolefin Roofing					
	-3	Roof Insulation Tapered					
	-4	Roof Insulation Tapered					
079200	-1	Joint Sealants					
	-2	Sheet Metal Flashing and Trim					
	-3	Pre-Finished Roof Edge					
	-4	Sheet Metal Flashing					
	-5	Sheet Metal Roof					
	-6	Sheet Metal Gravel Stop					
	-7	Sheet Metal Downspout					
	-8	Sheet Metal Scupper					
079505	-1	Expansion Joint Cover Assembly					
079506	-1	Roof Expansion Joint					
	-2	Wall Expansion Joint					
079513	-1	Penetration Firestopping					
079514	-1	Penetration Firestopping					
079515	-1	Joint Sealant					
079520	-1	Expansion Joint Systems					
	-2	Expansion Joint Assembly					
079530	-1	Rake Joints Inverted					
	-2	Sealant					
	-3	Backer Rod					
079600	-1	Expansion Control					



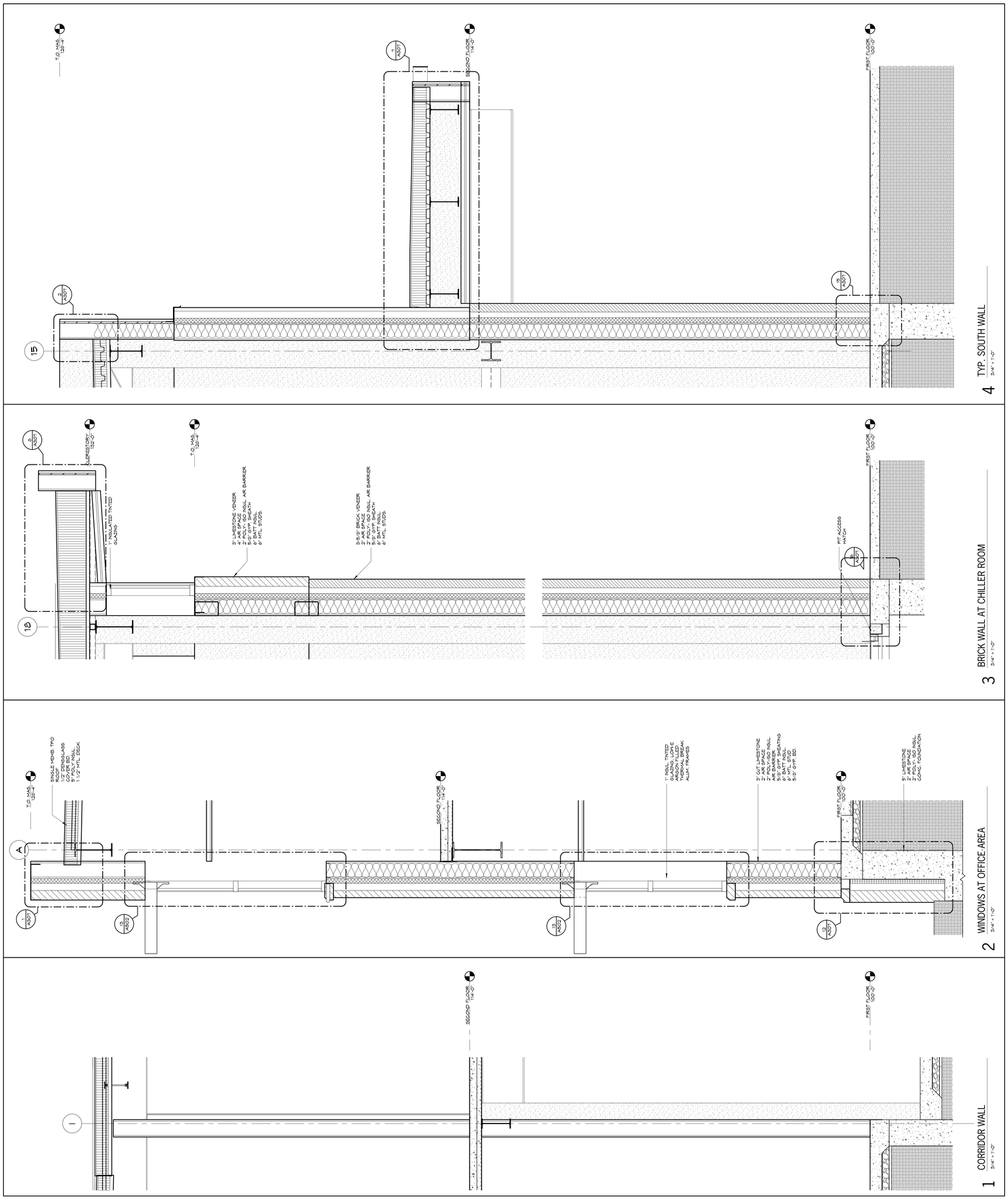
NOTE REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALL AND CONCRETE NOT SHOWN

NOTE REFER TO ALL DETAILS IDETAILS LOCATED ON THIS SHEET PRECEDING EXTERIOR WALL SECTIONS FOR APPLICABLE NOTES NOT SHOWN

NOTE REFER TO ALL SECTIONS SECTIONS LOCATED ON THIS SHEET PRECEDING EXTERIOR WALL SECTIONS FOR APPLICABLE NOTES NOT SHOWN

JC-33C
2-2-2016
Job 33-004

Note:	Keynotes are drawn from a master list + may not be sequentially numbered. Slots (Ex. 3x4) for other info. Following keynote divisions/ numbers are from last master export list.							
	033000	-1	Concrete Structure		051119	-1	Steel Floor	
		-2	Concrete Slab			-2	Steel Deck	
		-3	Vapor Barrier			-3	Framing Anchor	
		-4	Concrete Reinforcing Bar			-4	Joist	
		-5	Concrete Accessory		051419	-1	Fabricated Steel	
		-6	Admixtures		051815	-1	Pedestal Support	
		-7	Concrete Finish			-2	Access Floor Frame	
		-8	Sidewalk		053323	-1	Overhead Coiling Door	
		-9	Concrete Joint Filler			-2	Overhead Coiling Grille	
	033500	-1	Concrete Topping		053619	-1	Bar/Grate Overhead Door	
	034500	-1	Concrete Masonry Unit -			-2	Bar/Grate Overhead Grille	
		-2	Concrete Masonry Unit -		054119	-1	Aluminum Entrance Door	
		-3	Concrete Masonry Unit -			-2	Aluminum Storefront Door	
		-4	Metal Fabricating		054419	-1	Glazed Aluminum Curtain	
		-5	Concrete Coring			-2	Wall	
		-6	Control Joint Strip			-3	Threshold	
		-7	Concrete Repair		055119	-1	Aluminum Bollard	
		-8	Compressible Filler			-2	Aluminum Bin	
		-9	Mortar			-3	Metal Fabrication	
		-10	Cavity Drainage Material			-4	Joint Anchor	
	044500	-1	Stone Cladding		055500	-1	Metal Stair	
		-2	Stone Masonry			-2	Railing (or Schedule)	
		-3	Stone Sill			-3	Railing (or Schedule)	
		-4	Stone Base		055623	-1	Steel Grating Floor	
	047200	-1	Cast Stone		056313	-1	Steel Stud (*)	
	051200	-1	Steel Beam			-2	Steel Stud Framing (*)	
		-2	Steel Girder		057300	-1	Decorative Glass	
	051500	-1	Steel Joist			-2	Forming Channel	
		-2	Steel Joist Girder		059500	-1	Suspended Ceiling	
		-3	Steel Joist Extended End			-2	Fire Rated System Board	
	053100	-1	Steel Decking			-3	Gypsum Board	
		-2	Steel Decking Extension			-4	Acoustic Tile Backup	
		-3	Steel Decking Sump			-5	Acoustic Tile	
		-4	Steel Composite Decking			-6	Acoustic Insulation (*)	
	054000	-1	Structural Steel Studs			-7	Acoustic Ceiling Framing	
		-2	Structural Steel Joists			-8	Acoustic Insulation (*)	
	055000	-1	Stair Angle			-9	Cement Mortar Finishing	
		-2	Steel Bollard			-10	Cement Mortar Finishing	
		-3	Steel Lintel		059000	-1	Glazed Wall Tile	
		-4	Steel Pan			-2	Grating Khaki Tile	
		-5	Steel Rail			-3	Grout	
		-6	Steel Ladder		059100	-1	Glazed Tile	
		-7	Steel Miscellaneous Transporation Cover			-2	Tile Base	
	059100	-1	Steel Beam			-3	Tile Field	
		-2	Steel Stringer			-4	Porcelain Floor Tile	
		-3	Steel Pipe Handrail			-5	Quarry Tile	
		-4	Steel Pipe Railing			-6	Glazed Wall Tile	
		-5	Steel Miscellaneous Bracket		059123	-1	Acoustic Panel (x 1/8" -	
		-6	Steel Railing			-2	Fire Rated	
	059500	-1	Steel Framing			-3	Acoustic Suspension System	
		-2	3x Wood Blocking (*)		059813	-1	Edge Mold Trim	
		-3	4x Wood Blocking (*)			-2	Acoustic Tile Framing	
		-4	Ingrinal			-3	Resilient Tile Flooring	
		-5	Plywood (*)			-4	Resilient Base	
		-6	Insulating (*)			-5	Resilient Stair Tread	
	064116	-1	Plastic Laminate Interior Architecture			-6	Resilient Stair Riser	
		-2	High Pressure Laminate			-7	Resilient Stair Accessories	
		-3	Plastic Laminate			-8	Resilient Sheet Flooring	
		-4	Particle Board			-9	Interior Painting	
		-5	Plastic Laminate			-10	Interior Painting	
		-6	Stain Edge Molding			-11	Paint Transparent	
		-7	Plastic Laminate Molding			-12	Finishing	
		-8	Hardwood			-13	Tiled Partition	
		-9	Hardwood Cased Frames			-14	Wire Mesh Partitions	
		-10	Door Hinge			-15	Wire Mesh Partitions	
		-11	Door Closer Pull			-16	Commercial Carpet	
		-12	Magnetic Catch			-17	Commercial Carpet Cleaning	
		-13	Door Stop			-18	Tribute Dividender	
		-14	Shelf Supports		123000	-1	Plastic Laminate Clad Casework	
		-15	Shelf Standard			-2	Sanitary Napkin Disposal	
		-16	Shelf Surfacing			-3	Shelf	
	071113	-1	Bituminous Dampproofing			-4	Shower Seat	
	071123	-1	Cementitious Dampproofing		124413	-1	Shower Curtain Rod	
	071300	-1	Sheet Membrane (or under			-2	Grab Rods Hooks	
		-2	Sheet Membrane (or under			-3	Fire Extinguisher Cabinet	
		-3	Sheet Membrane (or under			-4	Fire Extinguisher	
		-4	Sheet Membrane (or under			-5	Personal Locker	
		-5	Sheet Membrane (or under			-6	Locker	
		-6	Sheet Membrane (or under		129113	-1	ADA Bench	
	072413	-1	Self-Adhering Sheet Air		129313	-1	Flagpole - Interior Swing	
		-2	Sealing Insulation and		129323	-1	Flagpole - Wall Bracket	
	074213	-1	Metal Wall Panel (Type 1)		129343	-1	Kiosk Window Shade	
		-2	Interior Liner Panel		312200	-1	Fill Compacting	
		-3	Soffit		312323	-1	Fill Material	
		-4	Furring (*)		312500	-1	Erosion Control	
		-5	Furring (*) (Type 2)			-2	Riprap Fill	
	074243	-1	Metal Composite Air Barrier			-3	Gravel Fill	
		-2	Metal Soffit Panel			-4	Granular Drainage Course	
	077129	-1	Manufactured Specialty			-5	Wetland Grading	
	077429	-1	Thermoplastic Polyolefin Roofing					
		-2	Roof Insulation Tapered					
		-3	Roof Insulation Board					
		-4	Roof Insulation Cover					
	078200	-1	Sealant Expansion Joint					
		-2	Sealant Control Joint					
		-3	Sealant Miscellaneous Joints					
		-4	Pre-Finished Roof Edge					
		-5	Sheet Metal Flashing					
		-6	Sheet Metal Roof					
		-7	Sheet Metal Gravel Stop					
		-8	Sheet Metal Downspout					
	079124	-1	Roof Expansion Joint					
	079143	-1	Roof Expansion Joint					
	079145	-1	Penetration Firestopping					
	079150	-1	Joint Sealant Backing Systems					
		-2	Sealant - Keke Lunns Inspired					
		-3	Sealant Primer					
		-4	Backer Rod					
	079500	-1	Expansion Control					



JC-3RC
2-2-2016
Job.No.0051

DESIGN DEVELOPMENT PHASE

HTK ARCHITECTS PA

900 S. KANSAS AVE., SUITE 200 TOPEKA, KANSAS 66612 P 785.266.3373
9300 W 110TH ST. STE. 150 OVERLAND PARK, KANSAS 66210 P 913.663.3573
www.htkarchitects.com

DATE: ● 2-9-15
REVISED DATE: ● 12.18.14 ● 2.9.15 ● 3.10.15
HTK PROJECT NUMBER: ● 1410.03

Department of Administration
Procurement Management
Office of Facilities and
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

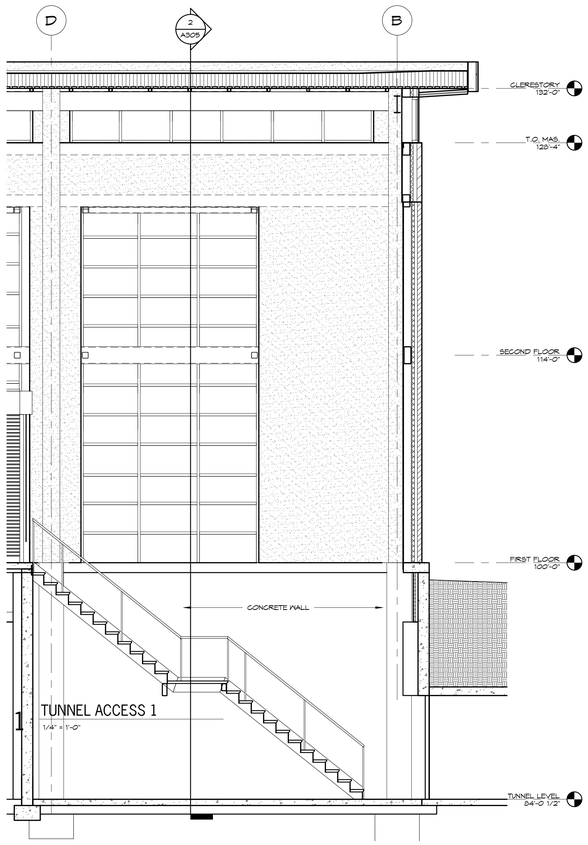
DATE: 2-9-15 DRAWN BY: Author CHECKED BY: Checker REV:

WALL SECTIONS

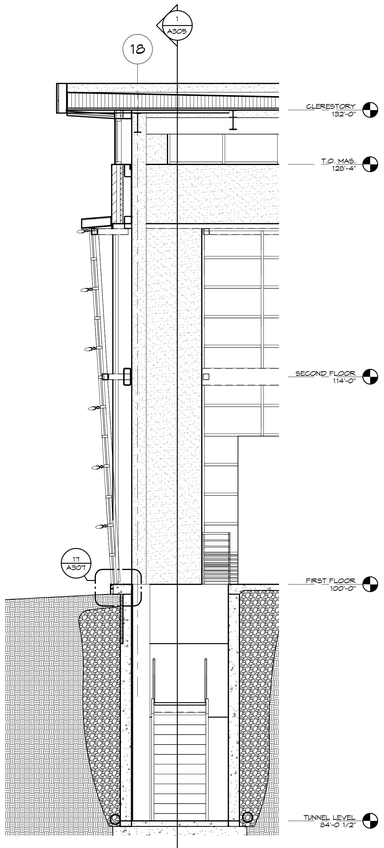
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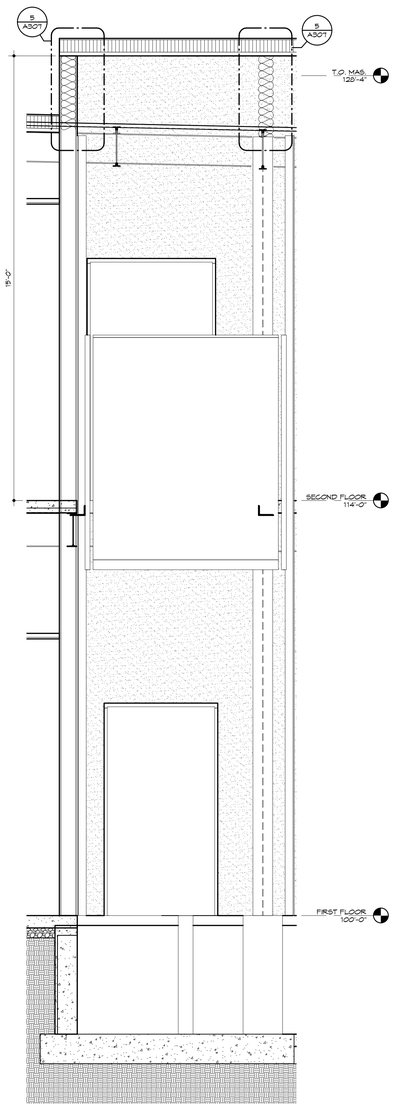
DESIGN DEVELOPMENT PHASE DOCUMENTS



1 TUNNEL ACCESS 1
1/4" = 1'-0"



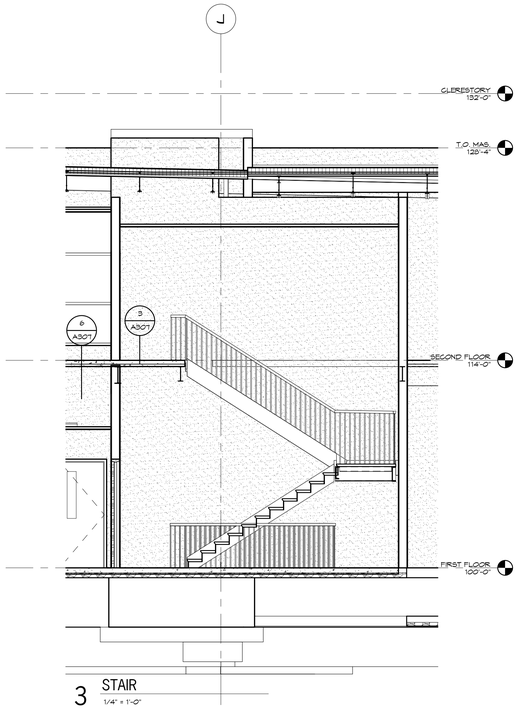
2 TUNNEL ACCESS 2
1/4" = 1'-0"



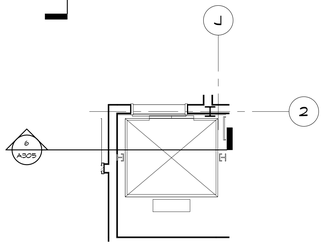
KEYNOTES

Note: Keynotes are drawn from a master list. It may not be sequentially numbered. Sizes (8x, 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

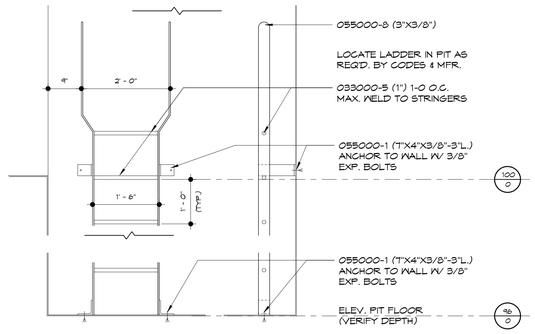
033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet/Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-A	Sidewalk
	-10	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Cavity Mortar
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-4	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"Z" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Lintel
	-6	Steel Pipe
	-7	Steel Tube
	-8	Steel Plate
	-9	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	1x Wood Continuous (")
	-4	Plywood (")
	-5	1"X3 Felt
	-6	1"X9 Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	Plastic Laminate Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Hardwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Sill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Exterior Liner Panel
	-3	Trim
	-4	Z-Furring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072726	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
076200	-1	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077124	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Rake where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Master Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-5	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Mullion Cap
	-3	Panning Strip
	-4	Jamb Anchor
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088055	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
	-1	Carpet Tile
096800	-1	Access Flooring
099113	-1	Exterior Painting
099123	-1	Interior Painting
099600	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102600	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102800	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course



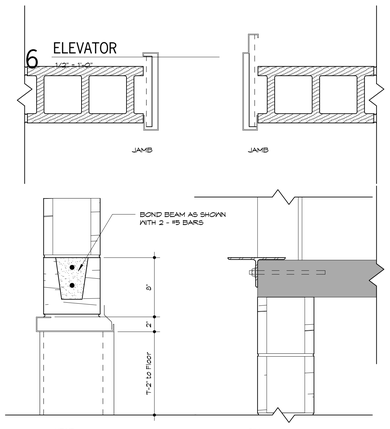
3 STAIR
1/4" = 1'-0"



7 ENLARGED ELEVATOR PLAN
1/4" = 1'-0"



8 ELEVATOR PIT LADDER
3/4" = 1'-0"



6 ELEVATOR
1/2" = 1'-0"

9 ELEVATOR DOOR HEAD, JAMB AND SILL
1 1/2" = 1'-0"

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

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HTK ARCHITECTS PA
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900 S. KANSAS AVE., SUITE 200
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www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author | CHECKED BY: Checker | REV:
DATE: 2-9-15

STAIRS AND ELEVATORS

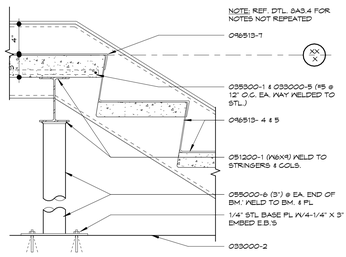
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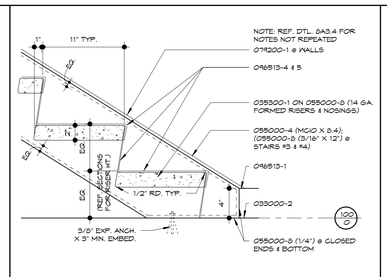
DESIGN DEVELOPMENT PHASE DOCUMENTS

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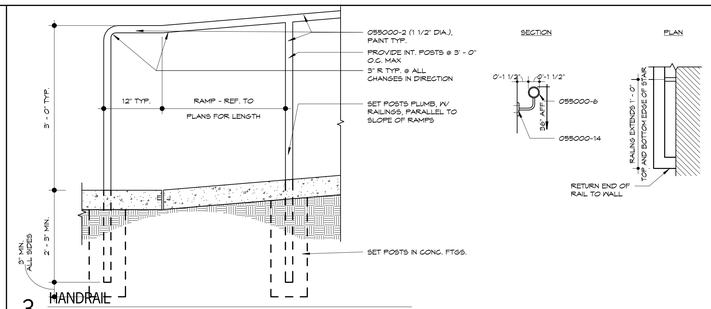
JCSBC
2-2-2016
Att.9A096



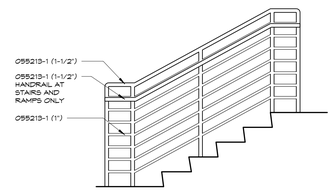
1 TYP. LANDING @ TREADS
1 1/2" = 1'-0"



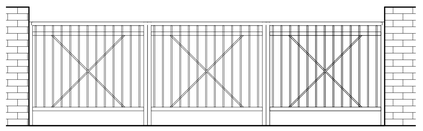
2 TYP. TREAD/STRINGER @ BOT. FLR
1 1/2" = 1'-0"



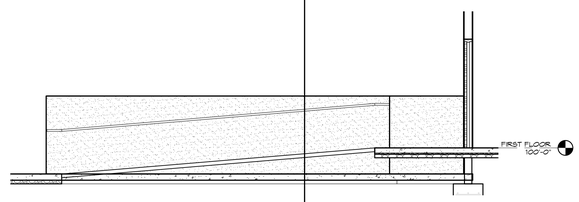
3 HANDRAIL
1 1/2" = 1'-0"



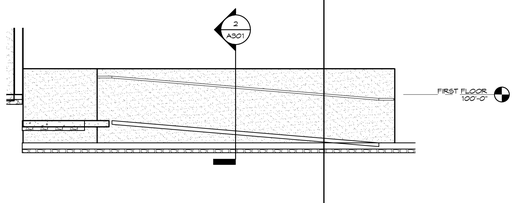
4 RAILING
1/2" = 1'-0"



5 DECORATIVE RAILING ELEVATION
1/2" = 1'-0"



6 HVAC 134 RAMP
1/4" = 1'-0"



7 CARPENTRY 141 RAMP
1/4" = 1'-0"

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (Ex. 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Rustication Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-A	Sidewalk
	-B	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-9	Bond Beam (")
	-A	Compressible Filler
	-B	Weep Hole
	-10	Cavity Drainage Material
	-13	Termination Bar
044300	-1	Stone Masonry Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-7	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"C" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-6	Steel Lintel
	-7	Steel Plate
	-9	Steel Tube
	-A	Steel Plate
	-E	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	¼ Wood Continuous (")
	-4	Plywood (")
	-5	"RO" Felt
	-6	"FS" Felt
	-9	Sheathing (")
	-D	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	Plastic Laminate Laminate
	-3	Solid Core Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Hardwood
	-E	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Sill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Interior Liner Panel
	-3	Trim
	-4	Z-Furring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072128	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
076200	-1	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Sheet Metal Coping
	-4	Sheet Metal Roofing
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077124	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Make where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Mission Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Window Wall
	-3	Mullion Cover
	-4	Jamb Anchor
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088053	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x ") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
	-1	Carpet Tile
096800	-1	Access Flooring
098433	-1	Exterior Painting
099123	-1	Interior Painting
099600	-11	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102900	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
312000	-1	Site Grearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

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HTK ARCHITECTS PA
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www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

STAIR DETAILS

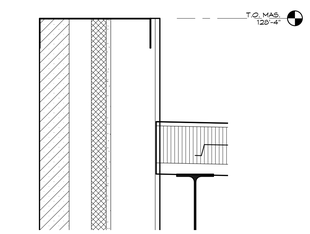
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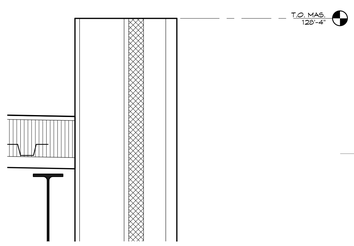
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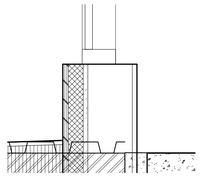
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2-2-2016
Att.9A097



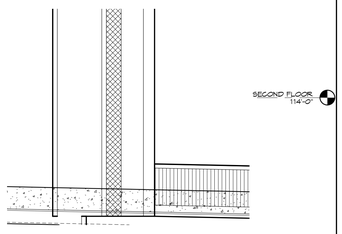
1 T.O. MASONRY WALL
1 1/2" = 1'-0"



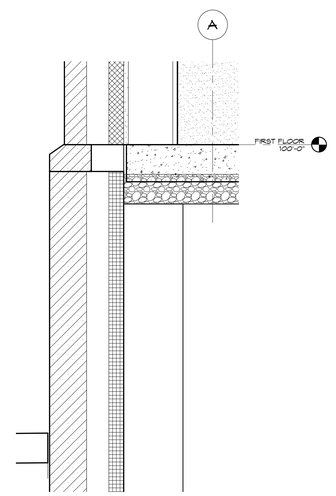
2 T.O. METAL WALL
1 1/2" = 1'-0"



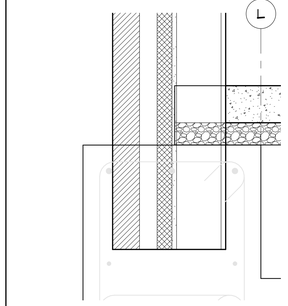
3 ROOF TO MASONRY WALL TRANSITION
1 1/2" = 1'-0"



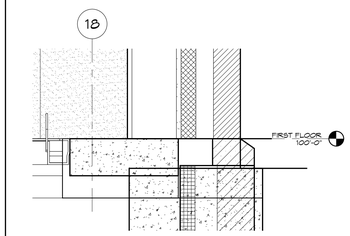
4 ROOF TRANSITION AT METAL WALL
1 1/2" = 1'-0"



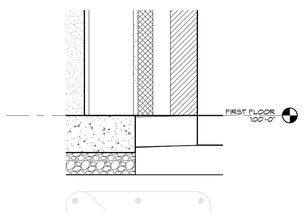
12 BTM OF WALL
1 1/2" = 1'-0"



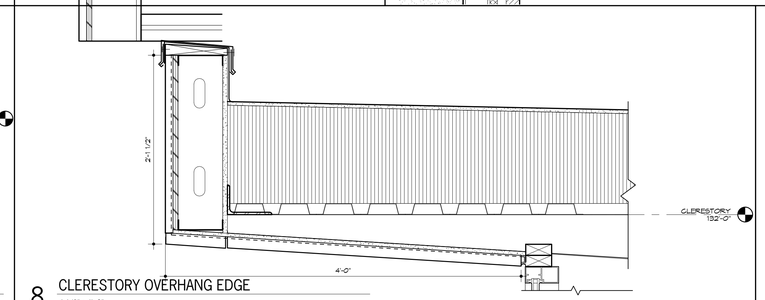
13 BTM OF EAST WALL
1 1/2" = 1'-0"



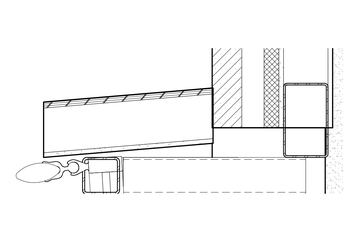
16 BTM OF WALL AT OPENING
1 1/2" = 1'-0"



15 BTM OF SOUTH WALL
1 1/2" = 1'-0"

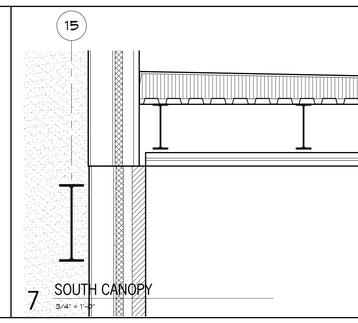


8 CLERESTORY OVERHANG EDGE
1 1/2" = 1'-0"

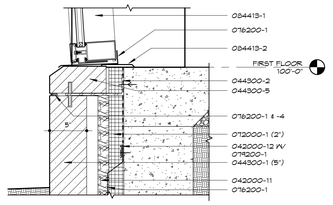


10 T.O. SLOPED GLAZING
1 1/2" = 1'-0"

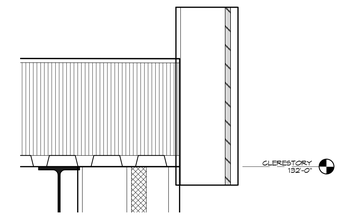
15 BTM OF SOUTH WALL
1 1/2" = 1'-0"



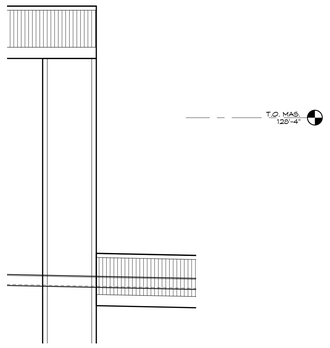
7 SOUTH CANOPY
3/4" = 1'-0"



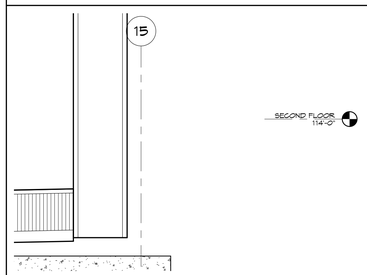
11 BTM OF SLOPED GLAZING
1 1/2" = 1'-0"



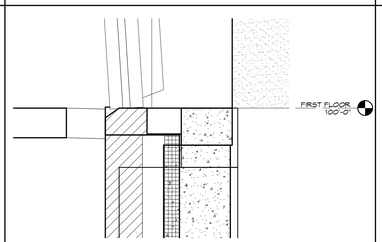
9 CLERESTORY EDGE
1 1/2" = 1'-0"



5 ELEVATOR ROOF
1 1/2" = 1'-0"



14 TRANSITION AT LOUVERS
1 1/2" = 1'-0"



17 BTM OF SLOPED GLAZING AT TUNNEL ACCESS
1 1/2" = 1'-0"

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (8x, 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet/Control Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-11	Sidewalk
	-12	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Weep Hole
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-5	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"C" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Lintel
	-6	Steel Plate
	-7	Steel Tube
	-9	Steel Plate
	-11	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055500	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	1x Wood Continuous (")
	-4	Plywood (")
	-5	90D Felt
	-6	15 Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	Plastic Laminate Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Hardwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Bill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1) Interior Liner Panel
	-2	Trim
	-3	Z-Furring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072128	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
076200	-1	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077129	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Expansive Joint Systems
079200	-1	Sealant - Make where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Plaster Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084115	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Mullion Cap
	-3	Aluminum Sill
	-4	Jamb Anchor
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088053	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile (" x ")
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
096813	-1	Carpet Tile
096900	-1	Access Flooring
099123	-1	Exterior Painting
099300	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102900	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

HTK ARCHITECTS PA
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
P 913.663.3373
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
P 785.266.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone: 785-296-2323
FAX: 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

DETAILS

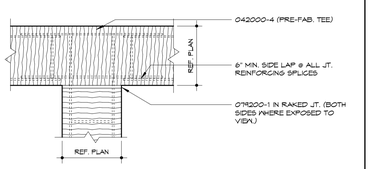
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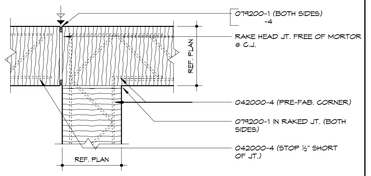
DESIGN DEVELOPMENT PHASE DOCUMENTS

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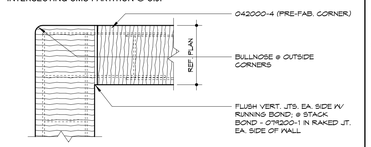
JCSBC
2-2-2016
Arc5A098



TYP. INTERSECTION CMU PARTITION DTL.

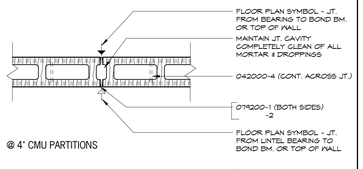


INTERSECTING CMU PARTITION @ C.J.

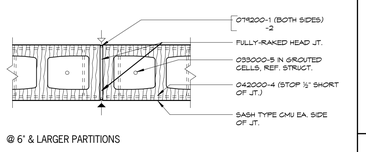


TYPICAL CMU CORNER DETAIL

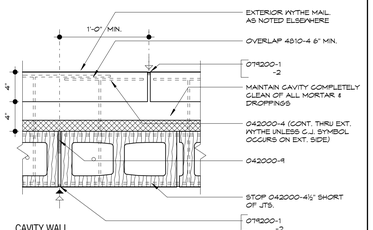
1 TYP. CMU DETAILS
1 1/2" = 1'-0"



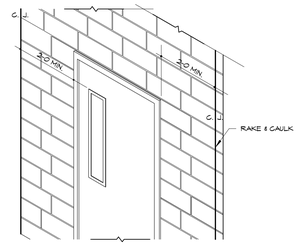
@ 4" CMU PARTITIONS



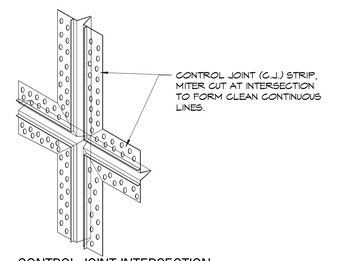
@ 6" & LARGER PARTITIONS



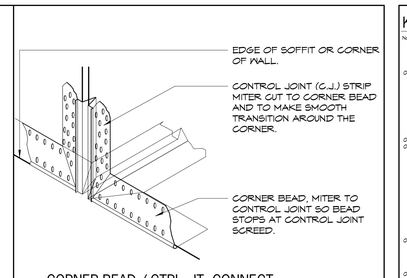
2 MASONRY SHRINKAGE CONTROL JTS.
1 1/2" = 1'-0"



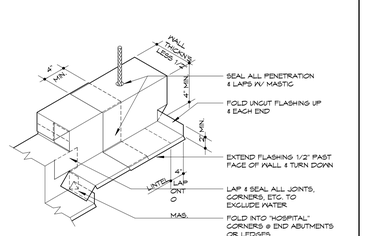
3 TYP. C.J. LOC. @ MASONRY OPNGS.
1/2" = 1'-0"



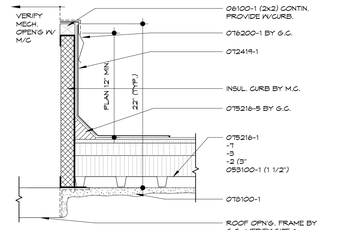
4 CONTROL JOINT INTERSECTION
3" = 1'-0"



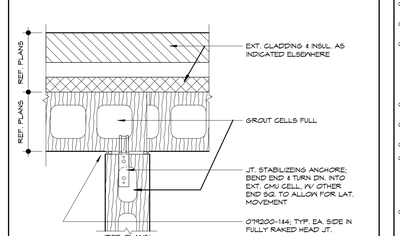
5 CORNER BEAD / CTRL. JT. CONNECT.
3" = 1'-0"



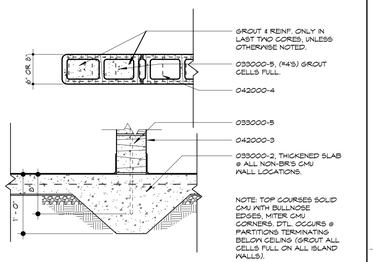
6 STD. FLASHING DETAILS
1 1/2" = 1'-0"



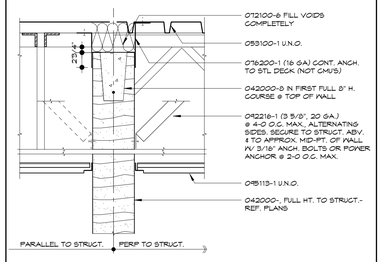
7 TYP. MECH. EQUIP. CURB
1 1/2" = 1'-0"



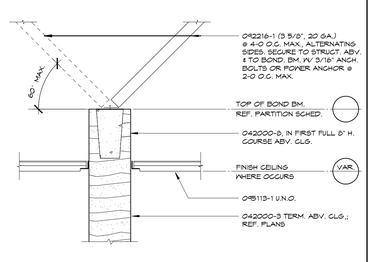
8 INT. PART'N. TO EXT. CMU WALL
1 1/2" = 1'-0"



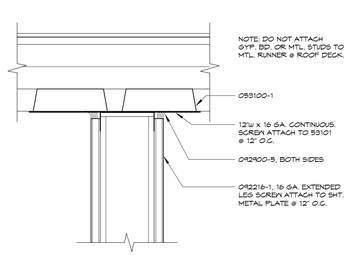
9 MASONRY WALL REINFORCING
1" = 1'-0"



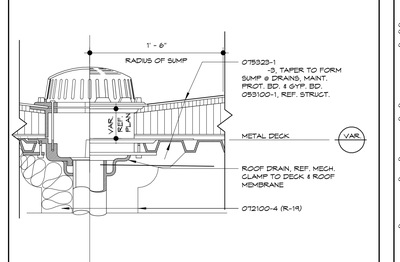
10 TYPICAL MAS. PARTN. (FULL HT.)
1 1/2" = 1'-0"



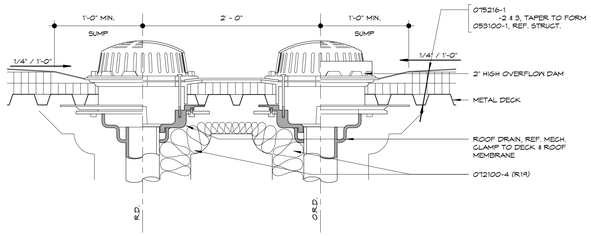
11 TYP. MAS. PARTN. (TO ABV. CLG.)
1 1/2" = 1'-0"



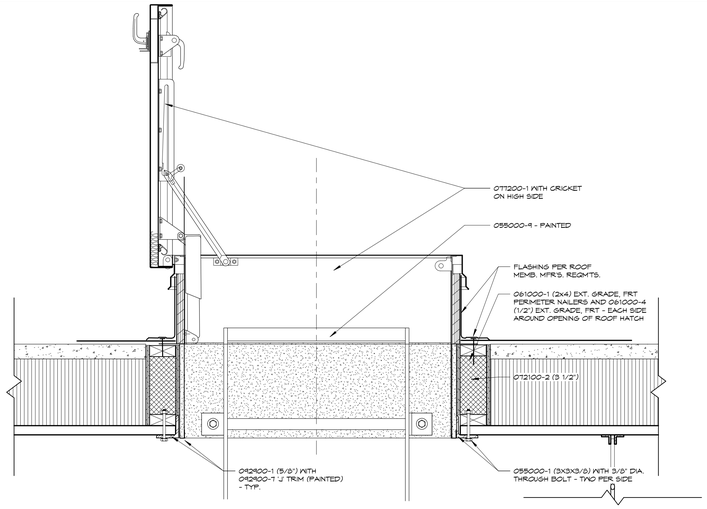
12 GYP. BD. PARTITON TERMINATION
3" = 1'-0"



13 ROOF DRAIN
1 1/2" = 1'-0"



14 ROOF DRAIN & OVERFLOW DRAIN
1 1/2" = 1'-0"



15 ROOF HATCH DETAIL
1 1/2" = 1'-0"

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (Ex: 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Weld Edge Joint
	-7	Rebarsaver
	-8	Dovetail Anchor
	-9	Sidewalk
	-10	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Weep Hole
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-2	Steel Composite Decking
	-3	"C" Closure
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"Z" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Lintel
	-6	Steel Pipe
	-7	Steel Tube
	-8	Steel Plate
	-9	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	¼ Wood Continuous (")
	-4	Plywood (")
	-5	1X0 Felt
	-6	1'0 Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	High Pressure Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Hardwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Insulation wall or under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Slip Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Interior Liner Panel
	-3	Trim
	-4	Z-flurring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072726	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
	-7	Sheet Metal Flashing and Counterflashing
	-2	Pre-finished Roof Edge
	-3	Pre-finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077124	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Rake where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Mission Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084115	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Aluminum Sill
	-3	Insect Screen
	-4	Mullion Cover
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088393	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Framing Compound
093000	-1	Ceramic Mosaic Tile
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel ("x") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nosing
096813	-1	Carpet Tile
096900	-1	Access Flooring
099113	-1	Exterior Painting
099123	-1	Interior Painting
099300	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102900	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
109113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
109613	-1	Metal Storage Shelving
107800	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

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DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
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FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

DETAILS

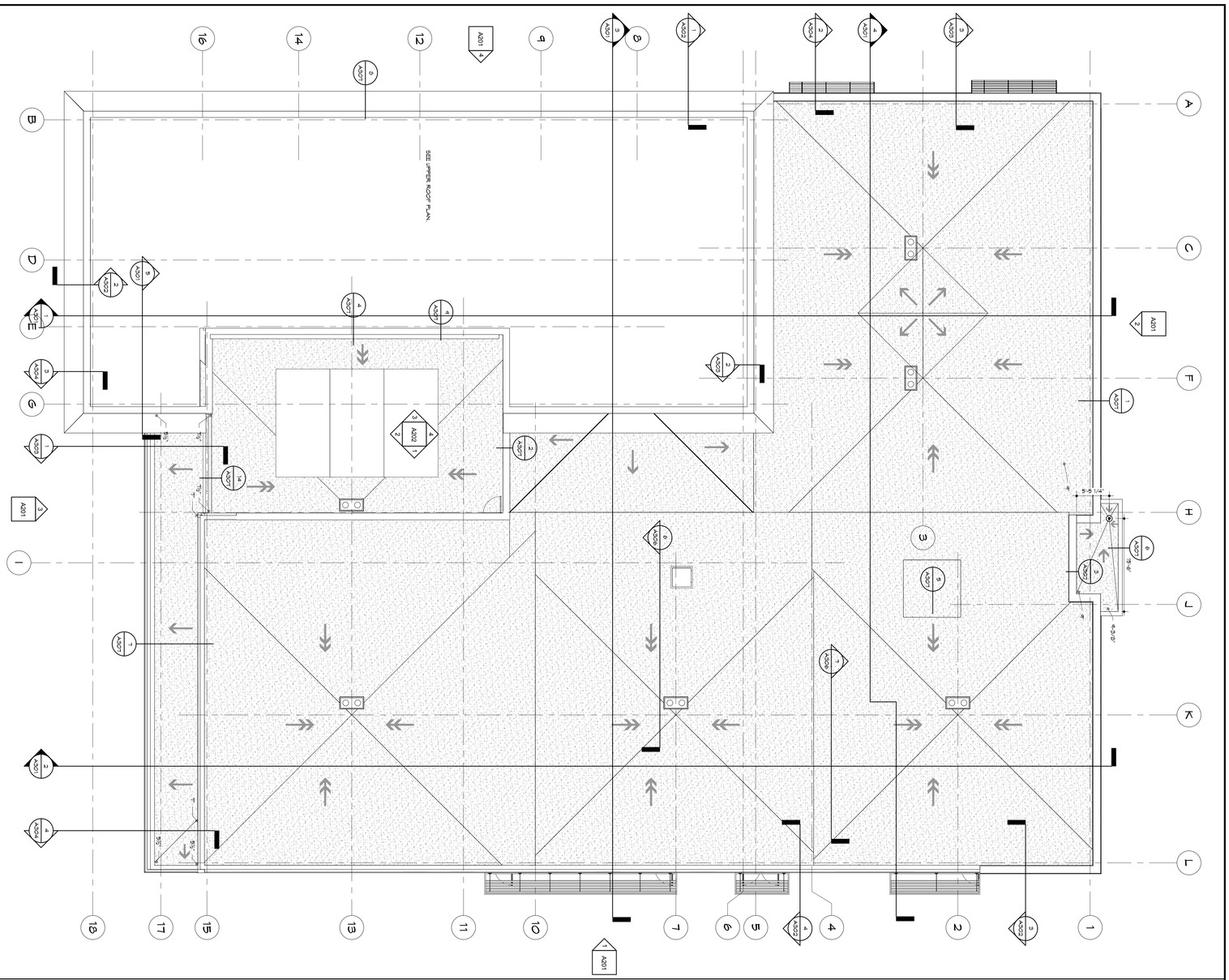
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ROOF PLAN LEGEND

INDICATES SLOPED STRUCTURE

INDICATES TAPERED INSULATION 1/2"/FT U.N.O

TOTAL THICKNESS OF INSULATION + ROOF SYSTEM ABOVE DECK U.N.O

TPO MEMBRANE OVER 1/2" DENSGLASS GOYPSBOARD AND 5" BASE POLYISO INSULATION

ROOF PLAN NOTES

GENERAL COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS. REF: FE SHEET FOR LIGHT COORDINATION

XXXXX
XXXXX
XXXXX
XXXXX

DESIGN DEVELOPMENT PHASE

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 2-9-15 DRAWN BY: Author CHECKED BY: Checker REV:

Department of Administration
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DATE: 2-9-15
REVISED DATE: 12-18-14
3-10-15
HTK PROJECT NUMBER: 1410.03

ROOF PLAN
A401
A012651
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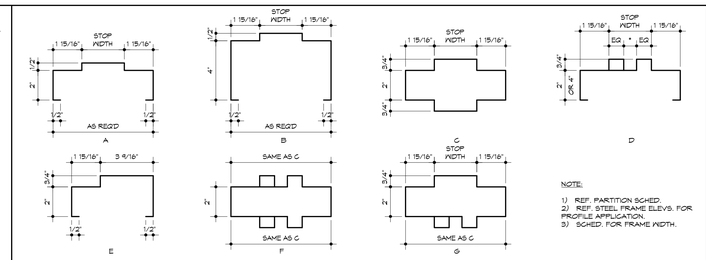
DOOR AND FRAME SCHEDULE

PLAN MARK	DOOR OPENING SIZE W	DOOR OPENING SIZE H	DOOR TYPE (A)	DOOR MATERIAL (B)	FRAME MATERIAL (B)	FRAME TYPE (C)	FRAME DETAILS HEAD (D)	FRAME DETAILS JAMB (D)	FRAME DETAILS OTHER (D)	RATING	NOTES
100.1	6'-0"	7'-2"	FG	A	A	A7	3	18	5		
100.2	6'-0"	7'-2"	FG	A	A	A8	2	2			
101.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
101.2	3'-0"	7'-2"	FG	N	HM	S1	2	2			
102	3'-0"	7'-2"	F	N	HM	S1	2	2			
103	2'-8"	7'-2"	F	N	HM	S1	2	2			
104	3'-0"	7'-2"	F	N	HM	S1	2	2			
105	3'-0"	7'-2"	F	N	HM	S1	2	2			
106	3'-0"	7'-2"	F	N	HM	S1	2	2			
107	3'-0"	7'-2"	F	N	HM	S1	2	2			
108	3'-0"	7'-2"	F	N	HM	S1	2	2			
109	3'-0"	7'-2"	F	N	HM	S1	2	2			
110.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
110.2	3'-0"	7'-2"	F	N	HM	S1	2	2			
111	3'-0"	7'-2"	F	N	HM	S1	2	2			
112	3'-0"	7'-2"	F	S	HM	S1	1	1			
115	3'-0"	7'-2"	F	N	HM	S1	2	1 & 2			
116	3'-0"	7'-2"	F	N	HM	S1	2	1 & 2			
117	3'-0"	7'-2"	F	N	HM	S1	1	1			
118	3'-0"	7'-2"	F	N	HM	S1	2	1 & 2			
120	3'-0"	7'-2"	F	N	HM	S1	2	2			
121	3'-0"	7'-2"	F	N	HM	S1	2	2			
123.1	3'-0"	7'-2"	F	S	HM	S1	1	1			
123.2	6'-0"	7'-2"	F	N	HM	S2	2	2			
123.3	3'-0"	7'-2"	F	N	HM	S1	2	2			
124	3'-0"	7'-2"	F	N	HM	S1	2	2			
125.1	3'-0"	7'-2"	FG	S	HM	S1	2	2			
125.2	3'-0"	7'-2"	FG	S	HM	S1	2	2			
125.3	3'-0"	7'-2"	F	S	HM	S1	2	2			
126.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
126.2	6'-0"	7'-2"	F	N	HM	S2	2	2			
127.1	3'-0"	7'-2"	F	FRP	A	S1 SM	3	19	5		
127.2	12'-0"	10'-0"						20			
128	6'-0"	7'-2"	F	S	HM	S2	2	2			
129.1	6'-0"	7'-2"	FG	A	A	A11	3	18	5		
129.2	6'-0"	7'-2"	F	N	HM	S2	2	2			
130.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
130.2	3'-0"	7'-2"	F	N	HM	S1	2	2			
131.1	3'-0"	7'-2"	F	FRP	A	A	3	19	5		
131.2	10'-0"	12'-0"	OHCD	S		OHCD	10	11	12		
132.1	3'-0"	7'-2"	F	S	HM	S1	2	2			
132.2	3'-0"	7'-2"	F	S	HM	S1	2	2			
133.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
133.2	3'-0"	7'-2"	F	N	HM	S1	2	2			
134	3'-0"	7'-2"	F	N	HM	S1	2	2			
135.1	3'-0"	7'-2"	F	S	HM	S1	2	2			
135.2	3'-0"	7'-4"	F	FRP	A	A9	3	19	5		
136.1	3'-0"	7'-4"	F	FRP	A	A9	3	19	5		
136.2	10'-0"	10'-0"	OHCD	S		OHCD	10	11	12		
138	3'-0"	7'-2"	F	N	HM	S1	2	2			
139	6'-0"	7'-4"	F	FRP	A	A10	3	19	5		
140	3'-0"	7'-2"	F	N	HM	S1	2	2			
141.1	3'-0"	7'-4"	F	FRP	A	A9	3	19	5		
141.2	10'-0"	10'-0"	OHCD	S		OHCD	10	11	12		
141.3	3'-0"	7'-2"	F	S	HM	S1	2	2			
142.1	3'-0"	7'-2"	F	N	HM	S1	2	2			
142.2	3'-0"	7'-2"	F	N	HM	S1	2	2			
143	3'-0"	7'-2"	F	S	HM	S1	2	2			
144	3'-0"	7'-2"	FG	N	HM	S1	1	1			
145	3'-0"	7'-2"	F	N	HM	S1	2	2			
200	3'-0"	7'-2"	F	N	HM	S1	1	1			
201	3'-0"	7'-2"	F	N	HM	S1	1	1			
202	3'-0"	7'-2"	F	N	HM	S1	1	1			
203	3'-0"	7'-2"	F	N	HM	S1	1	1			
204	3'-0"	7'-2"	F	N	HM	S1	2	2			
205	3'-0"	7'-2"	F	FRP	A	S1	1	1			
206	3'-0"	7'-2"	F	N	HM	S1	2	2			
207	3'-0"	7'-2"	F	N	HM	S1	2	2			
208	3'-0"	7'-2"	F	N	HM	S1	2	2			
209	3'-0"	7'-2"	F	N	HM	S1	2	2			
210	3'-0"	7'-2"	F	N	HM	S1	2	2			
211	3'-0"	7'-2"	F	N	HM	S1	2	2			
212	6'-0"	7'-2"	F	N	HM	S2	2	2			
214	3'-0"	7'-2"	F	N	HM	S1	2	2			
215	3'-0"	7'-2"	F	N	HM	S1	2	2			
217	3'-0"	7'-2"	F	N	HM	S1	2	2			
218	3'-0"	7'-2"	F	N	HM	S1	2	2			
219	3'-0"	7'-2"	F	N	HM	S1	2	2			
221	4'-0"	7'-2"	F	N	HM	S1	2	2			
222	4'-0"	7'-2"	F	S	HM	S1	2	2			
223	3'-0"	7'-2"	F	N	HM	S1	2	2			
224	3'-0"	7'-2"	F	S	HM	S1	2	2			

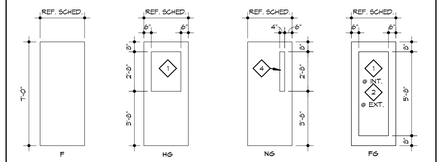
DOOR & FRAME SCHEDULE NOTES

- Field verify conditions at all exist. openings & modify as req'd to fit.
- All alum. frames are 4 1/2" deep and 2" wide- u.n.o.
- All steel welded frames are 3/4" wider than the nominal wall width - u.n.o
- All doors are 1 3/4" thick unless noted otherwise.
- Letters in parentheses ( ) A, B, C, D, E, & F at top of various columns in the schedule are for column identification & are clarified as follows:
  (A) To identify DOOR TYPES refer to DOOR TYPES this sheet.
  (B) For DOOR MATERIAL AND FRAME MATERIAL:
  S = Steel
  A = Aluminum
  N = None
  (C) To identify FRAME TYPES refer to STEEL FRAME ELEVATIONS & ALUM. FRAME ELEVS.
  (D) FRAME DETAILS are referenced and shown as follows, unless noted otherwise:
  Frame Details are referenced in Door and Frame Schedule, and shown on this sheet. Steel Frame Profiles are referenced on Steel Frame Elevations, and shown on this sheet.
  Glass types are shown on Frame Elevations.
  (E) SCHEDULE NOTES:
  1. XXXXX
  2. XXXXX

STEEL FRAME PROFILES

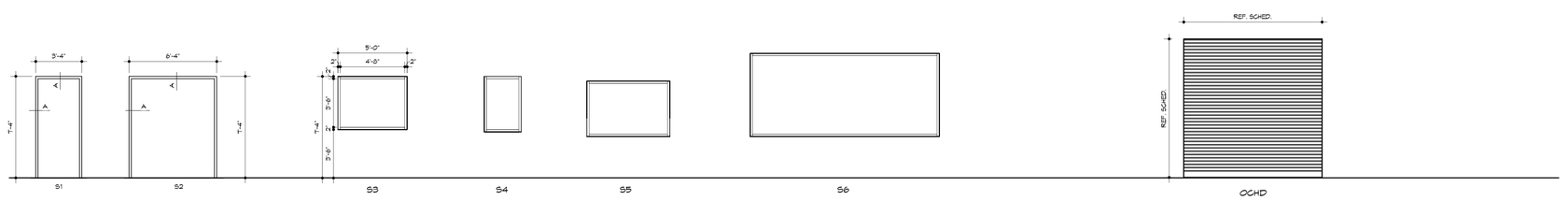


DOOR TYPES

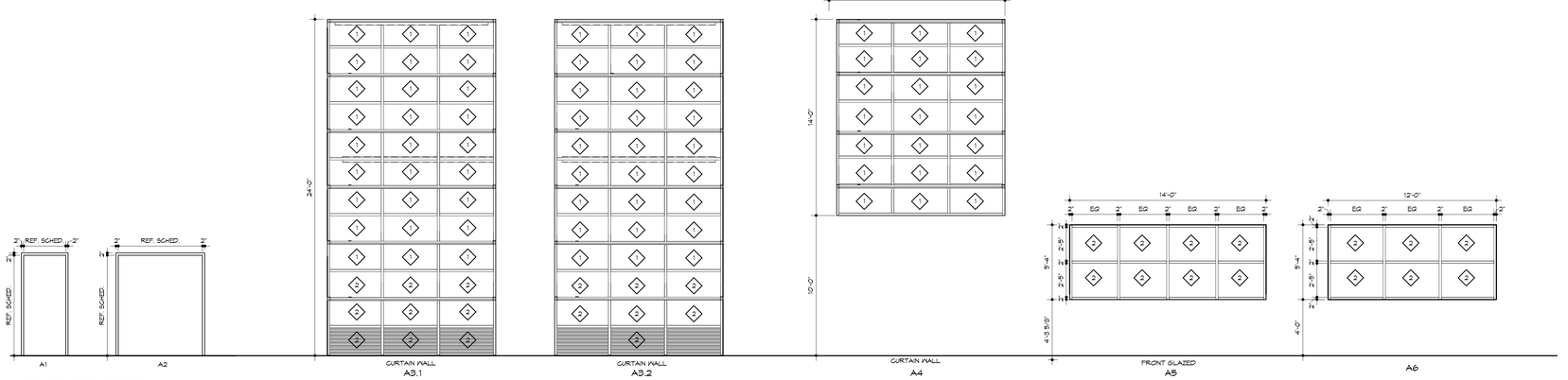


GLASS SCHEDULE

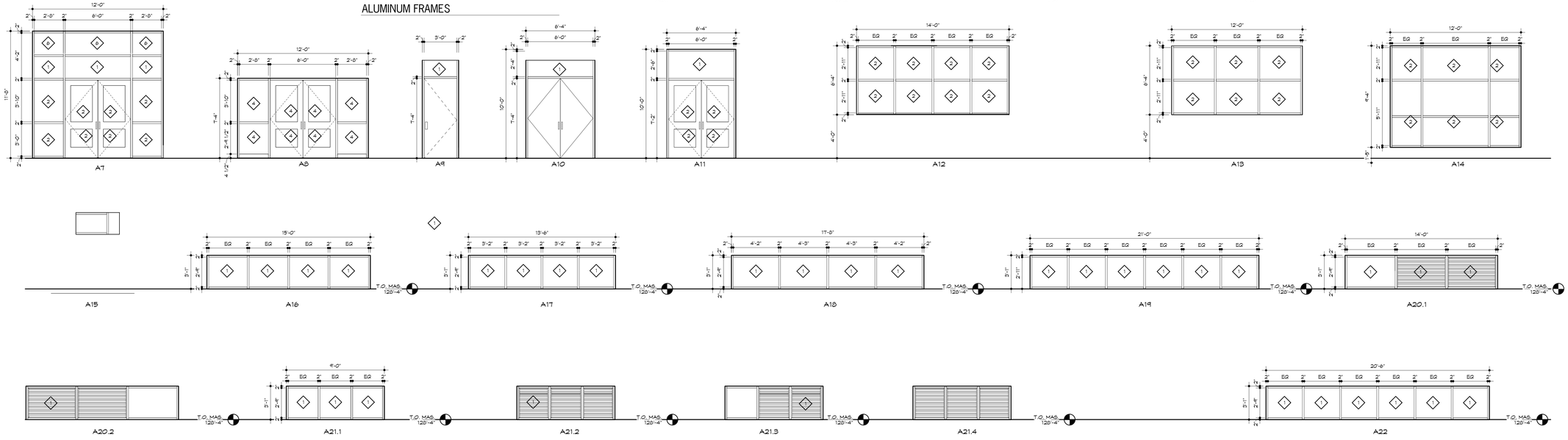
MARK	TYPE
1	1" INSULATING: A) Exterior - 1/4" Tinted B) Interior - 1/4" Clear Low-E
2	1" INSULATING TEMPERED: A) Exterior - 1/4" Tinted B) Interior - 1/4" Clear Low-E
3	1/4" CLEAR
4	1/4" CLEAR TEMPERED
5	BALLISTIC GLAZING
6	1" INSULATING TEMPERED SPANDREL



STEEL FRAMES



ALUMINUM FRAMES



HTK ARCHITECTS PA
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
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900 S. KANSAS AVE., SUITE 200
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DESIGN DEVELOPMENT PHASE

DATE:
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- 12-18-14
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HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone No. 785-296-3899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

DOOR, FRAME, & WINDOW SCHEDULES & DETAILS

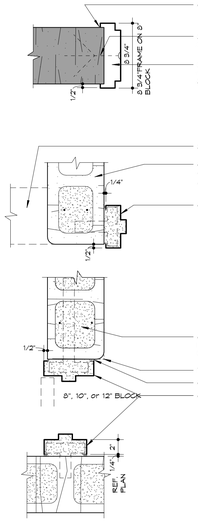
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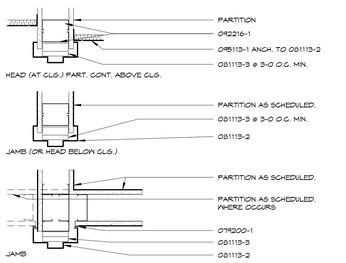
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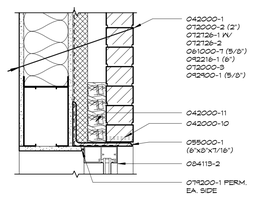
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2-2-2016
Att:9A101



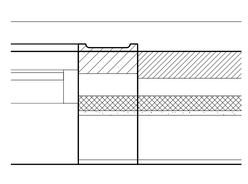
1 INT. MASONRY JAMB, HEAD SIM DETAIL
1 1/2" = 1'-0"



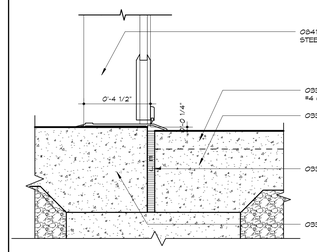
2 GYP. BD. PARTITION HEAD & JAMB DETAIL
1 1/2" = 1'-0"



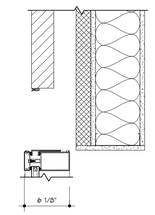
3 ALUM. EXTERIOR HEAD @ BRICK
1 1/2" = 1'-0"



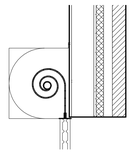
4 ALUMINUM JAMB- EXT.
1 1/2" = 1'-0"



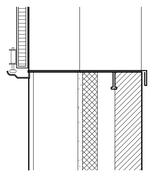
5 EXTERIOR THRESHOLD DETAIL
3" = 1'-0"



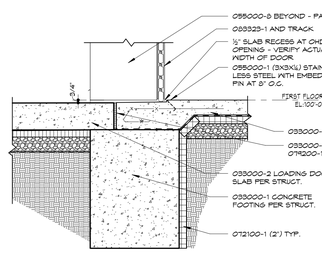
9 SLOPED GLAZING JAMB
1 1/2" = 1'-0"



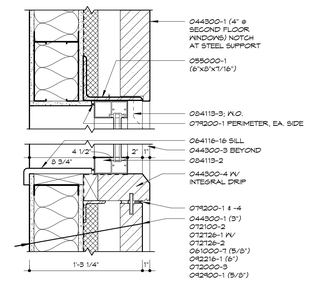
10 OVERHEAD COILING DOOR HEAD - EXT.
3/4" = 1'-0"



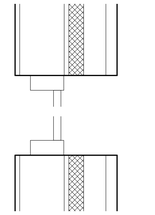
11 OVERHEAD COILING DOOR JAMB
1 1/2" = 1'-0"



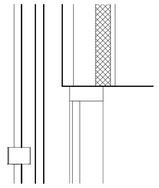
12 OVERHEAD COILING DOOR SILL
3/4" = 1'-0"



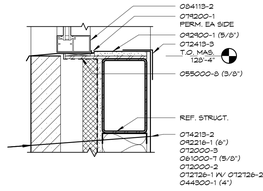
13 ALUM. WINDOW HEAD AND SILL
1 1/2" = 1'-0"



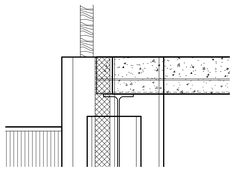
14 ALUM. HEAD AND SILL AT METAL PANEL
1 1/2" = 1'-0"



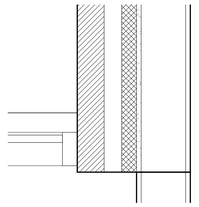
15 ALUM. JAMB AT METAL PANEL
1 1/2" = 1'-0"



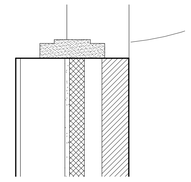
16 CLERESTORY ALUM. WINDOW SILL
1 1/2" = 1'-0"



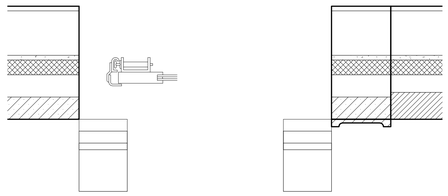
17 DOOR 205 SILL
1 1/2" = 1'-0"



18 DOOR 100.1 JAMB
1 1/2" = 1'-0"



19 EXTERIOR DOOR JAMB
1 1/2" = 1'-0"



20 SLIDING GARAGE DOOR JAMB
1 1/2" = 1'-0"

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (Ex. 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet on Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-11	Sidewalk
	-10	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Weep Hole
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-3	Steel Composite Decking
	-2	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"C" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-2	Steel Lintel
	-3	Steel Plate
	-7	Steel Tube
	-5	Steel Plate
	-6	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055300	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	¼ Wood Continuous (")
	-4	Plywood (")
	-5	HSO Felt
	-6	#15 Felt
	-7	Sheathing (")
	-8	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	Plastic Laminate Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Handwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Sill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1) Interior Liner Panel
	-3	Trim
	-4	Z-Flashing (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072126	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
	-7	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077129	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Rake where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control
081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Mission Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Mullion Cover
	-3	Panel Adapter
	-4	Jamb Anchor
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088053	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Finishing Compound
093000	-1	Ceramic Mosaic Tile (" x ")
	-2	Glazed Wall Tile (" x ")
	-4	Porcelain Floor Tile (" x ")
	-5	Tile Base
	-6	Tile Cap
	-7	Setting Bed
095113	-1	Acoustical Panel (" x ") (F = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
	-1	Carpet Tile
096723	-1	Access Flooring
099100	-1	Exterior Painting
099123	-1	Interior Painting
099300	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
	-4	Wire Mesh Partitions
102800	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102900	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personal Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flagpole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS (DETAILS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

NOTE: REFER TO ALL SECTIONS (SECTIONS LOCATED ON THIS SHEET, PRECEEDING SHEETS AND FOLLOWING SHEETS) FOR APPLICABLE NOTES NOT SHOWN

HTK ARCHITECTS PA
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
P 913.663.3373
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
P 785.266.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone: 785-296-8669
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???
DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

DOOR, FRAME, & WINDOW DETAILS

A-012651

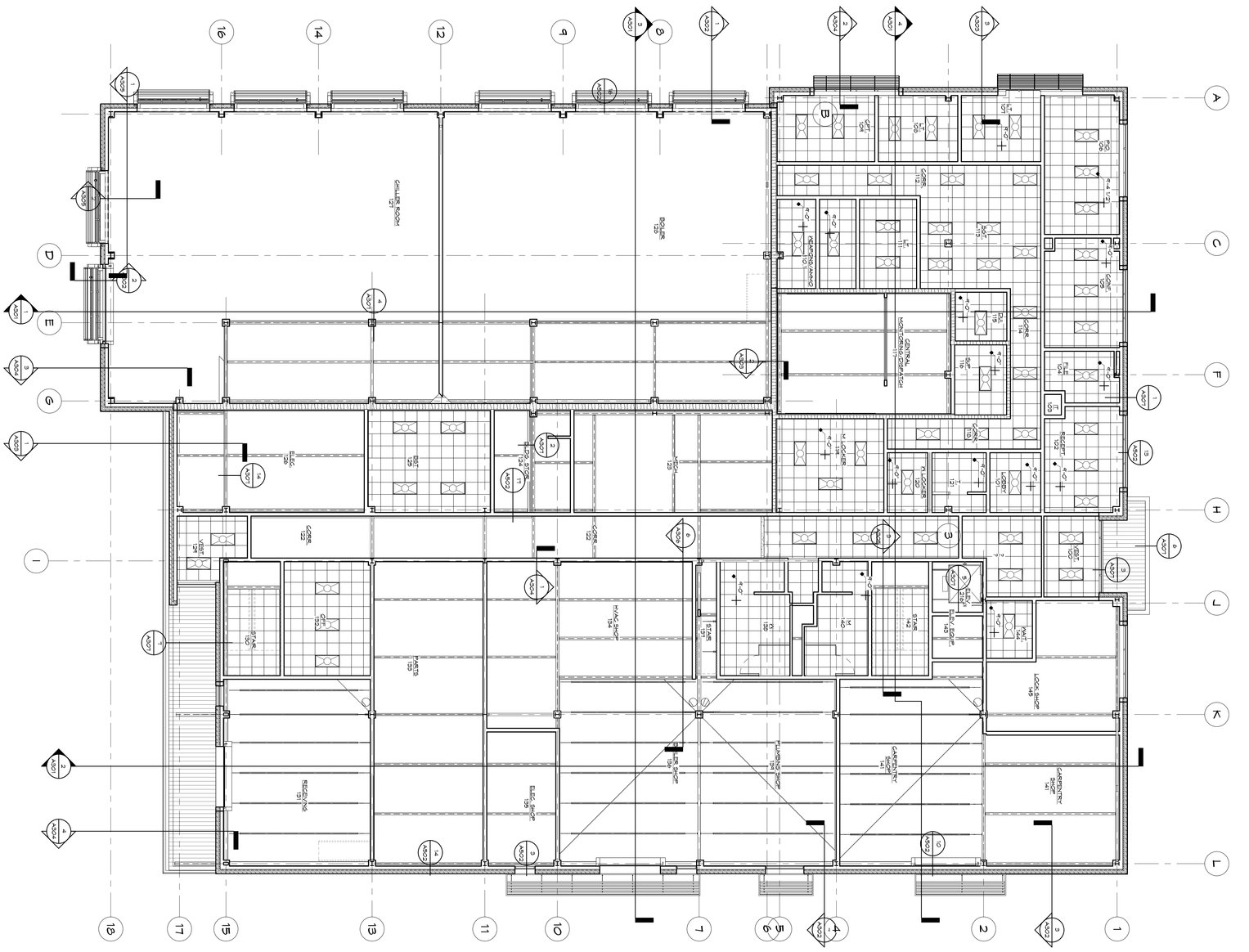
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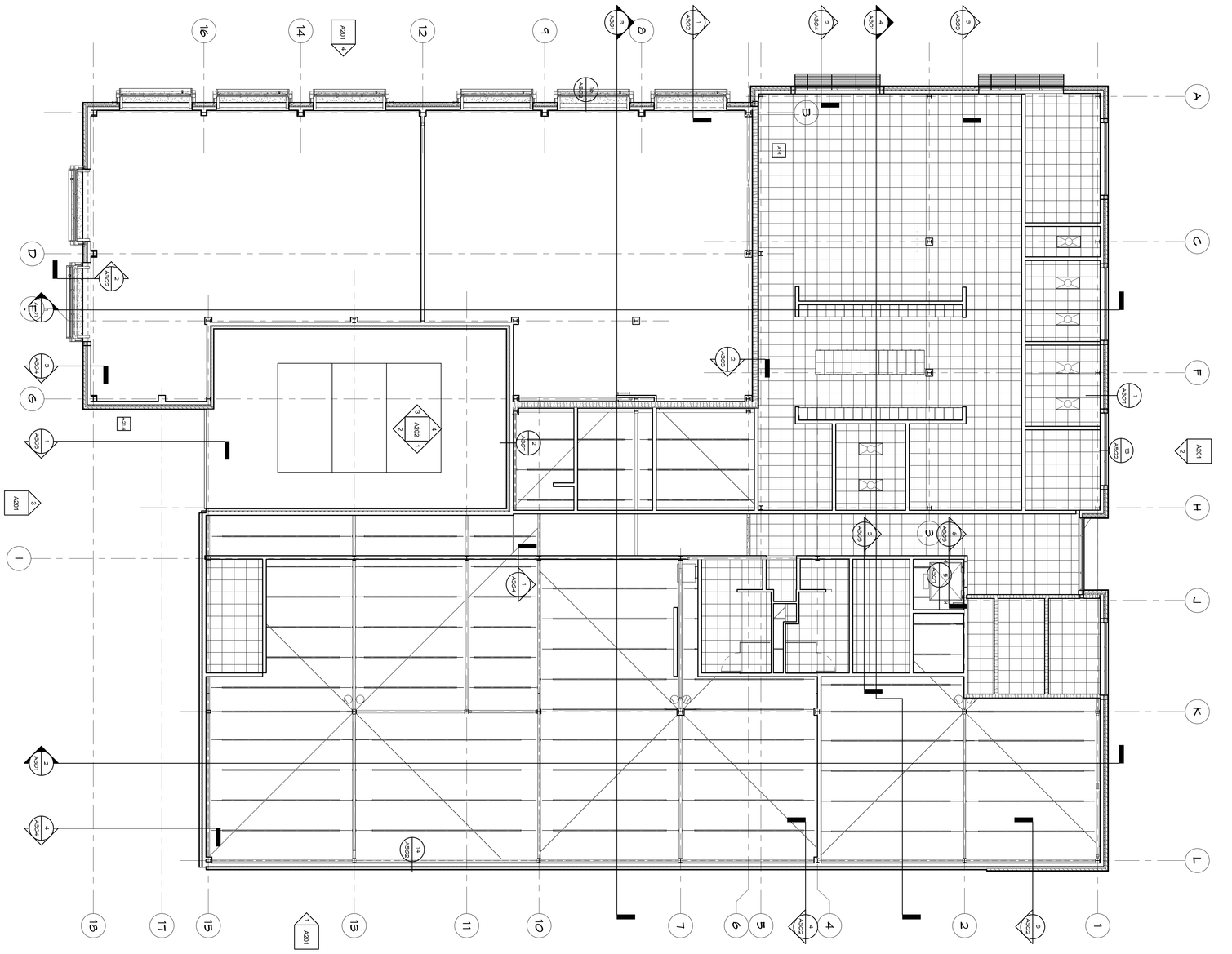
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JCSBC
2-2-2016
Att.9A102

1 FIRST FLOOR
1/8" = 1'-0"



1 SECOND FLOOR
1/8" = 1'-0"



NOTE: REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL IN EXTERIOR WALLS AND CONCRETE NOT SHOWN

NOTE: REFER TO ALL DETAILS SHOWN OR LOCATED ON THIS SHEET, PRECEDING SHEETS AND FOLLOWING SHEETS FOR APPLICABLE NOTES NOT SHOWN

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REFLECTED CEILING PLAN LEGEND

- 2'-0" X 2'-0" ACOUSTICAL CEILING TILE & GRID
- 2'-0" X 4'-0" ACOUSTICAL CEILING TILE & GRID
- PAINTED GYP. BD. & MTL. STUD SOFFIT
- 2'-0" X 2'-0" LIGHT FIXTURE. REF. ELEC.
- 2'-0" X 4'-0" LIGHT FIXTURE. REF. ELEC.
- EXTERIOR STRIP LIGHT FIXTURE. REF. ELEC.
- ADJUSTABLE RECESSED LIGHT FIXTURE. REF. ELEC.
- DOWNLIGHT FIXTURE. REF. ELEC.
- WALL WASHER FIXTURE. REF. ELEC.
- INTERIOR STRIP LIGHT FIXTURE. REF. ELEC.
- CEILING REGISTER. REF. MECH.
- CEILING RETURN. REF. MECH.
- EIFS SOFFIT
- 0'-0" CEILING HEIGHT OFF FLOOR.

REFLECTED CEILING PLAN NOTES

GENERAL: COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS. REF. TE SHEET FOR EQUIP. COORDINATION

- XXXXX
- XXXXX
- XXXXX
- XXXXX

DESIGN DEVELOPMENT PHASE

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 2-9-15 DRAWN BY: Author CHECKED BY: Checker REV:

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

DATE: 2-9-15
REVISED DATE: 12.18.14 3.10.15
HTK PROJECT NUMBER: 1410.03

HTK ARCHITECTS PA
900 S. KANSAS AVE., SUITE 200
TOPEKA KANSAS 66612
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9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
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www.htkarchitects.com

REFLECTED CEILING PLAN
SECOND FLOOR

A012651

A602

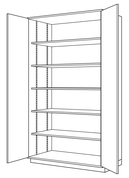
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PHASE DOCUMENTS

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By: Jeffrey Hall
Autodesk Revit 2015

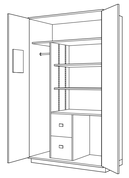
TALL CABINETS:



OPEN
T1
a)
b)



DOOR
T2

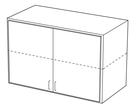


TEACHERS WARDROBE
T4

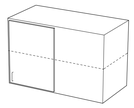
WALL CABINETS:



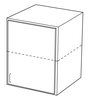
OPEN
W1
a)
b)



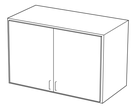
DOOR
W2



BLIND CORNER
W3



DRAWER
W10

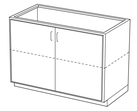


DOOR NO SHELF
W22

BASE CABINETS:



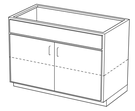
OPEN
B1
a)
b)



DOOR
B2



DOOR DRAWER
B7



SINK
K B
D



BLIND CORNER
B20



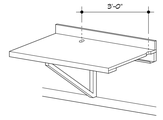
FILE DRAWER
B27



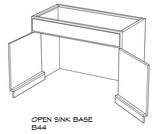
FILE DRAWER
B28



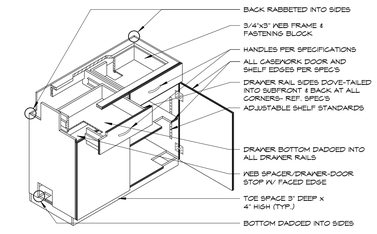
OPEN SINK BASE
B34



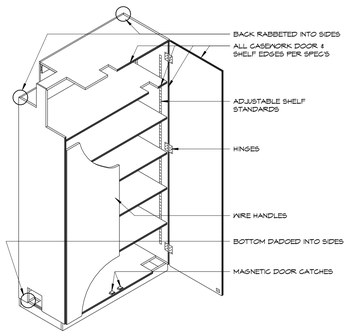
COMPUTER COUNTER
B40



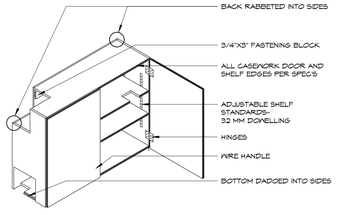
OPEN SINK BASE
B44



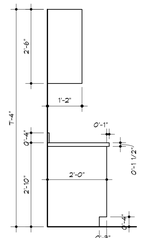
6 TYP. BASE CABINET
3" = 1'-0"



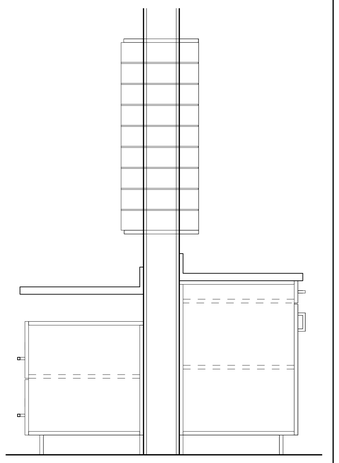
7 TYP. TALL CABINET
3" = 1'-0"



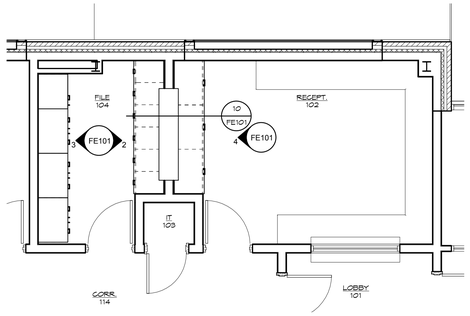
8 TYP. WALL CABINET
3" = 1'-0"



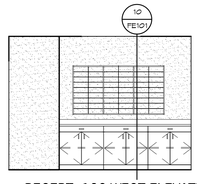
9 TYP. ELEVATIONS
1/2" = 1'-0"



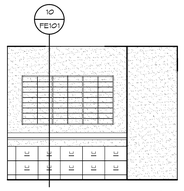
10 FILE 104/RECEPT 102 MAILBOXES
1" = 1'-0"



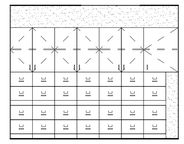
1 FIXED EQUPIMENT PLAN - MAIN LEVEL
1/4" = 1'-0"



4 RECEPT. 102 WEST ELEVATION
1/4" = 1'-0"



2 FILE 104 EAST ELEVATION
1/4" = 1'-0"



3 FILE 104 WEST ELEVATION
1/4" = 1'-0"

FIXED EQUIPMENT PLAN NOTES

GENERAL: COORDINATE WITH WORK SHOWN ON STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS, REF. FE SHEET FOR EQUIP. COORDINATION

△ XXXXX
△ XXXXX
△ XXXXX
△ XXXXX

FIXED EQUIPMENT GENERAL NOTES

A. ALL SCHEDULED HEIGHTS ARE FROM FLOOR TO TOP OF CASEWORK UNIT (U.N.O.). HEIGHT OF CASEWORK WILL BE MEASURED TO TOP OF FINISHED COUNTERTOP.
B. FILLER PANELS SHALL BE OF SAME MATERIAL, MATERIAL THICKNESS & FINISH MATERIAL AS CABINET - COLOR TO MATCH BODY.
C. REFERENCE SPECIFICATIONS & DETAILS FOR TYP. CASEWORK CONSTRUCTION.
D. FIELD VERIFY ALL LOCATIONS & ADJUST UNIT DIMENSIONS AS REQUIRED TO FIT.
E. MECHANICAL, PLUMBING & ELECTRICAL FIXTURES & FITTINGS BY MECHANICAL/ ELECTRICAL CONTRACTOR U.N.O.
F. REFERENCE MECHANICAL/ ELECTRICAL DRAWINGS FOR COORDINATION WITH ELECTRICAL OUTLETS, PLUMBING & MECHANICAL.
G. PROVIDE PLASTIC LAMINATE ON SURFACES OF CASEWORK EXPOSED TO VIEW.
H. PROVIDE CONTINUOUS COUNTERTOP & 4" HIGH BLACK SPLASH AND/ OR SIDESPLASH WHERE ABUTS VERTICAL WALL SURFACE; ALL EI ITEMS.
I. PROVIDE LOCKS ON ALL CABINET DOORS/ DRAWERS. ALL CASEWORK LOCKS WITH IN A ROOM KEYED ALIKE, EACH ROOM KEYED DIFFERENT. PROVIDE THREE (3) MASTER KEYS. PROVIDE THREE DIFFERENT LOCKS IN MAIN OFFICE.
J. WHERE TALL CASEWORK OCCURS ADJ. TO BASE CABINETS, SET TALL CABINETS OUT PAST COUNTERTOP SO THAT TALL CABINET DOORS OPEN 180 DEGREE & INSTALL FILLER PANELS @ TOP & EXPOSED EDGES.
K. PROVIDE FILLER PANEL @ TOP OF CABINET @ ALL LOCATIONS WHERE (2) WALL OR TALL CABINETS MEET @ INNER CORNER. PROVIDE A CONTINUOUS BRACING @ THE WALL TO ALLOW FOR STORAGE OF ITEMS ABOVE THE FILLER.
L. MOUNT TOPS OF ALL WALL CABINETS AT 24" A.F.F., U.N.O.
M. TYP. TOEKICK 4" HIGH UNLESS OTHERWISE NOTED.
N. PROVIDE PLAM COUNTERTOP WITH APPROPRIATE SUPPORT FOR LENGTH OF COUNTER, USE IN CONJUNCTION WITH WALL CLEATS & MTL. COUNTERTOP SUPPORTS.
O. PROVIDE COUNTERTOP ON ALL WALL CABINETS MOUNTED AT 60" A.F.F. OR LOWER

FIXED EQUIPMENT LEGEND

PLAM COLOR *1	PLAM COLOR *4
PLAM COLOR *2	PLAM COLOR *5
PLAM COLOR *3	TACK PANEL

NOTE:

1) * = ACTUAL COLORS WILL BE INDICATED BY ARCHITECT ON THE PROJECT COLOR SCHEDULE.

2) PLAM COLOR TO WRAP CONTINUOUSLY AROUND CORNERS.

KEYNOTES

Note: Keynotes are drawn from a master list & may not be sequentially numbered. Sizes (Ex. 2x4) or other info. following keynote on drawings indicates criteria for those materials/locations which may differ from std. material specified.

033000	-1	Concrete Structure
	-2	Concrete Floor Slab
	-3	Vapor Barrier
	-4	Welded Wire Fabric
	-5	Steel Reinforcing Bar
	-6	Reglet/Joint
	-7	Waterstop
	-9	Dovetail Anchor
	-9	Sidewalk
	-10	Premolded Joint Filler
035300	-1	Concrete Topping
042000	-1	Face Brick
	-2	Concrete Masonry Unit - Normal Weight (")
	-3	Concrete Masonry Unit - Lightweight (")
	-4	Wire Reinforcing
	-5	Metal Tie/Anchor
	-6	Through Wall Flashing
	-7	Control Joint Strip
	-8	Bond Beam (")
	-9	Compressible Filler
	-10	Weep Hole
	-11	Cavity Drainage Material
	-12	Termination Bar
044300	-1	Stone Masonry
	-2	Anchor
	-3	Stone Jamb
	-4	Stone Sill
	-5	Belt Course
047200	-1	Cast Stone
051200	-1	Steel Beams
	-2	Steel Column
	-3	Steel Tube
	-4	Steel Channel
052100	-1	Steel Joist
	-2	Joist - Extended End
	-3	Joist - Ceiling Extension
053100	-1	Metal Decking
	-2	Steel Composite Decking
	-3	Flexible Closure Strips
054000	-1	Structural Steel Studs
	-2	Structural Steel Joists
	-3	"Z" Closure
055000	-1	Steel Angle
	-4	Steel Channel
	-5	Steel Joist
	-6	Steel Plate
	-7	Steel Tube
	-8	Steel Plate
	-9	Steel Ladder
	-10	Steel Sidewalk Trenchdrain Cover
055100	-1	Steel Stairs
	-2	Steel Stair Stringer
	-3	Steel Embed Plate
055213	-1	Steel Pipe Handrail
	-2	Steel Pipe Guardrail
	-3	Steel Handrail Wall Bracket
055500	-1	Steel Grating
	-2	Steel Frame
061000	-1	2x Wood Nailer (")
	-2	2x Wood Blocking (")
	-3	1/4 Wood Continuous (")
	-4	Plywood (")
	-5	1100 Felt
	-6	1125 Felt
	-7	Sheathing (")
	-9	Cement Board
064116	-1	Interior Architectural Woodwork
	-2	Plastic Laminate Laminate
	-3	Cabinet Liner Laminate
	-4	Particle Board
	-5	Plywood
	-6	3mm Edge Molding
	-7	Solid Wood Blocking
	-8	Hardwood
	-9	Steel Tube/Leg Frame
	-10	Door Hinge
	-11	Door/Drawer Pull
	-12	Magnetic Catch
	-13	Drawer
	-14	Shelf Supports
	-15	Countertop
	-16	Solid-Surfacing Material
071113	-1	Bituminous Dampproofing
071326	-1	Self-Adhering Sheet Waterproofing
072100	-1	Foundation Wall or Under Slab Insulation (R-)
	-2	Cavity Wall Insulation (R-)
	-3	Building Insulation - Unfaced (R-)
	-4	Building Insulation - Faced (R-)
	-5	Sill Sealer
	-6	Batting Insulation
072413	-1	Exterior Insulation and Finish System
074213	-1	Metal Wall Panel (Type 1)
	-2	Interior Liner Panel
	-3	Trim
	-4	Z-Furring (")
	-5	Metal Wall Panel (Type 2)
	-6	Metal Soffit Panel
072726	-1	Fluid Applied Membrane Air Barrier
	-2	Flashing Tape
075423	-1	Thermoplastic Polyolefin (TPO) Roofing
	-2	Roof Insulation Flat
	-3	Roof Insulation Tapered
	-4	Roof Expansion Joint
	-5	Coverboard
	-6	Walkway Protection Board
	-7	Sheet Metal Flashing and Counterflashing
	-2	Pre-Finished Roof Edge
	-3	Pre-Finished Coping
	-4	Sheet Metal Reglet
	-5	Sheet Metal Gutter
	-6	Sheet Metal Downspout
	-7	Sheet Metal Scupper
077126	-1	Roof Expansion Joint
077200	-1	Roof Hatch/Ladder
078413	-1	Penetration Firestopping
078446	-1	Fire-Resistive Joint Systems
079200	-1	Sealant - Make where required
	-2	Joint Filler
	-3	Gasket
	-4	Backer Rod
079500	-1	Expansion Control

081113	-1	Steel Door
	-2	Steel Frame
	-3	Frame Anchor
	-4	Louver
	-5	Mission Guard
081416	-1	Flush Wood Door
083113	-1	Access Door
	-2	Access Door Frame
083323	-1	Overhead Coiling Door
	-2	Coiling Counter Door
083613	-1	Sectional Overhead Door
	-2	Sectional Overhead Door Track
	-3	Weatherstripping
084113	-1	Aluminum Entrance Door
	-2	Aluminum Entrance Frame
	-3	Sunshade
084413	-1	Glazed Aluminum Curtain Wall
	-2	Threshold
085113	-1	Aluminum Window
	-2	Mullion Cap
	-3	Panner Bar
	-4	Jamb Anchor
	-5	Aluminum Cover
088000	-1	Glazing (as scheduled)
088053	-1	Security Glazing (as scheduled)
089000	-1	Louvers and Vents
092216	-1	Steel Stud (")
	-2	Steel Stud Runner (")
	-3	Furring Channel
092900	-1	Gypsum Board (")
	-2	Fire Rated Gypsum Board (")
	-3	Cementitious Tile Backer Panel
	-4	Metal Suspension System
	-5	Acoustical Sealant
	-6	Acoustical Insulation (")
	-7	Metal Edge Trim
	-8	Auxiliary Support Framing
	-9	Metal Control Joint
	-10	High Impact Gypsum Board
	-11	Concrete Interior Framing Compound
093000	-1	Ceramic Mosaic Tile
	-2	Glazed Wall Tile
	-3	(" x ")
	-4	Porcelain Floor Tile
	-5	(" x ")
	-6	Tile Base
	-7	Tile Cap
	-8	Setting Bed
095113	-1	Acoustical Panel ('x ') (If = Fire Rated)
	-2	Ceiling Suspension System
	-3	Edge Mold Trim
	-4	Auxiliary Support Framing
096513	-1	Resilient Tile Flooring
	-2	Resilient Wall Base
	-3	Edge Strip
	-4	Tactile Warning Surface
	-5	Resilient Stair Tread
	-6	Resilient Stair Riser
	-7	Resilient Stringer Skirt
	-8	Resilient Stair Nose
096813	-1	Carpet Tile
096900	-1	Access Flooring
099113	-1	Exterior Painting
099123	-1	Interior Painting
099600	-1	Staining and Transparent Finishing
101400	-1	Signage
102113	-1	Toilet Partition
	-2	Urinal Screen
102213	-1	Wire Mesh Partitions
102600	-1	Impact-Resistant Cornerguard
	-2	Impact-Resistant Chairrail
102800	-1	Tissue Dispenser
	-2	Framed Mirror
	-3	Sanitary Napkin Disposer
	-4	Grab Bar
	-5	Shower Seat
	-6	Shower Curtain Rod
	-7	Coat/Robe Hook
	-8	Shower Curtain
104413	-1	Fire Extinguisher Cabinet
	-2	Fire Hose Cabinet
104416	-1	Fire Extinguisher
105113	-1	Personnel Locker
	-2	Locker
	-3	ADA Bench
105613	-1	Metal Storage Shelving
107500	-1	Flag Pole
122113	-1	Horizontal Louver Blinds
122413	-1	Roller Window Shades
142400	-1	Hydraulic Elevator
311000	-1	Site Clearing
312000	-1	Earth Moving
	-2	Interior Fill
	-3	Exterior Fill
	-4	Granular Drainage Course
	-5	Subbase Course

HTK ARCHITECTS PA
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
P 913.663.3373
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
P 785.266.3373
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-2323
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

FIXED EQUIPMENT PLANS

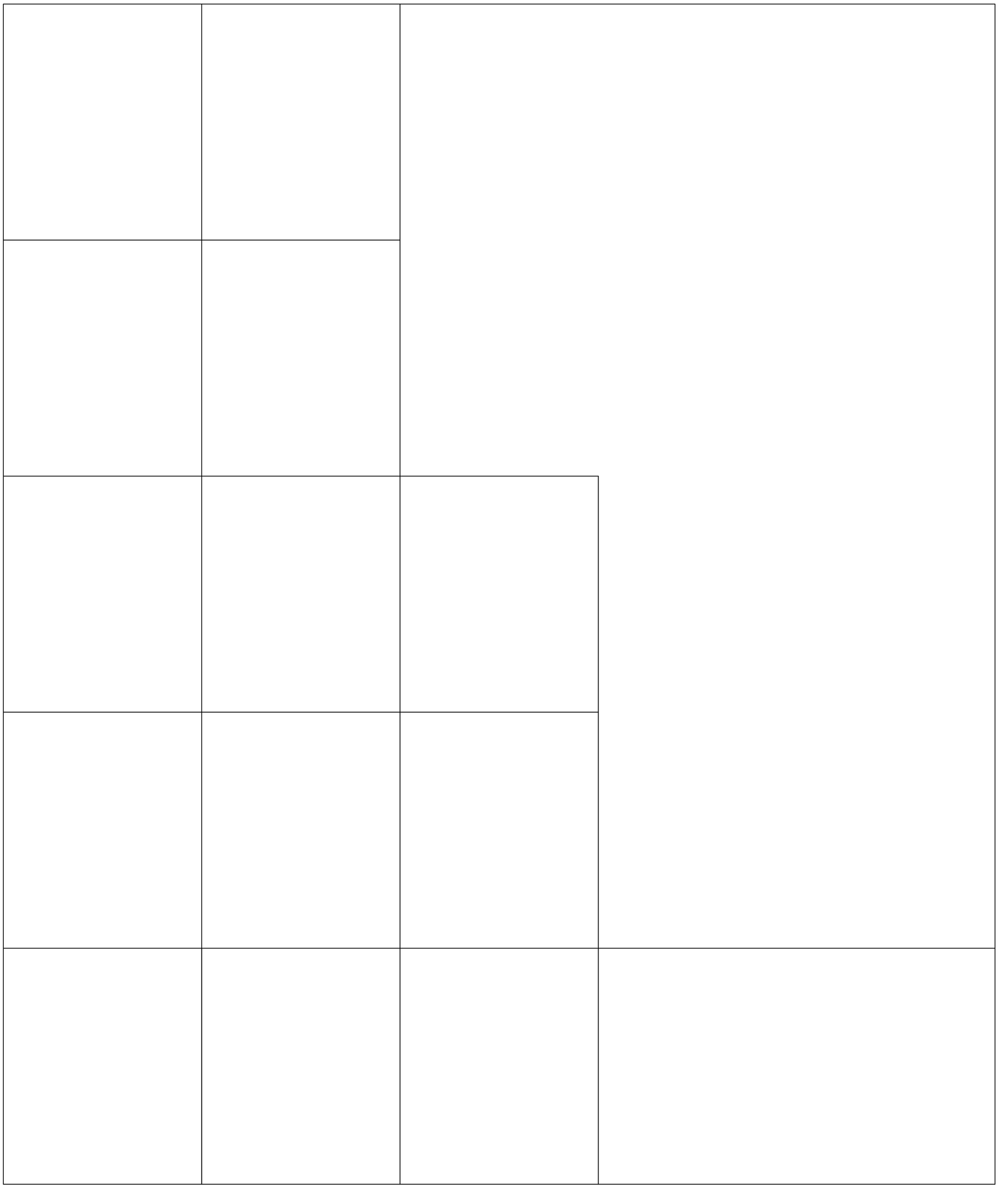
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DESIGN DEVELOPMENT PHASE DOCUMENTS

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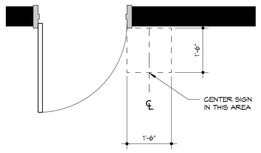
JCSBC
2-2-2016
Att:9A105



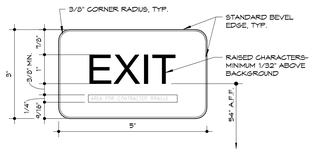
KEYNOTES

Note:
Keynotes are taken from a master list. It may not be respectfully numbered. Sizes and quantities are approximate. Refer to drawings for more information/location which may differ from list relative specified.

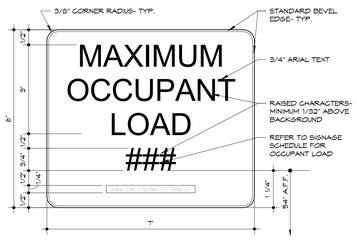
03000000	- 3	CONCRETE STRUCTURE
03100000	- 3	Concrete Form Ties
	- 4	Molded Joint Filler
	- 4	Reinforcing Steel Bar
	- 4	Reinforcing Steel Mesh
	- 4	Reinforcing Steel Rebar
03300000	- 3	CONCRETE
03310000	- 3	Concrete Topping Floor
	- 4	Concrete Topping Finish
03350000	- 3	CONCRETE FINISHING
	- 4	Concrete Repairing Unit -
	- 5	Concrete Repairing Unit - Vertical
	- 5	Concrete Repairing Unit - Horizontal
	- 4	Mild Reinforcing
	- 4	Through-wall Flashing
	- 5	Through-wall Flashing
	- 4	Bond Beam 1 - 0"
	- 5	Bond Beam 1 - 0"
	- 4	Post Tube
	- 5	Post Tube Footing Reinforcement
	- 5	Footing Step
	- 4	Steel Angle
	- 4	Steel Plate
	- 4	Steel Tube
	- 4	Steel Channel
	- 4	Steel Pipe
	- 4	Steel Pan
	- 4	Steel Plate
	- 4	Steel Bar
	- 4	Steel Beam
	- 5	Steel Beam Stringer
	- 5	Steel Beam Header
	- 4	Steel Pipe Column
	- 4	Steel Tube Column
	- 5	Steel Column Base Plate
	- 5	Steel Column Anchor Rod
	- 4	Steel Joist
	- 4	Steel Joist Girder
	- 4	Steel Deck
	- 4	Steel Deck Support
	- 4	Steel Deck Accessories
	- 4	Steel Deck Fasteners
	- 4	Steel Deck Closure
	- 4	Steel Deck Sump Pan
	- 4	Steel Deck Cant Strip
	- 4	Steel Deck Ridge and Valley Plate
	- 4	Steel Deck Edge Angle
	- 4	Steel Deck Pour Stop
	- 4	Steel Deck Girder Filler
	- 4	Steel Deck Column Closure
	- 4	Steel Deck Hole Cover Unit
	- 4	Steel Deck Roof Curb
	- 4	Steel Deck Flexible Closure Strip
	- 4	Steel Deck Cover Plate
	- 4	Steel Deck Girder Extension
	- 4	Steel Deck Column Bracket
	- 4	Steel Deck Pipe Column Infill
	- 4	Steel Deck Reinforcing
	- 4	Steel Deck Paint
	- 4	Steel Deck Touch-Up Paint
	- 4	Steel Deck Galvanizing Repair Paint
	- 4	Steel Deck Shop Paint
	- 4	Steel Deck Field Paint
	- 4	Steel Deck Prime Paint
	- 4	Steel Deck Intermediate Paint
	- 4	Steel Deck Finish Paint
	- 4	Steel Deck Miscellaneous Framing
	- 4	Steel Deck Framing Accessories
	- 4	Steel Deck Anchor
	- 4	Steel Deck Bearing Plate
	- 4	Steel Deck Grout
	- 4	Steel Deck Shim
	- 4	Steel Deck Leveling Plate
	- 4	Steel Deck Nonshrink Grout
	- 4	Steel Deck Miscellaneous Framing
	- 4	Steel Deck Support Framing
	- 4	Steel Deck Lintel
	- 4	Steel Deck Shelf Angle
	- 4	Steel Deck Hanger
	- 4	Steel Deck Loose Bearing
	- 4	Steel Deck Loose Plate
	- 4	Steel Deck Loose Angle
	- 4	Steel Deck Loose Beam
	- 4	Steel Deck Slide Bearing
	- 4	Steel Deck Slide Plate
	- 4	Steel Deck Guide
	- 4	Steel Deck Expansion Joint Cover Plate
	- 4	Steel Deck Metal Bridging
	- 4	Steel Deck Anchor Bolt
	- 4	Steel Deck Machine Bolt
	- 4	Steel Deck Heavy Hex Bolt
	- 4	Steel Deck Weld
	- 4	Steel Deck Shop Weld
	- 4	Steel Deck Field Weld
	- 4	Steel Deck Erection Aid
	- 4	Steel Deck Fabrication
	- 4	Steel Deck Erection
	- 4	Steel Deck Delivery
	- 4	Steel Deck Quality Control
	- 4	Steel Deck Safety
	- 4	Steel Deck Temporary Bracing
	- 4	Steel Deck Maintenance
	- 4	Steel Deck Repair
	- 4	Steel Deck Modification
	- 4	Steel Deck Demolition
	- 4	Steel Deck Salvage
	- 4	Steel Deck Recycling
	- 4	Steel Deck Disposal
	- 4	Steel Deck Waste Management
	- 4	Steel Deck Protection
	- 4	Steel Deck Cleaning
	- 4	Steel Deck Painting
	- 4	Steel Deck Coating
	- 4	Steel Deck Staining
	- 4	Steel Deck Sealing
	- 4	Steel Deck Waterproofing
	- 4	Steel Deck Damproofing
	- 4	Steel Deck Vapor Barrier
	- 4	Steel Deck Air Barrier
	- 4	Steel Deck Insulation
	- 4	Steel Deck Fireproofing
	- 4	Steel Deck Firestopping
	- 4	Steel Deck Sealants
	- 4	Steel Deck Caulking
	- 4	Steel Deck Weatherstripping
	- 4	Steel Deck Glazing
	- 4	Steel Deck Curtain Wall
	- 4	Steel Deck Storefront
	- 4	Steel Deck Skylight
	- 4	Steel Deck Louver
	- 4	Steel Deck Roof Hatch
	- 4	Steel Deck Roof Specialty
	- 4	Steel Deck Roof Accessory
	- 4	Steel Deck Gutter
	- 4	Steel Deck Downspout
	- 4	Steel Deck Scupper
	- 4	Steel Deck Expansion Joint
	- 4	Steel Deck Flashing
	- 4	Steel Deck Sheet Metal
	- 4	Steel Deck Miscellaneous
	- 4	Steel Deck Joint Sealer
	- 4	Steel Deck Door
	- 4	Steel Deck Frame
	- 4	Steel Deck Door Hardware
	- 4	Steel Deck Door Glazing
	- 4	Steel Deck Door Coating
	- 4	Steel Deck Door Seal
	- 4	Steel Deck Door Threshold
	- 4	Steel Deck Door Gasket
	- 4	Steel Deck Door Window
	- 4	Steel Deck Door Louver
	- 4	Steel Deck Door Vent
	- 4	Steel Deck Door Screen
	- 4	Steel Deck Door Hardware
	- 4	Steel Deck Door Operator
	- 4	Steel Deck Door Automatic Operator
	- 4	Steel Deck Door Security Device
	- 4	Steel Deck Door Intercom
	- 4	Steel Deck Door Detention Hardware
	- 4	Steel Deck Door Special Hardware
	- 4	Steel Deck Door Weatherstripping
	- 4	Steel Deck Door Sweep
	- 4	Steel Deck Door Astragal
	- 4	Steel Deck Door Threshold
	- 4	Steel Deck Door Gasket
	- 4	Steel Deck Door Seal



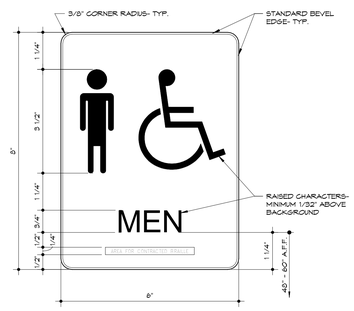
1 SIGN LOCATION DETAIL
1/2" = 1'-0"



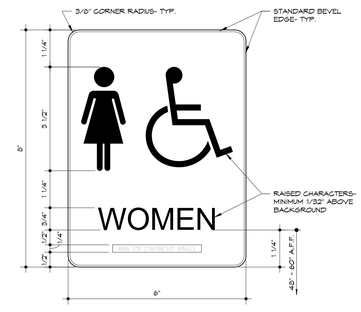
2 SIGN - EXIT
6" = 1'-0"



3 SIGN - OCCUPANCY
6" = 1'-0"



4 SIGN - TOILET - MEN
6" = 1'-0"



5 SIGN - TOILET - WOMEN
6" = 1'-0"

PANEL SIGN SCHEDULE

ARCH. PLAN NUMBER/ SIGN PLAN MARK/ ROOM NUMBER-TEXT	ROOM NAME-TEXT	ARCH. PLAN NAME	SIGN TYPE	QTY.
100		VEST.		
101		LOBBY		
102		RECEPT.		
103		IT		
104		FILE		
105		CONF.		
106		PIO.		
107		I.T.		
108		I.T.		
109		CPT.		
110.1		WEAPONS/AMMO		
110.2		SUPPLY		
111		I.T.		
112		CORR.		
113		SGT.		
114		CORR.		
115		DUI.		
116		SUP.		
117		CENTRAL MONITORING/DISPATCH		
118		CORR.		
119		M LOCKER		
120		W LOCKER		
121		T.		
122		CORR.		
123		MECH		
124		BLDG. STOR.		
125		BST		
126		ELEC.		
127		CHILLER ROOM		
128		BOILER		
129		VEST.		
130		STAIR		
131		RECEIVING		
132		OFF.		
133		PARTS		
134		HVAC SHOP		
135		ELEC. SHOP		
136		BOILER SHOP		
137		STAIR		
138		W		
139		PLUMBING SHOP		
140		M		
141		CARPENTRY SHOP		
142		STAIR		
143		ELEV. EQUIP.		
144		WAIT.		
145		LOCK SHOP		
146		CORR.		
200		EVIDENCE OFF.		
201		EVID. STOR.		
202		CORR.		
203		SERVICE SHOP MEZZANINE		
204		UNIFORM STOR.		
205		CORR.		
206		OFF.		
207		OFF.		
208		OFF.		
209		IT		
210		CONF.		
211		CREW		
212		CORR.		
213		LOCKERS		
214		CORR.		
215		SIGN		
216		ELEV.		
217		M		
218		W		
219		IT RM.		
221		MEZZANINE		
222		JAN / TRASH.		
223		SERVICE SHOP MEZZANINE		
224		WAREHOUSE MEZZANINE		
EXT		Exterior		

SIGN SCHEDULE GENERAL NOTES

1) THE TEXT-NUMBER AND TEXT-NAME ARE THE CHARACTERS TO BE PRINTED ON THE SIGN AS INDICATED BY THE SIGN TYPE.

2) ALL SIGNS ADJACENT TO DOORS OR OPENINGS TO BE LOCATED ACCORDING TO DETAIL 1/FE301

3) REFER TO FIXED EQUIPMENT PLANS FOR SIGN LOCATION PLAN MARKS UNLESS OTHERWISE NOTED. SIGN PLAN MARKS ARE INDICATED AS:

HTK ARCHITECTS PA
9300 W 110TH ST. STE. 150
OVERLAND PARK, KANSAS 66210
P 913.663.3373
900 S. KANSAS AVE., SUITE 200
TOPEKA, KANSAS 66612
T 785.266.3373 www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15
-

HTK PROJECT NUMBER:
- 1410.03

Department of Administration
Office of Facilities and
Procurement Management
800 SW Jackson, Suite 700
Topeka, Kansas 66612-1216
Phone 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICE CENTER
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???
DRAWN BY: Author CHECKED BY: Checker REV:
DATE: 2-9-15

SIGNAGE

A-012651

FE301

DESIGN DEVELOPMENT PHASE DOCUMENTS

3/10/2015 1:43:01 PM C:\Users\jdh\Documents\REVIT\State of Kansas Energy_Central_jdh.rvt

JCSBC
2-2-2016
Att:5A107

GENERAL NOTES - STRUCTURAL

1. The contractor shall verify dimensions and conditions before construction and notify the engineer of any discrepancies, inconsistencies, or difficulties affecting the work before proceeding.

2. The contractor shall coordinate all disciplines, verifying size and location of all openings, whether shown on structural drawings or not, as called for on architectural, mechanical, or electrical drawings. All conflicts, inconsistencies, or other difficulties affecting structural work shall be called to the architect or engineer's attention for direction before proceeding.

3. All design and construction work for this project shall conform to the requirements of the 2012 International Building Code, as amended by the City of Topeka, Kansas.

4. These drawings are for this specific project and no other use is authorized.

5. Structural Design Load Criteria:

A. Roof = 20 psf Live Load.
B. Floor: Office= 60 psf Live + 15psf partition
Corridor= 80 psf Live
Public Spaces/Stairs= 100 psf Live
Floor Collateral Dead Load= 10psf
C. Snow Pg = 20 psf, Is = 1.0
D. Lateral Loads:
1.) Wind V =90 mph
exposure C. Iw = 1.15
Occupancy (Risk) Category III. GCpi=+/-0.18.
Design wind pressures to be used for the design of exterior component & cladding materials on the designated zones of wall and roof surfaces shall be per section 30.7 & Table 30.7-2 of ASCE/SEI 7-05. Tabulated pressures shall be multiplied by effective area reduction factors, exposure adjustment factors, and topographic factors where applicable.
2.) Seismic= Ss = 0.155, S1 = 0.054. IE = 1.0
Occupancy (Risk) Category III. Site Classification D
Sds=0.165, Sd1=0.086, Ie=1.25
Seismic Design Category B
Basic Seismic Force-Resisting System:
Steel Systems Not Specifically Detailed for Seismic Resistance
Equivalent Lateral Force Procedure
(R=3.0, V=0.103W, Omega=3.0; Cd=3.0)
E. This project is designed to resist the most critical effects resulting from the load combinations of section 1605.3 of the 2009 International Building Code.

6. Concrete:

A. All concrete except exterior flat work shall develop minimum ultimate compressive design strength of 3500 psi in 28 days, but not less than 500 pounds of cement shall be used per cubic yard of concrete regardless of strengths obtained, not over 6 gallons of water per 100 pounds of cement and not over 4 inches of slump.
B. All concrete for interior flat work shall develop minimum ultimate compressive design strength of 4000 psi in 28 days, but not less than 560 pounds of cement shall be used per cubic yard of concrete regardless of strengths obtained, not over 5.0 gallons of water per 100 pounds of cement and not over 4 inches of slump.
C. Concrete for exterior flatwork shall have a minimum design compressive strength of 4500 psi in 28 days, with not less than 560 pounds of cement per cubic yard of concrete, not over 5 gallons of water per 100 pounds of cement, with 6% +/- 1% air entrainment, and a maximum of 4 inches of slump.
D. The preceding minimum mix requirements may have water-reducing admixtures conforming to ASTM C494 added to the mix at manufacturer's dosage rates for improved workability.
E. The preceding minimum mix requirements may have up to 15% maximum of the cement content replaced with an approved ASTM C618 Class C fly ash, provided the total minimum cementitious content is not reduced.
F. Aggregate for all concrete shall be well graded from coarsest to finest with no more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 and finer sieves.
G. All interior concrete slabs on grade shall be placed over 15 mil, Class A Vapor Barrier per ASTM E1745 with less than 0.01 perms, tested after mandatory conditioning. All joints shall be lapped and sealed per manufacturer's recommendations. All penetrations, as well as damaged vapor barrier material shall also be sealed per manufacturer's recommendation prior to concrete placement. The vapor barrier shall be placed over free-draining granular material as prescribed by the project soils report.
H. All concrete is reinforced concrete unless specifically called out as unreinforced. Reinforce all concrete not otherwise shown with same steel as in similar sections or areas. Any details not shown shall be detailed per ACI 315 and meet requirements of ACI 318, current editions.
I. Control joints in dirt formed slab to be as shown on plans. Where not shown, limit controlled areas to not more than 150 square feet, or 12 feet on any side.
J. Contractor shall verify that all concrete inserts, reinforcing and embedded items are correctly located and rigidly secured prior to concrete placement.
K. Construction joints in beams, slabs, and grade beams shall occur at midspan (middle third) unless noted otherwise. Provide 2 x 4 horizontal keys at construction joints for shear transfer.
L. No aluminum items shall be embedded in any concrete.

7. Reinforcing Steel:

A. All reinforcing steel shall conform to the requirements of ASTM A615 or A706 grade 60 steel. Welded plain wire fabric shall be supplied in sheets and conform to the requirements of ASTM A185.
B. Clear minimum coverage of concrete over reinforcing steel shall be as follows:

Concrete placed against earth	3"
Formed concrete against earth	2"
Slabs	1"
Beams or Columns	1-1/2"
Other	2"

All coverage shall be nominal bar diameter minimum.
C. All dowels shall be the same size and spacing as adjoining main bars (splice lap 48 bar diameters or 24" minimum unless noted otherwise).
D. At corners of all walls, beams, and grade beams supply corner bars (minimum 2'-0" in each direction or 48 bar diameters) in outside face of wall, matching size and spacing of horizontal bars. Where there are no vertical bars in outside face of wall, supply 3 - #4 vertical support bars for corner bars.
E. Bars marked continuous and all vertical steel shall be lapped 48 bar diameters (2'-0" minimum) at splices and embedments, unless shown otherwise. Splice top bars near midspan and splice bottom bars over supports, unless noted otherwise.
F. At all holes in concrete walls and slabs, add 2 - #5 bars (opening dimension plus 96 diameters long) at each of four sides and add 2 - #5 x 5'-0" diagonally at each of four corners of hole. Openings in 8" thick walls are reinforced similar, but with 1 - #5 instead of 2 - #5, respectively.
G. Accessories shall be as specified in latest edition of the ACI Detailing Handbook and the concrete Reinforcing Steel Institute Design Handbook. Maximum accessory spacing shall be 4'-0" on center, and all accessories on exposed surfaces are to have plastic coated feet.
H. All slabs and stairs not shown otherwise shall be 6" thick with #4 bars at 12" on center each way. All exterior porches and stoops not otherwise detailed may be constructed in any standard manner, solid or hollow, but must be reinforced with #4 bars at 12" on center each way minimum. Porches shall be doweled to adjacent walls or grade beams with #4 bars at 12" on center, hooked or embedded 40 diameters into both members. Slope porches 1/8" per foot for drainage unless noted otherwise.
I. Allow 1 ton of reinforcing bars #4 or larger to be used as directed in the field for special conditions (labor for placing same to be included).

8. Structural Steel:

A. All structural steel beams and columns shall be ASTM A992, grade 50 steel and all miscellaneous steel shall be ASTM A36 grade steel. Hollow Structural Sections (HSS) shall be ASTM A500, grade B. Fabrication and erection shall be in accordance with AISC 303-05 "Code of Standard Practice for Steel Buildings and Bridges" in the 13th Edition of the AISC Steel Construction Manual.
B. All welding shall conform to the recommendations of the AWS.
C. All bolts not otherwise specified shall be 3/4" diameter high strength (ASTM A325-N). All bolts shall be fully pretensioned. All beam connections shall be designed per the AISC Manual of Steel Construction "Framed Beam Connections" for the indicated reactions or at least 0.4 x beam total shear capacity, Vn/Omega, shown in the maximum total uniform load tables, whichever is greater; and, shall account for eccentricity when the bolt line is more than 2" from the center of the support. All connections must be two bolt minimum. Connection design and shop drawing preparation shall be completed under the direct supervision of a professional engineer licensed in the state the project is located and shop drawings and connection calculations shall bear his seal.
D. All anchor bolts shall be 3/4" diameter, ASTM F1554, Grade 36 unless noted otherwise.
E. Design, fabrication and erection of all open-web bar joists shall comply with the recommendations of the Steel Joist Institute (SJI). Joists shall be designed to support loads given in the standard load tables of SJI Specs and Tables plus an additional point load of 200 lbs. on the top or bottom chord at any location without additional web reinforcing.
F. All K-series joists shall bear 2-1/2" minimum on structural steel beams and be welded to the beams with 1 1/2" of 1/8" fillet weld each side (minimum).
G. All K-series joists bearing on masonry walls shall have 6" x 3/8" x 6" bearing plates welded to bubtees set in bond beams with 1 1/2" of 1/8" filet weld each side (minimum). Bearing plates shall be located not more than 1/2" from the face of the wall on the bearing side. Joists shall bear 4" minimum on bearing plates and be welded to beams or bearing plates with 1 1/2" of 3/8" fillet weld each side (minimum).
H. All LH and DLH series joists shall bear 4" minimum on structural steel beams and be welded to the beams with 2-1/2" of 1/4" fillet weld each side (minimum).
I. All LH and DLH – series joists bearing on masonry walls shall have 12" x 3/8" x 7" bearing plates welded to embed plates set in bond beams with 2-1/2" of 1/4" fillet weld each side (minimum). Bearing plates shall be located not more than 1/2" from the face of the wall on the bearing side. Joists shall bear 6" minimum on bearing plates and be welded to beams or bearing plates with 2-1/2" of 1/4" fillet weld each side (minimum).
J. All steel joists shall have horizontal bar or angle bridging per Steel Joist Institute Specifications. Provide rigid x-bridging in addition to and matching horizontal bridging where joists are discontinuous unless horizontal bridging is anchored to wall top and bottom. Joist sweep allowance shall comply with AISC Standard Practice.
K. All LH series joists shall have rigid x-bridging as per SJI Specifications.
L. Joists shall be designed for 25 psf net uplift resulting from wind loading as measured 10 ft from a building corner, 20 psf net uplift as measured from the building edge, and 15 psf otherwise.
L. All openings in steel joist roof to have 3 x 3 x 1/4" angle frame set between joists. Support mechanical equipment with 4 x 4 x 5/16" angles laid between joists framed to 4 x 4 x 5/16" angles (length equals mechanical unit dimension plus distance each end to next panel point) laid parallel to and welded to top and/or bottom cord of joists to distribute load to joist panel points.
M. All steel joists shall have a midspan camber approximately equal to that recommended by the Steel Joist Institute Specifications.
N. Design and installation of steel decking shall comply with the recommendations of the Steel Deck Institute (SDI). All decking shall be galvanized unless noted otherwise.
O. Allow 2 tons structural steel to be used as directed in field for special conditions by the engineer of record. Cost for shop drawings, fabrication, delivery, erecting, and erection to be included. 50% of structural steel allowance shall be bid as miscellaneous galvanized angle and plate.

9. Post-Installed Anchors:

A. Post-installed anchors shall be used only where specified on the drawings unless approved in writing by the engineer of record. See drawings for anchor diameter, spacing and embedment. Performance values of the anchors shall be obtained for specified products using appropriate design procedures and/or standards as required by the governing building code. Anchors installed in concrete shall have an ICC-ES Evaluation Service Report. Special inspection is required for all post-installed anchors.
B. Mechanical anchors used in cracked and uncracked concrete shall have been tested and qualified for use in accordance with ACI 355.2 and ICC-ES AC193. All anchors shall be installed per the anchor manufacturer's written instructions.
C. Adhesive anchors used in cracked and uncracked concrete shall have been tested and qualified for use in accordance with ICC-ES AC308. All anchors shall be installed per the anchor manufacturer's written instructions.
D. Mechanical anchors used in solid grouted masonry shall have been tested and qualified for use in accordance with ICC-ES AC01. All anchors shall be installed per the anchor manufacturer's written instructions.
E. Adhesive anchors used in solid grouted masonry shall have been tested and qualified for use in accordance with ICC-ES AC58. All anchors shall be installed per the anchor manufacturer's written instructions.
F. Anchors used in hollow concrete masonry shall have been tested and qualified in accordance with ICC-ES AC106 or ICC-ES AC58 as appropriate. All anchors shall be installed per the anchor manufacturer's written instructions with appropriate screen tubes used for adhesives.

10. Foundations:

A. The soil investigation was prepared by GeoSource. The report number is D14G1399 and the telephone number is 785-272-7200.
B. Spread footings, grade beams, and retaining walls are designed to bear on medium stiff to rammed aggregate piers designed by contractor to stiffen soils to safely sustain 5,000 psf.
C. Retaining structures are designed for a lateral load of 60 pcf equivalent fluid pressure.
D. Contractor shall provide for dewatering at excavations from either surface water or seepage.
E. All foundation excavations shall be inspected by a qualified soil engineer, approved by the architect and/or structural engineer, prior to placement of steel or concrete. This inspection shall be at the owner's expense.
F. All concrete in retaining walls shall have attained its design strength prior to being backfilled.
G. All basement walls shall not be backfilled until the first floor slab or wood decking is installed or the wall is temporarily braced by the contractor and the concrete has reached of its design strength.
H. Moisture content in soils beneath building locations should not be allowed to change after footing excavations and after grading for slabs on grade are completed. If subgrade materials become desiccated or softened by water or other conditions, recompact materials to the density and water content specified for engineered fill. Do not place concrete on frozen ground.

11. Concrete Block Masonry:

A. Concrete block used in exterior walls or load bearing walls shall meet the requirements of ASTM C90 and have a minimum net compressive strength of 1900 psi and laid up using type N mortar such that fm equals 1500 psi. Mortar shall be volume proportion based cement lime mortar. Proportioning shall be completed by box measure. Any block in contact with earth shall be normal weight units, laid using type "S" mortar and grouted solid.
B. The contractor shall provide adequate temporary bracing for all masonry walls during construction.
C. All concrete block shall have 9 gage (or larger) horizontal joint reinforcing (ladder or truss) per architectural drawings and specifications (16" maximum vertical spacing).
D. Cavity wall construction shall be reinforced as designed for specific concrete block used. The horizontal joint reinforcing shall be of the ladder or truss style per specification and continuous between brick and block, as prescribed by architectural drawings.
E. Concrete block shall be reinforced as follows in 6", 8", 10", and 12" walls:
1.) Vertical reinforcing shall be a minimum of 1 - #5 bar in 6" and 8" walls at 48" on center and 2 - #6 bars in 10" and 12" walls at 24" on center, at each corner, at each door and window jamb, each side of control joints and in the end void of each length of wall. Lap splices for masonry vertical reinforcing shall be 48 bar diameters or 24" minimum.
2.) Horizontal reinforcing:
A.) Horizontal joint reinforcing as noted above.
B.) Continuous horizontal bars shall be included per section or detail in bond beam or optional running bond be where noted. Where bond beams are continuous at corners of walls, supply corner bars matching size of horizontal bars (minimum 2'-0" or 48 bar diameters in each direction).
F. Grout, where noted above, shall have a minimum design ultimate compressive strength of 2500 psi at 28 day test and 3/8" maximum aggregate size.
G. Non-load bearing concrete block walls shall be isolated from adjacent structural elements with vertical 3/8" control joints and at the top of the wall with 1" air space or compressible material and support per architectural detail.
H. Unless otherwise covered on architectural plans or specifications, vertical control joints in masonry construction shall be 3/8" wide, full height of wall. Joints shall be spaced at a maximum of 24'-0" on center and coordinated with the architect. All horizontal joint reinforcing shall be discontinuous at control joints in masonry. All bond beam horizontal reinforcing shall be continuous through control joints.
I. Lintels over all openings in walls not otherwise covered shall be one 5" x 3-1/2" x 5/16" angle for each 4" of masonry. All exterior lintels to be galvanized.
J. Walls shall be anchored top and bottom by dowels matching wall vertical reinforcing (unless noted otherwise) from floor slab bottom and bracing angles at the top, per details on the drawings.

12. Light Gage Structural Stud Framing:

A. All load bearing, light gage structural studs, track, and bridging shall be of the type, size, gage, and spacing as shown on the plans.
B. All materials shall be 33,000 psi minimum yield, except studs of 16 gage or heavier shall have a minimum yield of 50,000 psi.
C. All properties, fabrication, and erection shall be in accordance with latest editions of the AISI "Specifications for the Design of Cold-Formed Structural Members."
D. All framing components shall be cut squarely or at an angle to fit squarely against abutting members. Splicing of axially loaded members is not permitted. Members shall be held firmly in place until properly fastened. Attachments of similar components shall be by welding, screw attachment, or bolting. Wire tying of components is not permitted.
E. Tracks shall be securely anchored to floor and overhead members. Special anchorage requirements required for wind bracing where joists are discontinuous unless horizontal bridging is anchored to wall top and bottom. Joist sweep allowance shall comply with AISC Standard Practice.
F. Multiple studs supporting beams or headers shall be fastened together with (2) - #10 self-drilling screws at 12" on center.
G. Prior to fabrication and/or erection, the contractor shall submit shop drawings complete with detail of erection, fabrication, attachments, anchorages, lintels, etc., for review by the architect/engineer.

14. Shop Drawing Review:

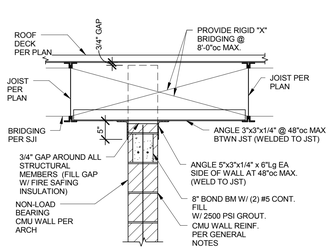
A. Bob D. Campbell and Company, Inc. will review the General Contractor's (GC) shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall structural system designed by Bob D. Campbell and Company, Inc.
B. Prior to submittal of a shop drawing or any related material to Bob D. Campbell and Company, Inc., the GC shall:
1) Review each submission for conformance with the means, methods, techniques, sequences and operations of construction and safety precautions and programs incidental thereto, all of which are the sole responsibility of the GC.
2) Review and approve each submission.
3) Stamp each submission as approved.
C. Bob D. Campbell and Company, Inc. shall assume that no submission comprises a variation unless the GC advises Bob D. Campbell and Company, Inc. with written documentation.
D. Shop drawings and related material (if any) required are indicated below. Should Bob D. Campbell and Company, Inc. require more than ten (10) working days to perform the review, Bob D. Campbell and Company, Inc. shall so notify the GC.
1) Concrete mix designs and material certificates including admixtures and compounds applied to the concrete after placement.
2) Reinforcing steel shop drawings including erection drawings and bending details. Bar list will not be reviewed for correct quantities.
3) Elevations of all reinforced concrete masonry walls at a scale no smaller than 3/8" = 1'-0" showing all required reinforcing.
4) Grout mix designs (for CMU).
5) Construction and control joint plans and/or elevations.
6) Structural steel shop drawings including erection drawings and piece details. Include joist, decking and connector submittals. Include miscellaneous framing specified on the structural drawings, but do not submit framing specified on non-structural drawings for Bob D. Campbell and Company, Inc. review.
7) Structural steel connection design calculations.
8) Miscellaneous anchors shown on the structural drawings.
9) Standard details and bridging information for light gage metal framing. Erection plans and details for light gage metal joists and lintels spanning more than 6'-0" shall be submitted. Standard wall framing need not be submitted.

15. Structural Special Inspection:

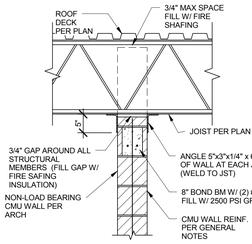
A. The structural design for this project is based on completion of special inspections during construction in accordance with section 1704 of the 2009 International Building Code. The owner shall employ one or more qualified special inspectors to provide the required special inspections.
B. Special Inspections shall be required for the items indicated below. The General Contractor shall provide notification to the inspector when items requiring inspection are ready to be inspected and provide access for those inspections.
1) Placement of Concrete
2) Testing of Concrete
3) Bolts in Concrete
4) Placement of Reinforcing Steel
5) Verification of Soil Bearing Capacities
6) Drilled Piers / Piles / Caissons
7) High Strength Bolting
8) Post-Installed Anchors
9) Structural Welding
10) Steel Frame Inspection
11) Structural Masonry
12) Shop Fabrication of Structural Steel
C. The special inspector shall furnish inspection reports to the building official, owner, architect and structural engineer, and any other designated person.
D. All discrepancies shall be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the proper design authority, building official and structural engineer.
E. The special inspector shall submit a final signed report stating that the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable workmanship provisions of the building code.

16. Copyright and Disclaimer:

A. All drawings in the structural set (S-series drawings) are the copyrighted work of Bob D. Campbell and company, Inc. These drawings may not be photographed, traced, or copies in any manner without the written permission of Bob D. Campbell and Company, Inc. Exception: Original drawings may be printed for distribution to the owner, architect, and general contractor for coordination, bidding, and construction. Subcontractors may not reproduce these drawings for any purpose or in any manner.
B. I, Clark A. Basinger, P.E., registered engineer and a representative of Bob D. Campbell and Company, Inc., do hereby accept professional responsibility as required by the professional registration laws of this state for the structural design drawings consisting of S-series drawings. I hereby disclaim responsibility for all other drawings in the construction document package, they being the responsibility of other design professionals whose seals and signed statements may appear elsewhere in the construction document package.



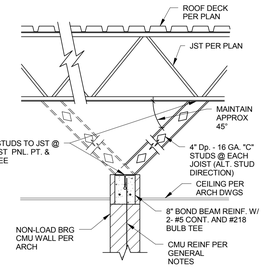
WALL PARALLEL TO JOIST

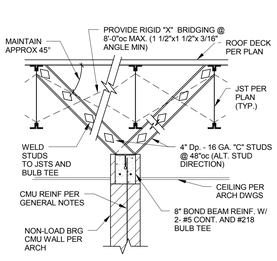


WALL PERPENDICULAR TO JOIST

TYPICAL BRACING DETAILS FOR NON-LOAD-BEARING WALLS THAT EXTEND TO ROOF DECK (REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION)

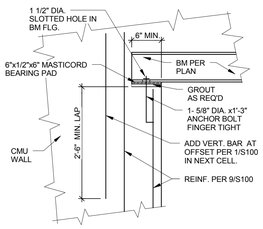
1 SECTION
3/4" = 1'-0"





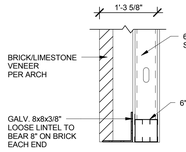
TYPICAL BRACING DETAILS FOR NON-LOAD-BEARING WALLS THAT DO NOT EXTEND TO ROOF DECK (REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION)

2 SECTION
3/4" = 1'-0"



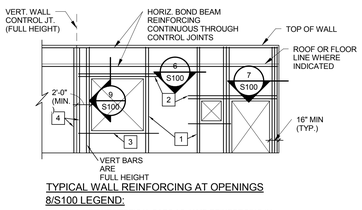
TYPICAL AT STEEL LINTELS

3 TYPICAL BEAM BEARING ON CMU DETAIL
3/4" = 1'-0"



TYPICAL BRICK LOOSE LINTEL

4 TYPICAL LOOSE LINTEL
3/4" = 1'-0"



TYPICAL WALL REINFORCING AT OPENINGS 8/S100 LEGEND:

1 FULL HEIGHT VERTICAL BARS AS JAMB REINFORCING IN FIRST 2 CELLS ADJACENT TO OPENING. REINFORCE EACH CELL WITH SIZE & QUANTITY OF BAR TO MATCH WALL REINFORCING (1 BAR TYPICAL IN 8" WALLS AND 2 BARS TYPICAL IN 12" WALLS).

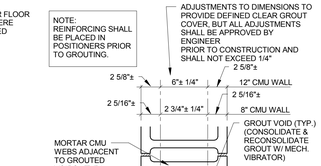
2 LINTEL REINFORCING PER SECTION 10/S100. EXTEND 2'-0" PAST EDGE OF OPENING ON EACH SIDE (TYPICAL).

3 2-#5 CONTINUOUS HORIZONTAL BARS AS SILL REINFORCING IN 8" COURSE BELOW OPENING (U.N.O.). EXTEND 2'-0" PAST EDGE OF OPENING ON EACH SIDE (TYPICAL).

4 FULL HEIGHT VERTICAL BARS PER MASONRY VERTICAL REINFORCING SCHEDULE LOCATED IN END CELL AT EACH SIDE OF VERTICAL WALL CONTROL JOINTS.

GENERAL CRITERIA: (SECTION 8/S100 CONT.)
1.) VERTICAL REINF. BARS SHALL BE DOWELED TO FOUNDATION WITH A DOWEL OF MATCHING SIZE AND SPACING.
2.) CONTRACTOR SHALL COORDINATE AND VERIFY OPENINGS IN MASONRY WALLS. OPENINGS SHALL BE DETAILED ON REINFORCING STEEL SHOP DRAWING ELEVATIONS.
3.) VERTICAL CONTROL JOINTS IN MASONRY WALLS SHALL BE 3/8" WIDE, FULL HEIGHT OF WALL. JOINTS SHALL BE SPACED AT A MAXIMUM OF 24'-0" o.c. AND NOT LESS THAN 2'-0" FROM THE EDGE OF ANY OPENING. ALL HORIZONTAL JOINT REINFORCING SHALL BE DISCONTINUOUS AT CONTROL JOINTS. ALL BOND BEAM HORIZONTAL REINFORCING SHALL BE CONTINUOUS THROUGH CONTROL JOINTS. CONTRACTOR SHALL COORDINATE AND VERIFY ALL CONTROL JOINT LOCATIONS.

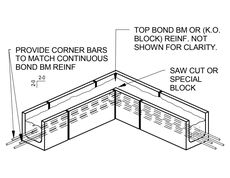
5 TYPICAL CMU WALL REINFORCING
1 1/2" = 1'-0"



NOTE:
ALL MASONRY VOIDS AND BOND BEAMS TO BE GROUTED SHALL BE FREE OF DEBRIS AND MORTAR DROPPINGS PRIOR TO GROUTING. ANY MASONRY W/ DROPPINGS OR DEBRIS OBSERVED IN VOIDS SHALL BE REJECTED.

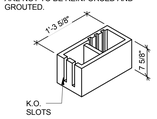
TYPICAL REBAR POSITIONING DETAIL

6 SECTION
1 1/2" = 1'-0"



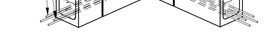
7 SECTION
3/4" = 1'-0"

"KNOCKOUT " (K.O.) or TROUGH BOND BM. BLOCK (TYPICAL UNIT EXCEPT @ DOOR OPNGS; SOLID BOTTOM BOND BEAM SHALL BE USED. PROVIDE GROUT STOP RE: SPECS.) UNDER K.O. BOND BEAMS OVER CELLS WHICH ARE NOT TO BE REINFORCED AND GROUTED.



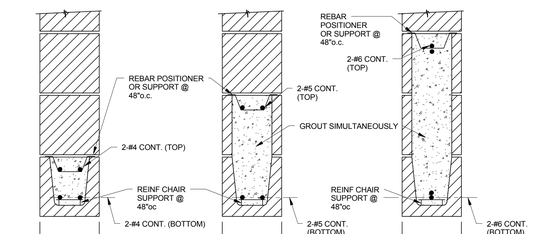
TYPICAL MASONRY REINFORCING NOTE:

ALL INTERIOR & EXTERIOR MSRY WALLS SHOWN ON ARCHITECTURAL AND STRUCTURAL DRAWINGS ARE TO BE REINFORCED HORIZONTALLY WITH BOND BEAMS (2 - #5 BOTTOM) AT BOTTOM COURSE, TOP COURSE, JOIST BEARING ELEVATION AND AT 8'-0" MAXIMUM O.C. AND VERTICALLY AS INDICATED ON DRAWINGS. THESE WALLS ARE TO BE ANCHORED TOP AND BOTTOM TO THE FOUNDATION, FLOOR, OR ROOF PER TYPICAL DETAILS. THE VERTICAL REINFORCING IS CONTINUOUS (IN 6'-6" MAXIMUM LENGTHS, LAPPED 2'-6" MINIMUM). FILL BLOCK CELLS AND BOND BEAMS WITH 2,500psi GROUT.



TYPICAL MASONRY COLUMN

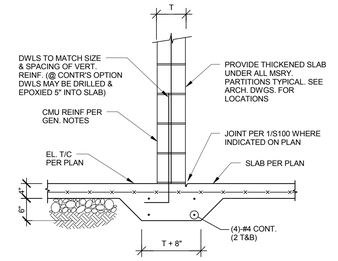
8 SECTION
3/4" = 1'-0"



NON-LOAD BRG WALLS | OPENINGS UP TO 6'-0" | OPENINGS GREATER THAN 6'-0" TO 8'-0"

TYPICAL LINTELS AT ALL CMU WALLS

9 TYPICAL CMU LINTEL REINFORCING
1 1/2" = 1'-0"



TYPICAL THICKENED SLAB (UNDER NON-LOAD-BEARING MASONRY)

10 TYP. NON-LOAD BRG CMU WALL FOOTING
3/4" = 1'-0"

LEGEND

...SPAN DIRECTION OF DECK
...FOOTING SIZE MARK
...COLUMN SIZE MARK

SOG-1 ...5" CONCRETE SLAB REINFORCED WITH 6x6-W2.9xW2.9 WWF ATOP VAPOR BARRIER PER GENERAL NOTES ATOP 4" COMPACTED GRANULAR MATERIAL ATOP 24" LOW VOLUME CHANGE MATERIAL

SOG-2 ...4" CONCRETE SLAB REINFORCED WITH 6x6-W2.9xW2.9 WWF ATOP VAPOR BARRIER PER GENERAL NOTES ATOP 4" COMPACTED GRANULAR MATERIAL ATOP 24" LOW VOLUME CHANGE MATERIAL

RD-1 ...DENOTES 1½"Dp x 22ga GALV. WIDE RIB ROOF DECK ATTACHED TO STRUCTURE TO ACHIEVE 300 PLF DIAPHRAGM SHEAT CAPACITY

RD-2 ...DENOTES 1½"Dp x 18ga GALV. WIDE RIB ROOF DECK ATTACHED TO STRUCTURE TO ACHIEVE 300 PLF DIAPHRAGM SHEAT CAPACITY

NCD-1 ...DENOTES 3" CONCRETE SLAB REINF. W/ 6x6-W2.9xW2.9 WWF ATOP 9/16" x 26ga GALV. FORM DECK

CD-1 ...DENOTES 5" CONCRETE SLAB REINF. W/ 6x6-W2.9xW2.9 WWF ATOP 2" x 18ga GALV. COMPOSITE DECK (5" TOTAL THICKNESS)

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DATE:
● 3-10-15

REVISED DATE:
●● 12-18-14
●●● 2-9-15
3-10-15

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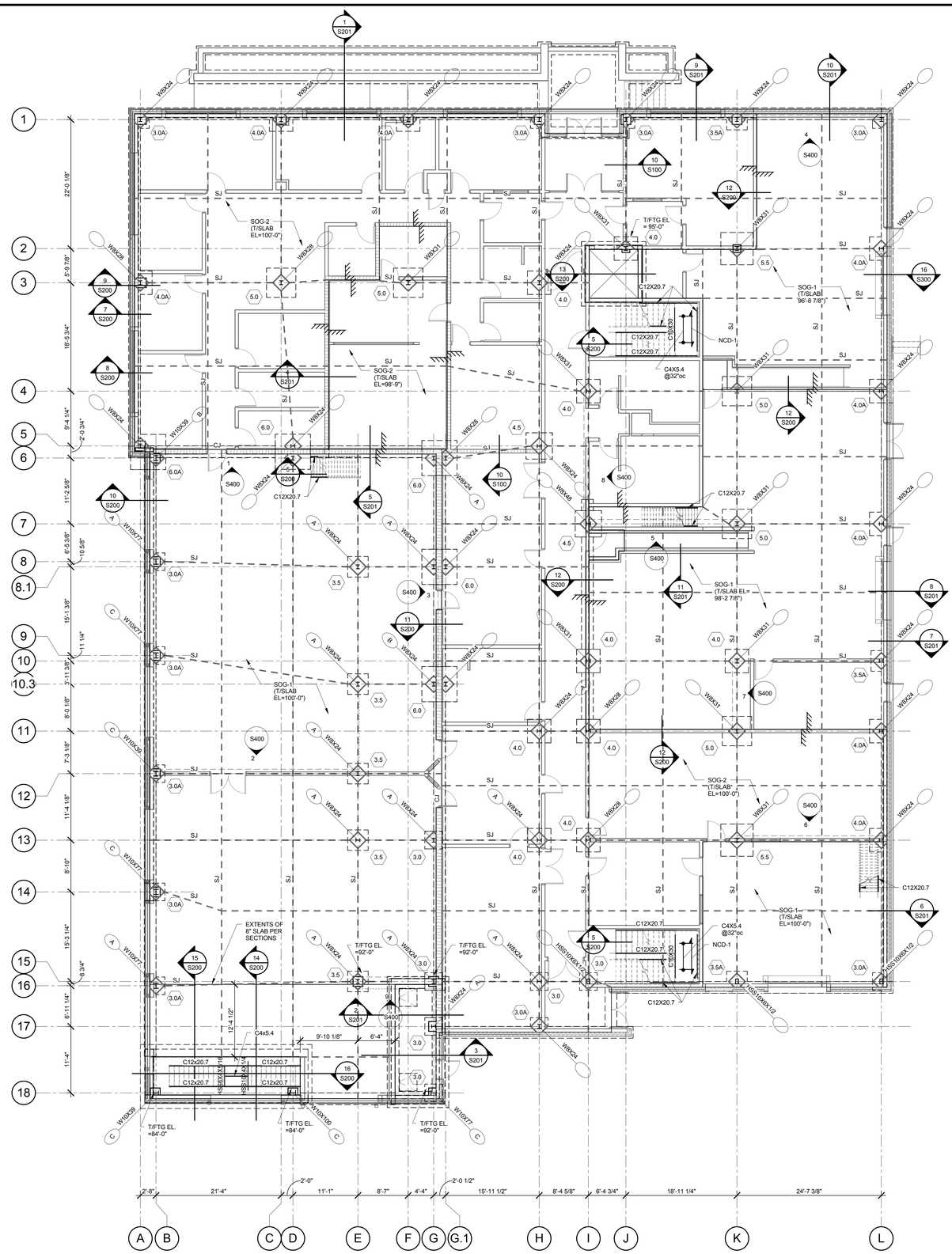
SHEET CONTENTS:
●●●● GENERAL NOTES & SECTIONS

PROJECT NUMBER:
● 1410.03

SHEET NUMBER:
S100
DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
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1 FOUNDATION PLAN

1/8" = 1'-0"

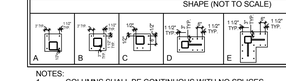
NOTES:
1.) REFER TO GENERAL NOTES & LEGEND ON SHEET S100.
2.) TOP OF GRADE BEAM ELEVATION = 99'-4" UNLESS NOTED OTHERWISE.

NORTH

COLUMN BASE PLATE SCHEDULE

TYPE	COLUMN	BASE PLATE	BASE PLATE TYPE	ANCHOR BOLTS	GROUT
A	PER PLAN	3/4"x14"x14"	A	(4) 3/4" Ø x 1' - 4" Lg.	1"
B	PER PLAN	3/4"x11"x11"	B	(4) 3/4" Ø x 1' - 4" Lg.	1"
C	PER PLAN	3/4"x12"x12"	B	(4) 3/4" Ø x 1' - 4" Lg.	1"
D	PER PLAN	3/4"x10"x10"	C	(4) 3/4" Ø x 1' - 4" Lg.	1"
E	PER PLAN	3/4"x11"x11"	A	(4) 3/4" Ø x 1' - 4" Lg.	1"
F	PER PLAN	3/4"x12"x12"	B	(4) 3/4" Ø x 1' - 4" Lg.	1"

SHAPE (NOT TO SCALE)



NOTES:
1. COLUMNS SHALL BE CONTINUOUS WITH NO SPLICES.
2. SEE PLAN FOR ORIENTATION OF COLUMNS.
3. ANCHOR BOLT LENGTH INCLUDES 4" OF PROJECTION AND 3" HOOK.

CONCRETE FOOTING SCHEDULE

SOIL PRESSURE (PSF): 5000	CONCRETE (PSI): 3500	REBAR (KSI): 60
TYPE	FOOTING SIZE (FT.) THICKNESS (IN.)	BAR SIZE/EA. WAY SPACING (IN.) BOTTOM
3.0	3'-0"x3'-0"x16"Dp	#4 @10"oc
3.0A	3'-0"x3'-0"x32"Dp	#4 @10"oc
3.5	3'-6"x3'-6"x16"Dp	#4 @10"oc
3.5A	3'-6"x3'-6"x32"Dp	#4 @10"oc
4.0	4'-0"x4'-0"x16"Dp	#4 @10"oc
4.0A	4'-0"x4'-0"x32"Dp	#4 @10"oc
4.5	4'-6"x4'-6"x18"Dp	#4 @10"oc
5.0	5'-0"x5'-0"x18"Dp	#5 @10"oc
5.5	5'-6"x5'-6"x18"Dp	#5 @10"oc
6.0	6'-0"x6'-0"x20"Dp	#5 @10"oc
6.0A	6'-0"x6'-0"x32"Dp	#5 @10"oc

NOTES:
1. EXTERIOR FOOTINGS OR FOOTING AT GRADE BEAM SHALL MATCH GRADE BEAM DEPTH AND BE PLACED WITH GRADE BEAM.
2. PROVIDE #4 @12"oc EACH WAY IN TOP OF FOOTING AT ALL BRACED BAY COLUMNS.
3. CENTER FOOTINGS ON COLUMNS AND/OR WALL CENTERLINES PER PLAN UNLESS NOTED OTHERWISE.

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- 3-10-15

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SHEET CONTENTS:
- FOUNDATION PLAN

PROJECT NUMBER:
- 1410.03

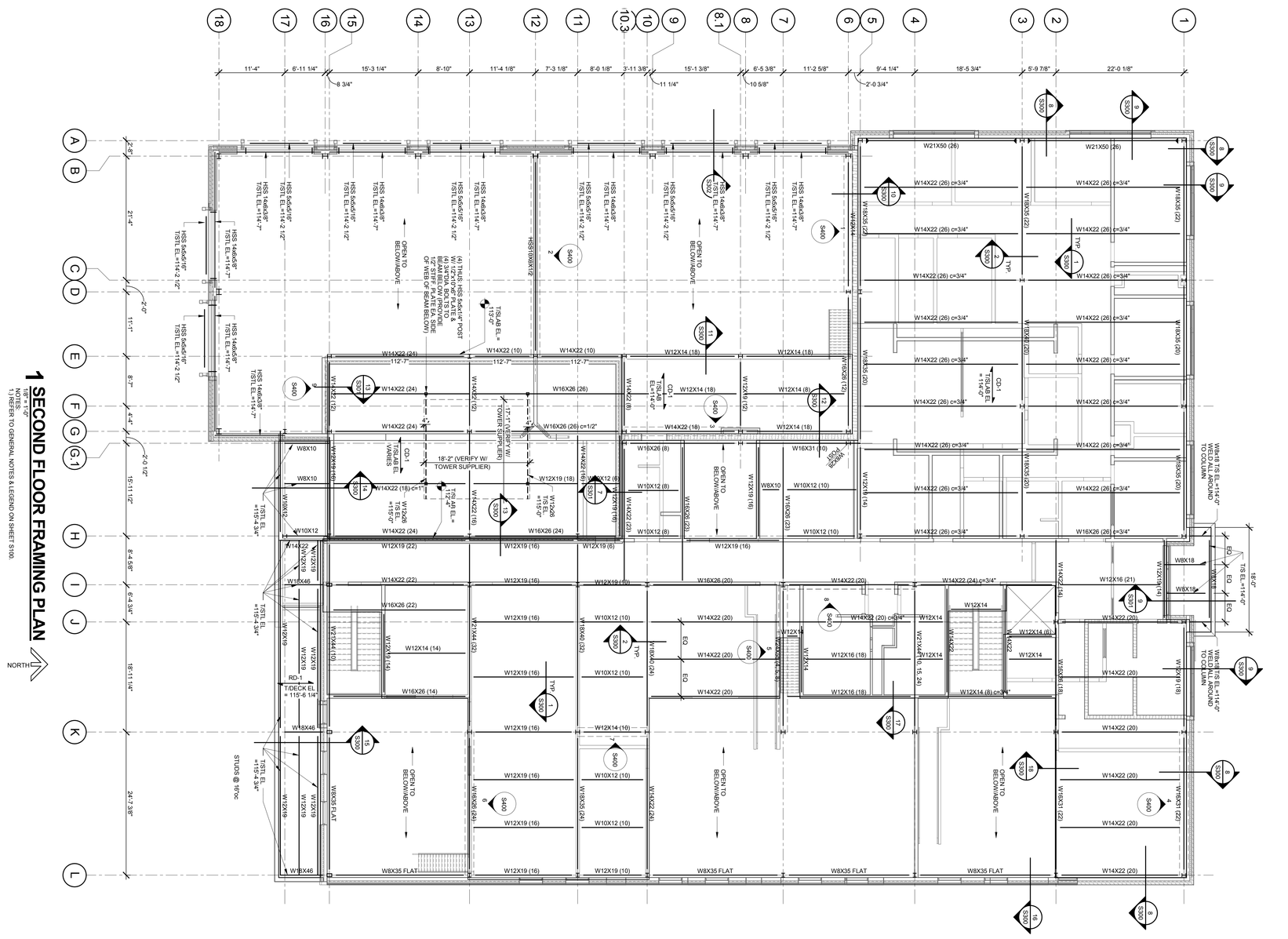
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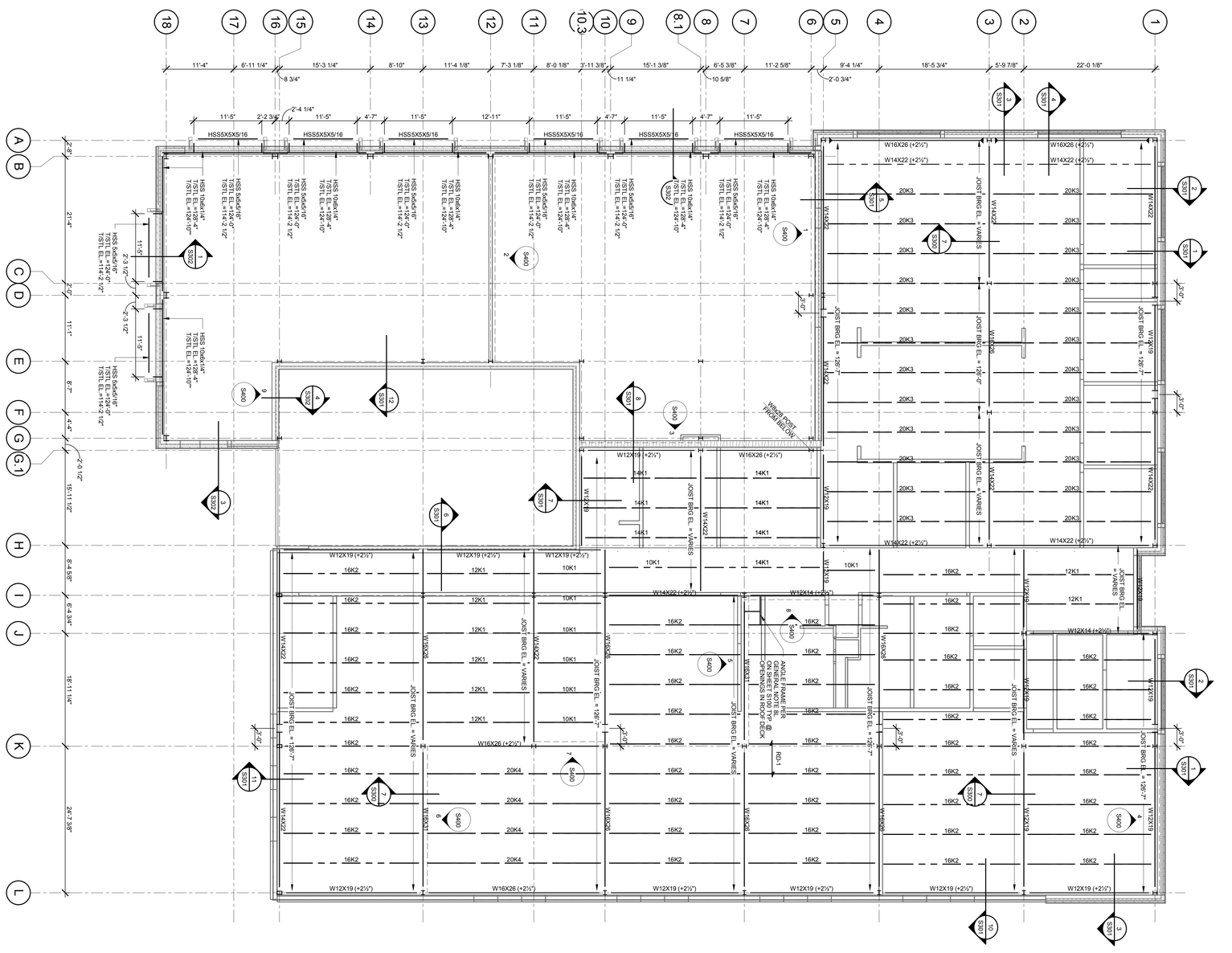
S101

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2-2-2016
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18 17 16 15 14 13 12 11 10.3 10 9 8.1 8 7 6 5 4 3 2 1
A B C/D E F G G.1 H I J K L
11'-4" 6'-11 1/4" 15'-3 1/4" 8'-10" 11'-4 1/8" 7'-3 1/8" 8'-0 1/8" 3'-11 3/8" 15'-1 3/8" 6'-5 3/8" 11'-2 5/8" 9'-4 1/4" 18'-5 3/4" 5'-9 7/8" 22'-0 1/8"
8 3/4"
11 1/4"
10 5/8"
2'-0 3/4"
21'-4"
3'-0"
11'-1"
8'-7"
4'-4"
2'-0 1/2"
15'-11 1/2"
8'-4 5/8"
8'-4 3/4"
18'-11 1/4"
24'-1 3/8"
NORTH
W21X50 (26)
W14X22 (26) c=3/4"
W18X35 (22)
W18X35 (20)
W18X35 (26)
W18X35 (28)
W18X44 (20)
W16X31 (20)
W16X31 (22)
W16X26 (12)
W16X44
W16X40
W12X14 (18)
W12X19 (12)
W12X14 (8)
W14X22 (24)
W14X22 (10)
W14X22 (12)
W16X26 (26)
W16X26 (26) c=1/2"
W14X22 (18)
W16X31 (10)
W8X10
W10X12
W14X22 (18)
W12X19 (18)
W12X26
W16X26 (24)
W12X19 (22)
W12X19 (16)
W12X19 (6)
W10X12 (8)
W16X26 (8)
W16X26 (23)
W12X19 (14)
W10X12 (10)
W16X26 (23)
W16X26 (26) c=3/4"
W14X22 (16)
W14X22 (23)
W14X22 (20)
W14X22 (24) c=3/4"
W12X16 (21)
W8X18
W8X15
W16X46
W14X22 (22)
W16X26 (22)
W12X44 (10)
W12X44 (32)
W12X19 (14)
W14X22 (32)
W14X22 (20)
W12X14 (14)
W12X14 (6)
W12X16 (18)
W12X14 (8) c=3/4"
W12X14 (10, 15, 24)
W16X26 (14)
W8X46
W12X19
W16X26 (24)
W18X40 (32)
W18X40 (24)
W8X35 FLAT
W14X22 (24)
W14X22 (2A)
W14X22 (2B)
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W16X18 (54)
W16X18 (56)
W16X18 (58)
W16X18 (60)
W16X18 (62)
W16X18 (64)
W16X18



1 LOW ROOF FRAMING PLAN

1/8" = 1'-0"

NOTES:
1.) REFER TO GENERAL NOTES & LEGEND ON SHEET S100.

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SHEET CONTENTS:
LOW ROOF FRAMING PLAN

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SHEET NUMBER:
S103
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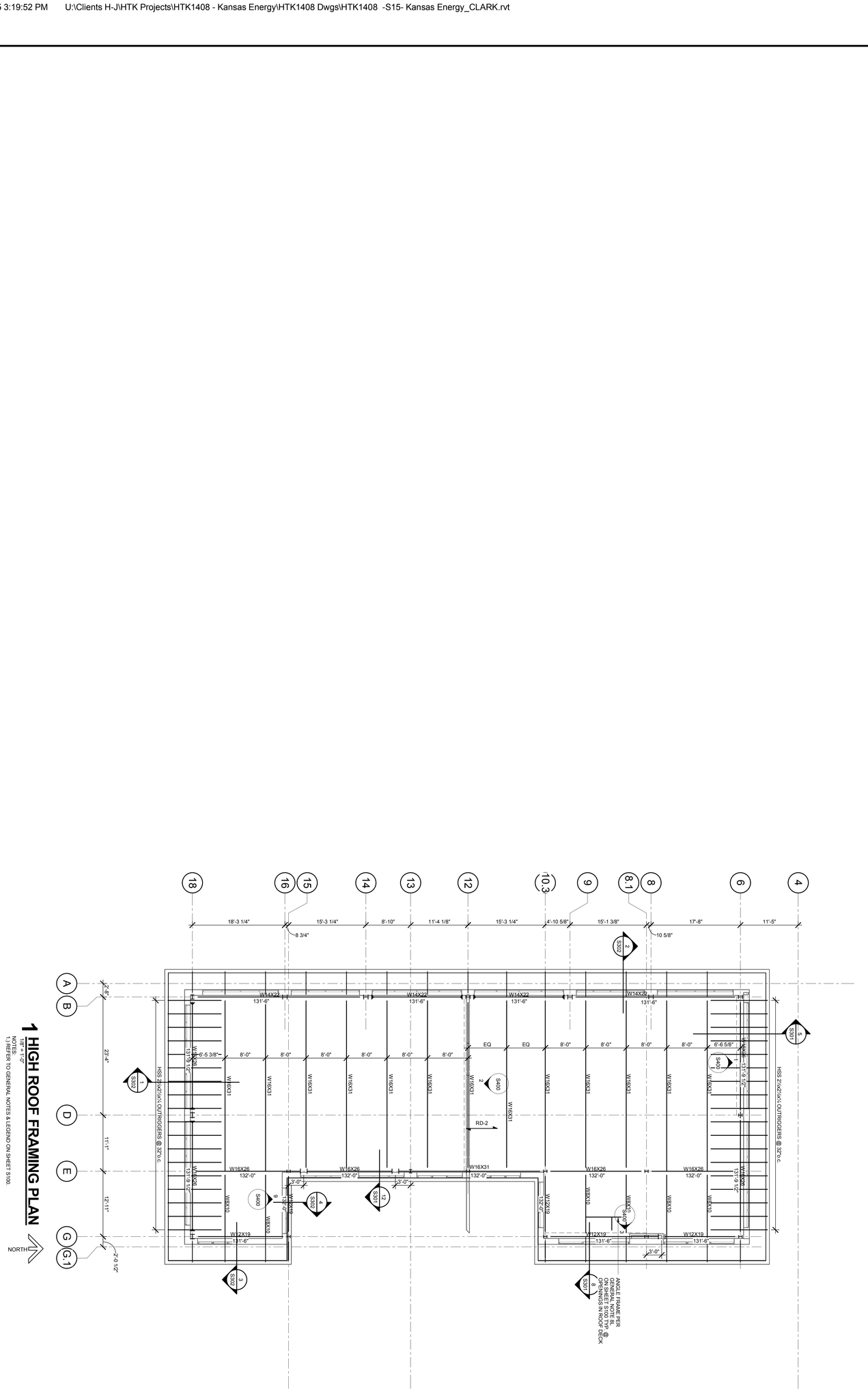
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By: Jason Clark
Autodesk Revit 2015



1 HIGH ROOF FRAMING PLAN

1/8" = 1'-0"

NOTES:
1.) REFER TO GENERAL NOTES & LEGEND ON SHEET S100.

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S104

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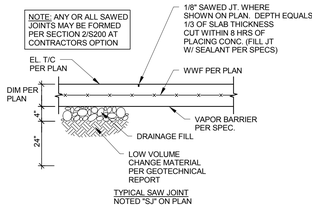
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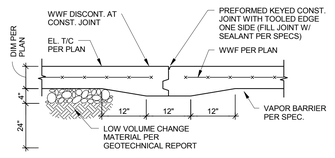
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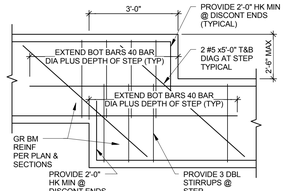
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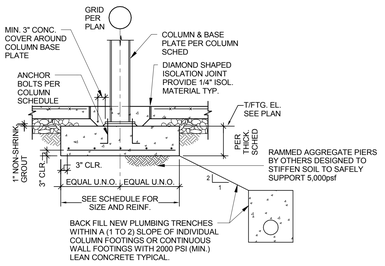
1 SECTION
3/4" = 1'-0"



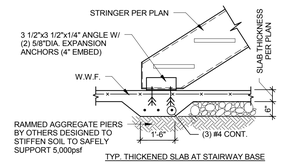
2 SECTION
3/4" = 1'-0"



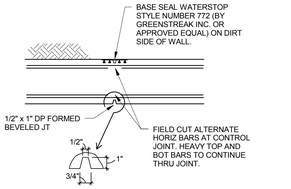
3 SECTION
1/2" = 1'-0"



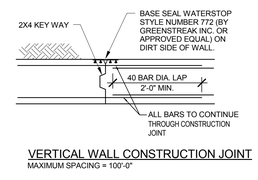
4 SECTION
1/2" = 1'-0"



5 SECTION
3/4" = 1'-0"

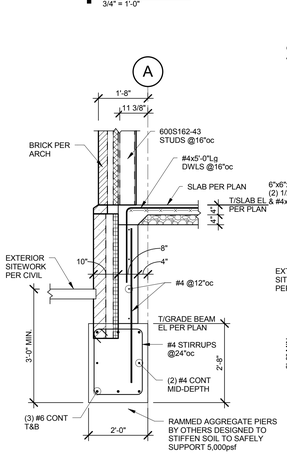


VERTICAL WALL CONTROL JOINT
MAXIMUM SPACING = 25'-0"
(COORDINATE LOCATIONS WITH ARCHITECT/ ALIGN WITH MASONRY CONTROL/EXPANSION JOINTS ABOVE)

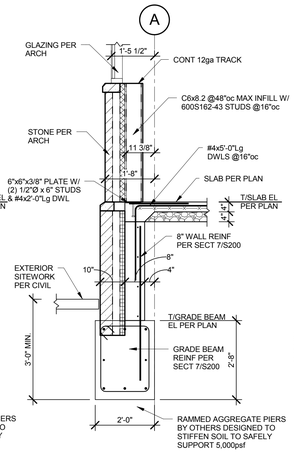


VERTICAL WALL CONSTRUCTION JOINT
MAXIMUM SPACING = 100'-0"

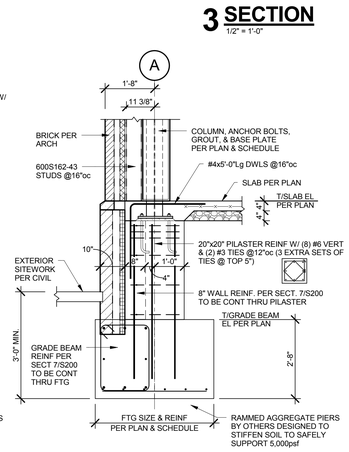
6 VERTICAL WALL CONTROL JOINT
3/4" = 1'-0"



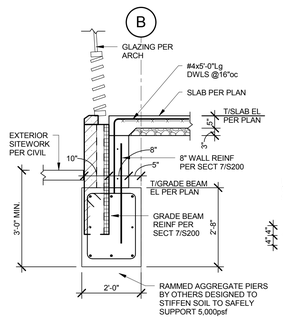
7 SECTION
1/2" = 1'-0"



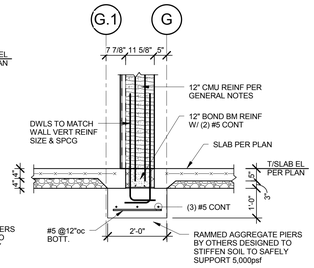
8 SECTION
1/2" = 1'-0"



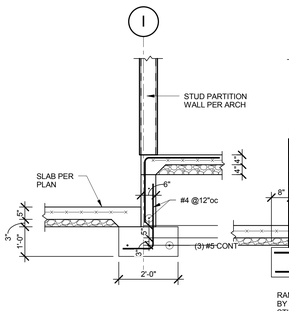
9 SECTION
1/2" = 1'-0"



10 SECTION
1/2" = 1'-0"

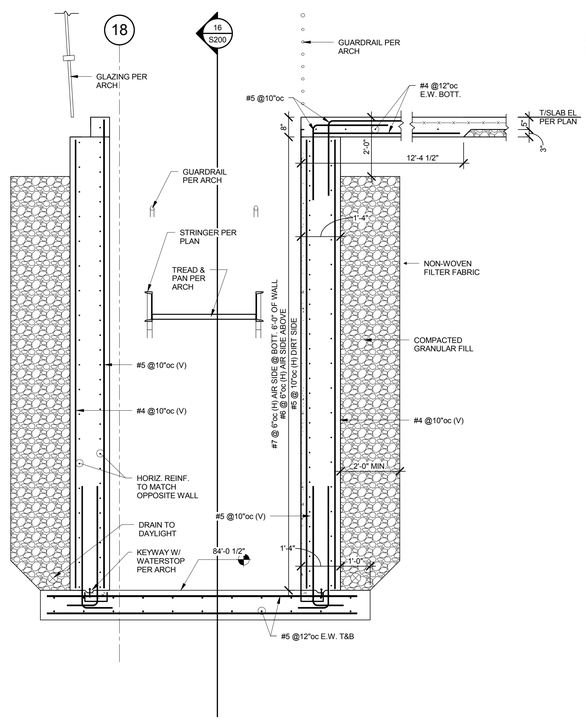


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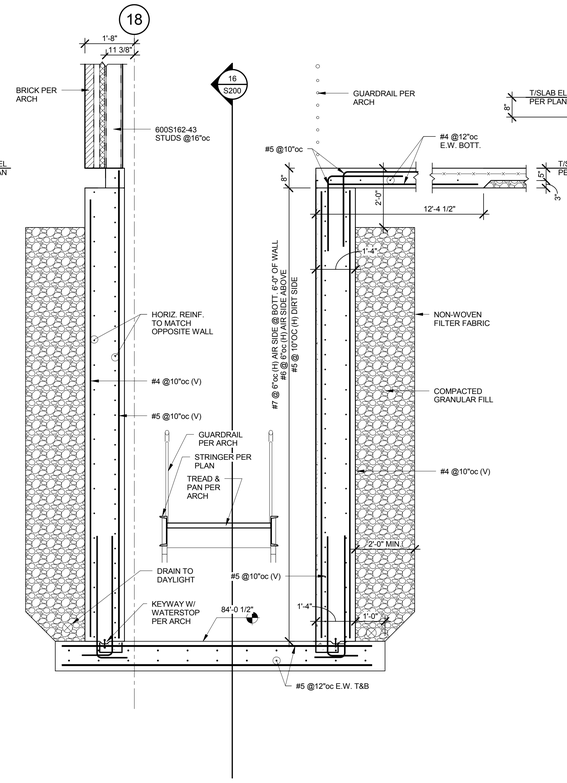


12 SECTION
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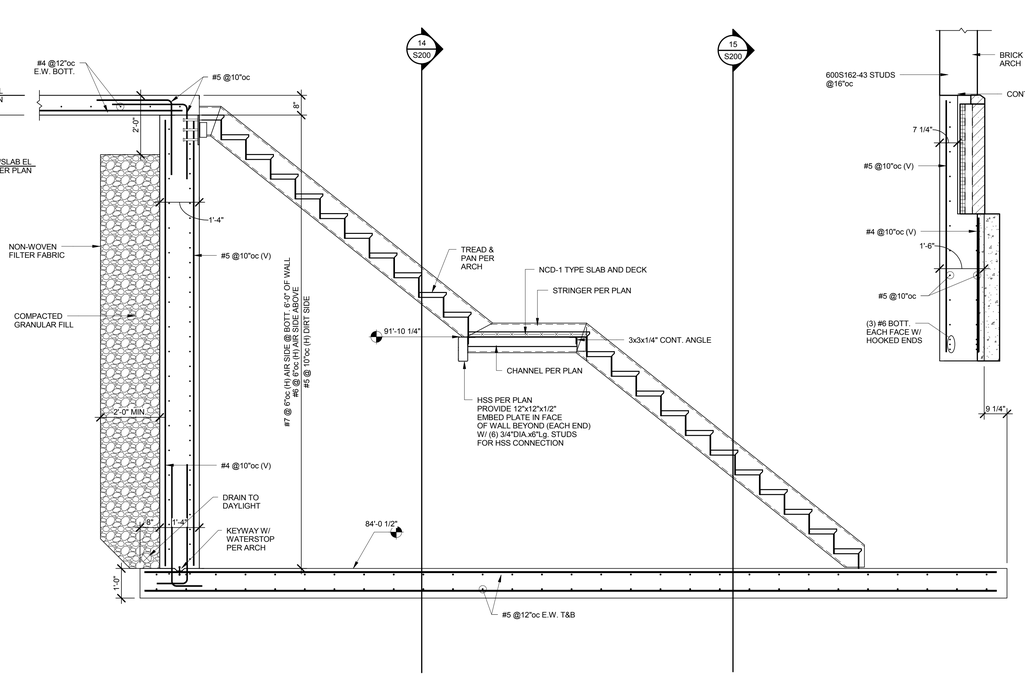
13 SECTION
1/2" = 1'-0"



14 SECTION
1/2" = 1'-0"



15 SECTION
1/2" = 1'-0"



16 SECTION
1/2" = 1'-0"

HTK ARCHITECTS PA
900 S. KANSAS AVE., SUITE 200 TOPEKA, KANSAS 66612
9300 W 110TH ST. STE 160 OVERLAND PARK, KS 66210
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DESIGN DEVELOPMENT PHASE

DATE:
- 3-10-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

STATE OF KANSAS ENERGY & SERVICE CENTER

HTK Architects
Seventh & Van Buren Street, Topeka, Kansas

SHEET CONTENTS:
- FOUNDATION SECTIONS

PROJECT NUMBER:
- 1410.03

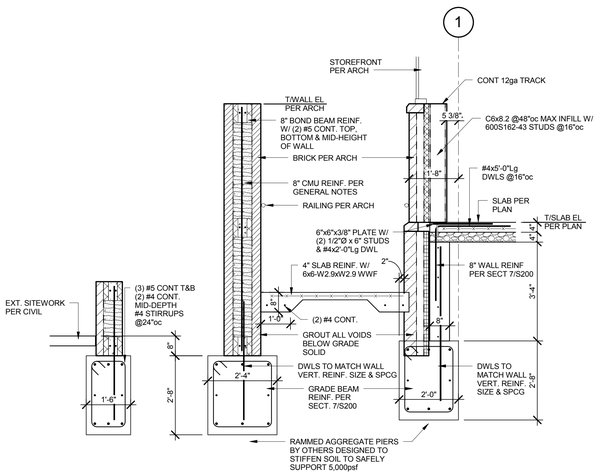
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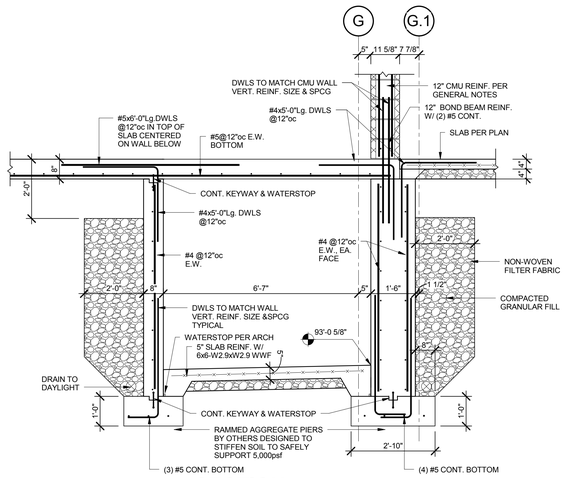
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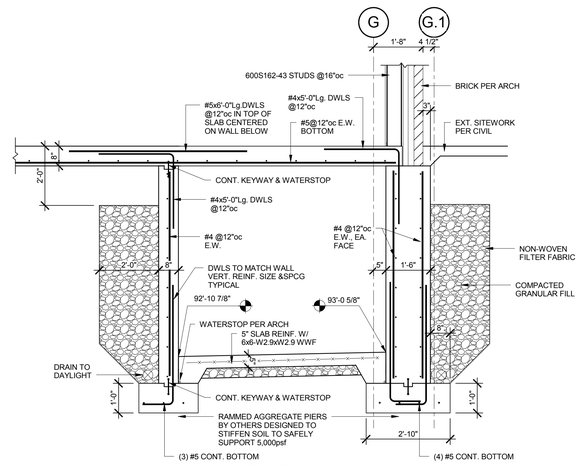
JCSBC
2-2-2016
Art:SA113



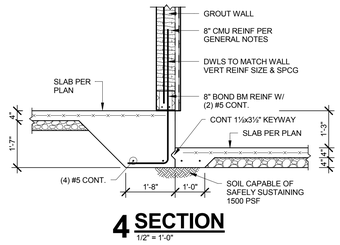
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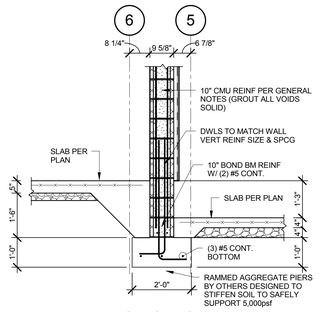
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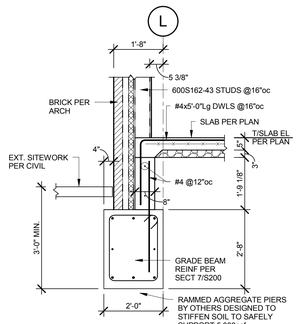
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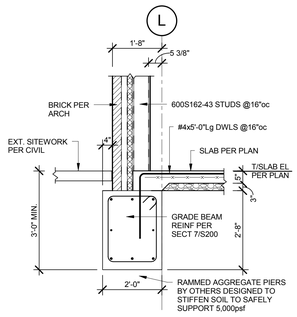
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1/2" = 1'-0"



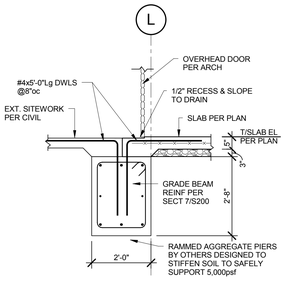
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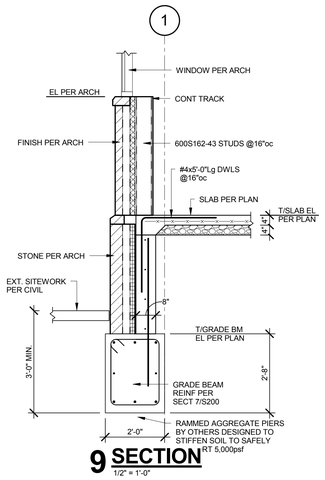
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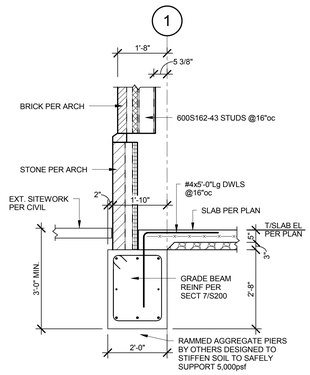
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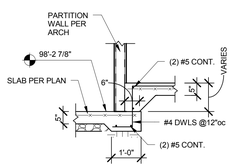
8 SECTION
1/2" = 1'-0"



9 SECTION
1/2" = 1'-0"



10 SECTION
1/2" = 1'-0"



11 SECTION
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STATE OF KANSAS ENERGY & SERVICE CENTER

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Seventh & Van Buren Street, Topeka, Kansas

SHEET CONTENTS:
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HTK PROJECT NUMBER:
- 1410.03

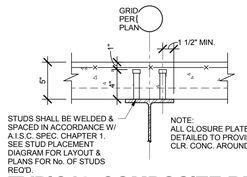
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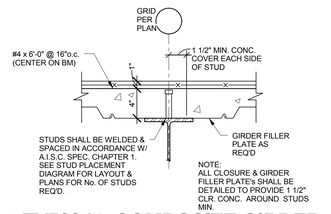
DESIGN DEVELOPMENT PHASE DOCUMENTS

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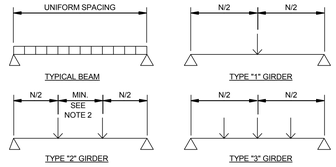
JCSBC
2-2-2016
Art:SA114



1 TYPICAL COMPOSITE BEAM
1 1/2" = 1'-0"

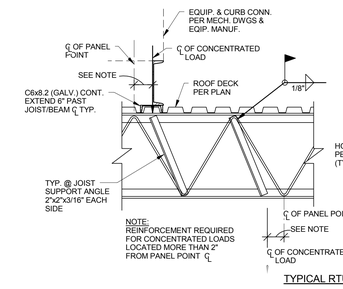


2 TYPICAL COMPOSITE GIRDER
1 1/2" = 1'-0"



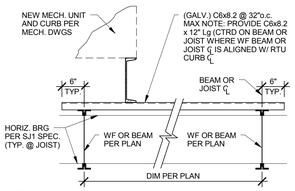
1. ALL DIAGRAMS REPRESENT IDEALIZED CONDITIONS. ACTUAL FRAMING CONFIGURATIONS MAY REQUIRE ADDITIONAL INTERPRETATION.
2. MAXIMUM SPACING OF STUDS SHALL BE 36"o.c. IF STUD SPACING EXCEEDS 12" O.C. PROVIDE 5/8" DIA. PUDDLE WELD ATTACHMENT SUCH THAT THE MAXIMUM AVERAGE SPACING OF STUD/WELD ATTACHMENTS IS 12"o.c., AND MAXIMUM SPACING BETWEEN ATTACHMENTS IS 18".
3. THE NUMBER OF STUDS PER BEAM SHOWN ON THE DRAWINGS IS BASED ON AN ASSUMED DESIGN VALUE OF 13.3 KIPS/STUD. THE ACTUAL NUMBER OF STUDS PER BEAM (N) MAY VARY BASED ON RIB WIDTH, DECK DEPTH, NUMBER OF STUDS PER CELL, DECK RIB ORIENTATION, ETC. AS PER AISC SPECIFICATIONS FOR COMPOSITE CONSTRUCTION. METAL DECK CONTRACTOR SHALL SUBMIT ALL CALCULATIONS VERIFYING THE HORIZONTAL SHEAR CAPACITY OF SHEAR STUDS DETAILED ON SHOP DRAWINGS AND PROVIDE THE STUDS REQUIRED.
4. SHEAR CONNECTOR PLACEMENT SHALL BE FULLY DETAILED ON THE METAL DECK SHOP DRAWINGS.

3 TYPICAL SHEAR STUD PLACEMENT DETAIL
3/4" = 1'-0"

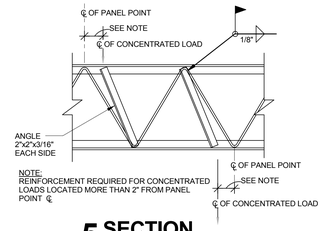


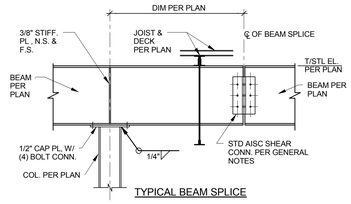
TYPICAL RTU CURB SUPPORT FRAMING

4 SECTION
3/4" = 1'-0"



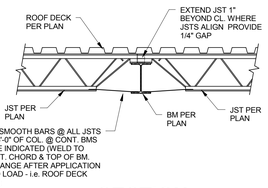
5 SECTION
3/4" = 1'-0"



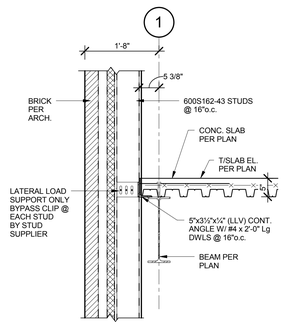


TYPICAL BEAM SPLICE

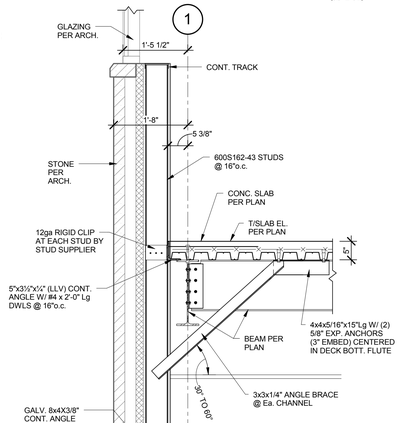
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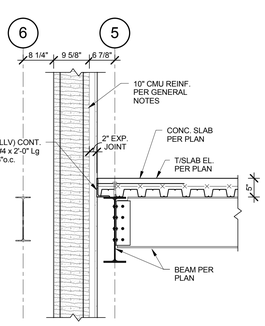
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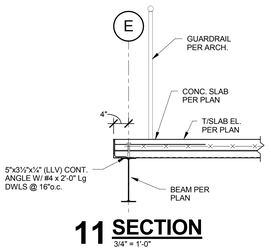
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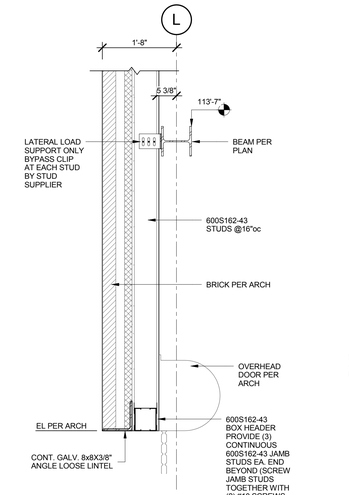
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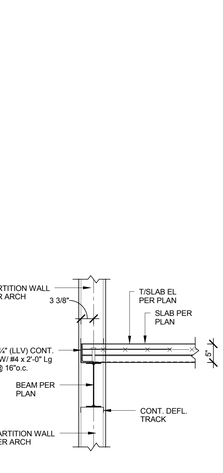
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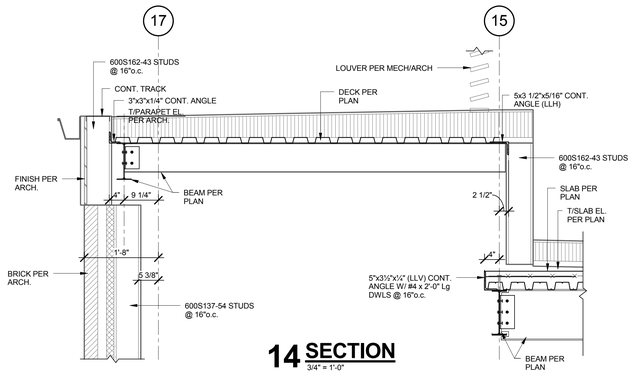
11 SECTION
3/4" = 1'-0"



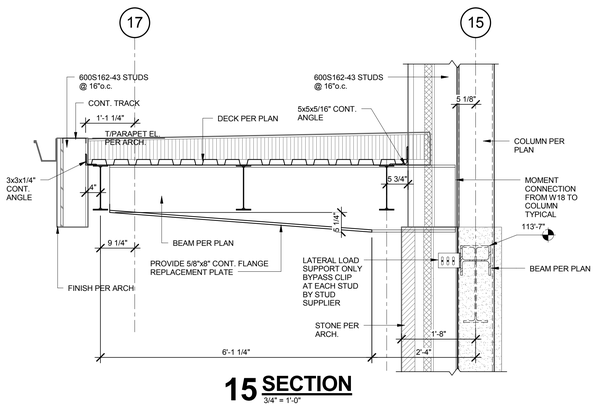
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13 SECTION
3/4" = 1'-0"



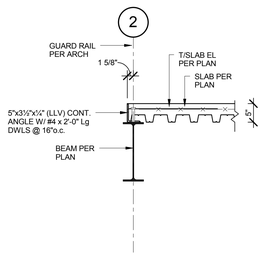
14 SECTION
3/4" = 1'-0"



15 SECTION
3/4" = 1'-0"

16 SECTION
3/4" = 1'-0"

17 SECTION
3/4" = 1'-0"



18 SECTION
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STATE OF KANSAS ENERGY & SERVICE CENTER

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Seventh & Van Buren Street, Topeka, Kansas

SHEET CONTENTS:
- FRAMING SECTIONS

PROJECT NUMBER:
- 1410.03

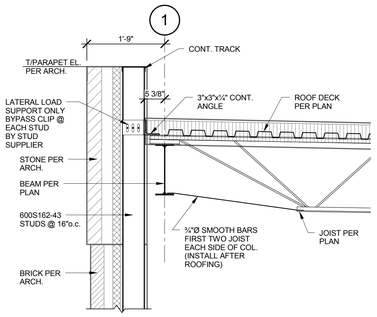
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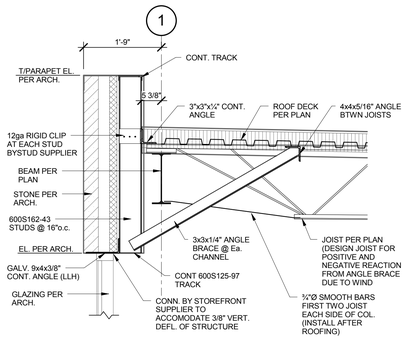
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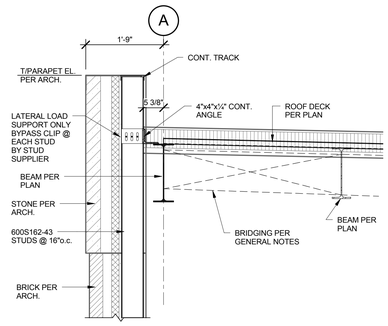
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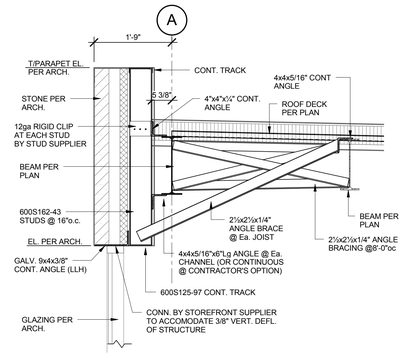
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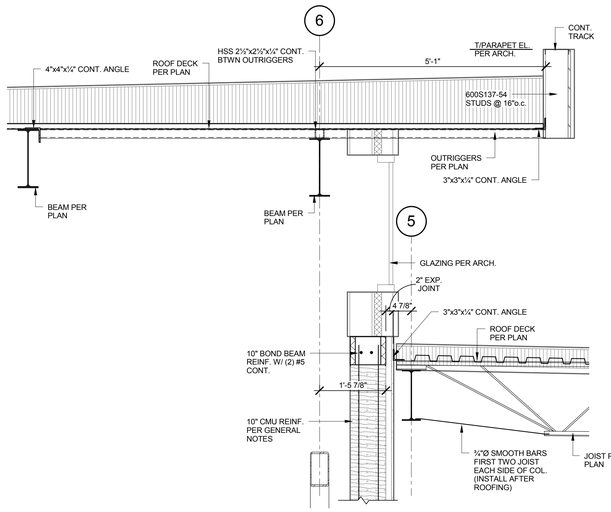
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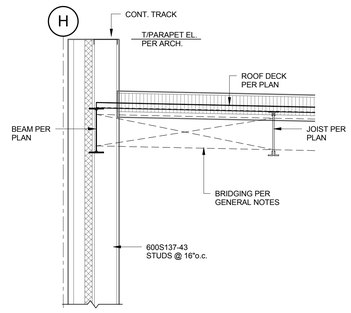
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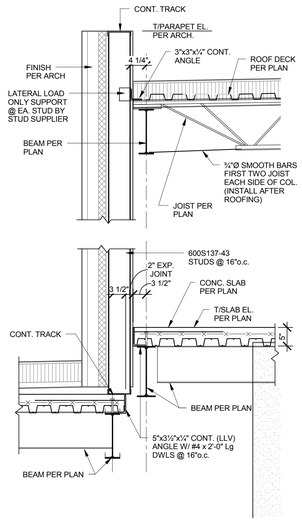
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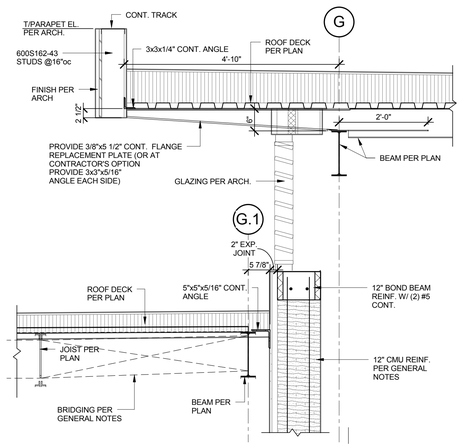
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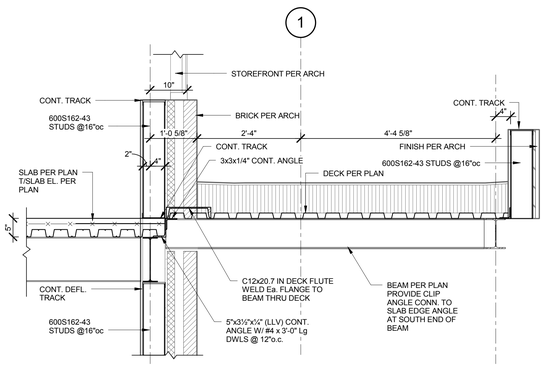
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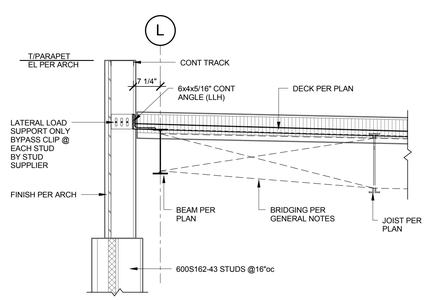
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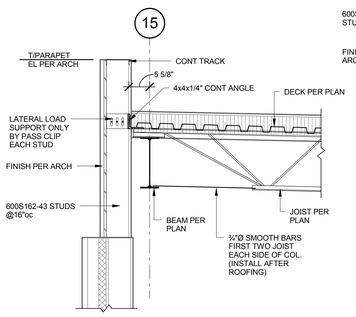
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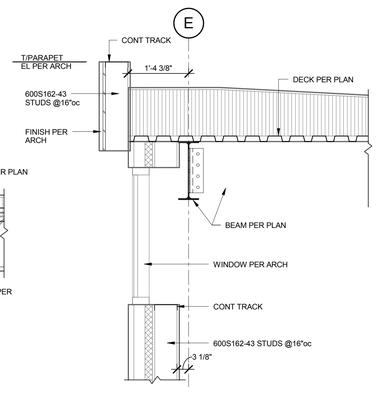
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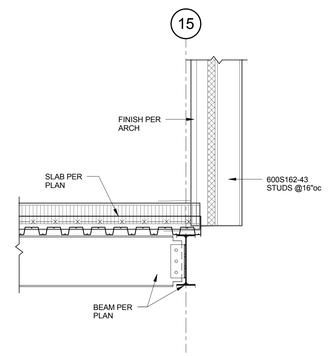
10 SECTION
3/4" = 1'-0"



11 SECTION
3/4" = 1'-0"



12 SECTION
3/4" = 1'-0"



13 SECTION
3/4" = 1'-0"

HTK ARCHITECTS PA
900 S. KANSAS AVE SUITE 200 TOPEKA, KANSAS 66612
9300 W 110TH ST. STE 160 OVERLAND PARK, KANSAS 66210
P 913.498.5370
www.htkarchitects.com

DESIGN DEVELOPMENT PHASE

DATE:
- 3-10-15

REVISED DATE:
- 12-18-14
- 2-9-15
- 3-10-15

STATE OF KANSAS ENERGY & SERVICE CENTER

HTK Architects
Seventh & Van Buren Street, Topeka, Kansas

SHEET CONTENTS:
- FRAMING SECTIONS

HTK PROJECT NUMBER:
- 1410.03

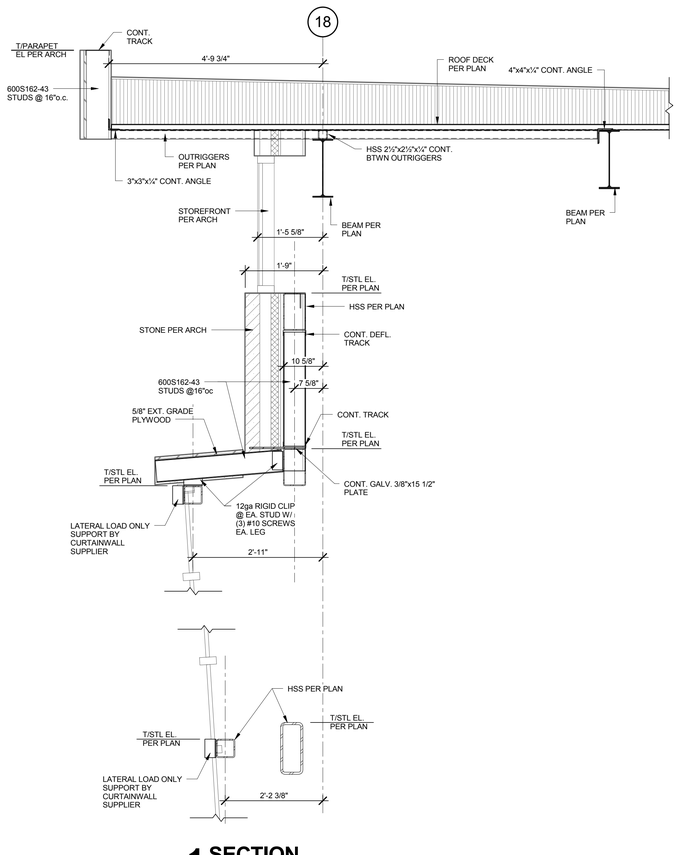
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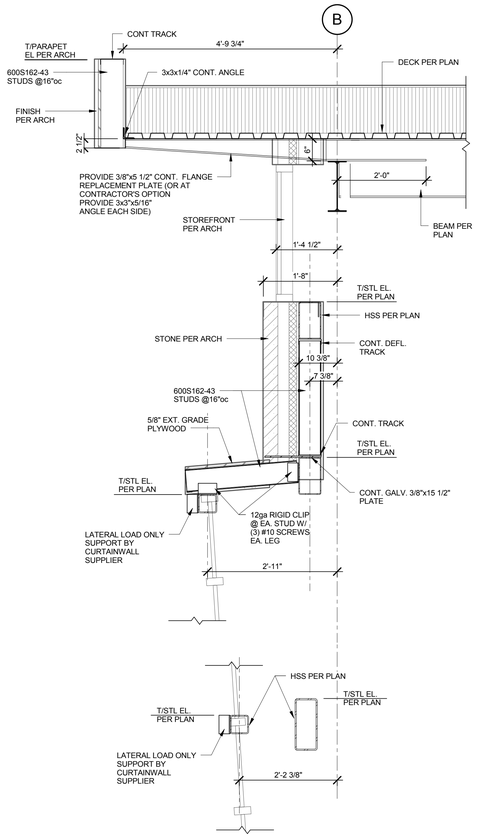
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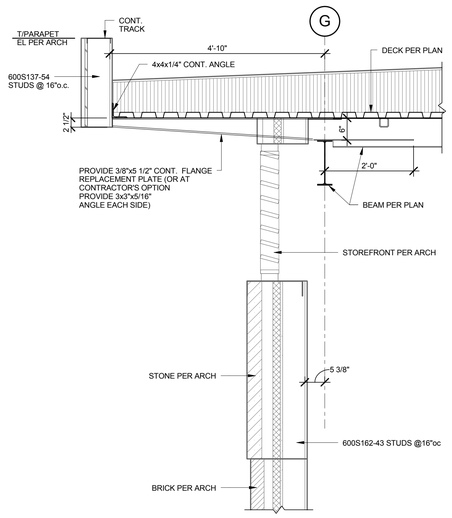
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2-2-2016
Att:9A1116



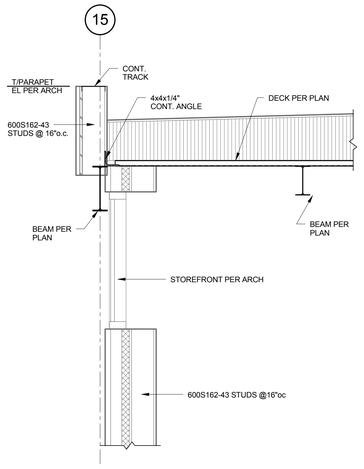
1 SECTION
3/4" = 1'-0"



2 SECTION
3/4" = 1'-0"



3 SECTION
3/4" = 1'-0"



4 SECTION
3/4" = 1'-0"

HTK ARCHITECTS PA
900 S. KANSAS AVE SUITE 200 TOPEKA KANSAS 66612
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DESIGN DEVELOPMENT PHASE

DATE:
- 3-10-15

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- 2-9-15
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STATE OF KANSAS ENERGY & SERVICE CENTER

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Seventh & Van Buren Street, Topeka, Kansas

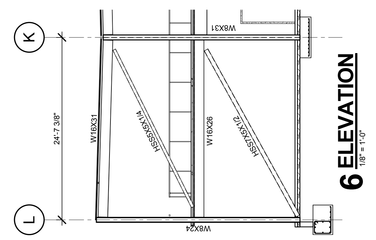
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- FRAMING SECTIONS

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- 1410.03

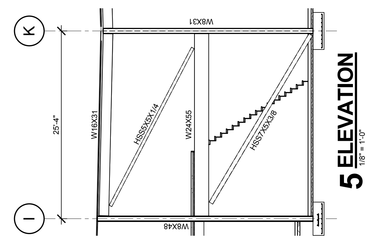
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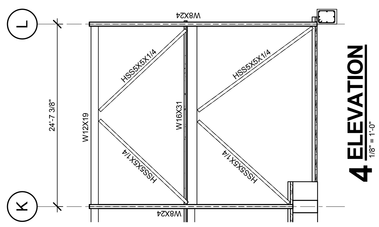
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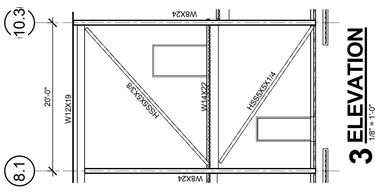
6 ELEVATION
1/8" = 1'-0"



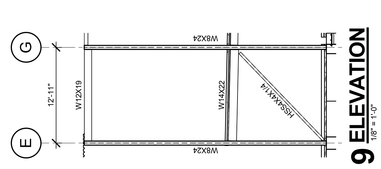
5 ELEVATION
1/8" = 1'-0"



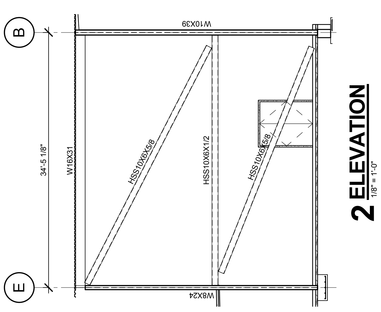
4 ELEVATION
1/8" = 1'-0"



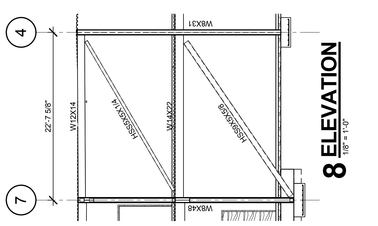
3 ELEVATION
1/8" = 1'-0"



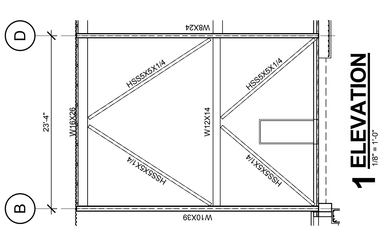
9 ELEVATION
1/8" = 1'-0"



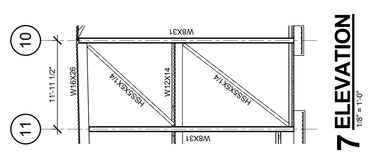
2 ELEVATION
1/8" = 1'-0"



8 ELEVATION
1/8" = 1'-0"



1 ELEVATION
1/8" = 1'-0"



7 ELEVATION
1/8" = 1'-0"

STATE OF KANSAS ENERGY & SERVICE CENTER

HTK Architects

Seventh & Van Buren Street, Topeka, Kansas

SHEET CONTENTS:
FRAMING ELEVATIONS

PROJECT NUMBER:
1410.03

SHEET NUMBER:
S400

DESIGN DEVELOPMENT PHASE DOCUMENTS

DATE:
3-10-15

REVISED DATE:
12-18-14
2-13-15
3-10-15

DESIGN DEVELOPMENT PHASE

HTK ARCHITECTS PA

900 S. KANSAS AVE., SUITE 200 TOPEKA, KANSAS 66612 P 785.266.5573

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2-2-2016
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MECHANICAL LEGEND

HVAC

	DIRECTION OF FLOW
	ELBOW DOWN
	ELBOW UP
	TEE UP
	TEE DOWN
	CAP
	UNION
	FLANGE
	REDUCER (OR INCREASER)
	PIPE FLEXIBLE CONNECTION
	"Y" TYPE STRAINER
R	RISE IN PIPING
D	DROP IN PIPING
	GUIDE
	ANCHOR
	PRESSURE GAUGE WITH GAUGE COCK
	TEMPERATURE GAUGE
	FLOW INDICATOR
	THERMOMETER
	SITE GLASS
	EXPANSION JOINT
FD	FILTER-DRIER
	DRIP ASSEMBLY
	BASKET TYPE STRAINER
	GATE TYPE VALVE
	BALL TYPE VALVE
	PLUG TYPE VALVE
	GLOBE TYPE VALVE
	BUTTERFLY TYPE VALVE
	BALANCING TYPE VALVE
	GAS (LUBRICATED) TYPE PLUG VALVE
	NEEDLE TYPE VALVE
	PRESSURE REDUCING TYPE VALVE
	QUICK (TYPE) OPENING VALVE
	QUICK (TYPE) CLOSING VALVE
	CHECK TYPE VALVE
	TRIPLE DUTY TYPE VALVE
S	SOLENOID TYPE VALVE
	CONTROL TYPE VALVE (2-WAY)
	CONTROL TYPE VALVE (3-WAY)
	SELF CONTAINED TYPE VALVE
	RELIEF/SAFETY TYPE VALVE
	CIRCUIT SETTER
M	MOTOR OPERATED TYPE VALVE
PS	PRESSURE SWITCH
FS	FLOW SWITCH
EP	ELECTRIC PNEUMATIC CONTROL SWITCH
PE	PNEUMATIC ELECTRIC CONTROL SWITCH
	FLOW CONTROL
CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
HWS	HOT WATER HEATING SUPPLY
HWR	HOT WATER HEATING RETURN
CTS	COOLING TOWER SUPPLY
CTR	COOLING TOWER RETURN
LPS	LOW PRESSURE STEAM
LPR	LOW PRESSURE CONDENSATE RETURN
HPS	HIGH PRESSURE STEAM - NO'S GIVE GAUGE PRESSURE IN P.S.I.
PR	PUMPED CONDENSATE RETURN
SPD	SUMP PUMP DISCHARGE

PLUMBING

CW	DOMESTIC COLD WATER
HCW	NON-POTABLE COLD WATER
HW	DOMESTIC HOT WATER
HWR	RECIRCULATING DOMESTIC HOT WATER
SW	SOFT DOMESTIC COLD WATER
SW-HW	SOFT DOMESTIC HOT WATER
SW-HWR	SOFT RECIRCULATING HOT WATER
LI	LAWN IRRIGATION
SAN	SOIL OR WASTE ABOVE GRADE OR FLOOR
SAN	SOIL OR WASTE BELOW GRADE OR FLOOR
ST	STORM ABOVE GRADE OR FLOOR
ST	STORM BELOW GRADE OR FLOOR
ST/O	STORM OVERFLOW ABOVE GRADE OR FLOOR
ST/O	STORM OVERFLOW BELOW GRADE OR FLOOR
V	PLUMBING VENT
W	WATER SERVICE
G	GAS (NATURAL)
PG	PROPANE (LIQUEFIED PETROLEUM)
F	FIRE SPRINKLER PIPING
HB	HOSE BIBB
WH	WALL HYDRANT
WCO	FLUSH WALL CLEAN OUT
CO	CLEAN OUT
GCO	YARD CLEANOUT OR GRADE CLEANOUT
FCO	FLUSH FLOOR CLEAN OUT
	FLOOR DRAIN, AREA DRAIN, FLOOR SINK
RD / ORD	ROOF DRAIN, OVERFLOW ROOF DRAIN
	SHOWER HEAD.
	DOUBLE CHECK BACKFLOW PREVENTER
P #	PLUMBING VENT RISER CALL-OUT NUMBER
RFR 301	VALVE SYSTEM AND NUMBER
5K	UP TO PLUMBING FIXTURE

ELECTRICAL LEGEND

CONDUIT AND WIRE

	ARROWS INDICATE CONDUIT & WIRE HOME RUN(S) TO PANEL WITH 2-#12 AWG CONDUCTORS UNLESS NOTED OR OTHERWISE REQUIRED.
	CONDUIT RUN CONCEALED IN WALL OR ABOVE CEILING.
	CONDUIT RUN UNDERGROUND OR CONCEALED IN FLOOR SLAB.
T	TELEPHONE CONDUIT
LV	LOW VOLTAGE CONDUIT AND WIRING
	CONDUIT DROP. CONDUIT RISE (ALL TYPES)

LIGHTING

	BATTERY OPERATED EMERGENCY LIGHT (WALL MOUNTED)
	BATTERY OPERATED EMERGENCY LIGHT (CEILING MOUNTED)
	SURFACE/RECESSED LIGHT FIXTURE
	FLUORESCENT LIGHT FIXTURE
	FLUORESCENT STRIP FIXTURE
	POLE MOUNTED LIGHT FIXTURE
	EXIT LIGHT - DOUBLE FACE - ARROWS AS SHOWN
	EXIT LIGHT - SINGLE FACE - ARROWS AS SHOWN
S3$4$5LK	LIGHTING SWITCHES-SINGLE POLE, 3-WAY, 4-WAY, KEY, LOW VOLTAGE, PILOT LIGHT
$D	DIMMER WITH SINGLE POLE SWITCH
$D3	DIMMER WITH THREE WAY SWITCH (WATTAGE NOTED)
$M	WALL MOUNTED MOTION SENSOR
(A)	CEILING MOUNTED MOTION SENSOR (LETTER DENOTES TYPE)
	DENOTES A WALL MOUNTED FIXTURE
$b	SINGLE POLE SWITCH, "b" = SWITCHLEG

COMMUNICATIONS

	TELEPHONE OUTLET
	LINE THRU DEVICE INDICATES ABOVE COUNTER
	DATA OUTLET
	1 TELEPHONE AND 1 DATA OUTLET
2-2	1ST # INDICATES # OF TELEPHONE OUTLETS; 2ND # INDICATES # OF DATA OUTLETS IN SAME BOX. (SINGLE GANG OUTLET BOX WITH 4" X 4" BACK BOX.)
	FLOOR BOX WITH COMMUNICATIONS OUTLET
TV	TELEVISION ANTENNA OUTLET
	TELEPHONE CABINET OR PLYWOOD BOARD

WIRING DEVICES

	DUPLEX RECEPTACLE.
	LINE THRU DEVICE INDICATES ABOVE COUNTER
GFCI	DUPLEX RECEPTACLE WITH ISOLATED GROUND (SINGLE AND FOURPLEX SIMILAR)
5	DUPLEX RECEPTACLE - TOP HALF SWITCHED - BOTTOM HALF TO HAVE POWER AT ALL TIMES
EM	DUPLEX RECEPTACLE ON EMERGENCY POWER (SINGLE AND FOURPLEX SIMILAR)
	FOURPLEX RECEPTACLE
GFCI	FOURPLEX RECEPTACLE - 1/2 NORMAL POWER, 1/2 ISOLATED GROUND COMPUTER POWER
	SINGLE RECEPTACLE
	CEILING MOUNTED RECEPTACLE
	MULTI-SERVICE FLOOR BOX
	DIVIDED POWER POLE
	FLOOR BOX W/DUPLEX RECEPTACLE
	SPECIAL RECEPTACLE W/NEMA CONFIGURATION AS NOTED
	CLOCK RECEPTACLE
	MULTI-OUTLET ASSEMBLY

POWER DEVICES AND CONTROLS

	THERMOSTAT
	DISCONNECT SWITCH. 30A-3P, NON-FUSED EXCEPT AS NOTED
	MANUAL MOTOR STARTER
	MAGNETIC MOTOR STARTER
	COMBINATION MAGNETIC MOTOR STARTER AND DISCONNECT SWITCH
	SINGLE-PHASE MOTOR
	THREE-PHASE MOTOR
	PANELBOARD (SEE ONE-LINE)
	DISTRIBUTION PANELBOARD
	CONTACTOR
	AUTOMATIC TRANSFER SWITCH
PC	PHOTOCELL
J	JUNCTION BOX
	PUSHBUTTON
T	TRANSFORMER
VAV	JUNCTION BOX FOR 120 VOLT VAV BOX (VARIABLE AIR VOLUME CONTROL BOX)

ONE-LINE DIAGRAM/RISER DIAGRAM

30/3 25	FUSE (30 AMPERE, 3 POLE CLIPS, 25 AMPERE FUSES)
30/3 25	FUSIBLE DISCONNECT (30 AMPERE, 3 POLE CLIPS, 25 AMPERE FUSES)
M	METER
	TRANSFORMER
60A/3P	CIRCUIT BREAKER (60 AMPERE TRIP, 3 POLE)
2000 AF 1600 AT, LSG	DRAW-OUT CIRCUIT BREAKER (2000 AMPERE FRAME, 1600 AMPERE TRIP SETTING) (LSIG = LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT SETTINGS AVAILABLE)
	EQUIPMENT GROUND
6	CONDUCTOR AND CONDUIT SIZE DESIGNATOR
	BUS DUCT TO WIRE TRANSITION BOX
	MOTOR STARTER OVERLOAD
X	MOTOR STARTER (NEMA X = STARTER SIZE)
VFD	VARIABLE FREQUENCY DRIVE

UNLESS OTHERWISE NOTED, MOLDED CASE CIRCUIT BREAKERS SHALL HAVE THE FOLLOWING MINIMUM FRAME SIZES:
15A TO 100A - 100AF
110A TO 250A - 250AF
300A TO 400A - 400AF
450A TO 600A - 600AF
700A TO 800A - 800AF
900A TO 1200A - 1200AF

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LSA PROJECT NO. 1402032

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
-
-

HTK PROJECT NUMBER:
- 1410.03

DEPARTMENT OF ADMINISTRATION
OFFICE OF FACILITIES AND PROCUREMENT MANAGEMENT
800 SW JACKSON, SUITE 700
TOPEKA, KANSAS 66612-1216
TELEPHONE 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: CAD | CHECKED BY: WRB | REV: WRB
DATE: 3-9-15

MECHANICAL AND ELECTRICAL SYMBOLS LIST

A-012651

ME101

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A119

I:\ME101_Mechanical and Electrical Symbols List.dwg 96 02/24/15 STC Last.dwg 96 02/24/15 STC STC STC

ELECTRICAL ABBREVIATIONS

(SOME ABBREVIATIONS ON THIS LEGEND MAY NOT BE USED. REFER TO FLOOR PLANS FOR ALL ABBREVIATIONS.)

A	
A	AMPERE/AMBER
AC	ALTERNATING CURRENT
A/C	AIR CONDITIONING
ACT	ABOVE COUNTER TOP
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
A-HR	AMPERE HOUR
AIA	AMERICAN INSTITUTE OF ARCHITECTS
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	AMERICAL NATIONAL STANDARDS INSTITUTE
ARCH	ARCHITECT/ARCHITECTURAL
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AVG	AVERAGE
AWG	AMERICAN WIRE GAUGE
B	
BD	BOARD
BLDG	BUILDING
BLK	BLOCK
BM	BENCH MARK
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
BTU/HR	BTU PER HOUR
C	
C	CONDUIT
°C	DEGREE CENTIGRADE
CAB	CABINET
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CFM	CUBIC FEET PER MINUTE
CKT	CIRCUIT
CLG	CEILING
CO	CONVENIENCE OUTLET
COL	COLUMN
COMB	COMBINATION
CONC	CONCRETE
CONST	CONSTRUCTION
CONTR	CONTRACT/CONTRACTOR
CP	CONTROL PANEL
CR	CONTROL RELAY
CRT	CATHODE-RAY TUBE
CS	CONTROL STATION
CSA	CANADIAN STANDARDS ASSOCIATION
CSW	CONTROL SWITCH
CT	CURRENT TRANSFORMER
CTR	CENTER
CTRL	CONTROL
CU	COPPER/CONDENSER UNIT
CW	COOL WHITE
CWP	CHILLED WATER PUMP
D	
DB	DECIBEL
DC	DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DF	DRINKING FOUNTAIN
DIM	DIMENSION
DISC	DISCONNECT
DN	DOWN
DPDT	DOUBLE-POLE DOUBLE-THROW
DPR	DAMPER
DPST	DOUBLE-POLE SINGLE-THROW
DTL	DETAIL
DWG	DRAWING
E	
E	EAST
EA	EACH
EC	EMPTY CONDUIT
EDP	ELECTRONIC DATA PROCESSING
EEMC	ELECTRICAL AND ELECTRONIC MANUFACTURERS ASSOCIATION OF CANADA
EF	EXHAUST FAN
EG	ENGINE-GENERATOR
EIA	ELECTRONIC INDUSTRIES ASSOCIATION
ELEC	ELECTRIC/ELECTRICAL
ELEV	ELEVATION
EMT	ELECTRICAL METALLIC TUBING CONDUIT
ENCL	ENCLOSURE
EP	ELECTRIC PANELBOARD
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EXG	EXISTING
EXH	EXHAUST
EXT	EXTERIOR
F	
F	FUSE/FUSED
°F	DEGREE FAHRENHEIT
FA	FIRE ALARM
FAAN	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FD	FIRE DAMPER
FFE	FINISHED FLOOR ELEVATION
FIXT	FIXTURE
FLA	FULL LOAD AMPERES
FLEX	FLEX METAL CONDUIT
FLR	FLOOR
FLUR	FLUORESCENT
FM	FACTORY MUTUAL
FND	FOUNDATION
FPC	FIRE PROTECTION CONTRACTOR
FTG	FOOTING
FUT	FUTURE
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
FW	FENDER WASHER
FWD	FORWARD
G	
G	GREEN
GA	GAUGE
GC	GENERAL CONTRACTOR
GD	GENERAL DUTY/GRADE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GPDW	GYPSUM DRYWALL
GRD	GROUND
GRMC	GALVANIZED RIGID METAL CONDUIT
GV	GALVANIZED
H	
H	HIGH/HEIGHT
HD	HEAVY DUTY
HDW	HARDWARE
HGT	HEIGHT
HHMB	HEX HEAD MACHINE BOLT
HO	HIGH OUTPUT
H-O-A	HAND-OFF-AUTO
HP	HORSEPOWER
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HOR	HORIZONTAL
HR	HOUR
HT	HEIGHT
HTG	HEATING
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING, AIR CONDITIONING
HWCP	HOT WATER CIRCULATING PUMP
HZ	HERTZ
I	
IC	INTERCOM
ICAND	INCANDESCENT
ID	INSIDE DIMENSION
IEC	INTERNATIONAL ELECTROTECHNICAL COMMISSION
IF	INSIDE FROSTED
IMC	INTERMEDIATE METAL CONDUIT
INCAN	INCANDESCENT
INSUL	INSULATED
INT	INTERIOR
J	
JB	JUNCTION BOX
JIC	JOINT INDUSTRIAL COUNCIL
K	
°K	DEGREE KELVIN
KO	KNOCKOUT
KVA	KILOVOLT-AMP
KW	KILOWATT
KWH	KILOWATT-HOUR
L	
LA	LIGHTNING ARRESTOR
LC	LIGHTING CONTRACTOR
LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
LOA	LENGTH OVER ALL
LP	LIGHTING PANEL/LIGHTING PANELBOARD
LPF	LOW POWER FACTOR
LRA	LOCKED ROTOR AMPERE
LTG	LIGHTING
LV	LOW VOLTAGE
LW	LOCK WASHER
M	
MAG	MAGNETIC
MAN	MANUAL
MAX	MAXIMUM
MCP	MOTOR CIRCUIT PROTECTOR
MECH	MECHANICAL
MFR	MANUFACTURER
MG	MOTOR-GENERATOR
MIC	MICROPHONE
MIN	MINIMUM
MH	METAL HALIDE/MANHOLE
MOG	MOGUL
MPS	MANUAL PULL STATION
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
MTS	MANUAL TRANSFER SWITCH
MV	MERCURY VAPOR
N	
N	NORTH/NEUTRAL
NA	NOT APPLICABLE
NATS	NON-AUTOMATIC TRANSFER SWITCH
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NF	NON-FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NTS	NOT TO SCALE
O	
OC	ON CENTER(S)
OD	OUTSIDE DIMENSION/ OUTSIDE DIAMETER
OH	OVERHEAD
OL	OVERLOAD
P	
P	POLE/PUMP
PA	PUBLIC ADDRESS
PB	PULL BOX/PUSH BUTTON
PC	PLUMBING CONTRACTOR
PE	PROFESSIONAL ENGINEER
PEC	PHOTO ELECTRIC CELL
PF	POWER FACTOR
PL	PILOT LIGHT/PROPERTY LINE
PNL	PANEL
PNLBD	PANELBOARD
POS	POSITION
PP	POWER PANEL/POWER PANELBOARD
PREFAB	PREFABRICATED
PSI	POUNDS PER SQUARE INCH
PT	POTENTIAL TRANSFORMER/POINT
P/T	PAN AND TILE
PVC	RIGID POLYVINYL CHLORIDE CONDUIT
PVMT	PAVEMENT
PWD	PLYWOOD
PWR	POWER
Q	
QTY	QUANTITY
R	
R	RED
RA	RETURN AIR
RAD	RADIUS
RAF	RETURN AIR FAN
RECEP	RECEPTACLE
REV	REVERSE/REVISION
RF	RETURN FAN
RLY	RELAY
RM	ROOM
RMC	RIGID METAL CONDUIT
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
S	
S	SOUTH
SA	SUPPLY AIR
SAF	SUPPLY AIR FAN
SECT	SECTION
SC	SCREW COVER
SCH	SCHEDULE
SEL	SELECTOR
SF	SUPPLY FAN/SQUARE FEET
SHT	SHEET
SPDT	SINGLE-POLE DOUBLE-THROW
SPEC	SPECIFICATION
SPK	SPEAKER
SPST	SINGLE-POLE SINGLE-THROW
SQ	SQUARE
SST	STAINLESS STEEL
STD	STANDARD
ST-FLEX	SEALTITE (LIQUIDTIGHT) FLEXIBLE METAL CONDUIT
STL	STEEL
STR	STARTER
SURF	SURFACE
SUSP	SUSPEND
SWBD	SWITCHBOARD
SW	SWITCH
T	
TB	TERMINAL BOX
TBD	TERMINAL BOARD
TCP	TEMPERATURE CONTROL PANEL
TELE	TELEPHONE/TELEPHOTO
TS	TRANSFER SWITCH
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
U	
UL	UNDERWRITER LABORATORIES, INC.
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	
V	VOLTAGE
VA	VOLT-AMP
VAV	VARIABLE AIR VOLUME
VDT	VIDEO DISPLAY TERMINAL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VHO	VERY HIGH OUTPUT
W	
W	WEST/WIRE/WATT/WIDTH/ WIDE
WA	WIDE ANGLE
WD	WOOD
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
WW	WARM WHITE/WIREWAY
X	
XFMR	TRANSFORMER
Y	
Y	WYE
Z	
Z	ZOOM
SYMBOLS	
Φ	PHASE
Δ	DELTA
%	PERCENT
#	NUMBER
≈	APPROXIMATELY

MECHANICAL ABBREVIATIONS

(SOME ABBREVIATIONS ON THIS LEGEND MAY NOT BE USED. REFER TO FLOOR PLANS FOR ALL ABBREVIATIONS.)

A	AMPS, AIR (COMPRESSED)	GV	GRAVITY VENTILATOR	PP	PIT PUMP
A/C	AIR CONDITIONING	GW	GROUND WATER	PRV	PRESSURE REDUCING VALVE
AD	AREA DRAIN				
AFF	ABOVE FINISH FLOOR	H	HUMIDISTAT	QTY	QUANTITY
AFC	ABOVE FINISH CEILING	HB	HOSE BIBB		
AFG	ABOVE FINISH GRADE	HEX	HEAT EXCHANGER	R	RETURN
AFS	AIR FLOW MEASURING STATION	HPS	HIGH PRESSURE STEAM	RA	RETURN AIR
AHU	AIR HANDLING UNIT	HPR	HIGH PRESSURE CONDENSATE RETURN	RAD	RADIATOR
AS	AIR SEPARATOR	HRU	HEAT RECOVERY UNIT	RAF	RETURN AIR FAN
		HTG	HEATING	RD	REFRIGERANT DISCHARGE, ROOF DRAIN
BBD	BOILER BLOWDOWN	HTR	HEATER	REV	REVISION
BDD	BACKDRAFT DAMPER	HVU	HEATING AND VENTILATING UNIT	RF	REFRIGERANT
BFP	BACKFLOW PREVENTER	HW	DOMESTIC HOT WATER	RFS	REFRIGERANT SUCTION
BFW	BOILER FEED WATER	HWR	HOT WATER HEATING RETURN	RG	RETURN GRILLE
BOD	BOTTOM OF DUCT	HWP	DOMESTIC HOT WATER PUMP	RH	RELATIVE HUMIDITY
BOP	BOTTOM OF PIPE	HWRP	DOMESTIC HOT WATER RECIRC. PUMP	RHW	DOMESTIC RECIRCULATING HOT WATER
BOS	BOTTOM OF STRUCTURE	HWS	HOT WATER HEATING SUPPLY	RLA	RUNNING LOAD AMPS
BTH	BRITISH THERMAL UNIT			RFL	REFRIGERANT LIQUID
BFD	BOILER FEED LINE	IAQ	INDOOR AIR QUALITY SENSOR	RPM	REVOLUTIONS PER MINUTE
		IE	INVERT ELEVATION	RTN	LOW PRESSURE CONDENSATE RETURN
CFM	CUBIC FEET PER MINUTE	IG	ISOLATED GROUND	RTU	ROOF TOP UNIT
CHP	CHILLED WATER PUMP				
CHR	CHILLED WATER RETURN	KV	KILOVOLT	S	SOLENOID
CHS	CHILLED WATER SUPPLY	KVA	KILOVOLT AMPS	SA	SUPPLY AIR
CKT	CIRCUIT	KW	KILOWATT	SAN	SANITARY
CO	CLEANOUT / CARBON MONOXIDE			SCHP	SECONDARY CHILLED WATER PUMP
CO2	CARBON DIOXIDE SENSOR	L	LOUVER	SD	SUPPLY DIFFUSER/SAN. OR COND. DRAIN
CTR	COOLING TOWER RETURN	LAT	LEAVING AIR TEMPERATURE	SE	SEWAGE EJECTOR
CTS	COOLING TOWER SUPPLY	LDB	LEAVING DRY BULB	SHWP	SECONDARY HOT WATER PUMP
CU	COPPER, CONDENSING UNIT	LP	LIQUEFIED PETROLEUM	SMP	SNOW MELT PUMP
CUH	CABINET UNIT HEATER	LPCP	LOW PRESSURE CONDENSATE PUMP	SMR	SNOW MELT RETURN
CW	DOMESTIC COLD WATER	LPS	LOW PRESSURE STEAM	SMS	SNOW MELT SUPPLY
CWP	DOMESTIC COLD WATER PUMP	LPR	LOW PRESSURE CONDENSATE RETURN	SPF	SMOKE PURGE FAN
		LRA	LOCKED ROTOR AMPS	SP	STATIC PRESSURE
DDC	DIRECT DIGITAL CONTROL	LWB	LEAVING WET BULB	SPD	SPLITTER DAMPER
DDVAV	DUAL DUCT VARIABLE AIR VOLUME	LWT	LEAVING WATER TEMPERATURE	SR	SUPPLY REGISTER
DN	DOWN			ST	STORM DRAIN
DPR	DAMPER	MA	MAKE UP AIR	ST/O	STORM OVERFLOW
DSP	DUPLEX SUMP PUMP	MBH	1000 BTU PER HOUR	SW	STORM WATER
DWH	DOMESTIC WATER HEATER	MC	MECHANICAL CONTRACTOR	SWC	SOFT DOMESTIC COLD WATER
DX	DIRECT EXPANSION	MCC	MOTOR CONTROL CENTER	SWH	SOFT DOMESTIC HOT WATER
		MD	MANUAL DAMPER		
EAT	ENTERING AIR TEMPERATURE	MFR	MANUFACTURER	TCV	TEMP. CONTROL VALVE
EF	EXHAUST FAN	MH	MANHOLE	TNK	TANK
ER	EXHAUST REGISTER	MTD	MOUNTED	TSTAT	THERMOSTAT
ESP	ELEVATOR SUMP PUMP	MTR	MOTOR		
ET	EXPANSION TANK	MUAF	MAKE UP AIR FAN	UH	UNIT HEATER
ETR	EXISTING TO REMAIN	MZD	MOTORIZED DAMPER	UNO	UNLESS NOTED OTHERWISE
EWB	ENTERING WET BULB			UPS	UNINTERRUPTIBLE POWER SUPPLY
EWC	ELECTRIC WATER COOLER	N	NITROGEN		
EWT	ENTERING WATER TEMPERATURE	N/A	NOT APPLICABLE	V	VENT PIPE
EXH	EXHAUST	NIC	NOT IN CONTRACT	VAV	VARIABLE AIR VOLUME
		N/C	NORMALLY CLOSED	VD	VOLUME DAMPER
F/S	COMBINATION FIRE AND SMOKE DAMPER	N/O	NORMALLY OPEN	VOC	VOLATILE ORGANIC COMPOUND SENSOR
FCO	FLUSH FLOOR CLEANOUT			VTR	VENT THROUGH ROOF
FCU	FAN COIL UNIT	OC	ON CENTERS		
FD	FIRE DAMPER, FLOOR DRAIN	OA	OUTSIDE AIR	W/	WITH
FL	FLOW LINE ELEVATION	ORD	OVERFLOW ROOF DRAIN	W/O	WITHOUT
FLA	FULL LOAD AMPS			WB	WET BULB
FLR	FLOOR	PCHP	PRIMARY CHILLED WATER PUMP	WCO	FLUSH WALL CLEANOUT
FP	FIRE PROTECTION	PD	PUMP DISCHARGE	WH	WALL HYDRANT
		PH	PHASE	WP	WEATHERPROOF
GCO	FLUSH GRADE CLEANOUT	PHWP	PRIMARY HOT WATER PUMP	WS	WATER SOFTENER
GMP	GLYCOL MAKE-UP PUMP	PIV	POST INDICATOR VALVE		
GND	GROUND			XP	EXPLOSION PROOF
GPM	GALLONS PER MINUTE				

GENERAL

NOT ALL SYMBOLS OR ABBREVIATIONS MAY BE USED

(1)	MECHANICAL NOTE REFERENCE
[2]	ELECTRICAL NOTE REFERENCE
⟨3⟩	DEMOLITION NOTE REFERENCE
△4	REVISION NOTE REFERENCE
◇5	GENERAL CONSTRUCTION NOTE REFERENCE
	CONNECTION POINT BETWEEN NEW & EXISTING WORK
1 / M1	DETAIL REFERENCE – NO./SHEET NO.
2 / M1	SECTION CUT – SECTION/SHEET NO.

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HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15
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HTK PROJECT NUMBER:
- 1410.03

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STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

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DATE: 3-9-15

MECHANICAL AND ELECTRICAL SYMBOLS LIST

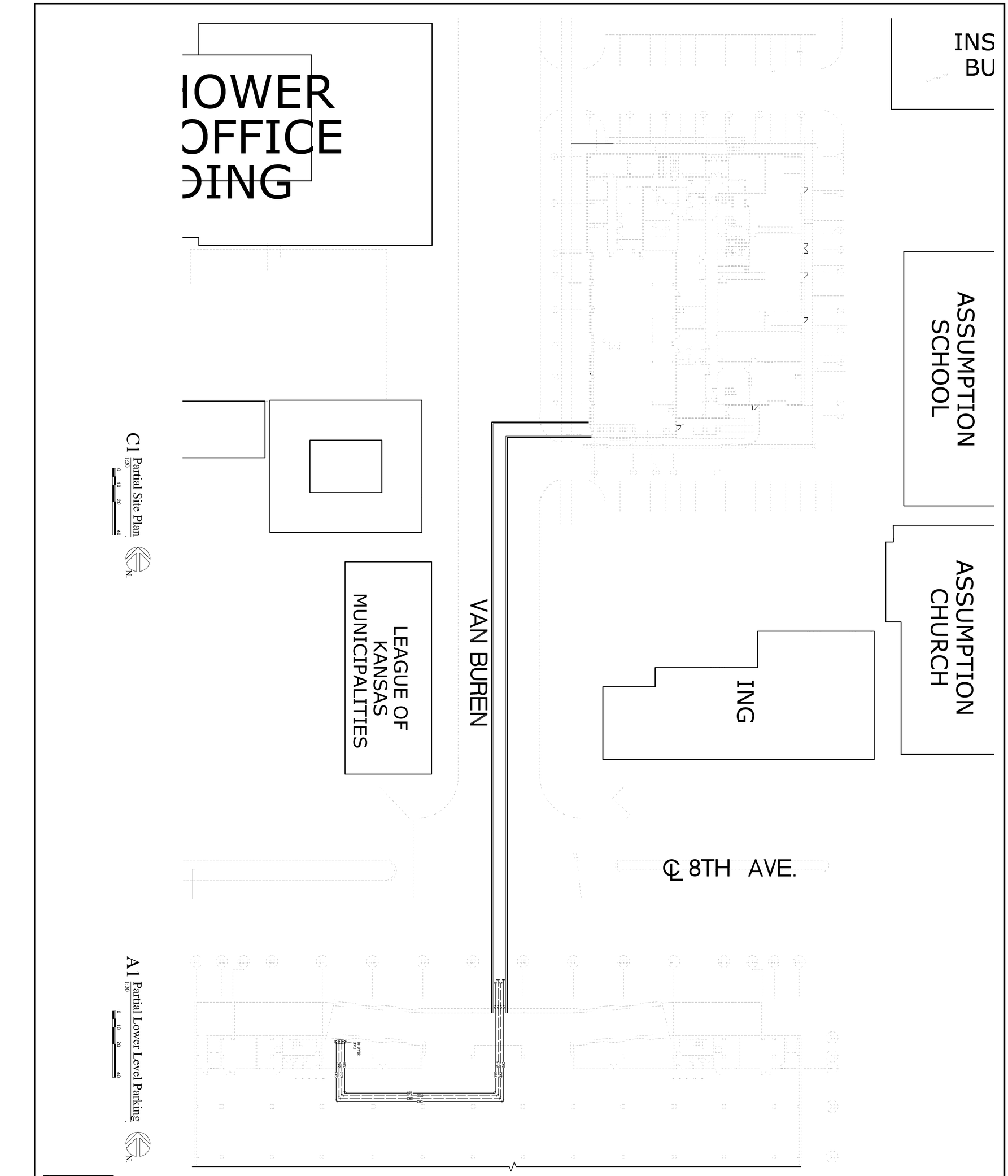
A-012651

ME102

DESIGN DEVELOPMENT PHASE DOCUMENTS

... ME102_Mechanical and Electrical Symbols List.dwg 96 02/24/15 CTC ltd.dwg 96 02/24/15 CTC CTC CTC

JCSBC
2-2-2016
Att:3A120



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DATE:
2.9.15

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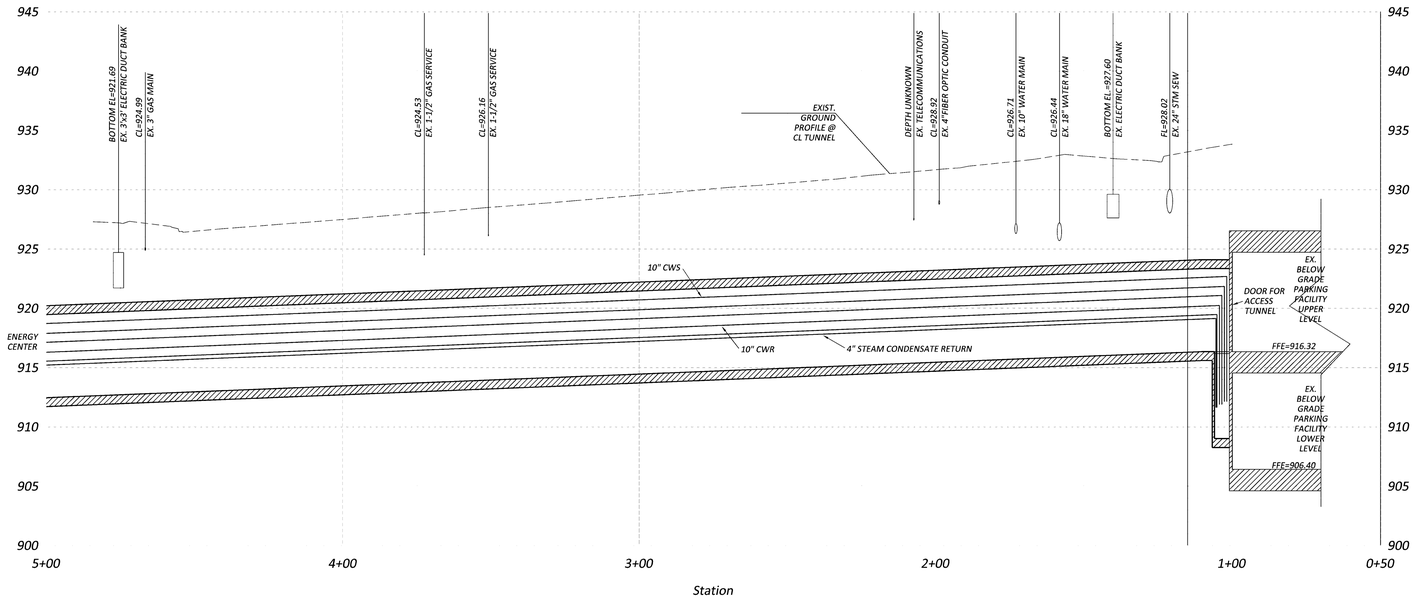
SITE PLAN

A012651

ME201

DESIGN DEVELOPMENT
PHASE DOCUMENTS

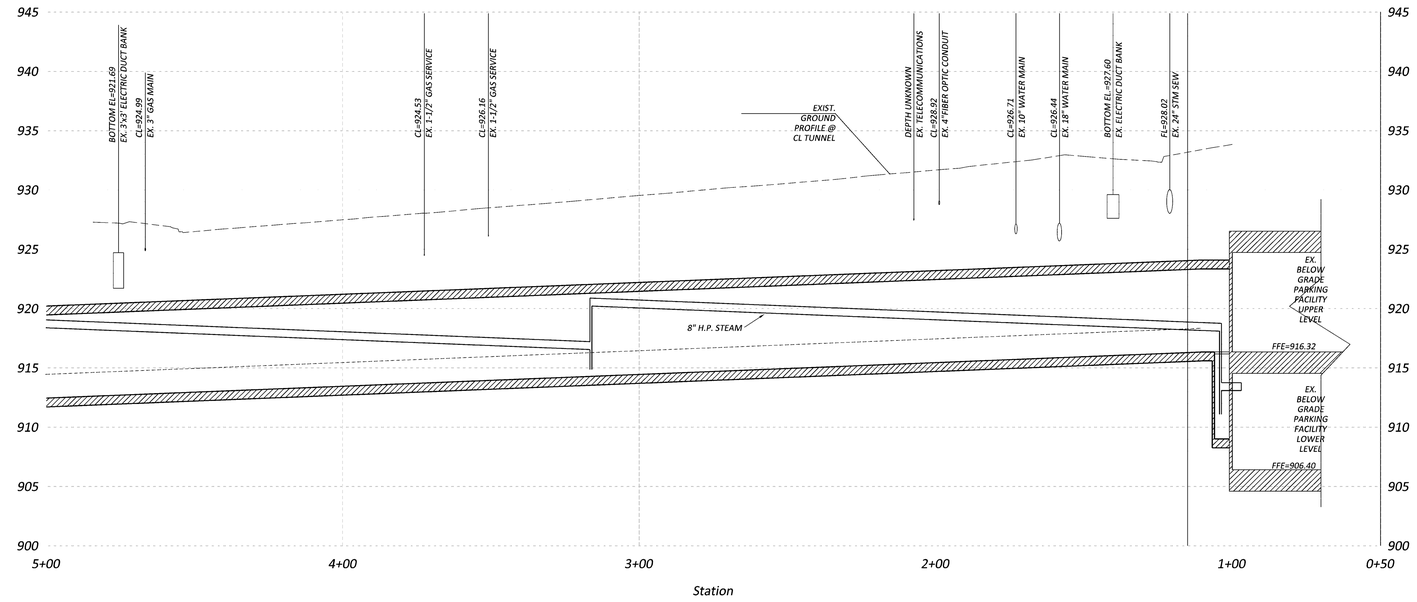
ACSBC
2-27-2015
A012651



B3 Tunnel Provile

1:20 HORIZONTAL
1:5 VERTICAL

0 10 20 40
0 2.5 5 10



B1 Tunnel Provile

1:20 HORIZONTAL
1:5 VERTICAL

0 10 20 40
0 2.5 5 10

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TUNNEL PROFILE

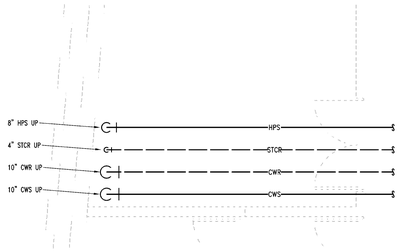
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ME202

DESIGN DEVELOPMENT
PHASE DOCUMENTS

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2-2-2016
Att.9A122

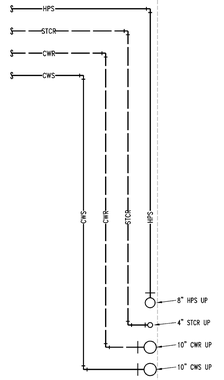
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C3 Upper Level Parking
1/4"=1'-0" Mechanical Piping

0 2 4 8

N.



A3 Upper Level Parking
1/4"=1'-0" Mechanical Piping

0 2 4 8

N.



A1 Upper Level Parking
1/16"=1'-0" Mechanical Piping

0 8 16 32

N.

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UPPER LEVEL PARKING - MECHANICAL PIPING

A-012651

ME203

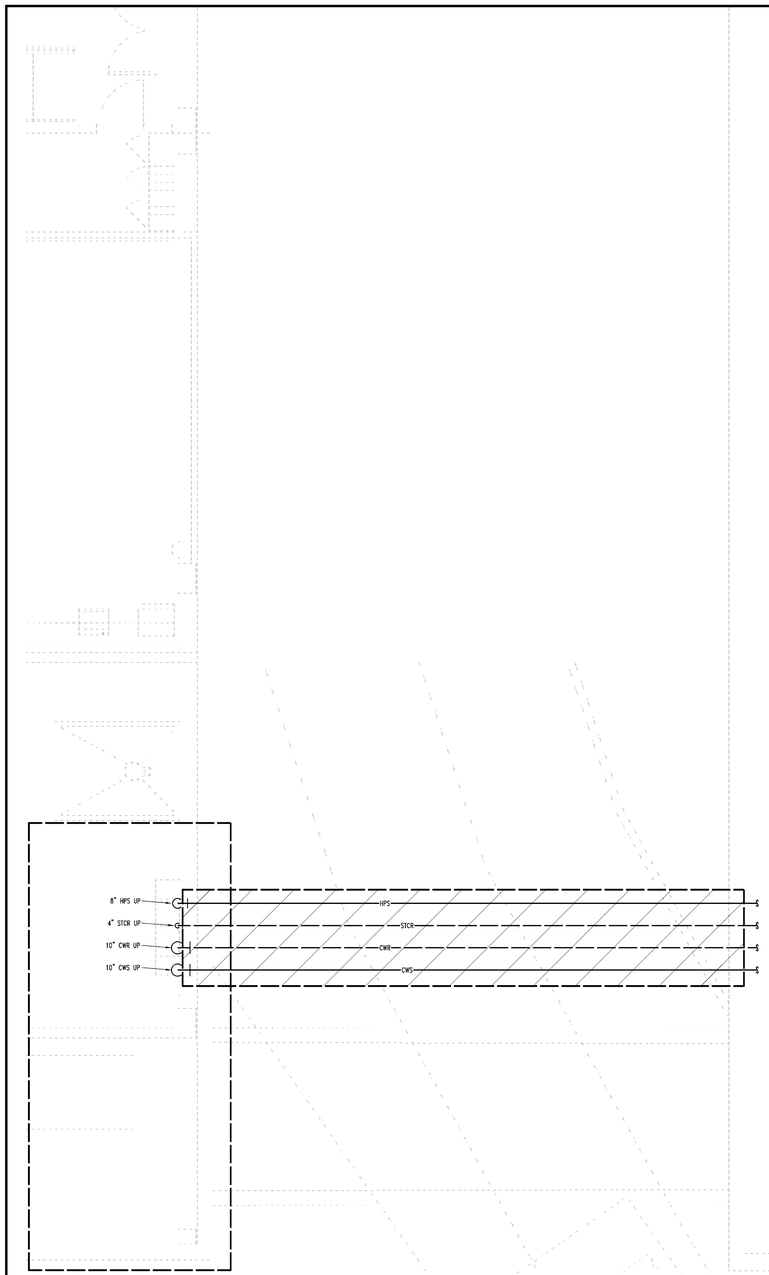
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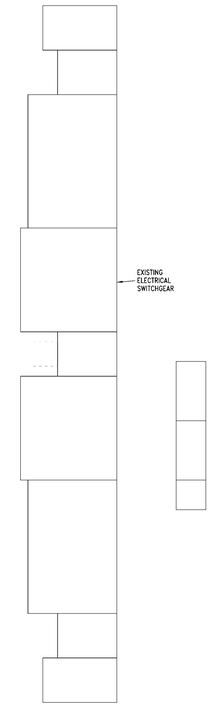
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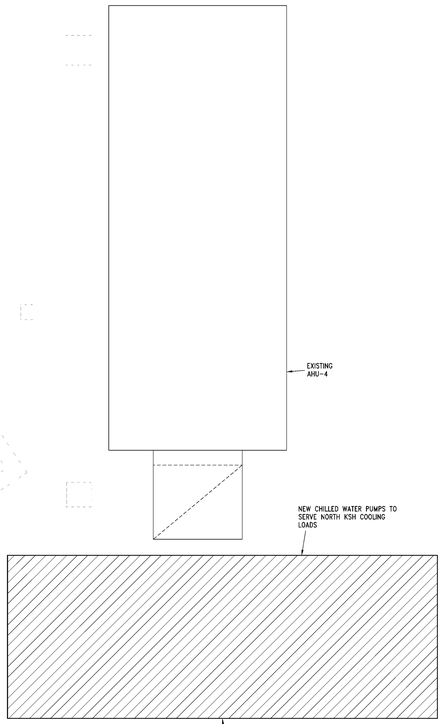
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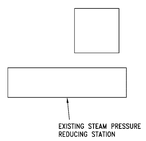
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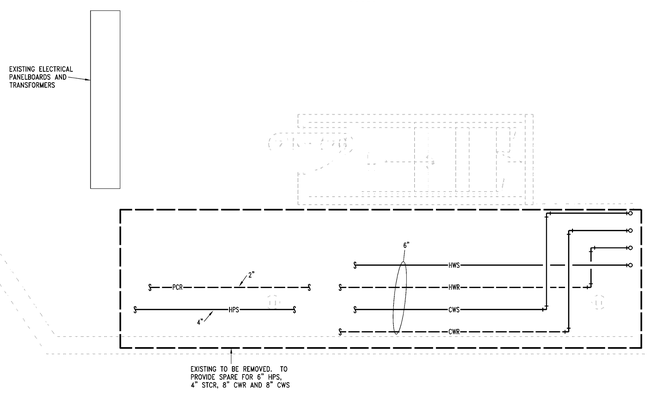








D2 Partial Ground Floor Plan
1/4"=1'-0" Mechanical Piping
N.
0 2 4 8



A1 Partial Foundation Plan
1/4"=1'-0" Mechanical Piping
N.
0 2 4 8

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NW MECHANICAL VAULT PLAN - MECHANICAL PIPING

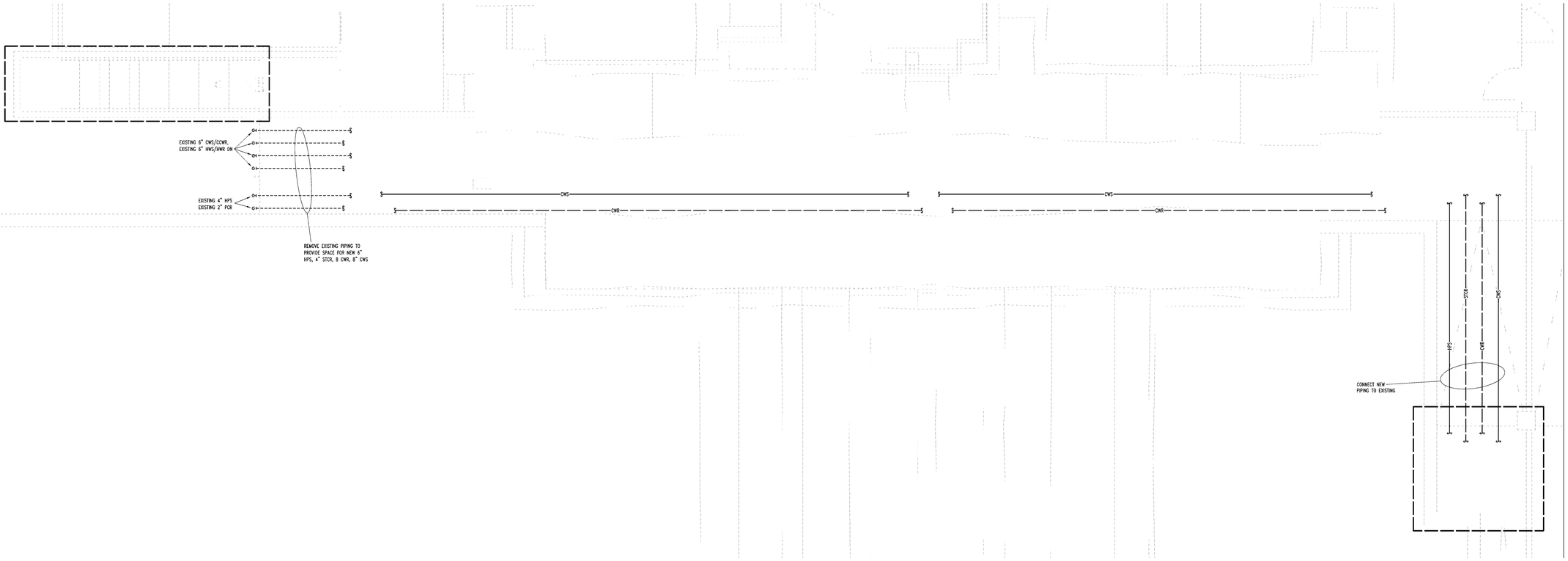
A-012651

ME204

DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
Att:SA124

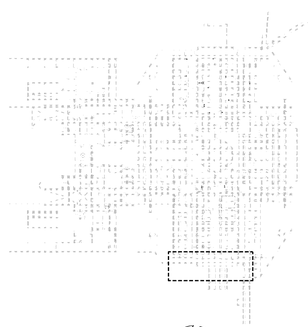
...ME204.dwg 48 02/25/15 GTC



A2 West Utility Corridor Floor Plan
1/4"=1'-0"
Mechanical Piping

0 2 4 8

N.



Key Plan
No Scale

N.

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WEST UTILITY CORRIDOR PLAN - MECHANICAL PIPING

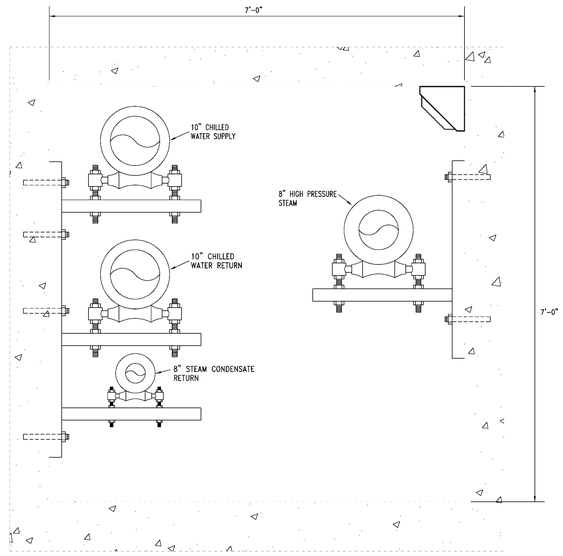
A-012651

ME205

DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
Alt:9A125

...\ME205.dwg 1 02/25/15 GTC



A3 Tunnel Section
1"=1'-0"
0 6 12 24

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TUNNEL SECTION -
MECHANICAL PIPING

A-012651

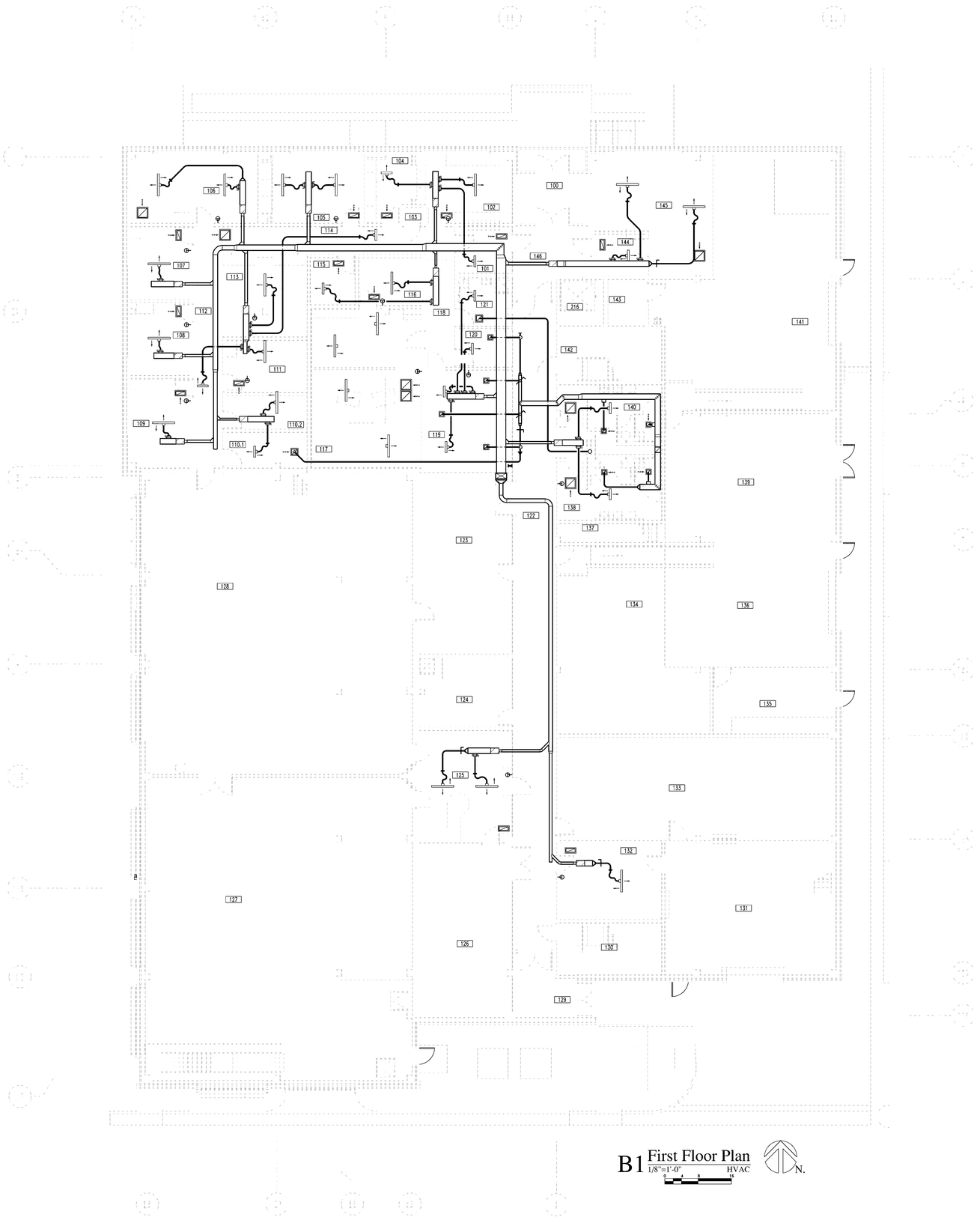
ME206

DESIGN DEVELOPMENT
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...ME201.dwg 12/02/15 GTC

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B1 First Floor Plan
1/8"=1'-0" HVAC
0 4 8 16
N.

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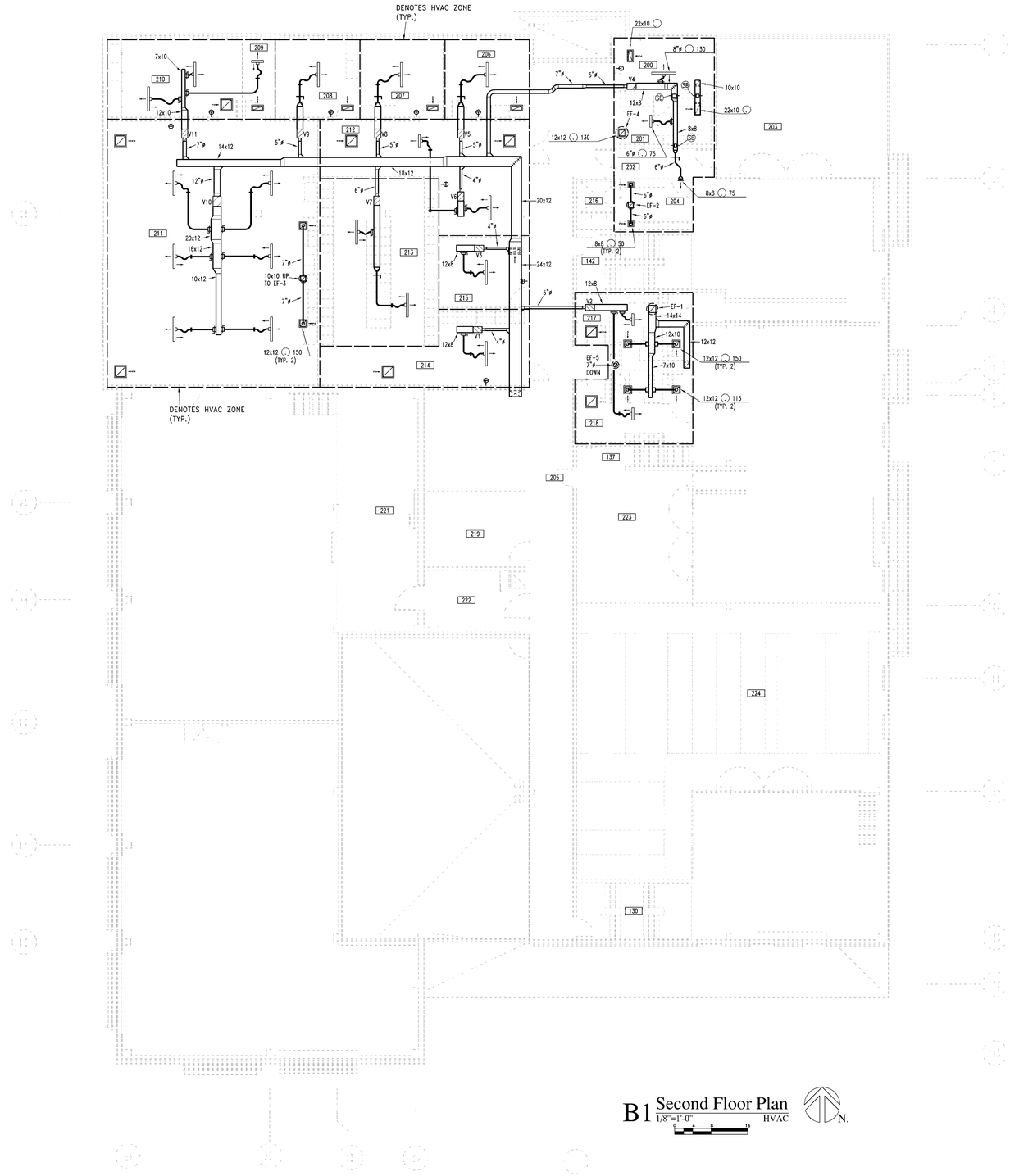
FIRST FLOOR PLAN - HVAC

A-012651

MH101

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A127



B1 Second Floor Plan — HVAC
1/8"=1'-0"

N.

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STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

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SECOND FLOOR PLAN
- HVAC

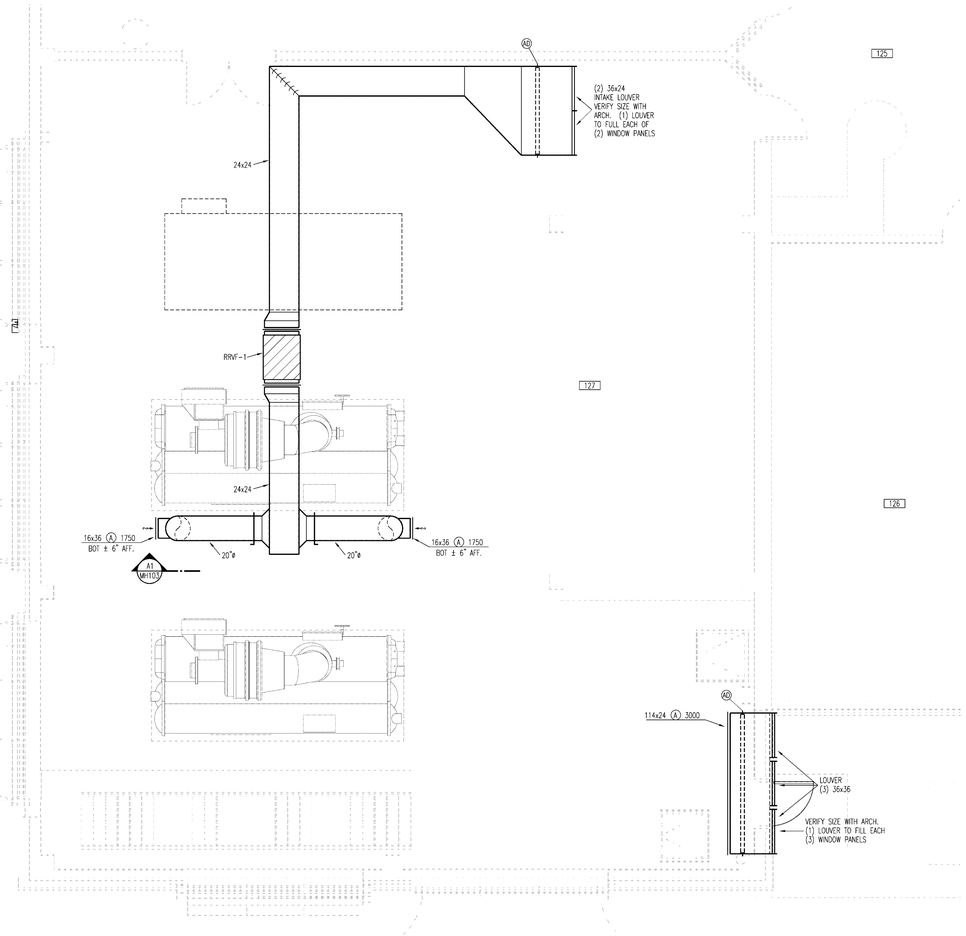
A-012651

MH102

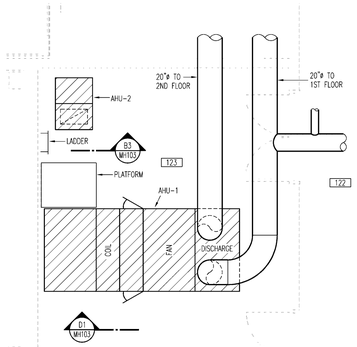
DESIGN DEVELOPMENT
PHASE DOCUMENTS

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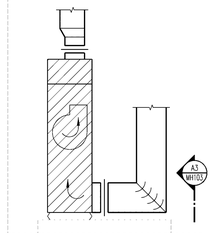
JCSBC
2-2-2016
Att:9A128



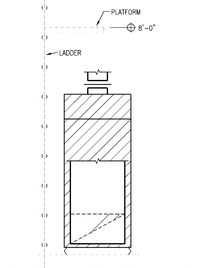
C1 Partial First Floor Plan - Chiller Room
1/4"=1'-0"
HVAC
N.



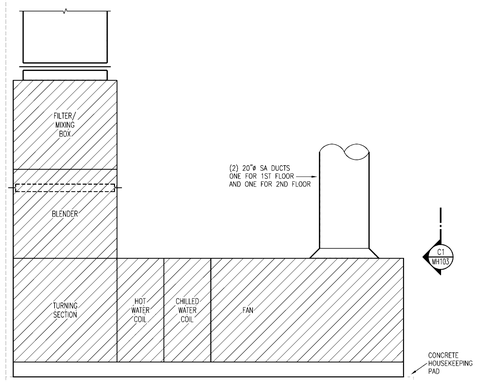
A4 Partial First Floor Plan
1/4"=1'-0"
HVAC
N.



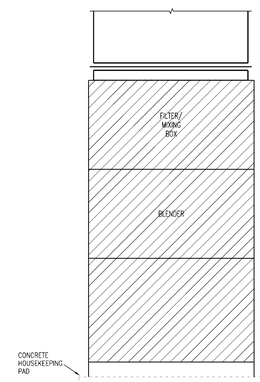
B3 AHU-1 Section
1/2"=1'-0"



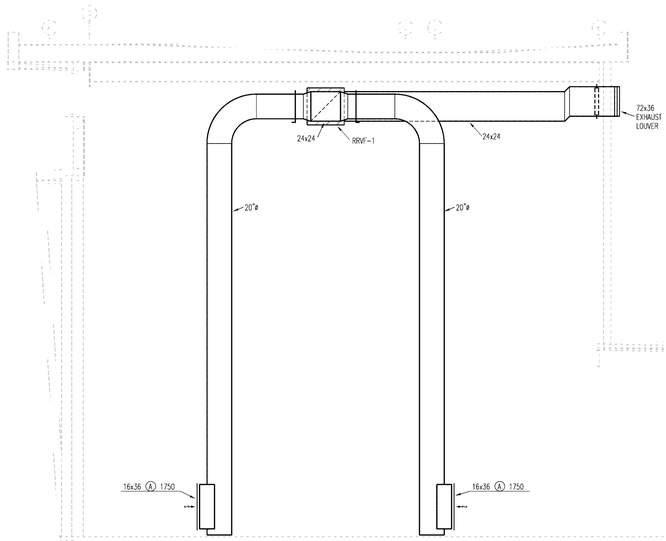
A3 AHU-1 Section
1/2"=1'-0"



D1 AHU-1 Section
1/2"=1'-0"



C1 AHU-1 Section
1/2"=1'-0"



A1 Section
1/4"=1'-0"

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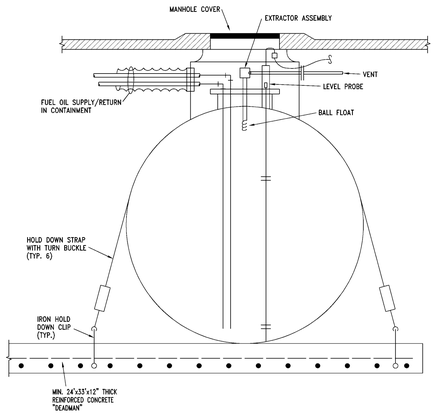
FIRST FLOOR PLAN - HVAC

A-012651

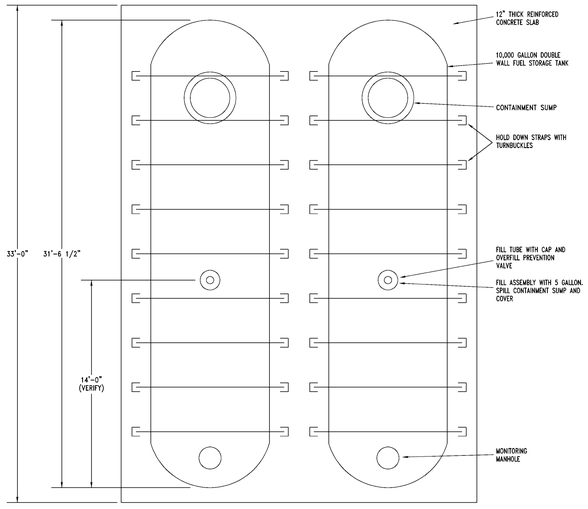
MH103

DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
Alt:SA129

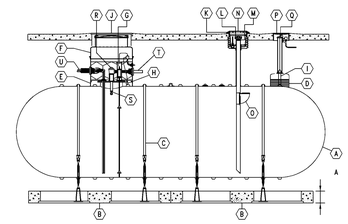


C3 FUEL STORAGE TANK ELEVATION
1/2"=1'-0"

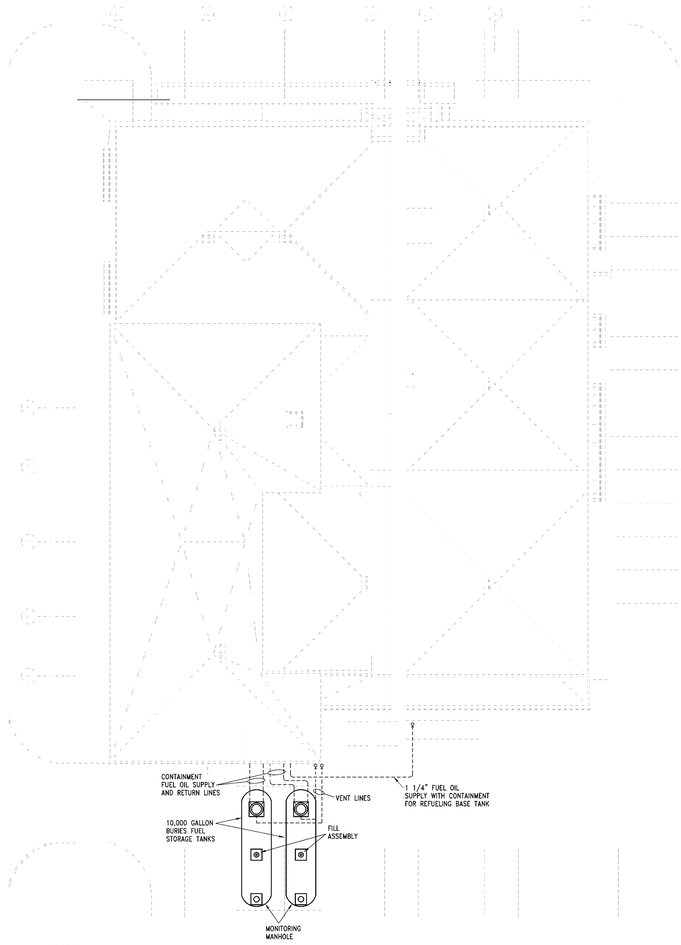


C1 FUEL STORAGE TANKS
1/4"=1'-0"

ITEM	EQUIPMENT LISTING	ITEM	EQUIPMENT LISTING	ITEM	EQUIPMENT LISTING
A	DOUBLE WALL FIBERGLASS STORAGE TANK	H	DISTINGUISHING LEAK SENSOR	P	MONITORING MANHOLE
B	CONCRETE SLAB	I	HYDROSTATIC MONITOR SENSOR	Q	4" SENSOR CAP
C	HOLD DOWN STRAP WITH TURNBUCKLE ASSY.	J	LARGE ROUND MANHOLE	R	EXTRACTOR ASSEMBLY
D	HYDROSTATIC MONITORING SYSTEM	K	FIVE GALLON SPILL FILL MANHOLE	S	BALL FLOAT
E	42"DIA FIBERGLASS CONTAINMENT COLLAR	L	FILL CAP	T	SINGLE WALL VENT PIPING
F	42"DIA FIBERGLASS 8 SIDED SW CONTAINMENT SUMP WITH 32"DIA WATERTIGHT TOP	M	FILL ADAPTER	U	DOUBLE WALL PRODUCT SUPPLY PIPING
G	LEVEL PROBE	N	PRODUCT LABEL MARKER		
		O	OVERFILL PREVENTION VALVE		



A4 FUEL STORAGE TANK
NO SCALE



A1 PARTIAL SITE PLAN
1/16"=1'-0"
Mechanical Piping

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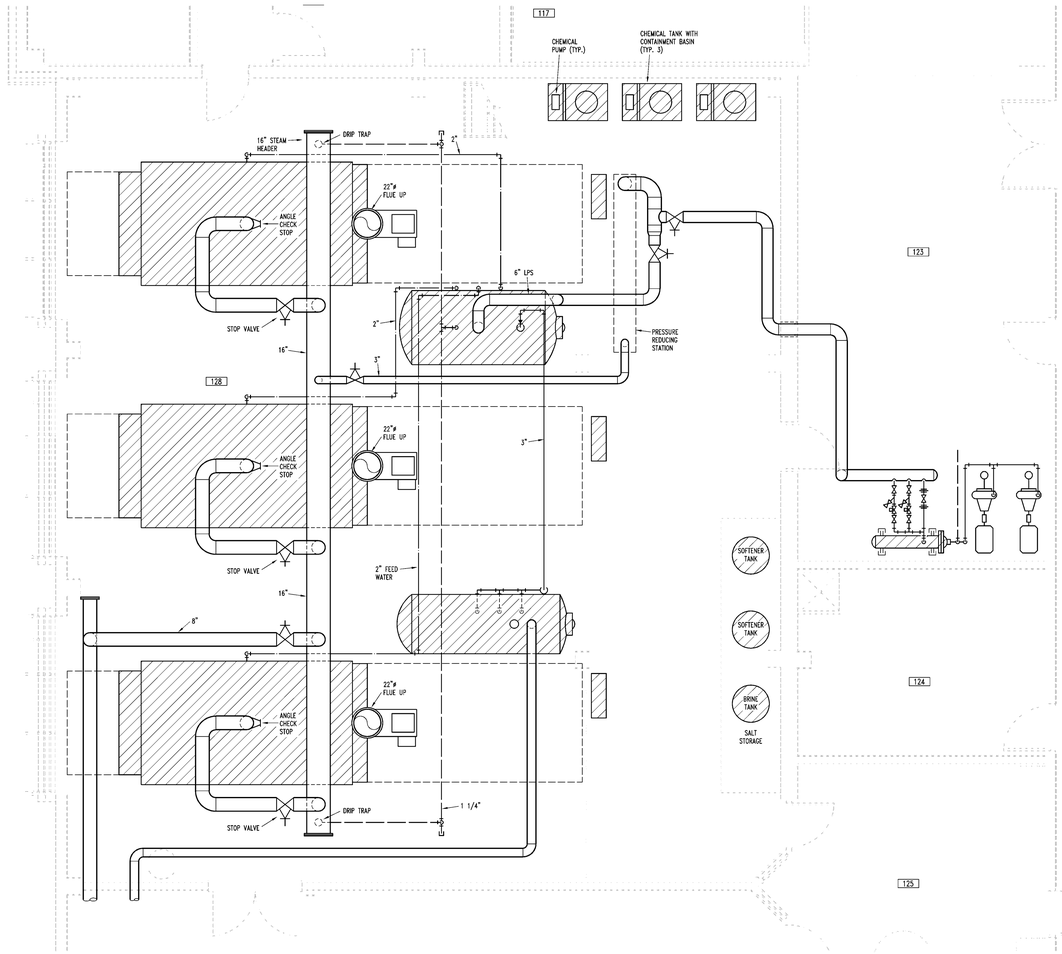
PARTIAL SITE PLAN - MECHANICAL PIPING

A-012651

MP101

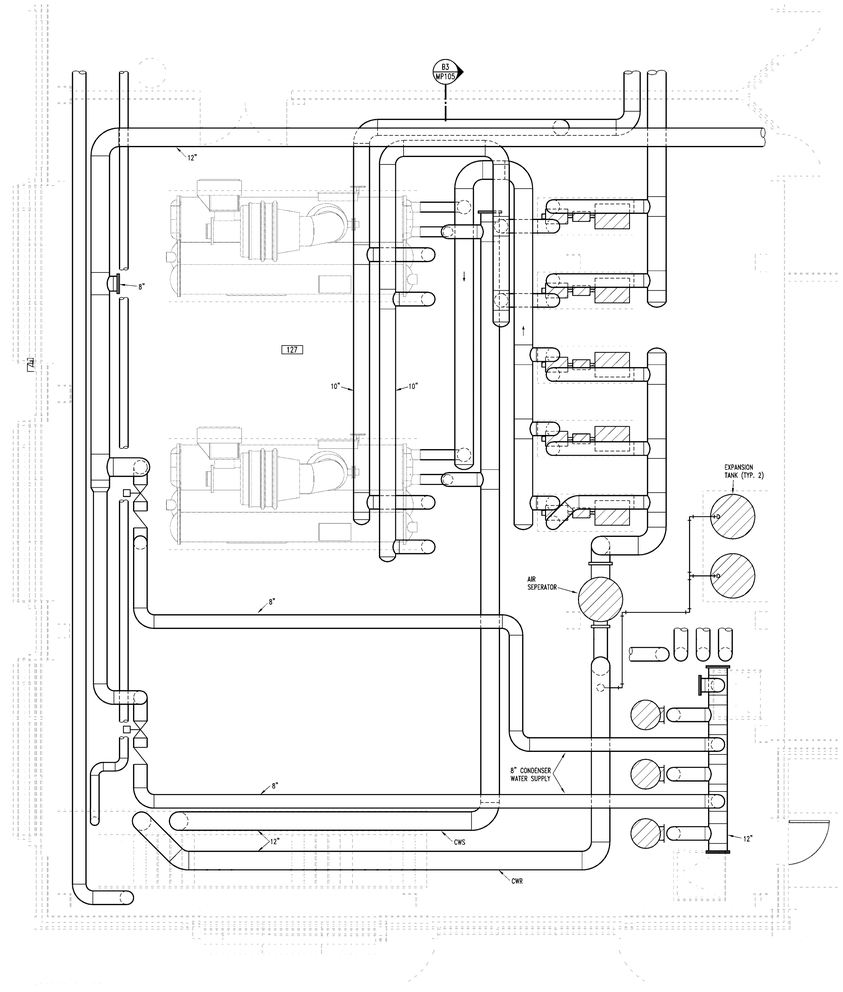
DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
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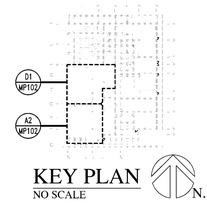
D2 PARTIAL FIRST FLOOR PLAN - CHILLER ROOM
1/4"=1'-0"
Mechanical Piping

N.



A2 PARTIAL FIRST FLOOR PLAN - CHILLER ROOM
1/4"=1'-0"
Mechanical Piping

N.



KEY PLAN
NO SCALE

N.

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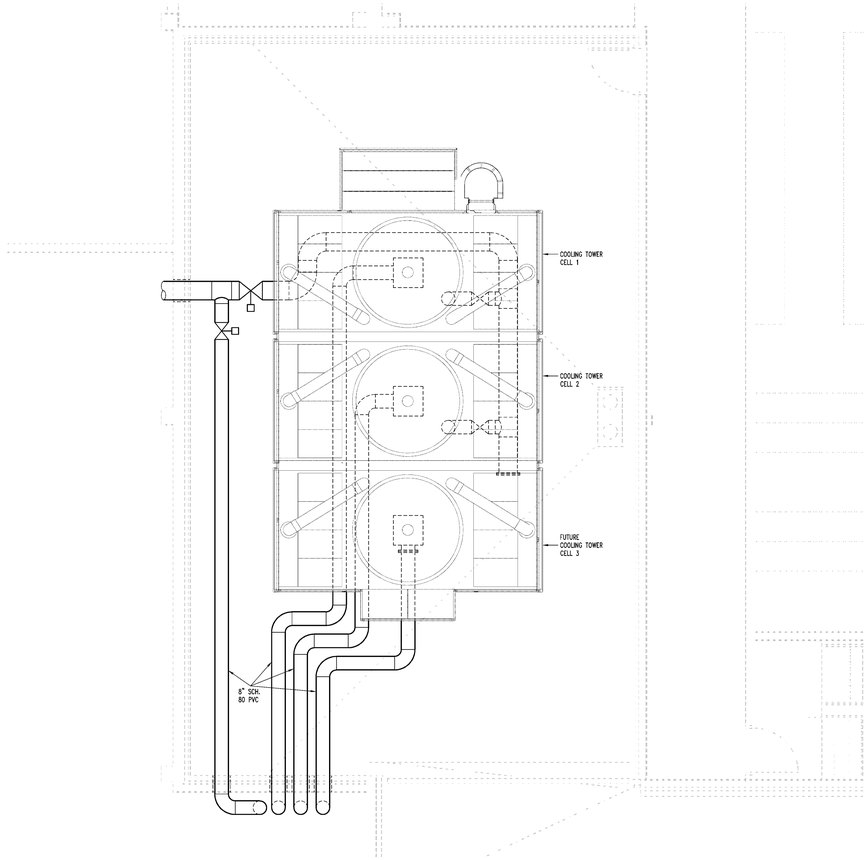
PARTIAL FIRST FLOOR PLAN - MECHANICAL PIPING

A-012651

MP102

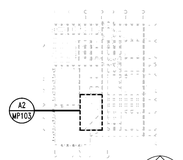
DESIGN DEVELOPMENT PHASE DOCUMENTS

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A2 PARTIAL SECOND FLOOR PLAN
1/4"=1'-0"
Mechanical Piping

N.



KEY PLAN
NO SCALE

N.

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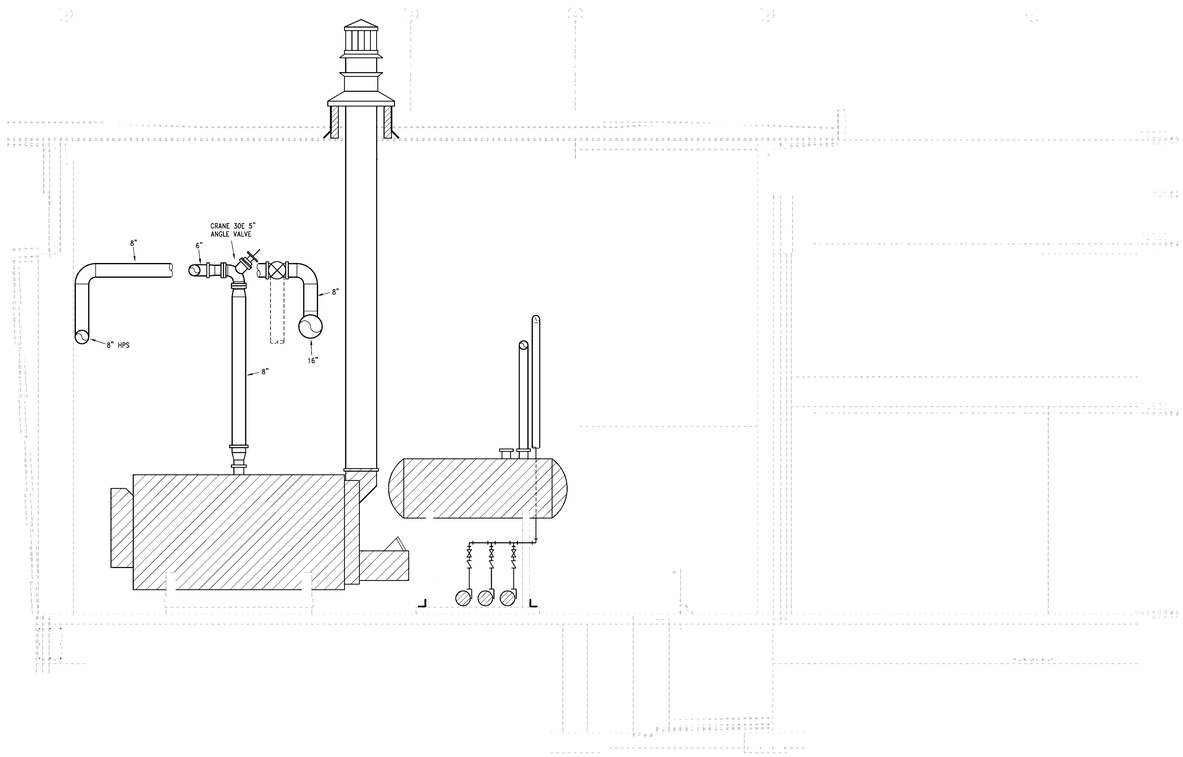
PARTIAL FLOOR PLANS - MECHANICAL PIPING

A-012651

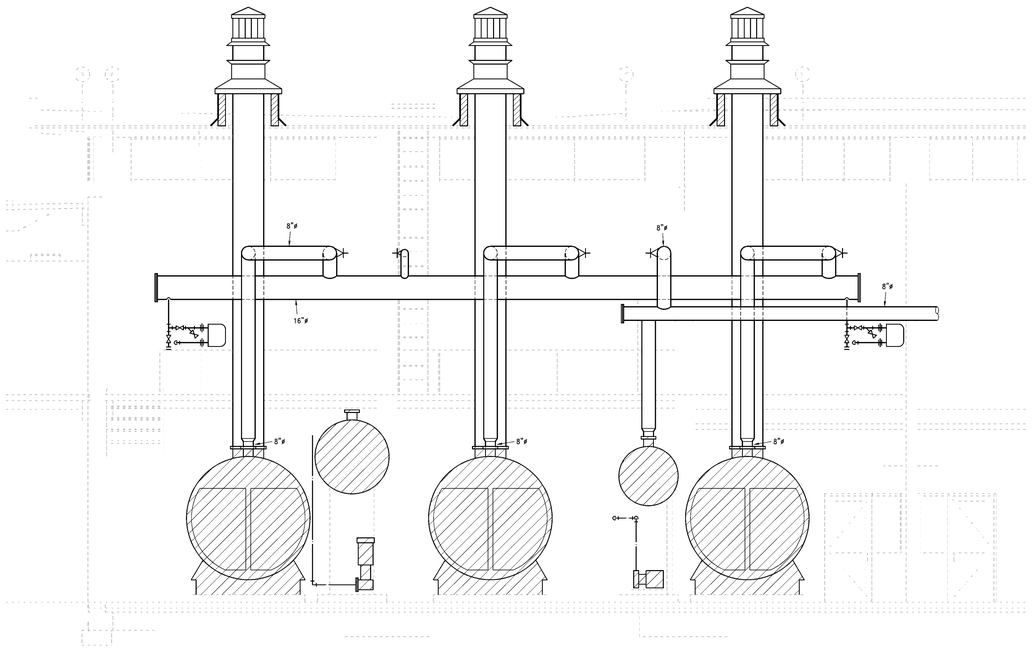
MP103

DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
Alt:SA132



B3 BUILDING SECTION - CHILLER ROOM
1/4"=1'-0"
Mechanical Piping



B1 BUILDING SECTION - CHILLER ROOM
1/4"=1'-0"
Mechanical Piping

HTK ARCHITECTS

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SECTIONS -
MECHANICAL PIPING

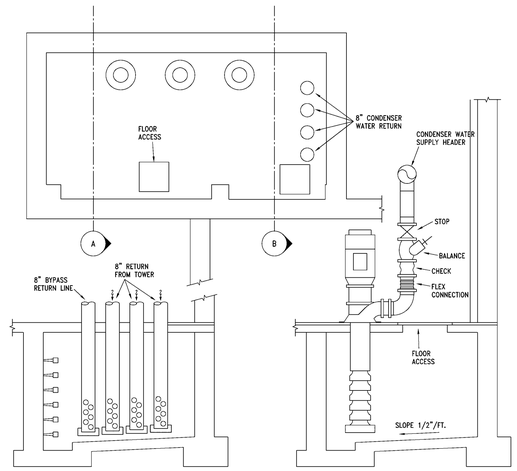
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MP104

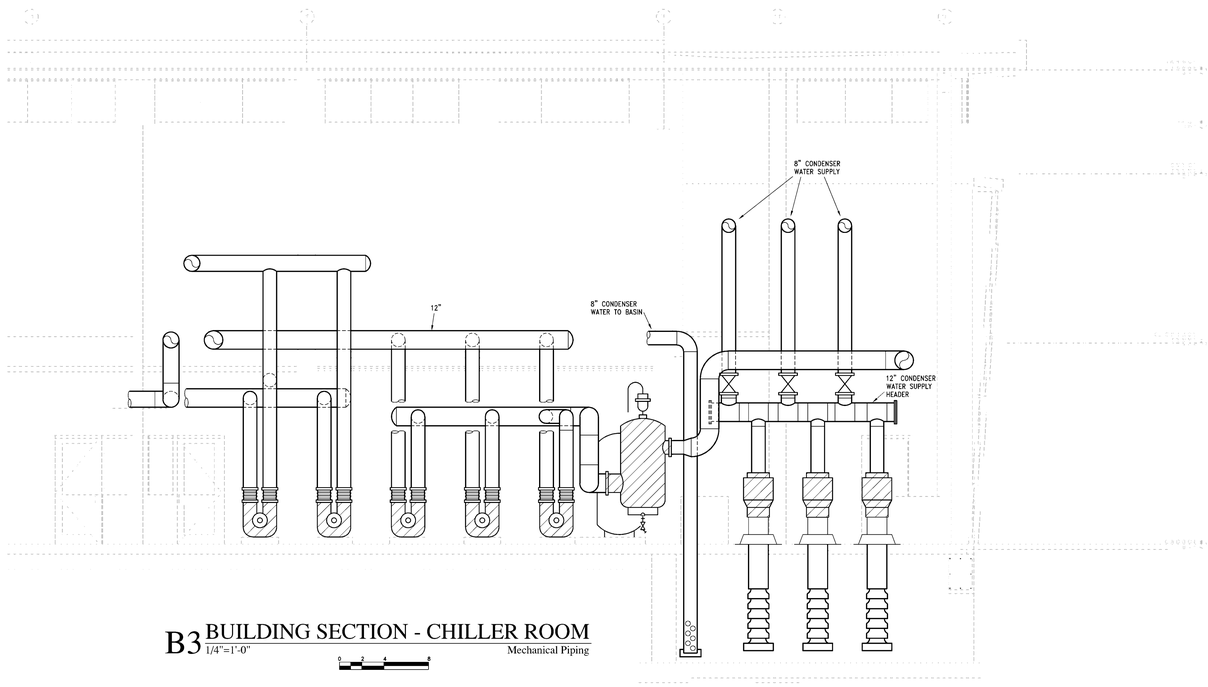
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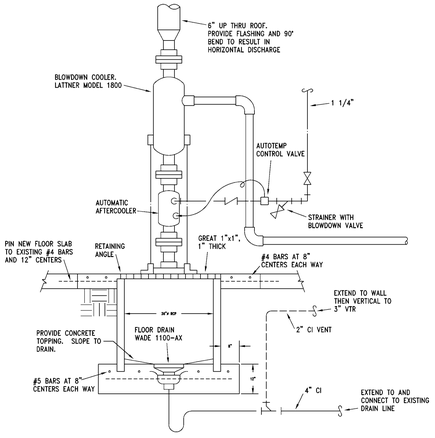
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Att.9A133



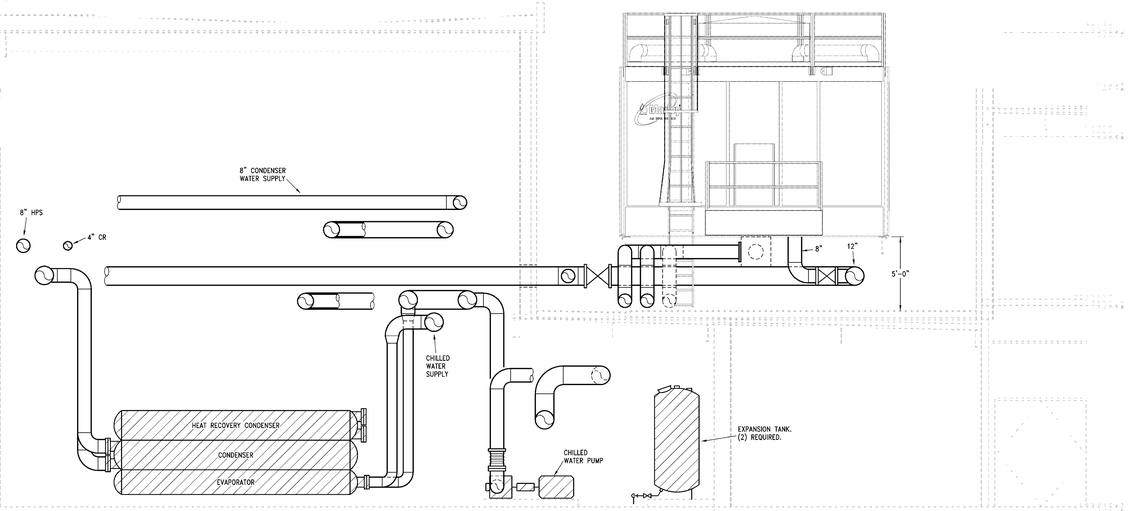
D3 1/4"=1'-0" Mechanical Piping



B3 BUILDING SECTION - CHILLER ROOM
1/4"=1'-0" Mechanical Piping



D1 BLOWDOWN COOLER DETAIL
1/2"=1'-0"



B1 BUILDING SECTION - CHILLER ROOM
1/4"=1'-0" Mechanical Piping

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SECTIONS - MECHANICAL PIPING

A-012651

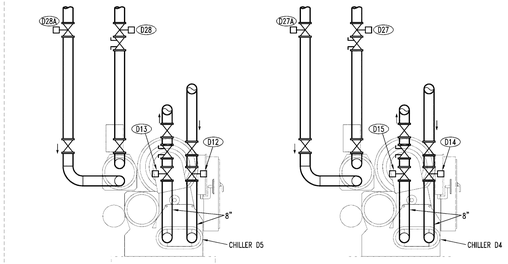
MP105

DESIGN DEVELOPMENT PHASE DOCUMENTS

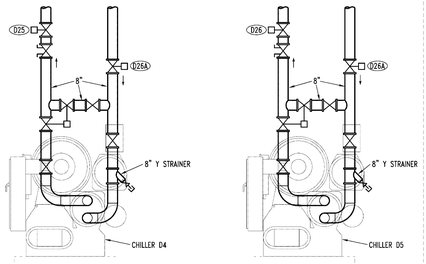
JCSBC
2-2-2016
Att:9A134

NOTES:

ADDENDUM #2, ARTICLE 2.3.J
PLAN SHEET MP101, 102, MP171 AND MP172: AS INDICTED ON THE PLAN SHEETS, THE PIPING CONNECTIONS TO CHILLERS D1, D2, D3, D4 AND D5 (EVAPORATOR, CONDENSER AND HEAT RECOVERY, AS NECESSARY) SHALL BE 8".



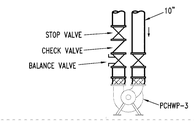
D4 Section
1/4"=1'-0"
0 2' 4' 8'



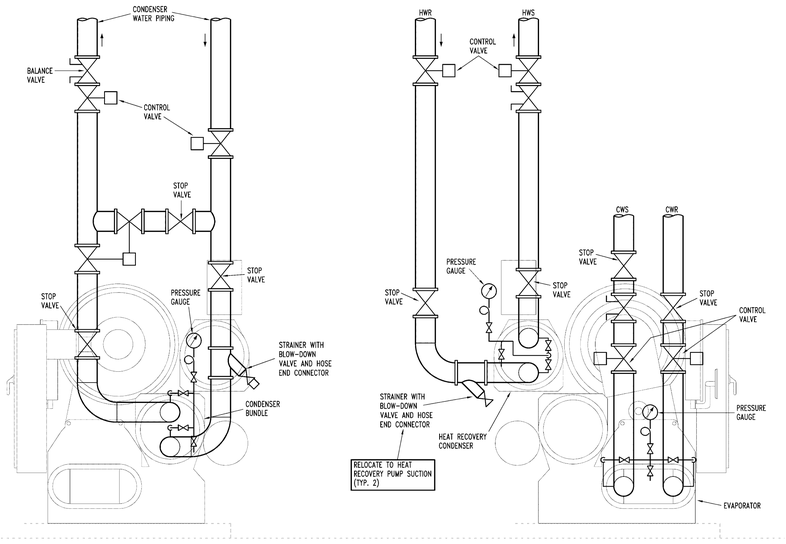
A4 Section
1/4"=1'-0"
0 2' 4' 8'

NOTES:

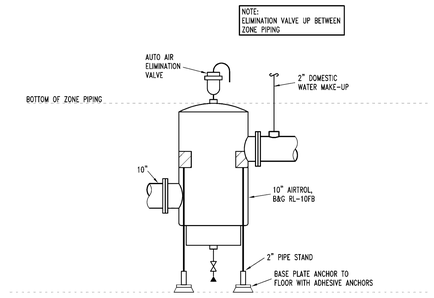
1. DO NOT USE TRIPLE DUTY VALVE IN LIEU OF STOP, CHECK AND BALANCE VALVE ON PUMP DISCHARGE.



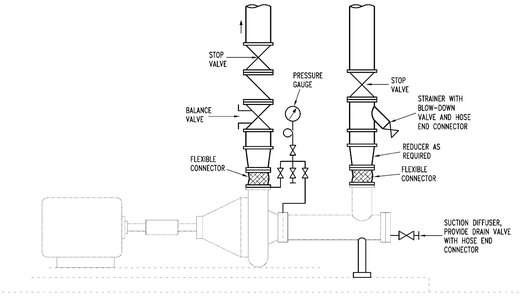
A3 Section
1/2"=1'-0"
0 1' 2' 4'



A3 Typical Chiller Piping Connections Elevation
1/2"=1'-0"
0 1' 2' 4'



B1 Elevation - Hot Water Pump Connection
1/2"=1'-0"
(Col, Item #3)
0 1' 2' 4'



Typical End Suction Pump
Piping Connections Elevation
D3 1/2"=1'-0"
0 1' 2' 4'

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MECHANICAL SECTIONS

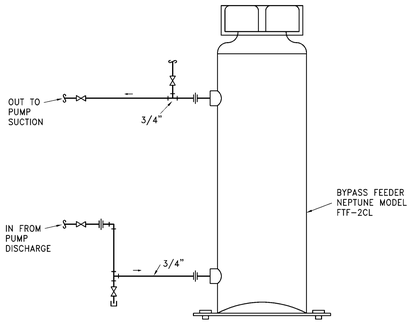
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MP106

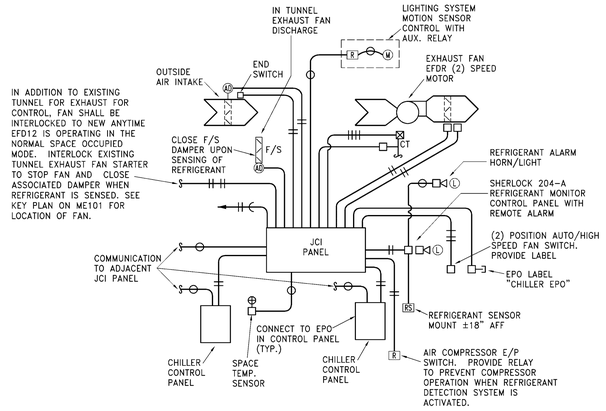
DESIGN DEVELOPMENT PHASE DOCUMENTS

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2-2-2016
Att.9A135

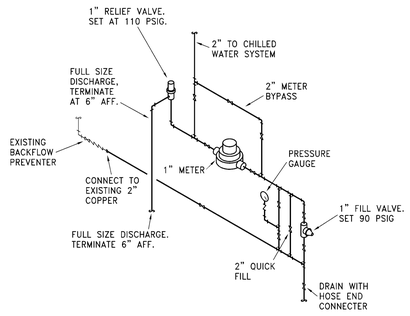
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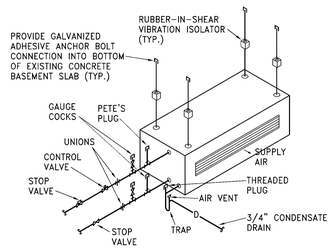
C3 Chemical Bypass (Pot) Feeder Connection Detail
No Scale



B3 Refrigerant Monitoring and Exhaust System Control Diagram
No Scale



C2 Fill Valve Detail
No Scale



B2 Fan Coil Unit Connection Detail
No Scale

LS&A
Latimer Sommers & Associates, P.A.
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LSA PROJECT NO. 1402032

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

DEPARTMENT OF ADMINISTRATION
OFFICE OF FACILITIES AND PROCUREMENT MANAGEMENT
800 SW JACKSON, SUITE 700
TOPEKA, KANSAS, 66612-1216
TELEPHONE 785-296-8899
FAX 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: CAD
CHECKED BY: WRB
REV: WRB
DATE: 3-9-15

MECHANICAL ELEVATIONS

A-012651

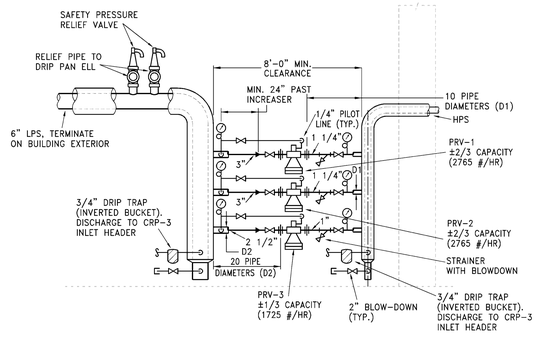
MP107

DESIGN DEVELOPMENT PHASE DOCUMENTS

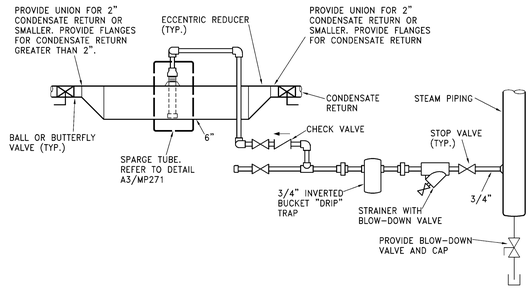
JCSBC
2-2-2016
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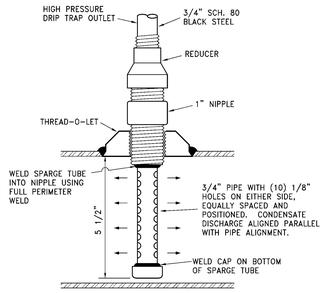
NOTES:
1. REFER TO PRESSURE REDUCING VALVE SCHEDULE AND PRESSURE RELIEF VALVE SCHEDULE FOR VALVE SIZES AND INLET/OUTLET PIPE SIZES.
2. TOTAL BUILDING LOAD IS 4,477 LBS PER HOUR.



C3 Pressure Reducing Station "1"
No Scale — Memorial Building

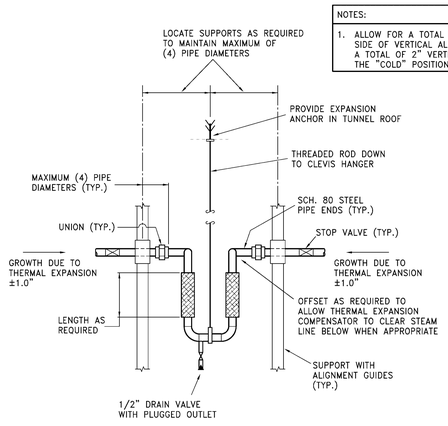


B3 Typical Drip Trap Detail
No Scale — (locate at all change in vertical elevation and end of main)

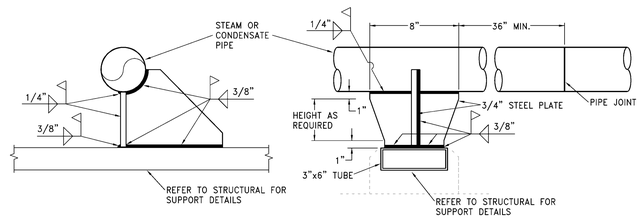


A3 Sparge Tube Detail
No Scale

NOTES:
1. ALLOW FOR A TOTAL MOVEMENT OF 3" EITHER SIDE OF VERTICAL ALIGNMENT. INSTALL WITH A TOTAL OF 2" VERTICAL MISALIGNMENT IN THE "COLD" POSITION.



D1 Horizontal Line Thermal Expansion Compensator
No Scale



A1 Pipe Anchor Detail
1 1/2"=1'-0" (Refer to Structural)

0 6" 1' 1'-6"

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

DEPARTMENT OF ADMINISTRATION
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STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???
DRAWN BY: CAD CHECKED BY: WRB REV: WRB
DATE: 3-9-15

MECHANICAL DETAILS

A-012651

MP201

DESIGN DEVELOPMENT PHASE DOCUMENTS

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LSA PROJECT NO. 1402032

JCSBC
2-2-2016
Att.9A137

...MP201_Mechanical Details.dwg 12:03/04/15 CTC Last dwg 06 02/24/15 CTC Last dwg 06 02/24/15 CTC

EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL NUMBER	MINIMUM COOLING TONS	EVAPORATOR OR COIL GPM	EVAPORATOR OR COIL PRESSURE DROP	EVAPORATOR OR COIL ENTERING WATER TEMP/ LEAVING WATER TEMP	CONDENSER GPM	CONDENSER PRESSURE DROP	CONDENSER ENTERING WATER TEMP/ LEAVING WATER TEMP	HEAT RECOVERY GPM	HEAT RECOVERY PRESSURE DROP	HEAT RECOVERY ENTERING WATER TEMP/ LEAVING WATER TEMP	PUMP GPM/ FAN CFM	TOTAL HEAD OR STATIC PRESSURE	ELECTRICAL CHARACTERISTICS					REMARKS
																KW/HP	MINIMUM * CIRCUIT AMPS	MAXIMUM OVERCURRENT PROTECTION	PHASE	VOLTAGE	
CHILLER D4	NEW HEAT RECOVERY CHILLER LOCATED IN DSOB	TRANE	CVHE 0360	400.0 TONS	800	14.2'	54°F/42°F	1144	18.05'	85°F/95°F	800	9'	96°F/109°F	N/A	N/A	253.7 KW	490A	800A	3	460 VOLT	
CHILLER D5	NEW HEAT RECOVERY CHILLER LOCATED IN DSOB	TRANE	CVHE 0360	400.0 TONS	800	14.2'	54°F/42°F	1144	18.05'	85°F/95°F	800	9'	96°F/109°F	N/A	N/A	253.7 KW	490A	800A	3	460 VOLT	
EFDR-1	REFRIGERATOR ROOM EXHAUST FAN	GREENHECK	BCF 110											3500 CFM	.5" WG	3/4 HP	1.6 FLA	20A	3	460 VOLT	1
FCUD-1	NEW FAN COIL UNIT	TRANE	FC00801 G/H HOB	TOTAL=23.6 MBH SENS=17.1 MBH	5 GPM	COIL ΔP=12 FT.	45°F/55°F							800 CFM		1/4 HP	3.4 FLA	20A	1	120 VOLT	2
FCUD-2	NEW FAN COIL UNIT	TRANE	FC00801 G/H HOB	TOTAL=23.6 MBH SENS=17.1 MBH	5 GPM	COIL ΔP=12 FT.	45°F/55°F							800 CFM		1/4 HP	3.4 FLA	20A	1	120 VOLT	2
PCHWP-1	NEW PRIMARY CHILLED WATER PUMP	BELL & GOSSETT	SERIES VSC 6x8x10-1/2A	--	--	--	--	--	--	--	--	--	--	2000 GPM	90'	60 HP	77 FLA	110A	3	460 VOLT	
PCHWP-2	NEW PRIMARY CHILLED WATER PUMP	BELL & GOSSETT	SERIES VSC 6x8x10-1/2A	--	--	--	--	--	--	--	--	--	--	2000 GPM	90'	60 HP	77 FLA	110A	3	460 VOLT	
PCHWP-3	NEW PRIMARY CHILLED WATER PUMP	BELL & GOSSETT	SERIES VSC 6x8x10-1/2A	--	--	--	--	--	--	--	--	--	--	2000 GPM	90'	60 HP	77 FLA	110A	3	460 VOLT	
DCHWP-3	EXISTING RELOCATED DSOB SECONDARY PUMP	BELL & GOSSETT	SERIES VSC 6x8x12S BF	--	--	--	--	--	--	--	--	--	--	1000 GPM	110'	40 HP	52 FLA	90A	3	460 VOLT	
PHRP-5	EXISTING RELOCATED KSH SECONDARY PUMP HEAT RECOVERY, DSOB HOT WATER	BELL & GOSSETT	SERIES HSC 3 6x8x12S BF	--	--	--	--	--	--	--	--	--	--	800 GPM	35'	25 HP	34 FLA	70A	3	460 VOLT	
PHRP-4	EXISTING RELOCATED KSH SECONDARY PUMP HEAT RECOVERY, DSOB HOT WATER	BELL & GOSSETT	SERIES HSC 3 6x8x12S	--	--	--	--	--	--	--	--	--	--	800 GPM	35'	25 HP	34 FLA	70A	3	460 VOLT	

REMARKS LEGEND:

1. 2-SPEED MOTOR, 2000 CFM LOW SPEED. PROVIDE MOTORIZED DAMPER IN EXHAUST DISCHARGE DUCTWORK.
2. COOLING ONLY. HORIZONTAL CABINET FAN COIL UNIT. 3-ROW COIL.

*OR FULL LOAD AMPS (FLA)

STOP VALVE SCHEDULE

SYSTEM STOP VALVE	TYPE	SIZE	BODY MATERIAL	BONNET/ PACKING GLAND DESIGN	DISC/BALL MATERIAL	STEM MATERIAL	PACKING MATERIAL LAND SEATS	PRESSURE RATING	REMARKS
DOMESTIC WATER	BALL FULL PORT	1/2" TO 2 1/2"	BRONZE, B-584 OR B-62 BRONZE	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	600 PSI CWP	PROVIDE THREADED OR SOLDERED ENDS AS REQUIRED BY PIPING SYSTEM
HEATING HOT WATER	BALL FULL PORT	1/2" TO 2 1/2"	BRONZE, B-584 OR B-62 BRONZE	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	600 PSI CWP	PROVIDE THREADED OR SOLDERED ENDS AS REQUIRED BY PIPING SYSTEM
HEATING HOT WATER	BUTTERFLY	3" AND UP	CAST OR DUCTILE IRON	FULL LUG BODY	STAINLESS STEEL	STAINLESS STEEL	EPDM	200 PSI CWP	FULL LUG BODY, STAINLESS STEEL TRIM, BRAY OR APPROVED EQUAL
COOLING CHILLED WATER	BALL FULL PORT	1/2" TO 2 1/2"	BRONZE, B-584 OR B-62 BRONZE	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	600 PSI CWP	PROVIDE THREADED OR SOLDERED ENDS AS REQUIRED BY PIPING SYSTEM
COOLING CHILLED WATER	BUTTERFLY	3" AND UP	CAST OR DUCTILE IRON	FULL LUG BODY	STAINLESS STEEL	STAINLESS STEEL	EPDM	200 PSI CWP	FULL LUG BODY, STAINLESS STEEL TRIM, BRAY OR APPROVED EQUAL
COMPRESSED AIR	BALL	1/2" TO 2 1/2"	CAST CARBON STEEL TWO PIECE, (4) BOLT DESIGN	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	250 PSI STEAM SERVICE	TREADED ENDS
CONDENSER WATER	GATE	3" AND UP	DUCTILE IRON	BOLTED BONNET OS AND Y DESIGN	DUCTILE IRON	STEEL	TFE-ARAMID	CLASS 150	FLANGED CONNECTIONS, STAINLESS STEEL TRIM

NOTES:
ADDENDUM #2, ARTICLE 2.3.B.a
STOP VALVE SCHEDULE:
VALVES IN SIZE 3" THROUGH 6" SHALL BE PROVIDED WITH LEVER OPERATOR.
VALVES IN SIZES ABOVE 6" SHALL BE PROVIDED WITH GEAR OPERATORS.

PIPING MATERIAL SCHEDULE

SYSTEM	PIPING						FITTINGS		MAXIMUM WORKING		MAXIMUM WORKING	
	SIZE	TYPE	SCHEDULE	GRADE	ASTM	MATERIAL	MATERIAL	TYPE	PRESSURE (PSI)	TEMP (°F)	HYDRO STATIC PRESSURE (PSI)	TIME
DOMESTIC COLD WATER	1/2"-6"	L	-	-	B-88	CP	CP	SJ	85	40 TO 65	150	1 HR
DOMESTIC HOT WATER	1/2"-6"	L	-	-	B-88	CP	CP	SJ	85	40 TO 65	150	1 HR
COMPRESSED AIR	1/2"-2 1/2"	L	-	-	B-88	CP	CP	B	150	80	175	1 HR
COMPRESSED AIR	3"-4"	ERW	40	-	A-53	CS	W		150	80	175	1 HR
HOT WATER	1/2"-2 1/2"	L	-	-	B-88	CP	CP	SJ	150	180	200	1 HR
HOT WATER	3" AND ABOVE	ERW	40	-	A-53	CS	CS	W	150	180	200	1 HR
CHILLED WATER	1/2"-2 1/2"	L	-	-	B-88	CP	CP	SJ	150	55	200	1 HR
CHILLED WATER	3" AND ABOVE	ERW	40	-	A-53	CS	CS	W	150	55	200	1 HR
CONDENSER WATER	5" AND ABOVE	CPVC	80	-	A-53	CPVC	CPVC	SW	75	95	150	1 HR

ABBREVIATIONS:

BLK - BLACK
CI - CAST IRON
CP - COPPER
CS - CARBON STEEL
ERW - ELECTRIC RESISTANT WELD
F - FUSION WELD
GLV - GALVANIZED
MECH - MECHANICAL
MI - MALLEABLE IRON
MJ - MECHANICAL JOINT
NG - NEOPRENE GASKET
PC - ROLLED GROOVED PIPE COUPLING
S - SOCKET JOINT
SJ - SOLDER JOINT 95-5 TIN-ANTIMONY
SL - SEAMLESS
SS - SILVER SOLDER
B - BRAZED
T - THREADED
W - WELDED
PVC - POLYVINYL CHLORIDE

REMARKS LEGEND:

1. "T" DRILL COPPER "TEES" WILL NOT BE PERMITTED.
2. "WELD-O-LETS" AND "THREAD-O-LETS" CAN BE USED FOR PIPING TAKE OFFS PROVIDED THE BRANCH LINE FOR WHICH EACH IS USED IS A MAXIMUM SIZE OF 1. PIPE SIZE SMALLER THEN 1/2 OF THE MAIN SIZE OF WHICH IT CONNECTS.
3. THE OWNER RESERVES THE RIGHT TO "X-RAY" ANY WELD PROVIDED BY THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR AND WELD THAT FAILS TO PASS THE "X-RAY" PROCESS WITH NO ADDITIONAL COST TO THE OWNER. COST ASSOCIATED WITH X-RAY OF THE WELD AFTER REPAIRS HAVE BEEN MADE, TO PROVIDE THE ACCEPTABILITY OF THE WELD, SHALL BE BY THE CONTRACTOR.
4. ALL PIPING SHALL PASS PRESSURE TESTING PRIOR TO THE INSTALLATION OF INSULATION.
5. ALL FLANGES IN COPPER PIPING SYSTEMS SHALL BE RATED MINIMUM 150 PSI NORMAL WORKING PRESSURE.
6. ALL JOINTS IN COPPER PIPING SYSTEM IN SIZES 2" AND LARGER SHALL BE BRAZED.
7. ALL GASKETS SHALL BE SPIRAL WOUND AND SHALL BE MANUFACTURED BY FLEXITALLIC.
8. ALL PIPE NIPPLES IN STEEL PIPING SHALL BE SCHEDULE 80 STEEL.

BALANCE VALVE SCHEDULE

SYSTEM	MANUFACTURER	MODEL	SIZE	BODY MATERIAL	TRIM	PRESSURE RATING	REMARKS
A11	BELL AND GOSSETT	CB-F	2 1/2" THRU 3 1/2"	CAST IRON	BRASS BALL	175 PSIG	THREADED ENDS
A11	BELL AND GOSSETT	CB-F	4" THRU 12"	FLANGED CAST IRON	BRASS DISC STAINLESS STEEL SLEEVE	175 PSIG	FLANGED ENDS

BALANCE VALVES

SYSTEM	MANUFACTURER	MODEL	VALVE SIZE	BODY MATERIAL
-	BELL & GOSSETT	CB	1 1/4"-2"	BRONZE

NOTES:

1. NO EQUIVALENTS ACCEPTED.

CHECK VALVE SCHEDULE

SYSTEM CHECK VALVES	TYPE	SIZE	BODY MATERIAL	CAP DESIGN	DISC MATERIAL	PRESSURE RATING	REMARKS
DOMESTIC WATER	"Y" PATTERN SWING CHECK	1/2" TO 2 1/2"	BRONZE, B-62 BRONZE	THREADED	BRONZE	CLASS 150	THREADED ENDS
HEATING HOT WATER	"Y" PATTERN SWING CHECK	1/2" TO 2 1/2"	BRONZE, B-62 BRONZE	THREADED	BRONZE	CLASS 150	THREADED ENDS
HEATING HOT WATER	FLANGE	3" AND UP	STEEL	NA	STAINLESS STEEL	CLASS 150	
COOLING CHILLED WATER	"Y" PATTERN SWING CHECK	1/2" TO 2 1/2"	BRONZE, B-62 BRONZE	THREADED	BRONZE	CLASS 150	THREADED ENDS
COOLING CHILLED WATER	FLANGE	3" AND UP	STEEL	NA	STAINLESS STEEL	CLASS 150	
CONDENSER WATER	FLANGE	3" AND UP	STEEL	NA	STAINLESS STEEL	CLASS 150	

NOTES:
ADDENDUM #2, ARTICLE 2.3.B.b
CHECK VALVE SCHEDULE:
CHECK VALVES IN SIZES 3" AND LARGER SHALL BE FLANGE STYLE IN LIEU OF WAFER STYLE AS ORIGINALLY INDICATED.

PIPING INSULATION SCHEDULE

SYSTEM	SIZE	TYPE	THICKNESS	JACKET	REMARKS
DOMESTIC COLD WATER	1/2" THRU 1"	1-PHC	1/2"	ASJ	-
DOMESTIC COLD WATER	1 1/4" THRU 2"	1-PHC	1/2"	ASJ	-
DOMESTIC COLD WATER	2 1/2" AND UP	1-PHC	1/2"	ASJ	-
CONDENSATE DRAIN	ALL SIZES	1-PHC	1/2"	ASJ	-
HEATING HOT WATER	1/2" - 3 1/2"	1-PHC	1"	ASJ	-
HEATING HOT WATER	4" AND UP	1-PHC	1 1/2"	ASJ	-
COOLING CHILLED WATER	1/2" - 1 1/4"	1-PHC	1/2"	ASJ	-
COOLING CHILLED WATER	1 1/2" - 4"	1-PHC	1"	ASJ	-
COOLING CHILLED WATER	5" AND UP	1-PHC	1 1/2"	ASJ	-
AIR SEPARATORS	-	1-EC	3/4"		1
STRAINERS	-	1-EC	3/4"	-	1
EXPANSION TANKS	-	1-EC	3/4"		1
DOMESTIC COLD WATER AND CHILLED WATER SYSTEM VALVES	-	1-EC	3/4"	-	1

LEGEND AND ABBREVIATIONS:

1. PROVIDE ALUMINUM PIPE INSULATION JACKET ON ALL PIPING BELOW ELEVATION OF 10 FEET ABOVE A RESPECTIVE FLOOR ELEVATION.

1-EC = FLEXIBLE CELLULAR FOAM, SHEET STOCK.
1-PHC = PRE-MOLDED FIBERGLASS PIPE INSULATION.

REMARKS:

1. PROVIDE WHITE LACQUER PAINT FINISH.

PRESSURE REDUCING VALVE SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	INLET PRESSURE	OUTLET PRESSURE	REQUIRED CAPACITY (#1HR)	REMARKS
PRV-1	SPENCE	-	100 PSI	8 PSI	-	1
PRV-2	SPENCE	-	100 PSI	10 PSI	-	1
PRV-3	SPENCE	-	100 PSI	12 PSI	-	1

REMARKS:

1. PILOT ACTUATED VALVE.

STOP VALVE SCHEDULE

SYSTEM STOP VALVES	TYPE	SIZE	BODY MATERIAL	BONNET/PACKING GLAND DESIGN	DISC/BALL MATERIAL	STEAM MATERIAL	PACKING MATERIAL AND SEATS	PRESSURE RATING	REMARKS
LOW PRESSURE STEAM	BALL	1/2" TO 2 1/2"	CAST CARBON STEEL TWO PIECE, (4) BOLT DESIGN	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	250 PSI STEAM SERVICE	THREADED ENDS
LOW PRESSURE STEAM	GATE	3" AND UP	DUCTILE IRON	BOLTED BONNET OS & Y DESIGN	DUCTILE IRON	STEEL	TFE-ARAMID	CLASS 150	FLANGED CONNECTIONS, STAINLESS STEEL TRIM
HIGH PRESSURE STEAM	BALL	1/2" TO 2 1/2"	CAST CARBON STEEL TWO PIECE, (4) BOLT DESIGN	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	250 PSI STEAM SERVICE	THREADED ENDS
HIGH PRESSURE STEAM	GATE	3" AND UP	STEEL BODY	BOLTED BONNET OS & Y DESIGN	STEEL	STEEL	TFE-ARAMID	CLASS 300	FLANGED CONNECTIONS, STAINLESS STEEL TRIM
GRAVITY CONDENSATE RETURN	BALL	1/2" TO 2 1/2"	CAST CARBON STEEL TWO PIECE, (4) BOLT DESIGN	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	250 PSI STEAM SERVICE	THREADED ENDS
GRAVITY CONDENSATE RETURN	GATE	3" AND UP	DUCTILE IRON	BOLTED BONNET OS & Y DESIGN	DUCTILE IRON	STEEL	TFE-ARAMID	CLASS 150	FLANGED CONNECTIONS, STAINLESS STEEL TRIM
PUMPED CONDENSATE RETURN	BALL	1/2" TO 2 1/2"	CAST CARBON STEEL TWO PIECE, (4) BOLT DESIGN	ADJUSTABLE WITHOUT REMOVING HANDLE	STAINLESS STEEL	STAINLESS STEEL	REINFORCED TEFLON	250 PSI STEAM SERVICE	THREADED ENDS
PUMPED CONDENSATE RETURN	GATE	3" AND UP	DUCTILE IRON	BOLTED BONNET OS & Y DESIGN	DUCTILE IRON	STEEL	TFE-ARAMID	CLASS 150	FLANGED CONNECTIONS, STAINLESS STEEL TRIM
CONDENSER WATER									
CHILLED WATER									
HOT WATER									

NOTES:

1. ALL STOP VALVES IN MECHANICAL SPACES LOCATED AT ELEVATIONS ABOVE 9'-0" SHALL BE PROVIDED WITH CHAIN OPERATOR.

CHECK VALVE SCHEDULE

SYSTEM CHECK VALVES	TYPE	SIZE	BODY MATERIAL	CAP DESIGN	DISC MATERIAL	PRESSURE RATING AT 350°F	REMARKS
GRAVITY CONDENSATE RETURN	STRAIGHT PATTERN SPRING LOADED	1/2" TO 2 1/2"	STAINLESS STEEL	THREADED	STAINLESS STEEL	250 PSI	THREADED ENDS
GRAVITY CONDENSATE RETURN	STRAIGHT PATTERN SPRING LOADED	3" AND UP	STAINLESS STEEL	THREADED	STAINLESS STEEL	250 PSI	WAFFER STYLE
PUMPED CONDENSATE RETURN	STRAIGHT PATTERN SPRING LOADED	1/2" TO 2 1/2"	STAINLESS STEEL	THREADED	STAINLESS STEEL	250 PSI	THREADED ENDS
PUMPED CONDENSATE RETURN	STRAIGHT PATTERN SPRING LOADED	3" AND UP	STAINLESS STEEL	THREADED	STAINLESS STEEL	250 PSI	WAFFER STYLE

NOTES:

1. DURABLE OR IFC NO OTHER EQUIVALENTS ACCEPTED.

EXPANSION JOINT SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	PIPE SIZE	TRAVEL	PRECOMPRESSION
EJ-AS1	HYSPAN	-	-	-	-
EJ-AC1	HYSPAN	-	-	-	-
EJ-BS1	HYSPAN	-	-	-	-
EJ-BS2	HYSPAN	-	-	-	-
EJ-BS3	HYSPAN	-	-	-	-
EJ-BC1	HYSPAN	-	-	-	-
EJ-BC2	HYSPAN	-	-	-	-
EJ-CS1	HYSPAN	-	-	-	-
EJ-CS2	HYSPAN	-	-	-	-
EJ-CC1	HYSPAN	-	-	-	-
EJ-CC2	HYSPAN	-	-	-	-

EQUIVALENT BY ADVANCED THERMAL SYSTEMS.

Article 2-21, Specification Section 23 0516 Expansion Fittings

1. V-Flex Flexible Expansion Fitting for Steam Condensate
   a. Expansion "V" type loops in the 2" condensate return piping, EJ-BC1 and EJ-BC2, shall be ordered from the manufacture with a factory installed ½" drain valve with plugged outlet.

PIPING INSULATION SCHEDULE

SYSTEM	SIZE	TYPE	THICKNESS	JACKET	REMARKS
HIGH PRESSURE STEAM	8"	1-PHC	3 1/2"	ASJ	1
HIGH PRESSURE STEAM	6"	1-PHC	3 1/2"	ASJ	1
HIGH PRESSURE STEAM	4"	1-PHC	2 1/2"	ASJ	1
CONDENSATE RETURN	4"	1-PHC	2"	ASJ	1
CONDENSATE RETURN	3"	1-PHC	2"	ASJ	1
CONDENSATE RETURN	2"	1-PHC	1 1/2"	ASJ	1
HOT WATER					

LEGEND AND ABBREVIATIONS:

1. PROVIDE 0.016" THICK ALUMINUM INSULATION JACKETING ON ALL STEAM AND CONDENSATE PIPING.

ASJ - ALL SERVICE JACKET
1-PHC - PRE-MOLDED FIBERGLASS PIPE INSULATION.

CO #1, SCP 005.1382B:

A. Steam and Condensate Return Piping;
   1. Omit lagging on all above ceiling piping in both the Curtis and Memorial building.
   2. Omit lagging on all steam piping in the Landon building that is above an elevation of 8'-0" above the respective finished floor elevation.
B. CWS and CWR Piping.
   1. Provide lagging on all CWS and CWR piping within the Statehouse vault and in Tunnel 'A' to the entrance to the Landon building chiller room.
   2. Provide lagging on all CWS and CWR piping in the Landon building Chiller Room this is below an elevation of 8'-0" above the finished floor.

PIPING MATERIAL SCHEDULE

SYSTEM	PIPING						FITTINGS		MAXIMUM WORKING		MAXIMUM WORKING	
	SIZE	TYPE	SCHEDULE	GRADE	ASTM	MATERIAL	MATERIAL	TYPE	PRESSURE (PSI)	TEMP (°F)	HYDRO STATIC PRESSURE (PSI)	TIME
HIGH PRESSURE STEAM	2" - 8"	ERW	40	-	A-53	CS BLK	CS	W	120	350	200	1 HR
LOW PRESSURE STEAM	1 1/2" - 2"	SL	40	-	A-53	CS BLK	CS	T	15	235	50	1 HR
LOW PRESSURE STEAM	2 1/2" - 8"	ERW	40	-	A-53	CS BLK	CS	W	15	235	50	1 HR
RELIEF VENT	1 1/2" - 2"	SL	40	-	A-53	CS BLK	CS	T	125	350	200	1 HR
RELIEF VENT	2" - 8"	ERW	40	-	A-53	CS BLK	CS	W	125	350	200	1 HR
STEAM CONDENSATE RETURN	1 1/2 - 2"	SL	80	-	A-53	CS BLK	CS	T	50	300	100	1 HR
STEAM CONDENSATE RETURN	2 1/2" - 6"	ERW	80	-	A-53	CS BLK	CS	W	50	300	100	1 HR
DRAIN PIPING	1/2" - 2 1/2"	L	-	-	B-88	CP	CP	SJ	0	200	15	1 HR
DRAIN PIPING	3" AND UP	L	-	-	B-88	CP	CP	V	0	200	15	1 HR
CONDENSER WATER												
CHILLED WATER												
HOT WATER												

ABBREVIATIONS:

ACR - AIR CONDITIONING REFRIGERANT
BLK - BLACK
BS - BELL AND SPIGOT
CI - CAST IRON
CP - COPPER
CS - CARBON STEEL
DI - DUCTILE IRON
ERW - ELECTRIC RESISTANT WELD
F - FUSION WELD
GLV - GALVANIZED
MECH - MECHANICAL
MI - MALLEABLE IRON
MJ - MECHANICAL JOINT
NG - NEOPRENE GASKET
NH - NO HUB
P - POLYVINYL CHLORIDE
PC - ROLLED GROOVED PIPE COUPLING
PE - POLYETHYLENE
PP - POLYPROPYLENE
S - SOCKET JOINT
SJ - SOLDER JOINT 95-5 TIN-ANTIMONY
SL - SEAMLESS
SS - SILVER SOLDER
SV - SERVICE WEIGHT
SW - SOLVENT WELD
T - THREADED
V - VICTAULIC
W - WELDED

NOTES:

1. "T" DRILL COPPER "TEES" WILL NOT BE PERMITTED.
2. "WELD-O-LETS" AND "THREAD-O-LETS" CAN BE USED FOR PIPING TAK-OFFS PROVIDED BRANCH LINE FOR WHICH EACH IS USED IN A MAXIMUM OF (1) PIPE SIZE SMALLER THAN 1/2 THE MAIN SIZE OF WHICH IT CONNECTS.
3. THE OWNER RESERVES THE RIGHT TO X-RAY ANY WELD PROVIDED BY THE CONTRACTOR AT THE OWNERS EXPENSE. THE CONTRACTOR SHALL REPAIR ANY WELD THAT FAILS TO PASS THE X-RAY PROCESS WITH NO ADDITIONAL COST TO OWNER. COST ASSOCIATED WITH X-RAY OF THE WELD AFTER REPAIRS HAVE BEEN MADE, TO PROVE ACCEPTABILITY OF THE WELD, SHALL BE BY THE CONTRACTOR.
4. ALL PIPING SHALL PASS PRESSURE TESTING PRIOR TO THE INSTALLATION OF THE INSULATION. PRESSURE TEST SHALL BE RECORDED AND SUBMITTED TO ENGINEER FOR APPROVAL

Article 2-20, Specification Section 23 2213, Piping

1. Pipe Flange Gaskets
   a. Gaskets for Steam, Steam Condensate Return shall be spiral would as manufactured by "Flexitaulic".
   b. Gaskets for Chilled Water shall be full face asbestos free type.

STEAM CONDENSATE RECEIVER SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	RECEIVER TANK VOL.	GPM	HEAD (PSI)	MOTOR	ELECTRICAL CHARACTERISTICS	REMARKS
CRP-1	-	-	-	-	-	-	-	-
CRP-2	-	-	-	-	-	-	-	-
CRP-3	MASSPLAY MACHINERY	CUSTOM BUILD	SEE REMARKS	20	30	1HP	208V., 3PH.	1, 2, 3, 6, 9, 10, 12, 13

REMARKS:

1. PROVIDE DUPLEX PUMPS WITH SQUARE D NEMA 1 #9038 MECHANICAL ALTERNATOR FLOAT SWITCH WITH HIGH WATER ALARM CONTACTS.
2. PROVIDE WITH SINGLE POINT CONNECTION.
3. PROVIDE REMOTE NEMA 12 DUPLEX CONTROL PANEL WITH IEC STARTERS, FUSED DISCONNECT, 120V. CPT, HOA SWITCHES, RUN LIGHTS, ALARM LIGHT, ALARM HORN AND SILENCE BUTTON.
4. PROVIDE WITH 48"Lx48"Wx36"H 5/16" THICK CARBON STEEL RECEIVER (FINISH PAINTED) WITH INSPECTION COVER AND CONNECTIONS AS NECESSARY.
5. PROVIDE WITH 36"Lx36"Wx22"H 5/16" THICK CARBON STEEL RECEIVER (FINISH PAINTED) WITH INSPECTION COVER AND CONNECTIONS, AS NECESSARY. ALSO PROVIDE SUPPLEMENTAL 24"Wx36"Lx22"H5/16" THICK FINISH PAINTED CARBON STEEL RECEIVER AND CONNECT TO PUMPED RECEIVER AS SHOWN IN DRAWINGS.
6. PROVIDE WITH 36"Lx36"Wx24"H 5/16" THICK CARBON STEEL RECEIVER (FINISH PAINTED) WITH INSPECTION COVER AND CONNECTIONS. AS NECESSARY.
7. PROVIDE WITH (2) GRUNDFOS FREE STANDING CR15-5, 10PH., 3PH PUMPS.
8. PROVIDE WITH (2) TOP MOUNTED MTR15-9/2, 2 HP., 3PH. PUMPS.
9. PROVIDE WITH (2) TOP MOUNTED MTR5-16/3, 1HP., 3PH, PUMPS.
10. PROVIDE WITH 4" CONDENSATE RETURN BASKET STRAINER, TANK THERMOMETER, GAGE GLASS, PUMP PRESSURE GAGES AND ISOLATION VALVES.
11. PROVIDE WITH 2" STAINLESS STEEL CHECK VALVE AND 2" BALL AND GOSSETT #CB-2 PUMP RATE SETTER.
12. PROVIDE WITH 1 1/2" STAINLESS STEEL CHECK VALVES AND 1 1/2" BELL AND GOSSETT CB-1 1/2 PUMP RATE SETTER.
13. HIGH WATER ALARM. PROVIDE BINARY INPUT TO LOCAL JCI PANEL.

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LSA PROJECT NO. 1402032

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

DEPARTMENT OF ADMINISTRATION
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STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 3-9-15 | DRAWN BY: CAD | CHECKED BY: WRB | REV: WRB

MECHANICAL SCHEDULES

A-012651

MS101

DESIGN DEVELOPMENT PHASE DOCUMENTS

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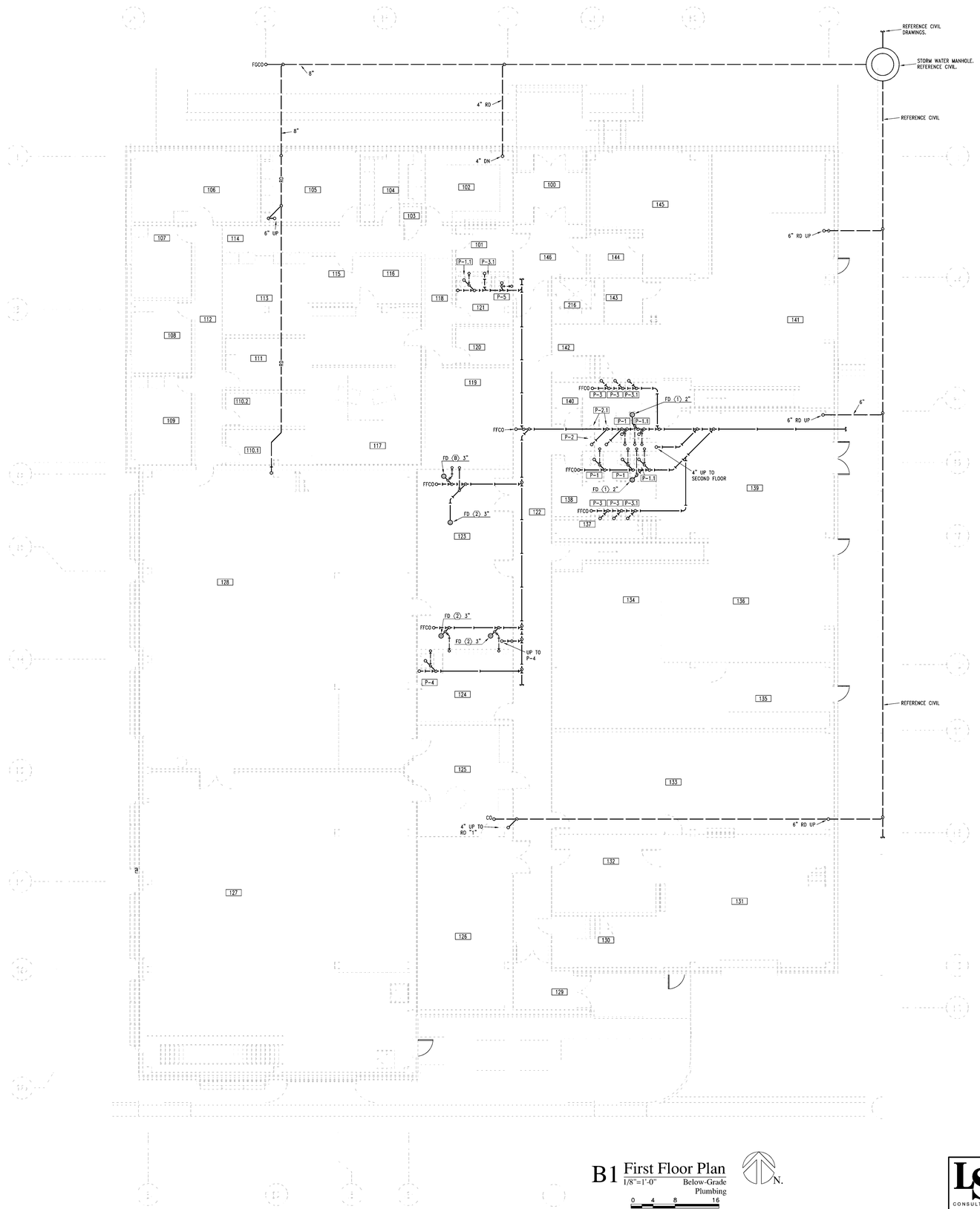
PLUMBING FIXTURE SCHEDULE

MARK	MANUFACTURER/ MODEL	DESCRIPTION	FITTINGS		REMARKS
			MANUFACTURER/ MODEL	DESCRIPTION	
P-1	ZURN Z5615.258.00.00.00	WATER CLOSET: WHITE VITREOUS CHINA, WALL HUNG TOILET, ELONGATED BOWL, 15" HIGH, SIPHON JET FLUSH, 1.28 GPF, COMPLETE WITH HIGH EFFICIENCY FLUSHOMETER VALVE.	Z5955SS-EL	ELONGATED, STANDARD WHITE, OPEN FRONT TOILET SEAT LESS COVER WITH STAINLESS STEEL CHECK HINGE.	3
P-1.1	ZURN Z5615.258.00.00.00	ADA COMPLIANT WATER CLOSET: WHITE VITREOUS CHINA, WALL HUNG TOILET, ELONGATED BOWL, 17" HIGH, SIPHON JET FLUSH, 1.28 GPF, COMPLETE WITH HIGH EFFICIENCY FLUSHOMETER VALVE.	Z5955SS-EL	ELONGATED, STANDARD WHITE, OPEN FRONT TOILET SEAT LESS COVER WITH STAINLESS STEEL CHECK HINGE.	3, 6
P-2	ZURN Z5755-U	URINAL: 1.0 GPF VITREOUS CHINA, WALL HUNG, INTEGRAL TRAP, WASHDOWN URINAL COMPLETE WITH 3/4" TOP SPUD CONNECTION, CONCEALED UNIVERSAL RETROFIT WALL BRACKET, 2" OUTLET CONNECTION AND VANDAL RESISTANT OUTLET STRAINER. MOUNT FIXTURE RIM AT 24" A.F.F. PROVIDE FLOOR MOUNTED, HEAVY DUTY TUBULAR STEEL UPRIGHTS, ADJUSTABLE CARRIER PLATED HANGER AND ALL OTHER REQUIRED MOUNTING HARDWARE.	ZTR6203-WS1-LL	SENSOR LONG LIFE BATTERY OPERATED URINAL FLUSH VALVE. 1.0 GPF	
P-2.1	ZURN Z5755-U	ADA COMPLIANT URINAL: 1.0 GPF VITREOUS CHINA, WALL HUNG, INTEGRAL TRAP, WASHDOWN URINAL COMPLETE WITH 3/4" TOP SPUD CONNECTION, CONCEALED UNIVERSAL RETROFIT WALL BRACKET, 2" OUTLET CONNECTION AND VANDAL RESISTANT OUTLET STRAINER. MOUNT FIXTURE RIM AT 17" A.F.F. PROVIDE FLOOR MOUNTED, HEAVY DUTY TUBULAR STEEL UPRIGHTS, ADJUSTABLE CARRIER PLATED HANGER AND ALL OTHER REQUIRED MOUNTING HARDWARE.	ZTR6203-WS1-LL	SENSOR LONG LIFE BATTERY OPERATED URINAL FLUSH VALVE. 1.0 GPF	6
P-3	ZURN Z5310	LAVATORY: 20" X 18" VITREOUS CHINA WALL HUNG LAVATORY WITH REAR OVERFLOW AND SINGLE FAUCET HOLE. PROVIDE CONCEALED ARM CARRIER SYSTEM.	Z6930-XL	BATTERY POWERED, CHROME PLATED SENSOR FAUCET, 1.5 GPM, SINGLE HOLE FAUCET	1,2,3,4,5
P-3.1	ZURN Z5310	ADA LAVATORY: 20" X 18" VITREOUS CHINA WALL HUNG LAVATORY WITH REAR OVERFLOW AND SINGLE FAUCET HOLE. PROVIDE CONCEALED ARM CARRIER SYSTEM. MOUNT TOP OF RIM AT 34" A.F.F.	Z6930-XL	ADA COMPLIANT, BATTERY POWERED, CHROME PLATED SENSOR FAUCET, 1.5 GPM, SINGLE HOLE FAUCET	1,2,3,4,5
P-4	ZURN Z1996-36	JANITORS SINK: 24X36X10 MOP SERVICE BASIN. MOLDED HIGH DENSITY COMPOSITE BASIN WITH AN INTEGRALLY MOLDED SELF-DRAINING MOP SHELF, PVC DRAIN BODY, STAINLESS STEEL STRAINER AND 3 GASKETED OUTLET CONNECTION.	Z1996-SF	SERVICE SINK FAUCET- CHROME PLATED SERVICE FAUCET, COMPLETE WITH VACUUM BREAKER, INTEGRAL STOPS, ADJUSTABLE WALL BRACE, PAIL HOOK, FOUR-ARM HOT AND COLD HANDLES AND 3/4" HOSE THREAD ON SPOUT. WATER INLETS ARE FOR 1/2" PIPE AND ARE ECCENTRIC ON AN 8" CENTERLINE.	
P-5	ZURN Z7500	ADA COMPLIANT SHOWER UNIT: TEMP-GARD PRESSURE BALANCING SHOWER VALV WITH SINGLE BRONZE STEM, STAINLESS STEEL BALANCING PISTON AND BOTTOM ACCES INTEGRAL SERVICE STOPS. STANDARD WITH 1/2" COPPER TUBING ASSEMBLY ENCLOSED BY 18 GAGE STAINLESS STEEL #4 BRUSHED FINISH SHROUD, CHROME PLATED BRASS SHOWER HEAD WITH 2.5 GPM FLOW CONTROL AND ADJUSTABLE SPRAY PATTERN, METAL STEM HANDLE			

REMARKS:
1 - PROVIDE CHROME PLATED BRASS TAILPIECE AND GRID DRAIN.
2 - PROVIDE CHROME PLATED BRASS P-TRAP.
3 - PROVIDE LOOSE KEY STOPS AND FLEXIBLE RISERS.
4 - PROVIDE CONCEALED ARM TYPE CARRIER WITH SQUARE TUBULAR STEEL UP-RIGHTS AND BLOCK TYPE BASES.
5 - INSULATE EXPOSED TAILPIECE, P-TRAP, AND WATER RISERS. REFER TO SPECIFICATIONS FOR INSULATION METHODS.
6 - PROVIDE FLUSH VALVE HANDLE ON WIDE SIDE OF STALL.

DRAIN SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	DESCRIPTION
RD "1"	WADE	SERIES 3000-52-AE	CAST IRON ROOF DRAIN WITH BEARING PAN, ADJUSTABLE EXTENSION, POLYPROPYLENE MUSHROOM DOME, UNDER-DECK CLAMP
RD "2"	WADE	SERIES 3000-52-AE-D	SAME AS RD "A" WITH DAM FOR OVERFLOW DRAINAGE SERVICE.
FD-1	WADE	SERIES 1100 STD	CAST IRON FLOOR DRAIN WITH FLANGE, INTEGRAL REVERSIBLE CLAMPING COLLAR, SEEPAGE OPENINGS 1/2" PLUGGED PRIMER TAP AND 6" DIAMETER NICKEL BRONZE STRAINER WITH VANDAL PROOF SCREWS.
FD-2	WADE	SERIES 1240-1, 27	CAST IRON FLOOR DRAIN WITH PLUGGED 1/2", PRIMER TAP, INTEGRAL CLAMPING COLLAR SEEPAGE OPENINGS, ADJUSTABLE TOP, AND NICKEL BRONZE VENEER DUCTILE IRON LOOSE SET TRACTOR GRATE AND SEDIMENT BUCKET.



B1 First Floor Plan — Below-Grade Plumbing
1/8"=1'-0"
0 4 8 16
N.

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LSA PROJECT NO. 1402032

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

DEPARTMENT OF ADMINISTRATION
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FAX: 785-296-3456

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

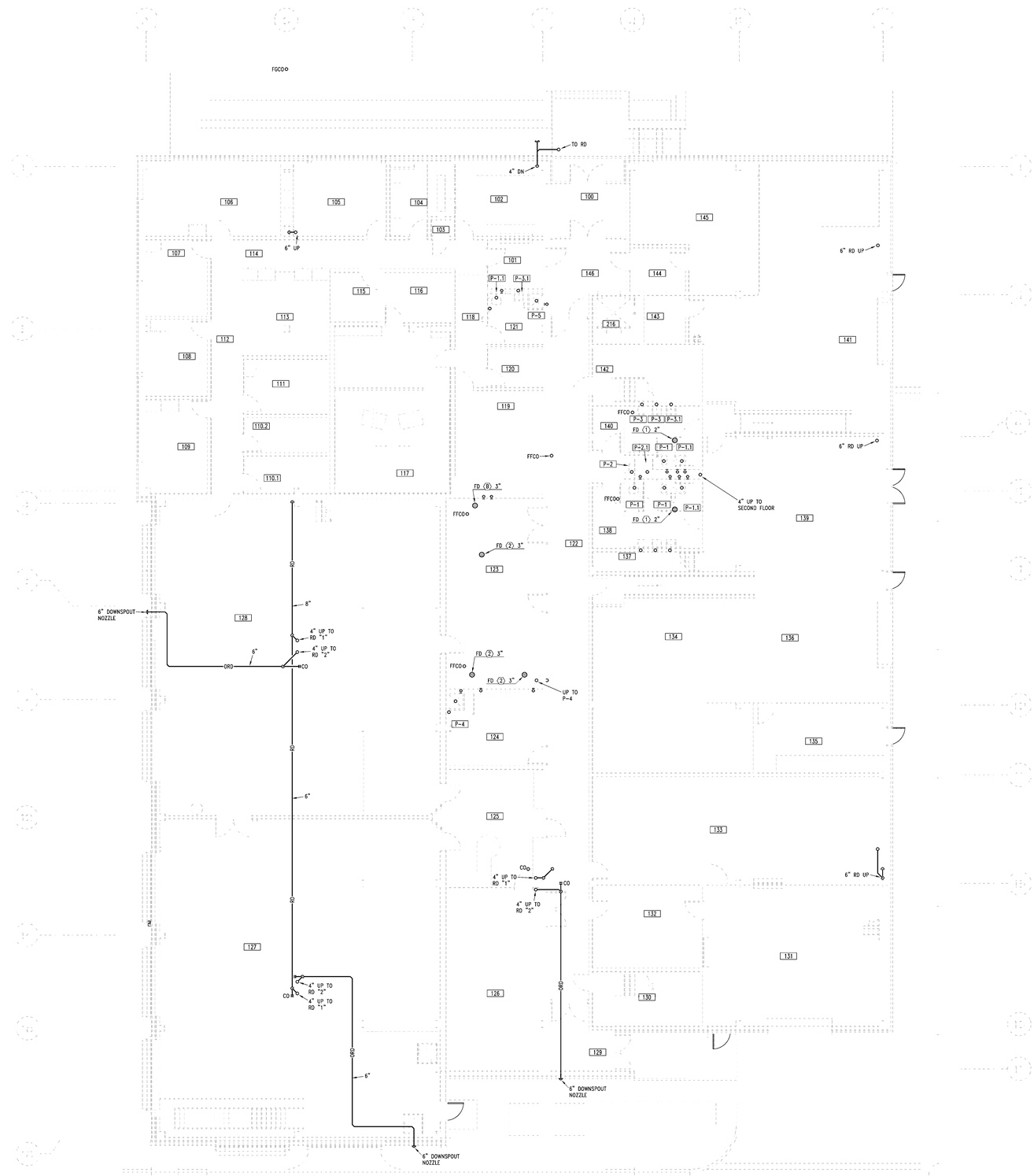
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FIRST FLOOR PLAN - BELOW-GRADE PLUMBING

A-012651

PH101

DESIGN DEVELOPMENT PHASE DOCUMENTS



B1 First Floor Plan
1/8"=1'-0" Plumbing

0 4 8 16

N.

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FIRST FLOOR PLAN - PLUMBING

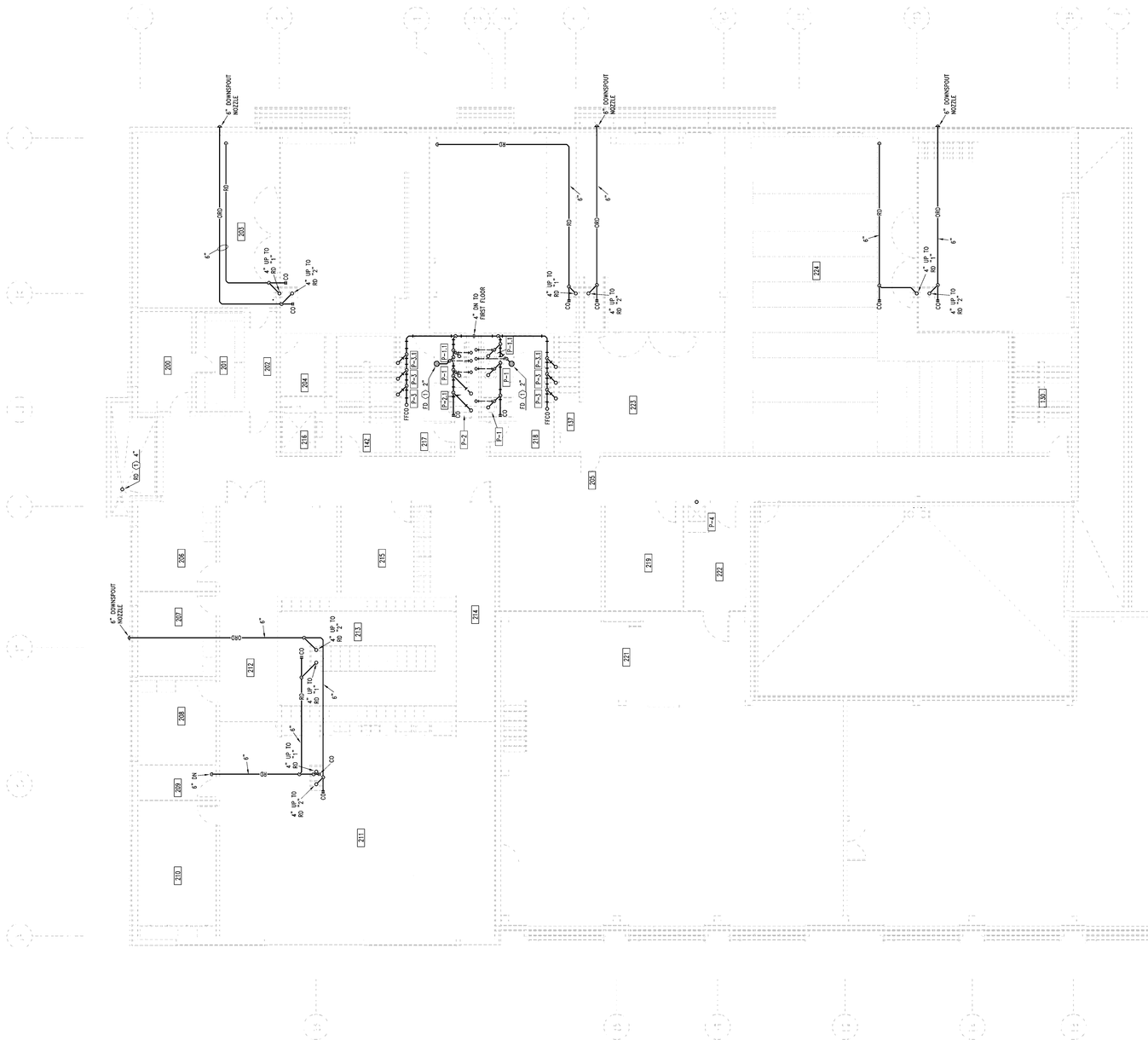
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PH102

DESIGN DEVELOPMENT PHASE DOCUMENTS

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6" DOWNSPOUT NOZZLE
6" UP TO RD 2"
6" UP TO RD 1'-1"
6" DN TO FIRST FLOOR
FFCO-1
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
P-9
P-10
P-11
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B1 Roof Plan
1/8"=1'-0" Plumbing

0 4 8 16

N.

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ROOF PLAN - PLUMBING

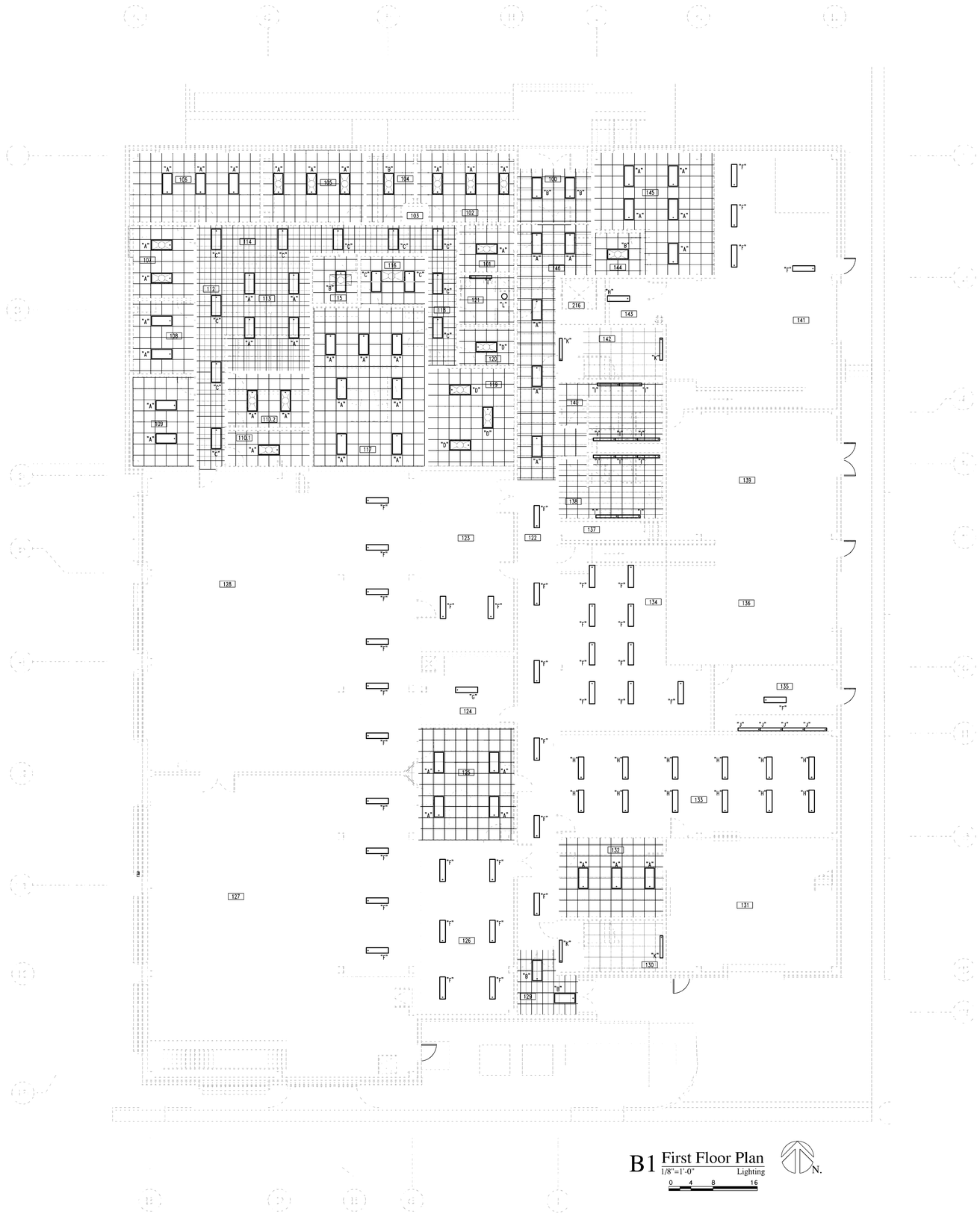
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PH104

DESIGN DEVELOPMENT PHASE DOCUMENTS

... PH103.dwg 04 02/25/15 GTC

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2-2-2016
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LIGHT FIXTURE SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	MOUNTING			FINISH	LAMPS					REMARKS
			LAY-IN	SUSPENDED	WALL		LED	FLUOR.	HID.	CODE	QUAN.	
"A"	WILLIAMS	DIG-S24-LED*PH75/840-AD-ED*PH	X			WHITE	X				–	–
"B"	WILLIAMS	DIG-S24-LED*PH60/840-AD-ED*PH	X			WHITE	X				–	–
"C"	WILLIAMS	DIG-S24-LED*PH50/840-AD-ED*PH	X			WHITE	X				–	–
"D"	WILLIAMS	DIG-S24-LED*PH40/840-AD-ED*PH	X			WHITE	X				–	–
"F"	COOPER	4WNLED-LD1-70-F-UNV-L840-U		X		WHITE	X				–	1
"G"	COOPER	4WNLED-LD1-54-F-UNV-L840-U		X		WHITE	X				–	1
"H"	COOPER	4WNLED-LD1-41-F-UNV-L840-U		X		WHITE	X				–	1
"I"	WILLIAMS	LLEG-4-LED*PH34/840-F116S/MWA-ED*PH	X			WHITE	X				–	–
"J"	COOPER	S23-D-W-1L40-SR-4-1-S1-S935-S			X	SILVER	X				–	–
"K"	WILLIAMS	SLF-4-LED*PH75/840-HIA-ED*PH			X	SILVER	X				–	–
"L"	WILLIAMS	LEDSL60-PH20/840-EDD*PH-120		RECESSED		WHITE	X				–	–

REMARKS LEGEND:
1 – FOR HIGH CEILING AREAS MOUNT FIXTURE AT 25'-0" A.F.F., FOR LOWER CEILING MOUNT FIXTURE AT 12'-0" A.F.F.

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FIRST FLOOR PLAN - LIGHTING

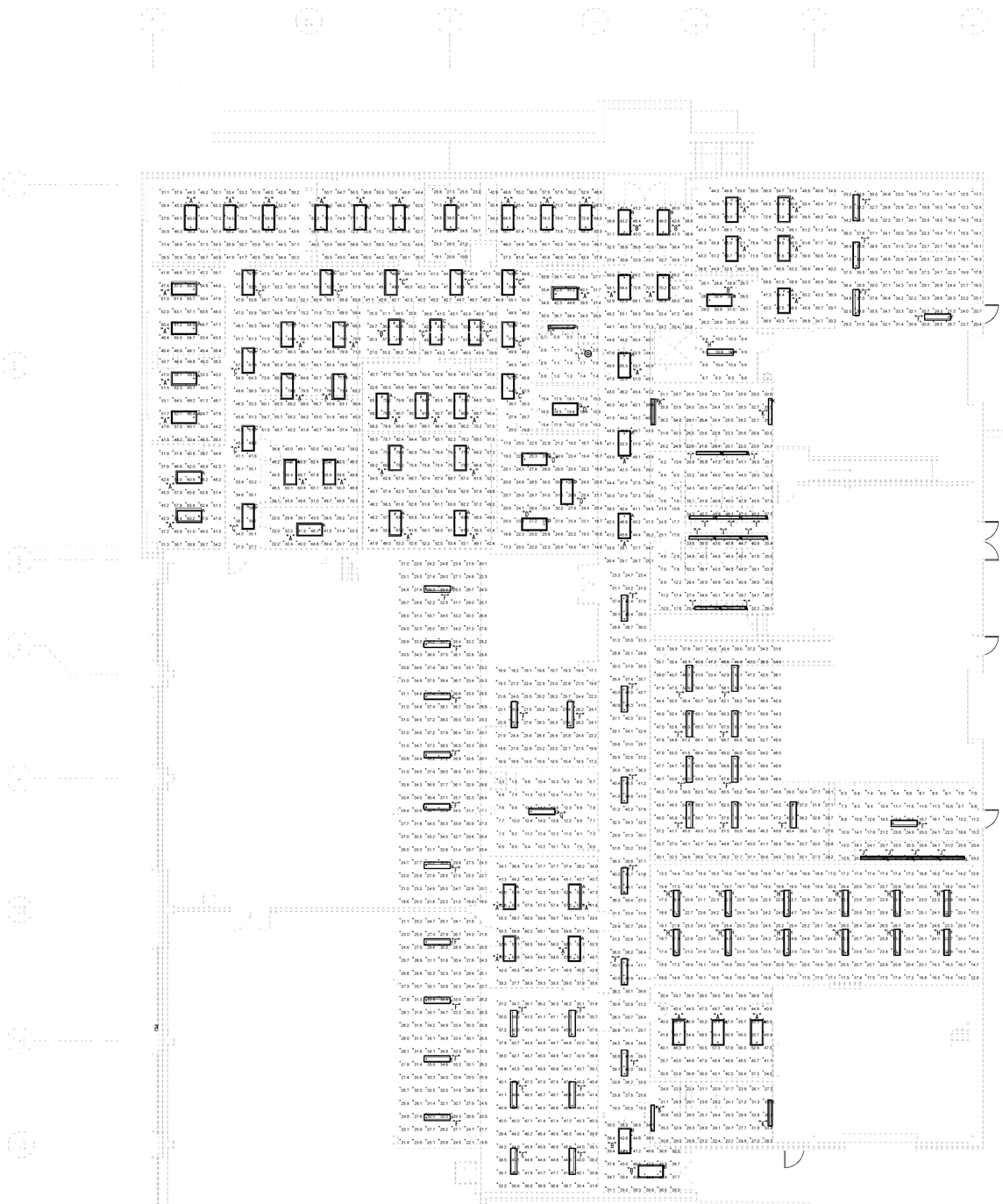
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EL101

DESIGN DEVELOPMENT PHASE DOCUMENTS

... EL101.dwg 06:03/09/15 DTC

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Statistics					
Description	Avg	Max	Min	Max/Min	Avg/Min
100	38.6 fc	47.5 fc	27.4 fc	1.7:1	1.4:1
101	36.4 fc	45.2 fc	26.9 fc	1.7:1	1.4:1
102	59.1 fc	78.6 fc	37.3 fc	2.1:1	1.6:1
104	29.1 fc	38.0 fc	19.1 fc	2.0:1	1.5:1
105	58.5 fc	77.4 fc	35.0 fc	2.2:1	1.7:1
106	50.6 fc	74.0 fc	26.5 fc	2.8:1	1.9:1
107	52.3 fc	67.1 fc	38.4 fc	1.7:1	1.4:1
108	52.5 fc	68.2 fc	38.0 fc	1.8:1	1.4:1
109	47.7 fc	65.6 fc	31.3 fc	2.1:1	1.5:1
110	32.8 fc	46.1 fc	21.3 fc	2.2:1	1.5:1
111	52.2 fc	67.8 fc	38.8 fc	1.7:1	1.3:1
113	56.1 fc	86.4 fc	19.8 fc	4.4:1	2.8:1
115	34.4 fc	41.4 fc	25.0 fc	1.7:1	1.4:1
116	44.5 fc	51.8 fc	35.5 fc	1.5:1	1.3:1
117	65.0 fc	91.5 fc	37.6 fc	2.4:1	1.7:1
119	73.3 fc	31.1 fc	14.6 fc	2.1:1	1.6:1
120	17.3 fc	19.6 fc	15.3 fc	1.3:1	1.1:1
121	1.3 fc	2.0 fc	0.3 fc	6.7:1	4.3:1
123	22.8 fc	28.3 fc	16.9 fc	1.7:1	1.3:1
124	9.6 fc	14.1 fc	1.5 fc	9.4:1	6.4:1
125	49.6 fc	60.2 fc	34.0 fc	1.8:1	1.5:1
126	42.2 fc	48.7 fc	31.2 fc	1.6:1	1.4:1
127.1	28.7 fc	34.9 fc	19.6 fc	1.8:1	1.5:1
128.1	30.8 fc	38.4 fc	18.0 fc	2.1:1	1.7:1
129	39.7 fc	47.2 fc	31.1 fc	1.5:1	1.3:1
132	45.6 fc	60.6 fc	30.4 fc	2.0:1	1.5:1
133	20.8 fc	26.7 fc	12.8 fc	2.1:1	1.6:1
134	48.9 fc	69.0 fc	24.1 fc	2.9:1	2.0:1
135	18.3 fc	41.3 fc	6.3 fc	6.6:1	2.9:1
138	32.3 fc	46.4 fc	2.8 fc	16.6:1	11.5:1
140	34.1 fc	49.0 fc	1.6 fc	30.6:1	21.3:1
141.1	27.4 fc	39.5 fc	11.7 fc	3.4:1	2.3:1
143	9.8 fc	10.8 fc	8.6 fc	1.3:1	1.1:1
144	28.5 fc	31.0 fc	26.1 fc	1.2:1	1.1:1
145	54.8 fc	76.2 fc	30.2 fc	2.5:1	1.8:1
BACK HALL	34.9 fc	44.6 fc	19.3 fc	2.3:1	1.8:1
FRONT HALL	45.4 fc	72.7 fc	15.8 fc	4.6:1	2.9:1
NORTH STAIR	27.3 fc	36.2 fc	20.4 fc	1.8:1	1.3:1
SOUTH STAIR	27.3 fc	36.2 fc	20.9 fc	1.7:1	1.3:1

B1 First Floor Plan
1/8"=1'-0" Lighting Photometric

0 4 8 16

N.

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Email: lsepa@lsepa.com
LSA PROJECT NO. 1402032

HTK ARCHITECTS

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

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STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 3-9-15 DRAWN BY: CAD CHECKED BY: WRB REV: WRB

FIRST FLOOR PLAN - LIGHTING PHOTOMETRIC

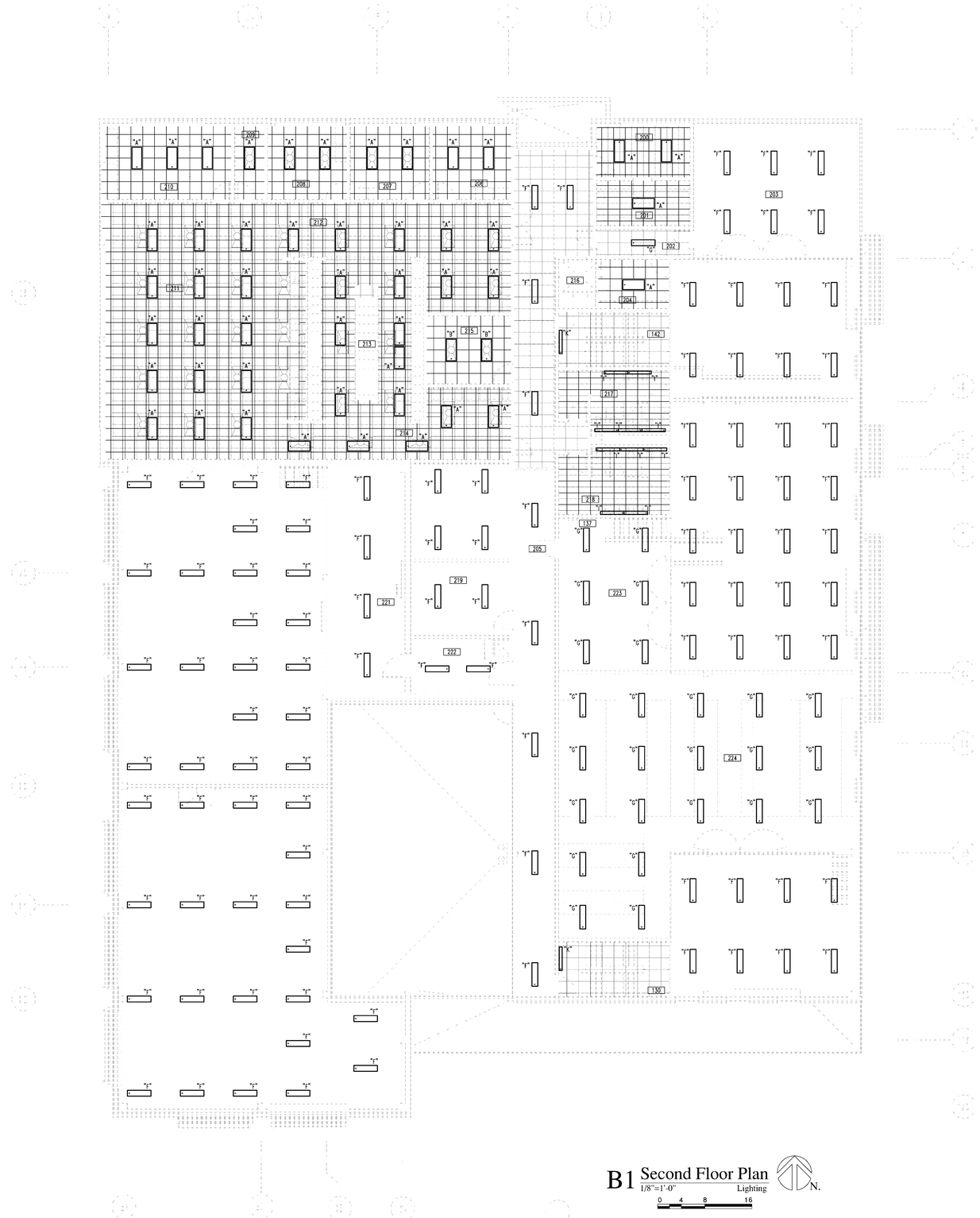
A-012651

EL101A

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A144

... EL101A.dwg 96 03/09/15 GTC



B1 Second Floor Plan
1/8"=1'-0" Lighting
0 4 8 16
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SECOND FLOOR PLAN - LIGHTING

A-012651

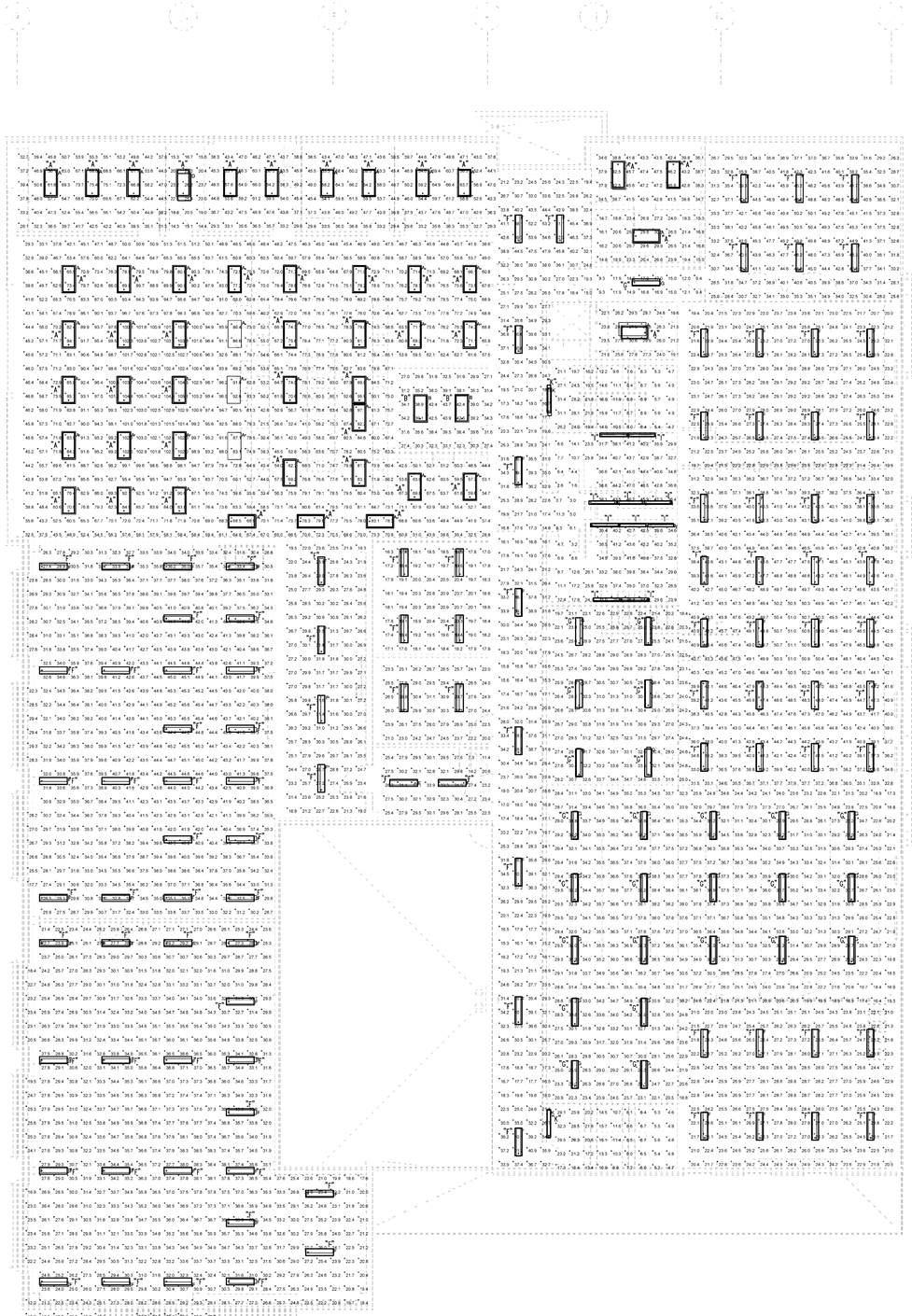
EL102

DESIGN DEVELOPMENT PHASE DOCUMENTS

... EL102.dwg 06 03/09/15 CTC

JCSBC
2-2-2016
Att:9A145

Statistics					
Description	Avg	Max	Min	Max/Min	Avg/Min
123.1	26.4 fc	31.1 fc	20.0 fc	1.6:1	1.3:1
200	41.6 fc	47.5 fc	34.5 fc	1.4:1	1.2:1
201	22.2 fc	30.1 fc	14.7 fc	2.0:1	1.5:1
202	13.3 fc	17.0 fc	9.3 fc	1.8:1	1.4:1
203	39.3 fc	50.5 fc	25.6 fc	2.0:1	1.5:1
204	25.7 fc	31.0 fc	19.1 fc	1.6:1	1.3:1
206	47.7 fc	66.4 fc	29.3 fc	2.3:1	1.6:1
207	47.8 fc	66.2 fc	29.4 fc	2.3:1	1.6:1
208	47.7 fc	66.0 fc	29.3 fc	2.3:1	1.6:1
209	19.8 fc	26.2 fc	14.3 fc	1.8:1	1.4:1
210	51.9 fc	75.4 fc	28.1 fc	2.7:1	1.8:1
211	73.1 fc	105.1 fc	21.5 fc	4.9:1	3.4:1
215	35.1 fc	43.9 fc	27.0 fc	1.6:1	1.3:1
217	32.7 fc	47.0 fc	1.6 fc	29.4:1	20.4:1
218	30.4 fc	43.6 fc	3.2 fc	13.6:1	9.5:1
219	19.0 fc	20.9 fc	16.3 fc	1.3:1	1.2:1
221	27.2 fc	31.8 fc	18.8 fc	1.7:1	1.4:1
222	27.6 fc	33.9 fc	7.3 fc	4.6:1	3.8:1
224	30.2 fc	38.4 fc	15.3 fc	2.5:1	2.0:1
SECOND HALLWAY	27.6 fc	54.6 fc	3.0 fc	18.2:1	9.2:1
SECOND NORTH STAIR	13.6 fc	31.4 fc	4.7 fc	6.7:1	2.9:1
SECOND SOUTH STAIR	13.1 fc	32.3 fc	4.6 fc	7.0:1	2.8:1
136	43.0 fc	51.1 fc	31.2 fc	1.6:1	1.4:1
139	25.1 fc	29.2 fc	19.4 fc	1.5:1	1.3:1
127	30.6 fc	38.5 fc	12.0 fc	3.2:1	2.6:1
128	37.3 fc	45.6 fc	17.7 fc	2.6:1	2.1:1
131	25.2 fc	28.8 fc	20.4 fc	1.4:1	1.2:1



B1 Second Floor Plan
1/8"=1'-0" Lighting Photometric

N.

0 4 8 16

HTK ARCHITECTS

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SECOND FLOOR PLAN - LIGHTING PHOTOMETRIC

A-012651

EL102A

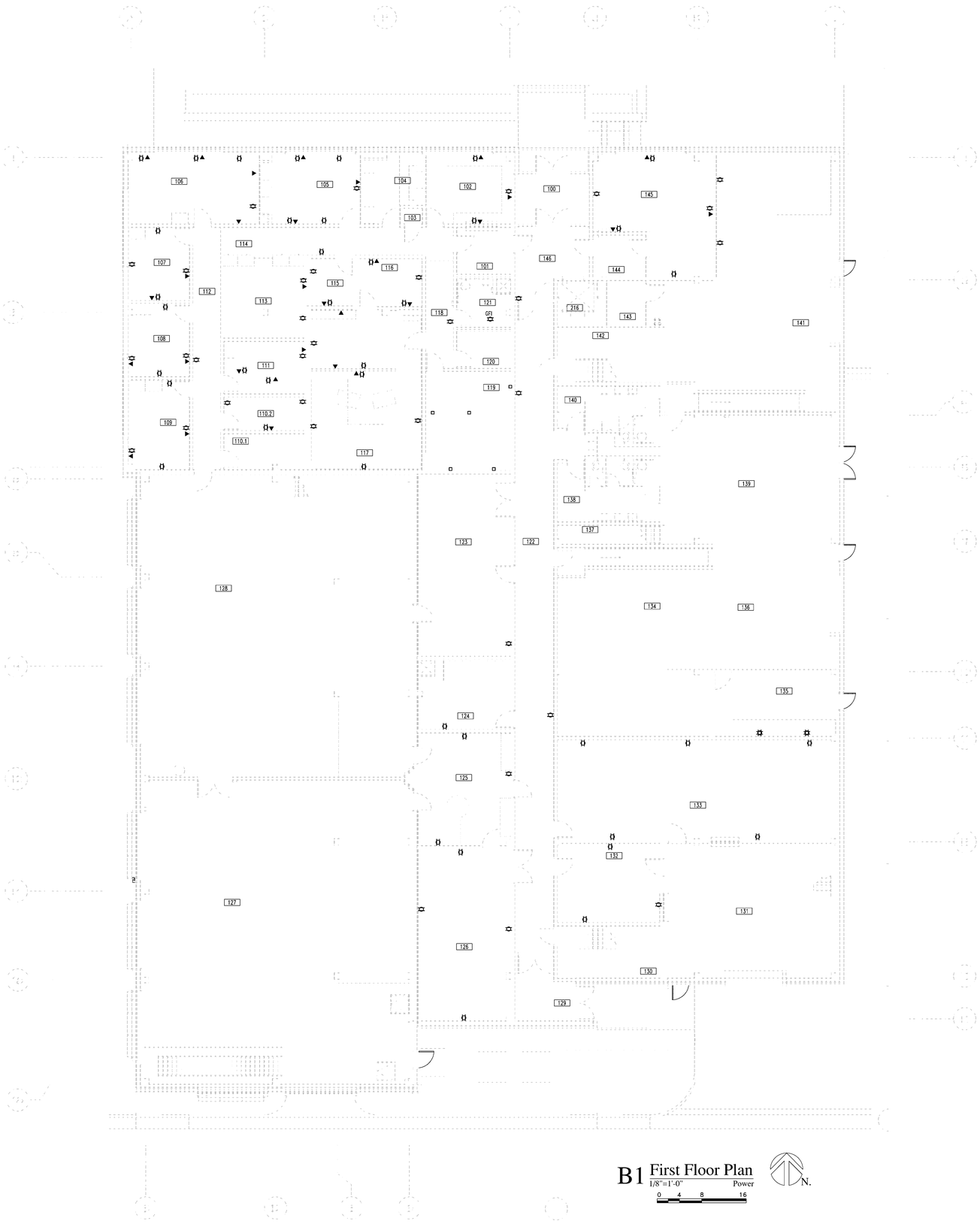
DESIGN DEVELOPMENT PHASE DOCUMENTS

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_ EL102A.dwg 96 03/09/15 GTC

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2-2-2016
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B1 First Floor Plan
1/8"=1'-0" Power

0 4 8 16

N.

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BUILDING NUMBER ???

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FIRST FLOOR
PLAN - POWER

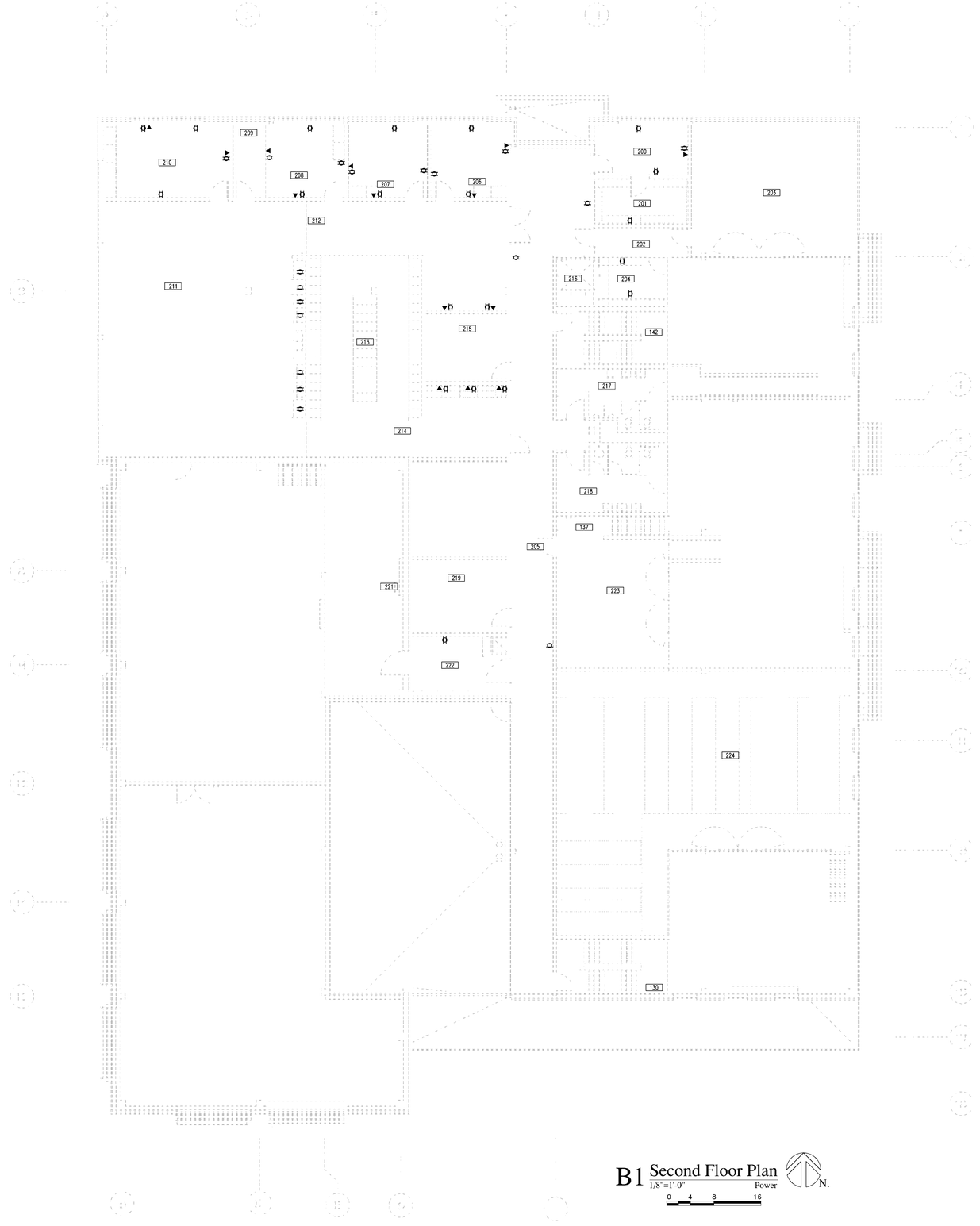
A-012651

EP101

DESIGN DEVELOPMENT
PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A147

... EP101.dwg 04 03/09/15 CJD



B1 Second Floor Plan
1/8"=1'-0"
Power

0 4 8 16

N.

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HTK PROJECT NUMBER:
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SECOND FLOOR PLAN - POWER

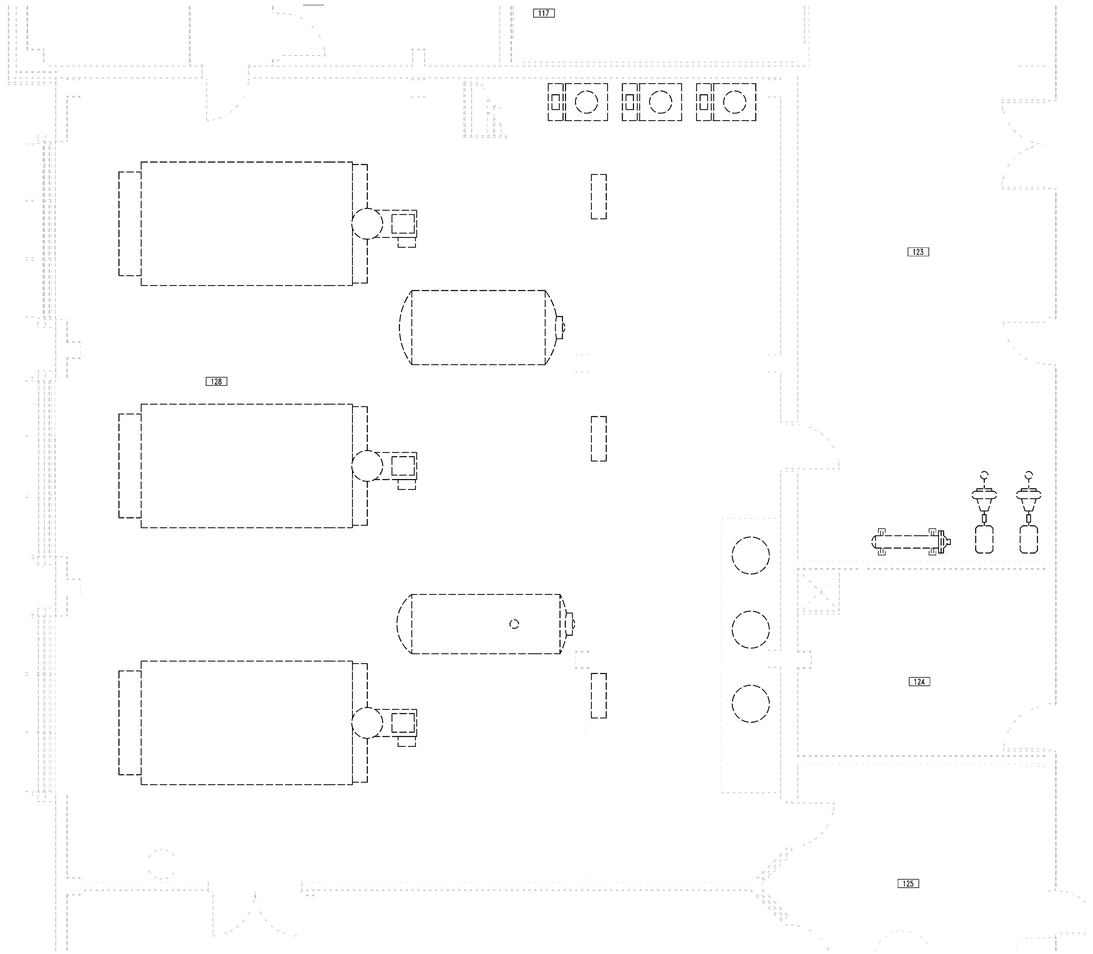
A-012651

EP102

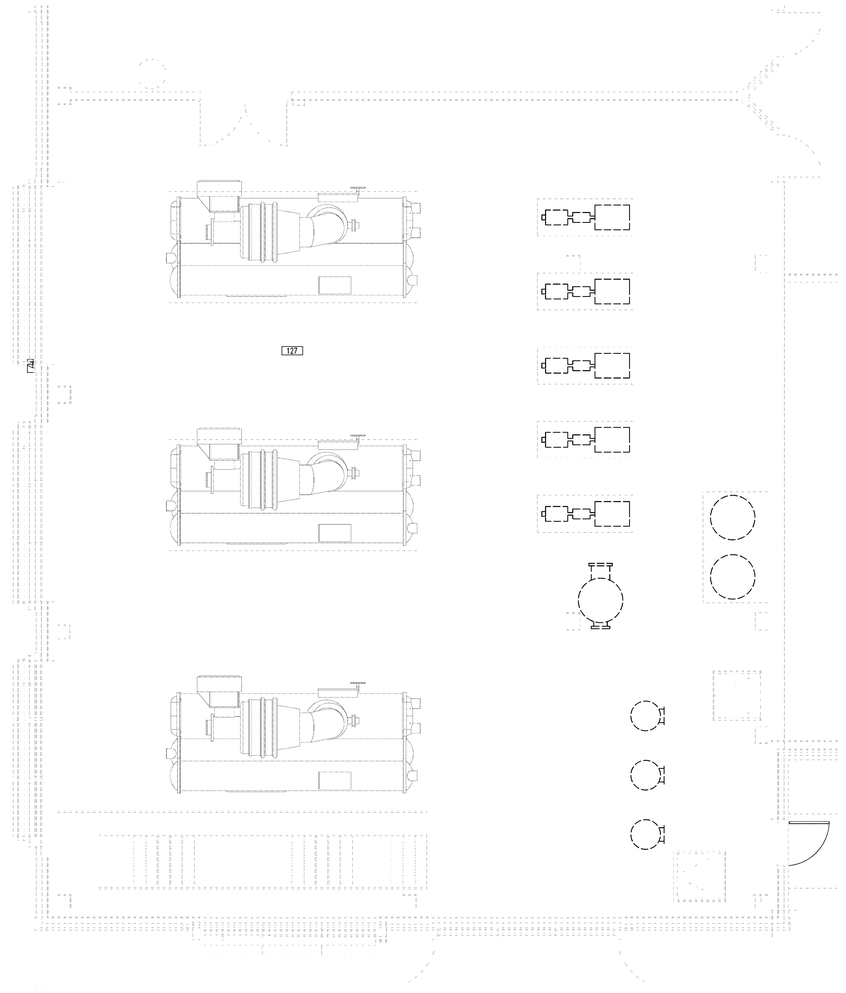
DESIGN DEVELOPMENT PHASE DOCUMENTS

... EP102.dwg 04 03/09/15 CTC

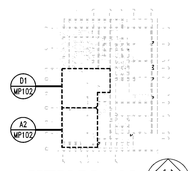
JCSBC
2-2-2016
Att.9A148



D2 PARTIAL FIRST FLOOR PLAN - CHILLER ROOM
1/4"=1'-0"
Power
N.



A2 PARTIAL FIRST FLOOR PLAN - CHILLER ROOM
1/4"=1'-0"
Power
N.



KEY PLAN
NO SCALE
N.

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Seventh & Van Buren Street, Topeka, Kansas
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CHECKED BY: WRB
REV: WRB
DATE: 3-9-15

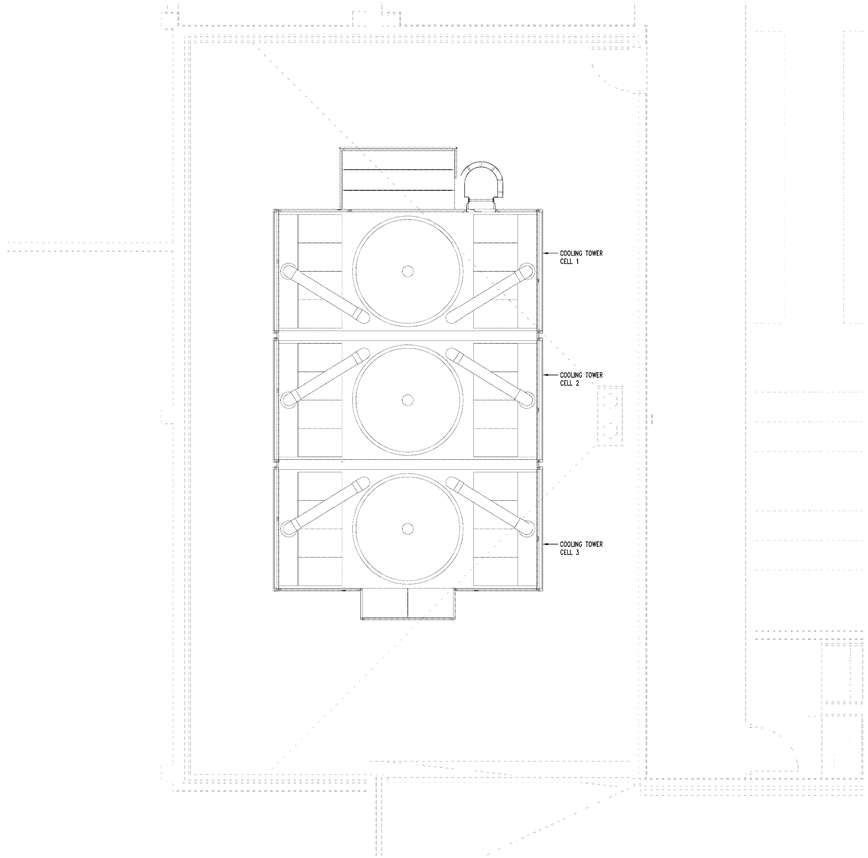
PARTIAL FIRST FLOOR PLAN - MECHANICAL PIPING

A-012651

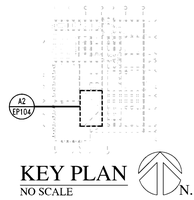
EP103

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att:9A149



A2 PARTIAL SECOND FLOOR PLAN
1/4"=1'-0"
Power
N.



KEY PLAN
NO SCALE
N.

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DATE: 3-9-15 DRAWN BY: CAD CHECKED BY: WRB REV: WRB

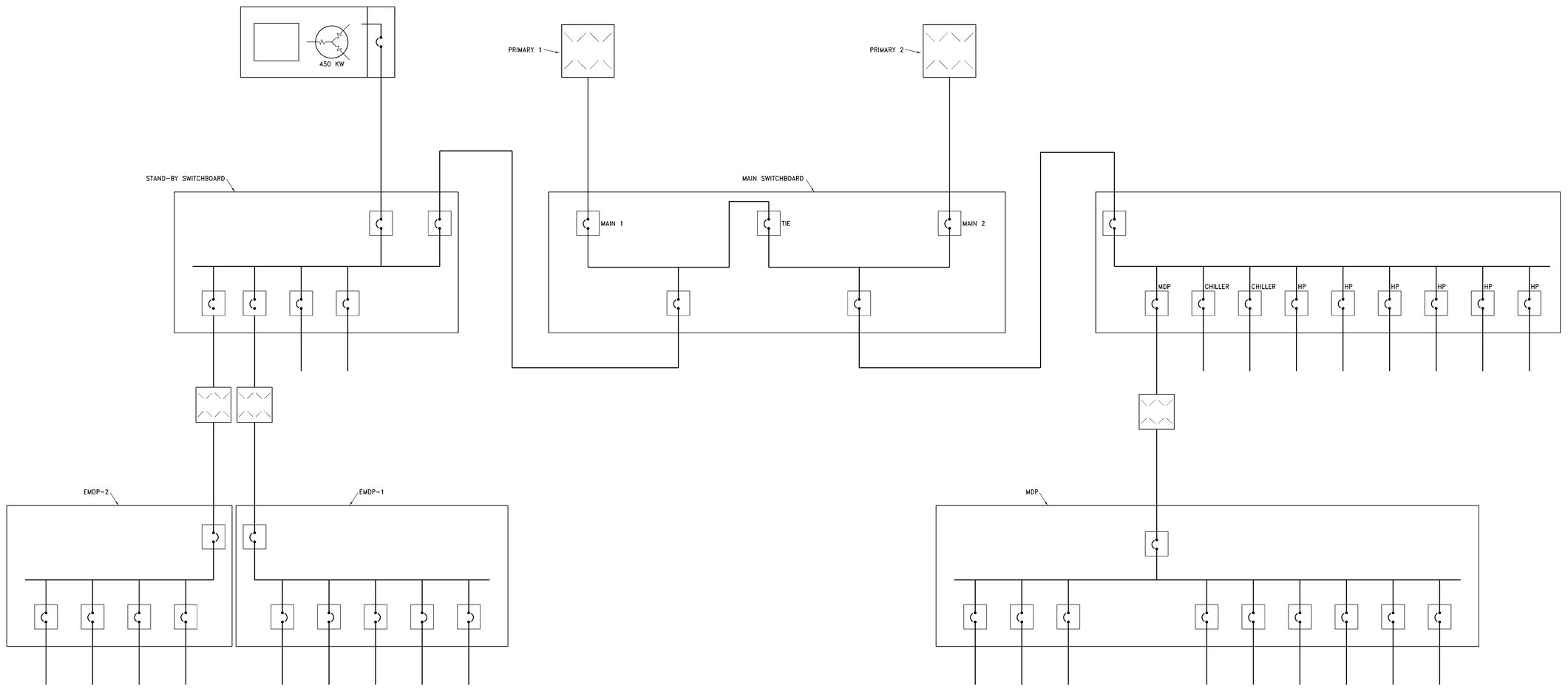
PARTIAL FLOOR PLANS - POWER

A-012651

EP104

DESIGN DEVELOPMENT PHASE DOCUMENTS

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Alt.9A150



A1 Electrical Distribution Riser Diagram
No Scale

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ELECTRICAL DISTRIBUTION
RISER DIAGRAM

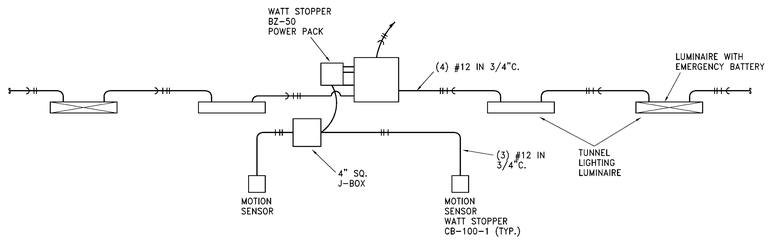
A-012651

EP201

DESIGN DEVELOPMENT
PHASE DOCUMENTS

... EP201.dwg 96 02/25/15 GTC

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2-2-2016
Att:9A151



B2 WIRING SCHEMATIC - TUNNEL LIGHTING
NO SCALE

HTK ARCHITECTS

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ELECTRICAL DETAILS AND SCHEDULES

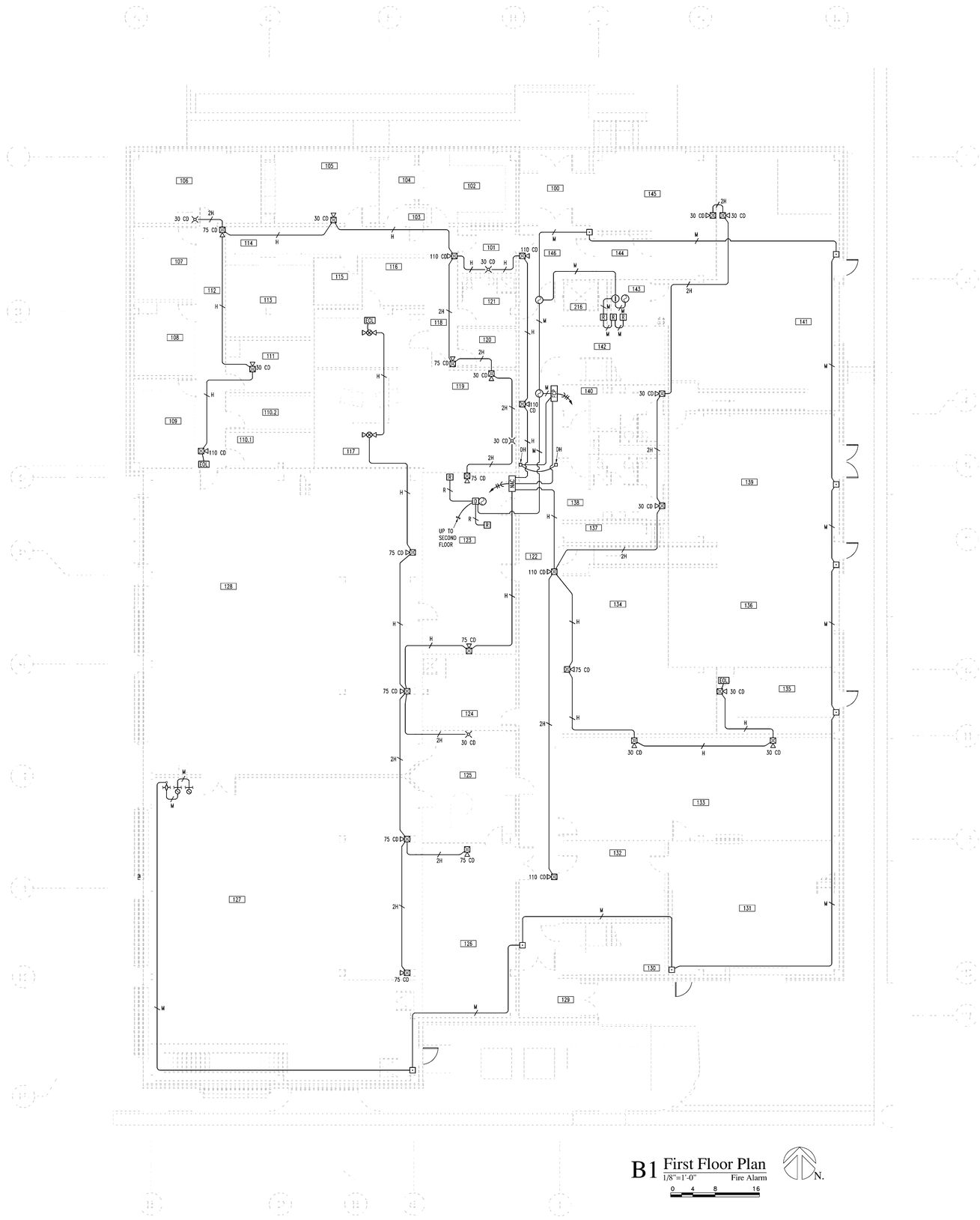
A-012651

ES101

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A152

... ES101_Electrical Schedule and Details.dwg 96 03/09/15 GTC 48 02/25/15 GTC 48 02/25/15 GTC 48 02/25/15 GTC SAVE AS FROM.dwg 96 02/24/15 GTC LstAvg 96 02/24/15 GTC LstAvg 96 02/24/15 GTC GTC GTC



B1 First Floor Plan
1/8"=1'-0" Fire Alarm

0 4 8 16

N.

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Seventh & Van Buren Street, Topeka, Kansas
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DATE: 3-9-15

FIRST FLOOR PLAN - FIRE ALARM

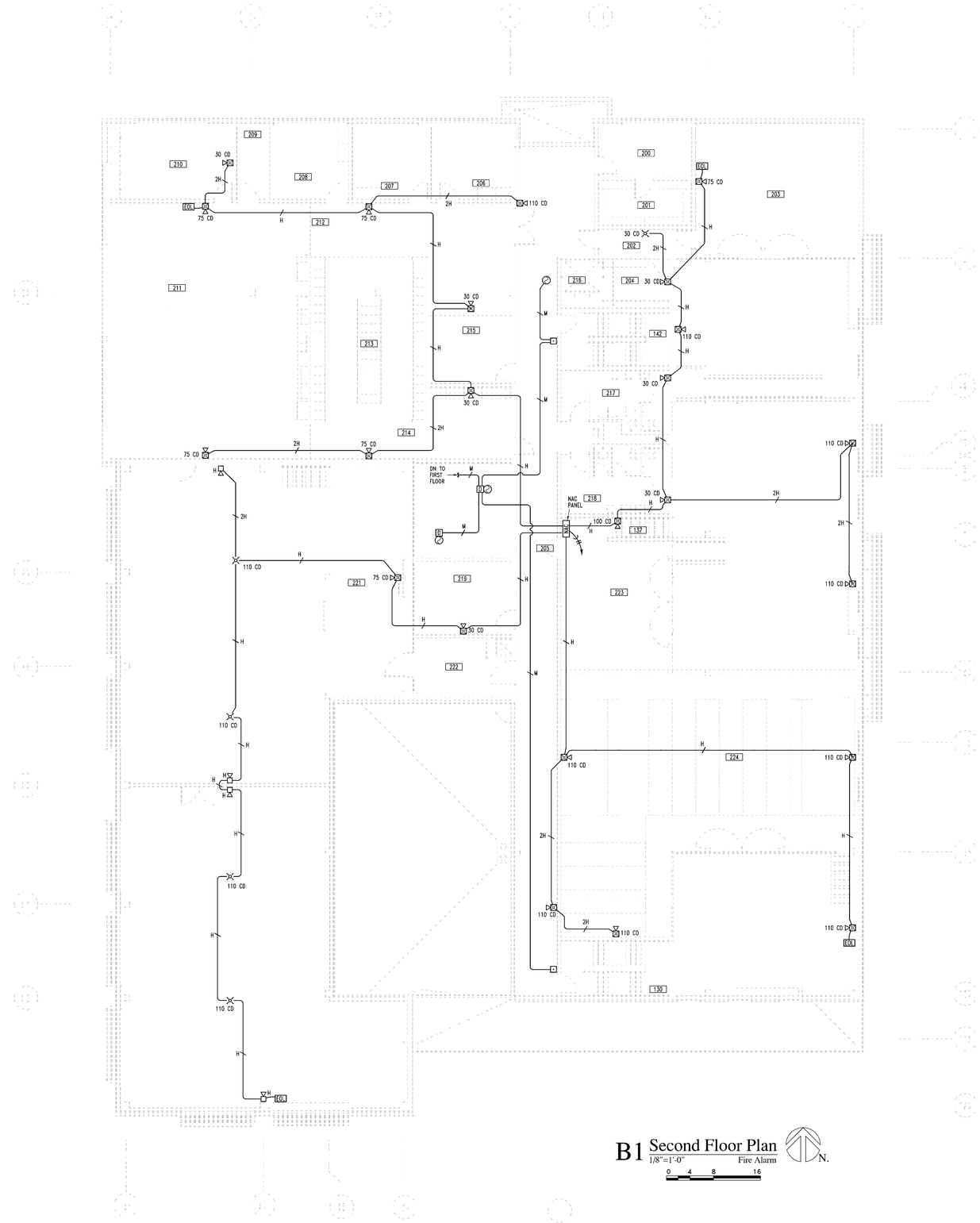
A-012651

EY101

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A153

... EY101.dwg 04 03/09/15 CDC



B1 Second Floor Plan
1/8"=1'-0" Fire Alarm

N.

0 4 8 16

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SECOND FLOOR
PLAN - FIRE ALARM

A-012651

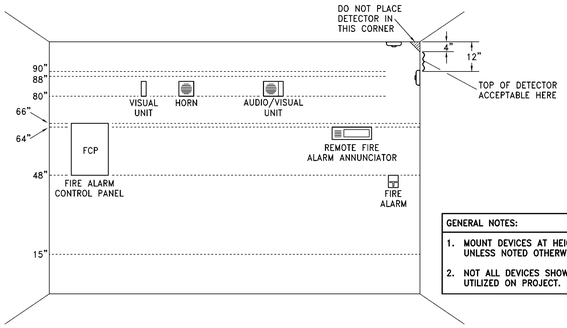
EY102

DESIGN DEVELOPMENT
PHASE DOCUMENTS

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LSA PROJECT NO. 1402032

JCSBC
2-2-2016
Alt:9A154

... EY102.dwg 96 03/09/15 CTC



GENERAL NOTES:

1. MOUNT DEVICES AT HEIGHT INDICATED UNLESS NOTED OTHERWISE ON PLANS.
2. NOT ALL DEVICES SHOWN MAY BE UTILIZED ON PROJECT.

DEVICE MOUNTING NOTES:

1. VISUAL UNIT
   DEVICE BOTTOM 80" ABOVE HIGHEST FLOOR LEVEL OR TOP 6" BELOW CEILING; WHICHEVER IS LOWER, OR ON CEILING.
2. AUDIO UNIT
   DEVICE BOTTOM 80" ABOVE HIGHEST FLOOR LEVEL OR TOP 6" BELOW CEILING; WHICHEVER IS LOWER.
3. AUDIO/VISUAL UNIT
   DEVICE BOTTOM 80" ABOVE HIGHEST FLOOR LEVEL OR TOP 6" BELOW CEILING; WHICHEVER IS LOWER, OR ON CEILING.
4. PULL STATION
   HIGHEST OPERABLE PART SHALL NOT BE MORE THAN 48" ABOVE THE FLOOR.

1 ELECTRICAL DEVICE MOUNTING HEIGHTS
NO SCALE

FIRE ALARM WIRE LIST

H	AUDIBLE AND VISUAL CIRCUIT – 2 CONDUCTOR 14 AWG SOLID NON-PLENUM RATED: FPLR BELDEN 5120UL AREA=0.0356 SQ. INCH.	CONDUIT ONLY: THHN (2) #14 AWG (RED/BLACK) AREA=0.0097 SQ. INCH (EACH)
K	REMOTE TEXT SWITCH/LED CIRCUIT – (2) 2 CONDUCTOR 18 AWG SOLID NON-PLENUM RATED: FPLR BELDEN 5320UL AREA = 0.0179 SQ. INCH	CONDUIT ONLY: THHN (2) #8 AWG (PINK/BROWN) (2) #18 AWG (WHITE/ORANGE) AREA = 0.0055 SQ. INCH (EACH)
M	SLC CIRCUIT – 1 PAIR 16 AWG SOLID UNSHIELDED. NON-PLENUM RATED: FPLR BELDEN 5320UL AREA = 0.0179 SQ. INCH.	CONDUIT ONLY: TFFN (2) #16 AWG (YELLOW/BLUE) AREA=0.0055 SQ. INCH (EACH)
P	SLC POWER CIRCUIT – 2 CONDUCTOR 14 AWG SOLID NON-PLENUM RATED: FPLR BELDEN 5120UL AREA = 0.0356 SQ. INCH	CONDUIT ONLY: THHN (2) #14 AWG (YELLOW/BLUE) AREA=0.0097 SQ. INCH (EACH)
R	RELAY CIRCUIT – 2 CONDUCTOR 14 AWG SOLID NON-PLENUM RATED: FPLR BELDEN 5120UL AREA = 0.0356 SQ. INCH	CONDUIT ONLY: THHN (2) #14 AWG (YELLOW/BLUE) AREA=0.0097 SQ. INCH (EACH)
C	ANNUNCIATOR COMMUNICATION – 2 CONDUCTOR 16 TWISTED AND SHIELDED NON-PLENUM RATED: FPLR BELDEN 5200FE DIAMETER: 0.184 INCH AREA = 0.0266 SQ. INCH	

CONDUIT SIZE	CONDUCTOR AREA	CONDUIT SIZE	CONDUCTOR AREA
1/2" 3/4" 1"	0.12 SQ INCH.* 0.21 SQ INCH.* 0.34 SQ INCH.*	1 1/4" 1 1/2" 2"	0.60 SQ INCH.* 0.82 SQ INCH.* 1.34 SQ INCH.*

* 40% FILL PER N.E.C.

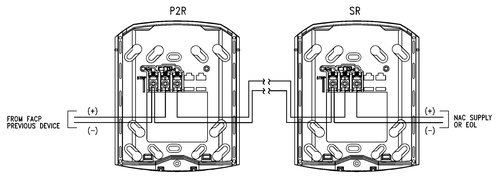
THE CABLE SPECIFIED HERE ARE FOR REFERENCE OF REQUIRED ELECTRICAL CHARACTERISTICS AS WELL AS CODE REQUIREMENTS. ALTERNATE SUPPLIERS MAY BE SUBSTITUTED PROVIDED EQUIVALENT CHARACTERISTICS ARE MAINTAINED. ITEMS SUCH AS CAPACITANCE BETWEEN CONDUCTORS AND WIRE GAUGE CAN BE CRUCIAL TO BE CIRCUIT DESIGN OF THIS SYSTEM INSTALLATION.

NOTE: EQUIVALENT CABLES BY WEST PENN. ALL CONDUCTORS AND CABLES SHALL BE IN CONDUIT.

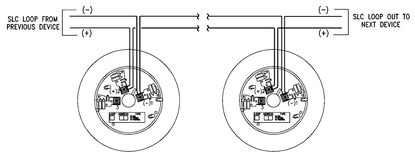
NFPA SYMBOLS LEGEND		MANUFACTURER	MODEL NUMBER
S	SMOKE DETECTOR	NOTIFIER	FSP-851
H	HEAT DETECTOR	NOTIFIER	FSP-851
RS	DUCT DETECTOR	NOTIFIER	DNR & FCM-1 & R10E
M	ADDRESSABLE MANUAL PULL STATION	NOTIFIER	NBG-12LX
B	BEAM DETECTOR (TRANSMITTER OR RECEIVER)	BOSCH	D296 & FWM-101
WF	WATERFLOW SWITCH	NOTIFIER	FWM-101
TV	TAMPER SWITCH ON VALVE	NOTIFIER	FWM-101
PS	LOW AIR PRESSURE SWITCH	NOTIFIER	FWM-101
15	A/V (WALL MOUNTED) 24 VDC 15 CANDELA	NOTIFIER	P2R
HORN	FIRE ALARM HORN	NOTIFIER	
110	A/V (CEILING MOUNTED) 24 VDC 110 CANDELA	NOTIFIER	PC2R
30	STROBE 24 VDC 30 CANDELA, ADDRESS: "Y1-3"	NOTIFIER	SR
FCP	FIRE ALARM CONTROL PANEL	NOTIFIER	NFS-320 OR NFS-640
FAA	FIRE ALARM ANNUNCIATOR	NOTIFIER	FDU-80
IAM R	RELAY IAM	NOTIFIER	FRM-1
EOL	END OF LINE RESISTOR		
T	TAMPER SWITCH		
TS	KEYED TEST SWITCH	NOTIFIER	RTS151KEX
I	ADDRESSABLE INPUT MODULE	NOTIFIER	
R	ADDRESSABLE RELAY – EITHER CONTROL OR MONITOR	NOTIFIER	
DH	DOOR HOLD OPEN DEVICE	NOTIFIER	

* ALL SYMBOLS SHOWN ABOVE MAY NOT APPEAR ON PLANS

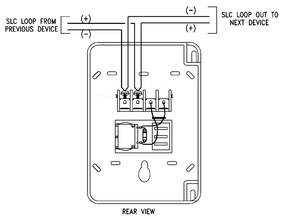
NOTE: REFER TO DEVICE MOUNTING HEIGHT DETAIL FOR MOUNTING REQUIREMENTS.



NOTIFICATION CIRCUIT WIRING DETAIL

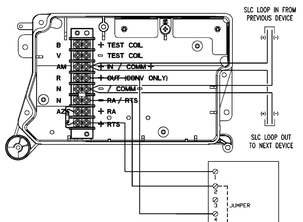


FSP-851 OR FST-851



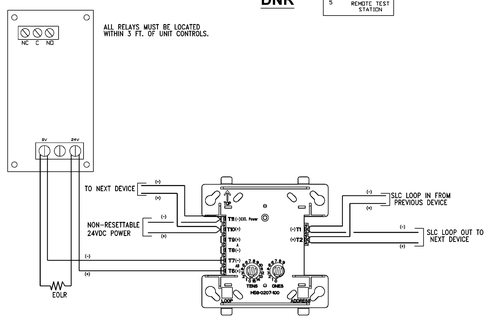
NOTE:
THE NOT-BG12LX CAN BE FLUSH MOUNTED ON A SINGLE GANG DEEP BOX OR CAN BE SURFACE MOUNTED ON A NOTIFIER SB-10 BOX.

NBG-12LX



RELAY

DNR



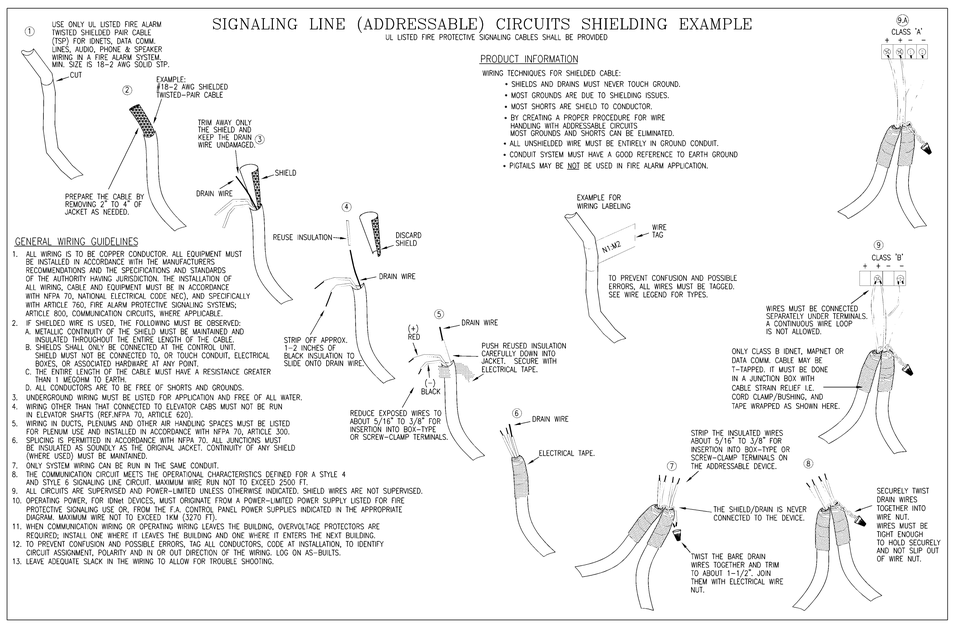
FCM-1

DUCT DETECTOR ASSEMBLY (TYP.)

FIRE ALARM SYSTEM INPUT/OUTPUT MATRIX	A	B	C	D	E	F	G	H	I	J	K	L
SYSTEM – INPUTS	ACTUATE COMMON VISUAL ALARM SIGNAL INDICATOR AT FCP	ACTUATE COMMON AUDIBLE ALARM SIGNAL AT FCP	ACTUATE COMMON TROUBLE SIGNAL AT FCP	ACTUATE COMMON SUPERVISORY SIGNAL AT FCP	ACTUATE ZONE/DEVICE APPLIANCES	TRANSMIT ALARM SIGNALS TO NETWORK WORKSTATIONS	TRANSMIT SUPERVISORY SIGNALS TO NETWORK WORKSTATIONS	TRANSMIT TROUBLE SIGNALS TO NETWORK WORKSTATIONS	SHUT DOWN ALL AUDIBLE NOTIFICATION APPLIANCES	SHUT DOWN ASSOCIATED A/V		
MANUAL PULL STATION	●	●					●	●			●	
SMOKE DETECTOR	●	●					●	●			●	
HEAT DETECTOR	●	●					●	●			●	
DUCT DETECTOR			●	●					●			●
SPRINKLER SYSTEM FLOOR	●	●					●	●			●	
SPRINKLER SYSTEM TAMPER					●	●				●		
FIRE ALARM AC POWER FAILURE					●	●				●		
FIRE ALARM SYSTEM LOW BATTERY					●	●				●		
OPEN CIRCUIT					●	●				●		
GROUND CIRCUIT					●	●				●		
SHORT CIRCUIT					●	●				●		

● PERFORM OPERATION/REPORT DEVICE STATUS

SIGNALING LINE (ADDRESSABLE) CIRCUITS SHIELDING EXAMPLE
UL LISTED FIRE PROTECTIVE SIGNALING CABLES SHALL BE PROVIDED



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HTK ARCHITECTS
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TOPEKA, KANSAS 66612-1216
TELEPHONE 785-296-8899
FAX 785-296-3456

DATE:
- 2-9-15

REVISED DATE:
- 12-18-14
- 2-9-15

HTK PROJECT NUMBER:
- 1410.03

STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 3-9-15	DRAWN BY: CAD	CHECKED BY: WRB	REV: WRB

FIRE ALARM - DETAILS AND SCHEDULES

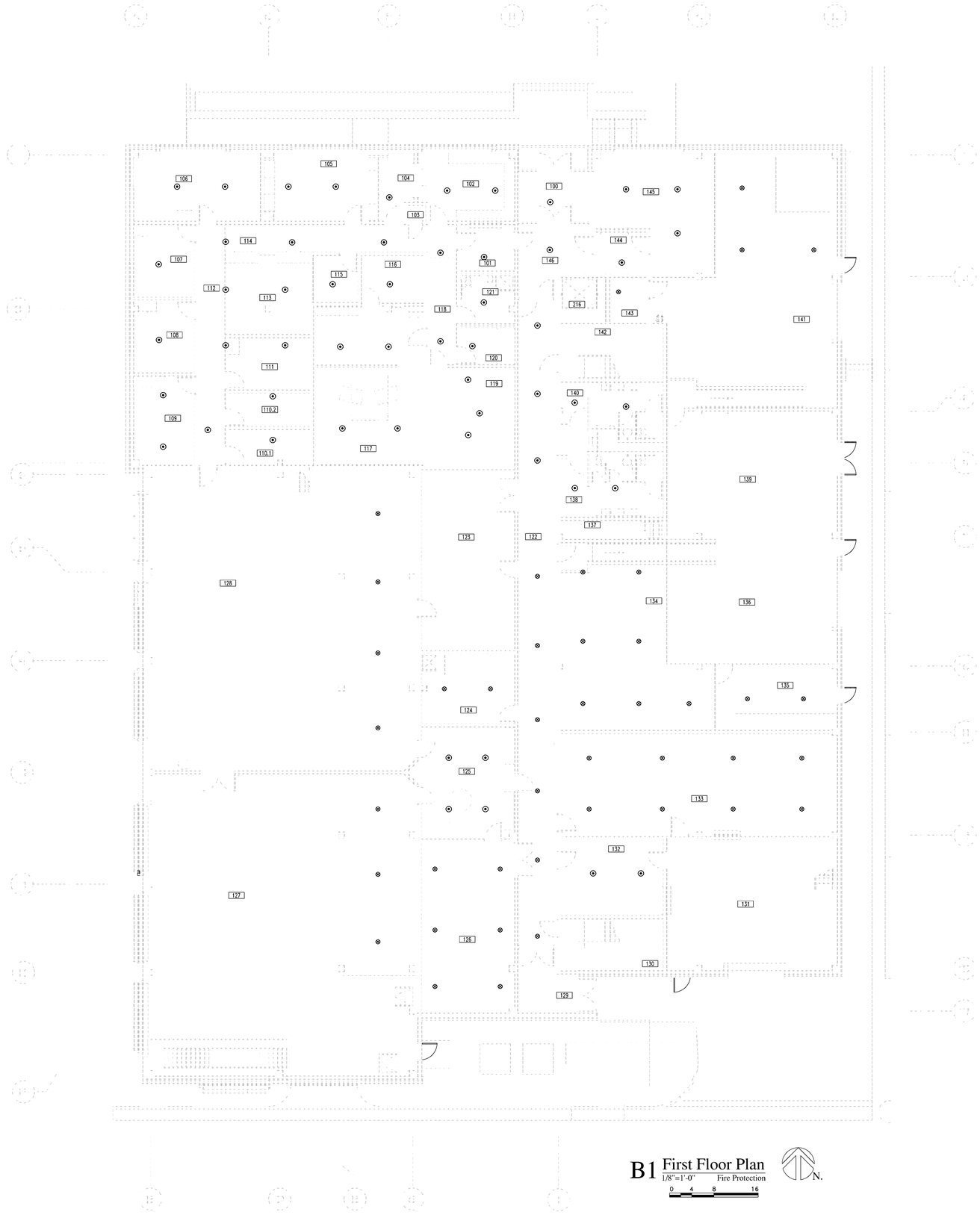
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EY201

DESIGN DEVELOPMENT PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A155

... FA201.dwg 86 02/25/15 EJS



B1 First Floor Plan
1/8"=1'-0" Fire Protection

0 4 8 16

N.

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-
-

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STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DATE: 3-9-15 DRAWN BY: CAD CHECKED BY: WRB REV: WRB

FIRST FLOOR
PLAN - FIRE
PROTECTION

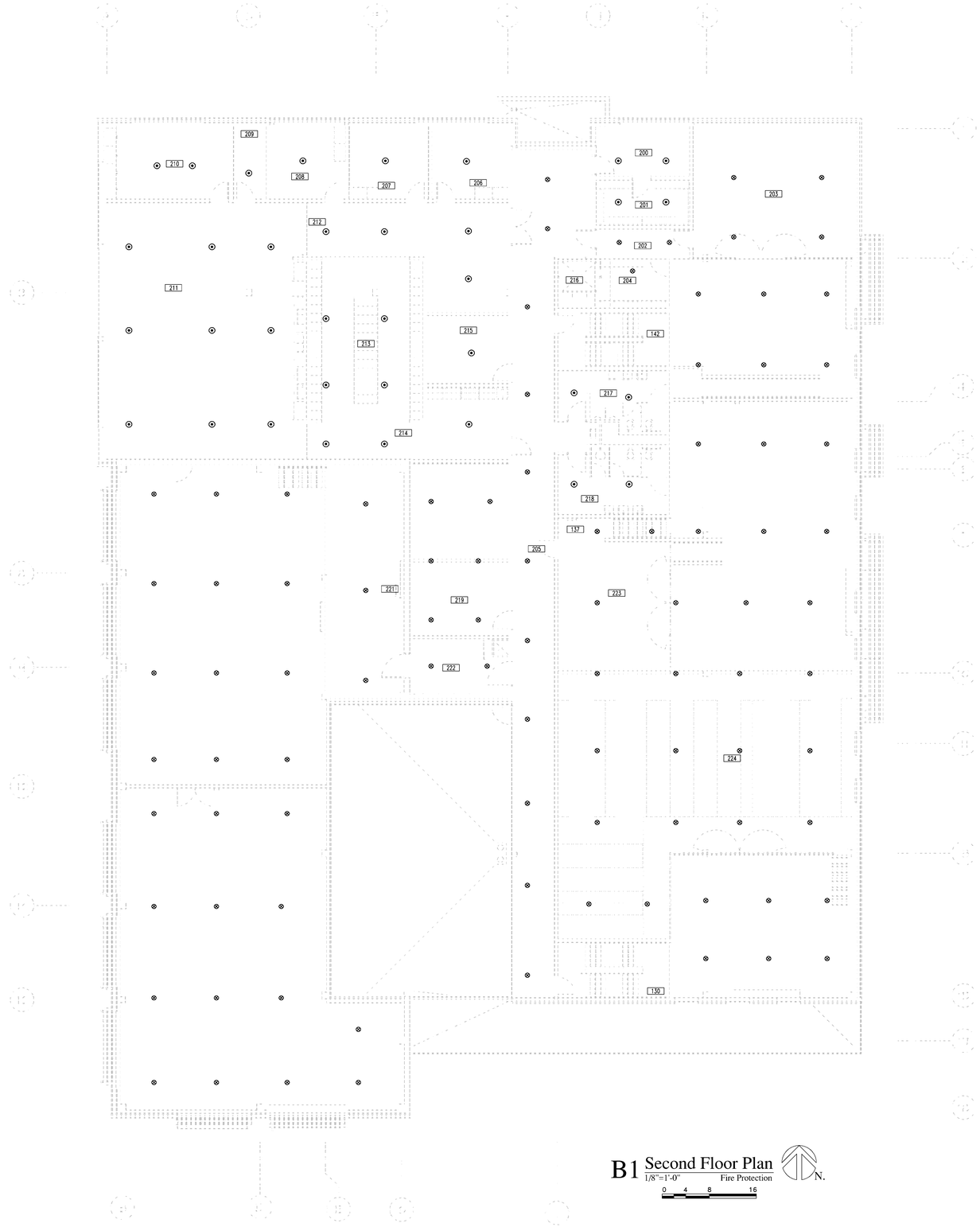
A-012651

FH101

DESIGN DEVELOPMENT
PHASE DOCUMENTS

JCSBC
2-2-2016
Att.9A156

... FH101.dwg 04 03/09/15 CJD



B1 Second Floor Plan
1/8"=1'-0" Fire Protection

0 4 8 16

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LSA PROJECT NO. 1402032

HTK ARCHITECTS

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DEPARTMENT OF ADMINISTRATION
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STATE OF KANSAS
STATE OF KANSAS ENERGY & SERVICES FACILITY
Seventh & Van Buren Street, Topeka, Kansas
BUILDING NUMBER ???

DRAWN BY: CAD CHECKED BY: WRB REV: WRB
DATE: 3-9-15

SECOND FLOOR
PLAN - FIRE
PROTECTION

A-012651

FH102

DESIGN DEVELOPMENT
PHASE DOCUMENTS

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2-2-2016
Att.9A157

STATE OF KANSAS
BID & CONSTRUCTION DOCUMENTS

STATE OF KANSAS

ENERGY & SERVICE CENTER

BUILDING NO.: 17300-00038

TOPEKA, KANSAS
CCR# A-012651

MARCH 10, 2015
60% COMPLETION CONSTRUCTION SPECIFICATIONS

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES AND PROCUREMENT MANAGEMENT

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Phone: 785-266-5373
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HTK Project No. 1410.03

HTK ARCHITECTS PA

JCSBC
2-2-2016
Att.9A158

BIDDING REQUIREMENTS, CONTRACT AND BOND FORMS, AND CONDITIONS OF THE CONTRACT

	STATEMENT OF RESPONSIBILITY
DOCUMENT A	NOTICE TO BIDDERS
DOCUMENT B	INSTRUCTIONS TO BIDDERS
DOCUMENT C	FORM OF BID
DOCUMENT D	GENERAL CONDITIONS OF THE CONTRACT
DOCUMENT E	SUPPLEMENTAL GENERAL CONDIDTIONS
DOCUMENT F	FORM OF CONTRACT
DOCUMENT G	FORM OF PERFORMANCE BOND
DOCUMENT H	FORM OF PUBLIC WORKS BOND
DOCUMENT I	FORM OF APPOINTMENT OF SERVICE AGENT

SPECIFICATIONS

DIVISION 1: GENERAL REQUIREMENTS

SECTION 010000- STATE OF KANSAS REQUIREMENTS
SECTION 011000- SUMMARY OF WORK

1. Work Covered by Contract documents: Building, Site Improvements; Site Utilities, Landscaping.
2. Contract: Single, fixed-price Contract
3. Works by Others
4. Access to Site
5. On-site Parking
6. Storage
7. Protection of existing utilities.
8. Beneficial occupancy by Owner.
9. Work Sequence

10. Use of Premises
11. Adjacent Site Condition Survey
12. Use and Occupancy of Work Prior to Acceptance by Owner.
13. Owner-Furnished Products

SECTION 012100- ALLOWANCES

1. Related Documents
2. Summary
3. Selection and Purchase
4. Submittals
5. Unused Materials
6. Examination
7. Preparation
8. Schedule of Allowances

SECTION 012200- UNIT PRICES

9. Related Documents
10. Summary
11. Selection and Purchase
12. Submittals
13. Unused Materials
14. Examination
15. Preparation
16. Schedule of Unit Prices

SECTION 012300- ALTERNATES

1. Related Documents
2. Summary
3. Definitions
4. Procedures
5. Schedule of Alternates

SECTION 013100- PROJECT MANAGEMENT AND COORDINATION

1. Related Documents
2. Summary
3. Coordination
4. General Coordination Provisions
5. Pre-construction Conference
6. Site Mobilization Conference
7. Pre-installation Conference
8. Progress Meetings

SECTION 013200- CONSTRUCTION PROGRESS DOCUMENTATION

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Submittal Schedules
6. Construction Schedules

SECTION 013300- SUBMITTAL PROCEEDURES

1. Related Documents
2. Summary

3. Submittal Procedures
4. Real Property Capitalization Form
5. Request for Information
6. Construction Progress Schedule
7. Contractor- Prepared Network Analysis System
8. Submittal Schedule
9. Shop Drawings
10. Product Data
11. Samples
12. Contracting Officer's Action

SECTION 013543- ENVIRONMENTAL MANAGEMENT SYSTEMS

1. Summary
2. Related Sections
3. References
4. Program Description
5. Contractural Assent

SECTION 014000- QUALITY REQUIREMENTS

1. Related Documents
2. Summary
3. Responsibilities
4. Submittals
5. Quality Assurance
6. Repair and Protection

SECTION 014200- REFERENCES

1. Related Documents
2. Definitions
3. Industry Standards
4. References
5. Governing Regulations

SECTION 015000- TEMPORARY FACILTIES AND CONTROLS

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Project Conditions
6. Materials
7. Equipment
8. Installation
9. Temporary Utility Installation
10. Support Facilities Installation
11. Security and Protection Installation
12. Roads and Parking
13. Operation, Termination & Removal

SECTION 016000- PRODUCT REQUIREMENTS

1. Related Documents
2. Summary
3. Definitions
4. Submittals

5. Substitutions
6. Quality Assurance
7. Product Delivery, Storage & Handling
8. Product Selection
9. Installation of Product

SECTION 017300- EXECUTION

7. Related Documents
8. Summary
9. Quality Assurance
10. Examination
11. Preparation
12. Construction Layout
13. Field Engineering
14. Installation
15. Owner-Installed Products
16. Progress Cleaning
17. Starting and Adjusting
18. Protection of Installed Construction
19. Correction of the Work

SECTION 017329- CUTTING AND PATCHING

20. Related Documents
21. Summary
22. Quality Assurance
23. Materials, General

24. Inspection
25. Preparation
26. Performance

SECTION 017419- CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

SECTION 017700- CLOSEOUT PROCEEDURES

1. Related Documents
2. Summary
3. Substantial Completion
4. Inspection Procedures
5. Project Final Acceptance
6. Record Document Submittals at Substantial Completion
7. Close Out Procedures
8. Final Cleaning at each Phase of Construction

SECTION 017823- OPERATION AND MAINTENANCE DATA

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Coordination
6. Operation and Maintenance Documentation Directory
7. Manuals
8. Manual Preparation

SECTION 017839- PROJECT RECORD DOCUMENTS

1. Related Documents
2. Summary
3. Submittals
4. Record Drawings
5. Record Product Data
6. Recording and Maintenance

SECTION 017900- DEMONSTRATION AND TRAINING

1. Related Documents
2. Summary
3. Submittals
4. Coordination
5. Instruction Program
6. Demonstration and Training Videos

SECTION 018113- SUSTAINABLE DESIGN REQUIREMENTS (To be provided at a later date)

SECTION 019113- GENERAL COMMISSIONING REQUIREMENTS (To be provided at a later date)

DIVISION 2: EXISTING CONDITIONS

SECTION 024119- SELECTIVE DEMOLITION

1. Related Documents
2. Summary
3. Definitions
4. Material Owernership
5. Submittals
6. Quality Assurance

7. Project Conditions
8. Examination
9. Utility Services and Mechanical/ Electrical Systems
10. Preparation
11. Selective Demolition, General
12. Selective Demolition Procedures for Specific Materials
13. Disposal of Demolished Materials
14. Clearing

DIVISION 3: CONCRETE

SECTION 033000- CAST-IN PLACE CONCRETE

1. Related Documents
2. Standards
3. Description of Work
4. Qualifications
5. Quality Control
6. Pre-installation Conferences
7. Submittals
8. Provision for Other Work
9. Concrete Materials
    a. Portland Cement: ASTM C 150, Type I or Type III, or ASTM C 1157, Type GU or HE unless otherwise approved by the Architect/Engineer.
    b. Fly Ash: ASTM C 618, Class C or F.
    c. Ground Granulated Blast-Furnace Slag Cement: ASTM C989, Grade 100 or 120 or ASTM C 595, Type IS or Type S.
    d. Normal Weight Aggregates: ASTM C33, and as herein specified. Submit material certificates certifying conformance to this specification for each source of aggregate.
    e. Water: Clean, fresh, drinkable, free of oils, acids or organic matter harmful to concrete.
    f. Air-Entraining Admixture: ASTM C260. Provide air entrainment as specified in Table 4.2.1.of ACI 318-99 in all concrete exposed to freezing and thawing. Interior steel troweled surfaces subjected to vehicular traffic shall not have more than 3% entrained air. Surfaces scheduled to receive hardeners shall not have more than 3% entrained air.

g. Water-Reducing Admixture: ASTM C494, Type A
h. Mid-Range Water-Reducing Admixture: ASTM C494, Type A and Type F.
i. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G.
j. Water-Reducing, Accelerator Admixture (Non-Corrosive, Non-Chloride): ASTM C494, Type C or E.
k. Water-Reducing, Retarding Admixture: ASTM C 494, Type D
l. Calcium Chloride and Chloride Ion Content:
    i. Calcium chloride or admixtures containing more than 0.5% chloride ions by weight of the admixture are not permitted.
    ii. The maximum water soluble chloride ion concentration in hardened concrete at ages from 28 to 42 days contributed from all ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits specified in ACI 318-99 Table 4.4.1. Water-soluble chloride ion tests shall conform to ASTM C1218.
m. Certification: Written conformance to all the above mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of mix design review by the Engineer.

10. Reinforcing Materials
    a. ASTM A 615 Grade 60.
    b. Deformed bar anchors ASTM A 496.
    c. Welded Wire Fabric ASTM A 185.
    d. Joint Dowel Bars ASTM A 615 Grade 40 or A36.

11. Related Materials
    a. Moisture Retarder: Provide moisture retarder cover chosen from products specified below over prepared base material where indicated.
    b. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
    c. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171:
        i. Waterproof paper.
        ii. Polyethylene film.
        iii. Polyethylene-coated burlap.
    d. Liquid Membrane-Forming Curing and Curing and Sealing Compounds
    e. Chemical Curing/Floor Hardener Compound: Sodium silicate based compound which reacts with concrete constituents to harden the surface, resulting in a surface having a maximum abrasion coefficient of 0.25 cm3/cm2 when tested in accordance with ASTM C 418.
    f. Evaporation Control: Monomolecular film forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss in hot weather conditions
    g. Epoxy Products: Two component material suitable for use on dry or damp surface, complying with ASTM C 881, for use in all structural concrete repairs.
    h. Expansion Bolts in Concrete
    i. Anchor Rods F1554 Grade 55 with Supplement S1.
    j. Contraction and Construction Joint-Filler Material for Slabs-on-Grade: Provide a 2-component semi-rigid, 100% solids epoxy having a minimum shore A hardness of 75 when tested in accordance with ASTM D2240.
    k. Bondbreaker for Construction Joints in Slabs-on-Grade: A dissipating bondbreaking

compound containing no silicones, resins, or waxes, and that conforms to ASTM C309

l. Joint-Filler Strips for Isolation Joints in Slabs-on-Grade: ASTM D1751, asphalt-saturated cellulosic fiber, or ASTM D1752, cork or self-expanding cork.

12. Proportioning and Design of Concrete Mixes

13. Concrete Mixes
    a. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, "Ready Mixed Concrete" and Testing Laboratory section of the specifications.

14. Slump Limit

15. Moisture Retarder Installation

16. Joints in Concrete

17. Installation of Embedded Items

18. Concrete Placement

19. Finish of formed Surfaces

20. Monolithic Slab Finishes

21. Concrete Finish Measurements and Tolerances

22. Concrete Curing and Protection

23. Hot or Other Adverse Weather Concreting

24. Cold or Other Adverse Weather Concreting

25. Miscellaneous Concrete Items

26. Concrete Surface Repairs

27. Quality Control Testing during Construction

28. Investigation of Low Concrete Strength Test Results

DIVISION 4: MASONRY

SECTION 042000- UNIT MASONRY

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Concrete Masonry Units
    a. Concrete Masonry Units: ASTM C 90 and as follows:
        a. Weight Classification: Lightweight, unless otherwise indicated.
        b. Provide Type I, moisture-controlled units.
        c. Size (Width): Manufactured to the following dimensions:
            1. 6 inches (152 mm) nominal; 5-5/8 inches (143 mm) actual.
            2. 8 inches (203 mm) nominal; 7-5/8 inches (194 mm) actual.
        d. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

9. Brick
    a. Face Brick: ASTM C 216, Grade SW, Type FBX
        a. Initial Rate of Absorption: Less than 20 g/30 sq. in. (20 g/194 sq. cm) per minute when tested per ASTM C 67.
        b. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
        c. Size: Manufactured to the following actual dimensions:
            1. Modular: 3-1/2 to 3-5/8 inches (89 to 92 mm) wide by 2-1/4 inches (57 mm) high by 7-1/2 to 7-5/8 inches (190 to 194 mm) long.
        d. Provide face brick with color, texture, and size as selected by the architect.
            1. Cloud Ceramics
            2. Endicott
            3. Acme Brick

        e. Rick Pattern: Running Bond.

10. Mortar and Grout Materials
    a. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
    b. Hydrated Lime: ASTM C 207, Type S.
    c. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
    d. Mortar Cement: ASTM C 1329.
    e. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
    f. Aggregate for Grout: ASTM C 404.
    g. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.
    h. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.

i. Water: Potable.

11. Reinforcing Steel
    a. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60 (Grade 400).
    b. Epoxy-Coated Reinforcing Steel: ASTM A 615/A 615M, Grade 60 (Grade 400); epoxy coated to comply with ASTM A 775/A 775M.

12. Masonry Joint Reinforcement
    a. General: ASTM A 951 and as follows:
        a. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
        b. Wire Size for Side Rods: W2.8 or 0.188-inch (4.8-mm) diameter.
        c. Wire Size for Side Rods: W2.8 or 0.188-inch (4.8-mm) diameter.
        d. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units where indicated.
    b. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches (407 mm) o.c.

13. Ties and Anchors, General
    a. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
    b. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating
    c. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180), commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.
    d. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.
    e. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

14. Bent Wire Ties
    a. General: Rectangular units with closed ends and not less than 4 inches (100 mm) wide. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches (50 mm) long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.
    b. Wire: Fabricate from 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire.

15. Adjustable Anchors for Connecting to Steel Frame
    a. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
        a. Anchor Section: Crimped 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire anchor section for welding to steel.
        b. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.25-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire.

16. Rigid Anchors
    a. General: Fabricate from steel bars as follows:
        a. 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
        b. Finish: Hot-dip galvanized to comply with ASTM A 153.

17. Adjustable Masonry-Veneer Anchors
    a. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
        a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
    b. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
        a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
        b. Wire Tie Section: Triangular- shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face
        c. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0966-inch- (2.5-mm-) thick, steel sheet, galvanized after fabrication.
        d. Fabricate wire tie sections from 0.25-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire.
    c. Products: Subject to compliance with requirements, provide one of the following:
        a. Screw-Attached, Masonry-Veneer Anchors:
            1. D/A 213; Dur-O-Wal, Inc

18. Miscellaneous Anchors
    a. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations
        a. Headed bolts.
        b. Nonheaded bolts, bent in manner indicated.
    b. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
        a. Type: Expansion anchors.
        b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
        c. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
        d. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

19. Embedded Flashing Materials
    a. For flashing not exposed to the exterior, use the following, unless otherwise indicated:
        a. Rubberized-Asphalt Flashing: Manufacturer's standard composite flashing product consisting of a pliable and highly adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of 0.040 inch (1.0 mm).
    b. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.

c. Products: Subject to compliance with requirements, provide one of the following:
    a. Rubberized-Asphalt Flashing:
        1. Dur-O-Barrier; Dur-O-Wal, Inc
        2. Perm-A-Barrier Wall Flashing; W. R. Grace & Co., Construction Products Division.
        3. Textroflash; Hohmann & Barnard, Inc.

20. Miscellaneous Masonry Accessories
    a. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.
    b. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
        a. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.
        b. PVC: ASTM D 2287, Type PVC-65406.
    c. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
    d. Wicking Material: Cotton or polyester rope, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity between wythes.
    e. Cavity Drainage Material: 2-inch- (50-mm-) thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
    f. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.187-inch (4.8-mm) steel wire, hot-dip galvanized after fabrication.
        a. Provide units with either two loops or four loops as needed for number of bars indicated.
    g. Termination Bar: Stainless steel units with pre-punched holes at 16” o.c. designed to secure flashing to back-up material.
    h. Products: Subject to compliance with requirements, provide one of the following:
        a. Cavity Drainage Material:
            1. Mortar Break; Advanced Building Products, Inc.
            2. Mortar Net; Mortar Net USA, Ltd.
            3. Mortar Stop; Polytite Manufacturing Corp.
        b. Reinforcing Bar Positioners:
            1. D/A 811; Dur-O-Wal, Inc.
            2. D/A 816; Dur-O-Wal, Inc.
            3. No. 376 Rebar Positioner; Heckman Building Products, Inc.
        c. Termination Bars:
            1. T2, 22 gauge; Hohmann & Barnard, Inc.

21. Masonry Cleaners
    a. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) of water.

22. Mortar and Grout Mixes
    a. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other

admixtures, unless otherwise indicated.
   a. Do not use calcium chloride in mortar or grout.
   b. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.

b. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

c. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
   a. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
   b. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
   c. For masonry below grade, in contact with earth, and where indicated, use Type S.
   d. For reinforced masonry and where indicated, use Type S.
   e. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

23. Examination

24. Installation, General

25. Construction Tolerances

26. Laying Masonry Walls

27. Mortar Bedding and Jointing

28. Bonding of Multi-wythe Masonry

29. Cavities

30. Masonry Joint Reinforcement

31. Anchoring Masonry to Structural Members

32. Anchoring Masonry Veneers

33. Control and Expansion Joints

34. Lintels

35. Flashing, Weep Holes & Vents

36. Reinforced Unit Masonry Installation

37. Field Quality Control

38. Repairing, Pointing & Cleaning

39. Masonry Waste Disposal

SECTION 044300 - STONE MASONRY

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

2. SUMMARY
   a. Section includes the following applications of stone masonry:
      1. Anchored to concrete backup.
      2. Anchored to unit masonry backup.
      3. Anchored to cold-formed metal framing and sheathing.
      4. Adhered to non-load bearing metal framing and sheathing.
   b. Related Sections:
      1. Division 03 Section "Cast-in-Place Concrete" for dovetail slots in concrete for anchoring stone.
      2. Division 04 Section "Unit Masonry" for concealed flashing, horizontal joint reinforcement and veneer anchors.
      3. Division 04 Section "Exterior Stone Cladding" for descriptions of stone types required by this Section.
      4. Division 07 Section "Thermal Insulation" for materials and installation methods for insulation installed in association with stone walls.
      5. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
   c. Products installed, but not furnished, in this Section include:
      1. Steel lintels for stone masonry specified in Division 05 Section "Metal Fabrications."

3. SUBMITTALS
   a. Product Data: For each type of product indicated.
      1. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties specified or required by referenced ASTM standards.
   b. Samples for Initial Selection: For colored mortar and other items involving color selection.
   c. Samples for Verification:
      1. For each stone type indicated. Include at least three samples in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work.
      2. For each color of mortar required.
   d. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, sources of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.
      1. Submittal is for information only. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
   e. Qualification Data: For qualified Installer.

4. QUALITY ASSURANCE
   a. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.
   b. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from one quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.
   c. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
   d. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
      1. Build mockup of typical wall area as shown on Drawings.
      2. Build mockups for typical exterior wall in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup wythes and accessories.
         a. Include stone coping at top of mockup.
         b. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
         c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit stone masonry above half of flashing).
         d. Include metal studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
      3. Protect accepted mockups from the elements with weather-resistant membrane.
      4. Approval of mockups is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.
         a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing.
         b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
      5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
   e. Preinstallation Conference: Conduct conference at Project site.

5. DELIVERY, STORAGE, AND HANDLING
   a. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
   b. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
   c. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
   d. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

6. PROJECT CONDITIONS

a. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
b. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.
   1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
c. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
d. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

7. COORDINATION
   a. Advise installers of other work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.

8. STONE
   a. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with Division 04 Section "Exterior Stone Cladding."

9 LIMESTONE
   a. Limestone: Comply with ASTM C 568.
      1. Products: Subject to compliance with requirements, provide one of the following:
         a. U.S.Stone,LLC, Prairie Village, Kansas.
         b. HJ Born Stone Co., Arkansas City, Kansas
      2. Products: Oolitic limestone.
      3. Classification: II Medium-Density.
      4. Description: Oolitic limestone.
   b. Stone Type: Bottom ledge Cottonwood to match existing.

10. MORTAR MATERIALS
   a. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
      1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
   b. Hydrated Lime: ASTM C 207, Type S.
   c. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Essroc, Italcementi Group; Capitol PCL Blend.
   b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
   c. Lafarge North America; Eaglebond.
   d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

d. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Davis Colors; True Tone Mortar Colors.
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors; SGS Mortar Colors.

e. Aggregate: ASTM C 144 and as follows:
   1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
   2. White Aggregates: Natural white sand or ground white stone.
   3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
      a. Match Architect's sample.

f. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Euclid Chemical Company (The); Accelguard 80.
      b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
      c. Sonneborn, Div. of Degussa Building Systems; Trimix-NCA.

g. Water: Potable.

11. VENEER ANCHORS
   a. Materials:
      1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
      2. Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.
      3. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
   b. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches (38 mm), through stone masonry and with at least 5/8-inch (16-mm) cover on outside face.
   c. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch- (3.8-mm-) diameter, stainless-steel wire.
      1. Ties are bent in the form of loops with legs not less than 15 inches (381 mm) in length and with last 2 inches (50 mm) bent at 90 degrees.
      2. Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement specified in Division 04 Section "Unit Masonry."
      3. Ties are bent in the form of triangular loops designed to be attached to masonry joint reinforcement specified in Division 04 Section "Unit Masonry" with vertical wires passing through ties and through eyes projecting from masonry joint reinforcement.

d. Corrugated-Metal Veneer Anchors: Not less than 0.030-inch- (0.76-mm-) thick by 7/8-inch- (22-mm-) wide stainless-steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch (7.6 to 13 mm) and an amplitude of 0.06 to 0.10 inch (1.5 to 2.5 mm).

e. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dur-O-Wal, a Dayton Superior Company; D/A 213.
   b. Heckmann Building Products Inc.; 315-D with 316.
   c. Hohmann & Barnard, Inc.; DW-10.
   d. Wire-Bond; 1004, Type III.
2. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
3. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit veneer anchor section.
4. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from [0.188-inch- (4.8-mm-)] [0.25-inch- (6.4-mm-)] diameter, stainless-steel wire.

f. Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint, complying with the following requirements:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dur-O-Wal, a Dayton Superior Company; D/A 213S.
   b. Hohmann & Barnard, Inc.; DW-10-X-Seismiclip.
   c. Wire-Bond; RJ-711 with Wire-Bond Clip.
2. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
3. Fabricate wire connector sections from [0.188-inch- (4.8-mm-)] [0.25-inch- (6.4-mm-)] diameter, stainless-steel wire.
4. Continuous Wire: 0.188-inch- (4.8-mm-) diameter, stainless-steel wire.

g. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm diameter) by length required to penetrate steel stud flange with not less than three exposed threads.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dur-O-Wal, a Dayton Superior Company; Stainless Steel SX Fastener.
   b. ITW Buildex; Scots Long Life Teks.

h. Polymer-Coated, Steel Tapping Screws for Concrete Masonry: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16-inch (4.8-mm) diameter by 1-1/2-inch (38-mm) length, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ITW-Buildex; Tapcon.
   b. Powers Fasteners; Tapper.

12. STONE TRIM ANCHORS

a. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Halfen Anchoring Systems; Meadow Burke.
      b. Heckmann Building Products Inc.
      c. Hohmann & Barnard, Inc.

b. Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.

c. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 1 (A1).

d. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: Chemical anchors, torque-controlled expansion anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

13. MISCELLANEOUS MASONRY ACCESSORIES

a. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

b. Weep Hole/Vent Products: Use one of the following unless otherwise indicated:
   1. Wicking Material: Absorbent rope, made from cotton, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity behind stone masonry. Use only for weep holes.
   2. Mesh Weep Holes/Vents: Free-draining mesh; made from polyethylene strands, full width of head joint and 2 inches (50 mm) high by thickness of stone masonry; in color selected from manufacturer's standard.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) CavClear/Archovations, Inc.; CavClear Weep Vents.
         2) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

c. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
   1. Provide one of the following configurations:
      a. Strips, full-depth of cavity and 10 inches (250 mm) wide, with dovetail shaped notches 7 inches (175 mm) deep that prevent mesh from being clogged with mortar droppings.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Advanced Building Products Inc.
      b. CavClear/Archovations, Inc.
      c. Dur-O-Wal, a Dayton Superior Company.
      d. Mortar Net USA, Ltd.; Mortar Net.

d. Expanded Metal Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m), self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60 (Z180).

14. MASONRY CLEANERS

a. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Diedrich Technologies, Inc.
      b. Dominion Restoration Products.
      c. EaCo Chem, Inc.
      d. Hydrochemical Techniques, Inc.
      e. Prosoco, Inc.

15. MORTAR MIXES
   a. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
      1. Do not use calcium chloride.
      2. Limit cementitious materials in mortar to portland cement and lime.
      3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
      4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
   b. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
   c. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.
      1. Mortar for Setting Stone: Type S.
      2. Mortar for Pointing Stone: Type O.
   d. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
      1. Pigments shall not exceed 10 percent of portland cement by weight.
      2. Mix to match Architect's sample.
   e. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
      1. Mix to match Architect's sample.

16. FABRICATION

17. EXAMINATION

18. PREPARATION

19. SETTING OF STONE MASONRY, GENERAL

20. CONSTRUCTION TOLERANCES

21. INSTALLATION OF ANCHORED STONE MASONRY

22. ADJUSTING AND CLEANING

23. EXCESS MATERIALS AND WASTE

DIVISION 5: METALS

SECTION 051200- STRUCTURAL STEEL FRAMING

1. Related Documents
2. Standards
3. Description of Work
    a. Conform to Section 2.1 of the AISC "Code of Standard Practice for Steel Buildings and Bridges".
4. Quality Assurance
5. Submittals
6. Preconstruction conferences
7. Delivery, Storage & Handling
8. Job Conditions
9. Materials
    a. Structural Steel ASTM A6
    b. Refer to General Notes for Structural Steel Material Requirements.
    c. Primer Paint Class A coating
    d. All steel exposed to the environment or in unheated, unconditioned space shall be Hot-dipped galvanized.
10. Fabrication
11. Welding
    a. Welder certification per AWS required.
    b. Welding procedures
12. Bolting
13. Connections

a. Connections to be designed and detailed by the fabricator's specialty engineer.

14. Surfaced Preparation and Shop Prime Painting

15. Erection

16. Special inspections Required

    a. Welding of structural steel
    b. High-strength Bolting

SECTION 052100- STEEL JOIST FRAMING

1. Related Documents

2. Scope of Work

3. Quality Assurance

    a. Steel Joist Supplier minimum of 2 years related experience.
    b. Per SJI Standard Specifications
    c. Comply with all OSHA Requirements

4. Submittals
    a. Shop Drawings
    b. Design Calculations
    c. Mill Certificates
    d. Certificate of compliance

5. Delivery, Storage & Handling

6. Shop Inspection

7. Materials
    a. Steel: Comply with SJI specifications for chord and web members
    b. Steel Bearing Plates: ASTM A 36
    c. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.
    d. High-Strength Threaded Fasteners: ASTM A 325 heavy hexagon structural bolts with nuts and hardened washers.
    e. Steel Prime Paint: Comply with SJI specifications.
    f. Welding Electrodes: Comply with AWS standards.

8. Fabrication
    a. Bridging: Provide horizontal and/or diagonal bridging for all joists, complying with SJI specifications at a minimum to resist net uplift forces shown on the drawing and special bracing.
    b. Shop Painting: apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not

less than 0.50 mil.

9. Erection

10. Anchoring Joists

11. Attachments to Joists

12. Field Inspection

SECTION 053113- COMPOSITE FLOOR DECK

1. Related Documents

2. Standards

3. Scope of Work

4. Qualifications
    a. Supplier minimum 2-years experience.

5. Quality Assurance
    a. Per Factory Mutual Research Corporation Approval Guide 2006-Building Materials.

6. Submittals
    a. Product certifications
    b. Shop Drawings
    c. Insurance Certification
    d. Welding Certificates.

7. General Requirements
    a. Type VLI.

8. Grades of Steel
    a. ASTM A653 Grades C, D or E. Minimum 33 ksi.

9. Finish
    a. All roof deck shall be galvanized, ASTM A653 G90

10. Floor Deck Accessories

11. Mechanical Fasteners
    a. Powder-Actuated or Pneumatically Driven Pins AISI 1060 or 1061 steel.

12. Side-Lap Fasteners
    a. Corrosion resistant, hexagonal washer head; self drilling, carbon-steel screws, No. 10 minimum diameter.

13. Fabrication

14. Floor Openings

15. Installation
    a. Attach to supported structure per Structural General Notes and Plan notes.

16. Touch-Up Painting

17. Inspection

SECTION 053100- STEEL ROOF DECKING

18. Related Documents

19. Standards

20. Scope of Work

21. Qualifications
    a. Supplier minimum 2-years experience.

22. Quality Assurance
    a. Per Factory Mutual Research Corporation Approval Guide 2006-Building Materials.

23. Submittals
    a. Product certifications
    b. Shop Drawings
    c. Insurance Certification
    d. Welding Certificates.

24. General Requirements
    a. Type B Wide Rib Roof Deck Units per SDI.

25. Grades of Steel
    a. ASTM A653 Grades C, D or E. Minimum 33 ksi.

26. Finish
    a. All roof deck shall be galvanized, ASTM A653 G90

27. Roof Deck Accessories

28. Mechanical Fasteners
    a. Powder-Actuated or Pneumatically Driven Pins AISI 1060 or 1061 steel.

29. Side-Lap Fasteners
    a. Corrosion resistant, hexagonal washer head; self drilling, carbon-steel screws, No. 10 minimum diameter.

30. Fabrication

31. Roof Openings

32. Installation
    a. Attach to supported structure per Structural General Notes and Plan notes.

33. Touch-Up Painting

34. Inspection

SECTION 054000- COLD FORMED METAL FRAMING

1. Related documents

2. Summary
    a. This Section includes the following:.
        i. Ceiling joist framing.
        ii. Exterior non-load-bearing curtain-wall framing

3. Definitions

4. Performance requirements

    a. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing – Header Design."
    b. Design exterior nonload-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
    c. Cold-Formed Steel Framing: Design according to AISI's "Standard for Cold-Formed Steel Framing – General Provisions."

5. Submittals

6. Quality assurance

7. Delivery, storage, and handling

8. Products

9. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
        i. Clark Steel Framing Industries.
        ii. Dale Industries, Inc.
        iii. Dietrich Industries, Inc.
        iv. MarinoWare; Div. of Ware Industries, Inc.
        v. Unimast, Inc.
10. Materials
    a. Steel Sheet: ASTM A 653, structural steel, zinc coated, of grade and coating as

follows:
i. Grade: 33 (for 18 gauge or thinner), 50 (for 16 gauge or thicker).
ii. Coating: G60.

11. Non-load-bearing curtain-wall framing
    a. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
        i. Minimum Uncoated-Steel Thickness: As indicated on the drawings.
        ii. Flange Width: 1-3/8 inches.
    b. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, complying with ASTM C 955, and as follows:
        i. Minimum Uncoated-Steel Thickness: 0.0566inch.
        ii. Flange Width: 1-1/4 inches.
    c. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:.
        i. Minimum Uncoated-Steel Thickness: 0.0566 inch.
        ii. Flange Width: 2 inches.

12. Ceiling joist framing
    a. Steel Ceiling Joists: Manufacturer’s standard C-shaped steel sections, of web depths indicated, unpunched with stiffened flanges, and as follows:
        i. Minimum Base-Metal Thickness: 0.0329 inch.
        ii. Flange Width: 1-5/8 inches, minimum.

13. Framing accessories
    a. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.
    b. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
        i. Revise list below to suit Project.
        ii. Supplementary framing.
        iii. Bracing, bridging, and solid blocking.
        iv. Web stiffeners.
        v. End clips.
        vi. Gusset plates.
        vii. Stud kickers, knee braces, and girts.
        viii. Joist hangers and end closures.
        ix. Hole reinforcing plates.
        x. Backer plates.

14. Anchors, clips, and fasteners
    a. Delete zinc coating in first two paragraphs below if not required.
    b. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
    c. Retain paragraph below if expansion anchors are acceptable. Verify safety factor with Project's structural engineer. Revise as required or insert specific load requirements and names of acceptable products.
    d. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per

ASTM E 488 conducted by a qualified independent testing agency.

e. Retain paragraph below if power-actuated fasteners are acceptable. Verify safety factor with Project's structural engineer.
f. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
g. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
h. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
i. Welding Electrodes: Comply with AWS standards.

15. Miscellaneous materials
    a. Galvanizing Repair Paint: ASTM A 780.
    b. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

16. Fabrication
    a. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
    b. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    c. Retain subparagraph above and below if option of using mechanical fasteners is retained.
    d. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
    e. Retain subparagraph below if fabricated assemblies include other materials or revise to suit Project.
    f. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
    g. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
    h. Revise paragraph and subparagraphs below to suit Project.
    i. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
    j. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
    k. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

17. Examination

18. Preparation

19. Installation, general

20. Non-load-bearing curtain-wall installation

21. Gypsum sheathing installation
22. Field quality control
23. Repairs and protection

SECTION 055000- METAL FABRICATIONS

1. Related Documents
2. Summary
3. Performance Requirements
4. Submittals
5. Quality Assurance
6. Project Conditions
7. Coordination
8. Manufacturers
9. Metals, General
10. Ferrous Metals
11. Non-Ferrous Metals
12. Fasteners
13. Miscellaneous Materials
14. Fabrication, General
15. Miscellaneous Framing and Supports
16. Loose Steel Lintels
17. Shelf Angles
18. Loose Bearing and Leveling Plates
19. Steel Welded Plates and Angles
20. Metal Ladders
21. Metal Bollards

22. Finishes, General

23. Steel and Iron Finishes

24. Aluminum Finishes

25. Installation, General

26. Installing Miscellaneous Framing and Supports

27. Installing Pipe Bollards

28. Adjusting and Cleaning

SECTION 055100 - METAL STAIRS

1. RELATED DOCUMENTS

2. SUMMARY

3. SUBMITTALS

4. QUALITY ASSURANCE

5. COORDINATION

6. MANUFACTURERS
   a. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
      1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

7. METALS, GENERAL
   a. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

9. FERROUS METALS
   a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   b. Iron Castings: Either gray or malleable iron, unless otherwise indicated.
      1. Malleable Iron: ASTM A 47/A 47M.
   c.. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.

10. FASTENERS
    a. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

b. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
c. Anchor Bolts: ASTM F 1554, Grade 36.
d. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
e. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
f. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

11. MISCELLANEOUS MATERIALS
a. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
b. Shop Primers: Provide primers that comply with Division 09 painting Sections.
c. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

12. FABRICATION, GENERAL
a. Provide complete stair assemblies, including metal framing, hangers, struts,clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
1. Join components by welding, unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
b. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
c. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
d. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
e. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
f. Weld connections to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously, unless otherwise indicated.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
g. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

13. STEEL-FRAMED STAIRS
a. Available Manufacturers:
1. Alfab, Inc.
2. American Stair, Inc.

3. Sharon Companies Ltd. (The).

b. Stair Framing:
   1. Fabricate stringers of steel channels.
      a. Provide closures for exposed ends of channel and/or tube stringers.
   2. Construct platforms of steel [channel headers and miscellaneous framing members as needed to comply with performance requirements indicated.
   3. Weldstringers to headers; weldframing members to stringers and headers.
   4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

c. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0677 inch (1.7 mm).
   1. Steel Sheet: Uncoated hot-rolled steel sheet, unless otherwise indicated.
   2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
   3. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.

14. FINISHES
   a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   b. Finish metal stairs after assembly.
   c. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
      1. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
      2. Interior Stairs (SSPC Zone 1A): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   d. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

15. INSTALLATION, GENERAL

16. ADJUSTING AND CLEANING

SECTION 055213- PIPE AND TUBE RAILING

1. Related Documents

2. Summary

3. Performance Requirements

4. Submittals

5. Quality Assurance

6. Project Conditions

7. Coordination and Scheduling

8. Metals, General
    a. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
    b. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

9. Steel and Iron
    a. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
        i. Provide galvanized finish for exterior installations and where indicated.
    b. Plates, Shapes, and Bars: ASTM A 36/A 36M.

10. Fasteners
    a. General: Provide the following:
        i. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
        ii. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
        iii. Galvanized Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
        iv. Dissimilar Metals: Type 304 stainless-steel fasteners.
    b. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
    c. Fasteners for Interconnecting Railing Components:
        i. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
        ii. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.
    d. Anchors: Provide torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

11. Miscellaneous Materials
    a. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
    b. Shop Primers: Provide primers that comply with Division 9 painting Sections
    c. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
    d. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

12. Fabrication
    a. General: Fabricate railings to comply with requirements indicated for design,

dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

b. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
c. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
d. Form work true to line and level with accurate angles and surfaces.
e. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
f. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
g. Connections: Fabricate railings with welded connections, unless otherwise indicated.
h. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
i. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
j. Close exposed ends of railing members with prefabricated end fittings.
k. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
l. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
m. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

13. Finishes, General
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

14. Steel and Iron Finishes
    a. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
    b. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed railings:
        i. Interior Railings (SSPC Zone 1A): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
    c. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

15. Installation, General
16. Railing Connections
17. Anchoring Posts
18. Attaching Handrails to Walls
19. Adjusting and Cleaning
20. Protection

DIVISION 6: WOOD, PLASTICS, AND COMPOSITES

SECTION 061000- ROUGH CARPENTRY

1. Related Documents
2. Summary
3. Definitions
4. Delivery, Storage & Handling
5. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Metal Framing Anchors:
            1. Alpine Engineered Products, Inc.
            2. Cleveland Steel Specialty Co.
            3. Harlen Metal Products, Inc.
            4. KC Metals Products, Inc.
            5. Silver Metal Products, Inc.
            6. Simpson Strong-Tie Company, Inc.
            7. Southeastern Metals Manufacturing Co., Inc.
            8. United Steel Products Company, Inc.
6. Wood Products, General
    a. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
        i. Factory mark each piece of lumber with grade stamp of grading agency.
        ii. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
        iii. Provide dressed lumber, S4S, unless otherwise indicated.
        iv. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
    b. Wood Structural Panels:

i. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
ii. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
iii. Factory mark panels according to indicated standard.

7. Wood- Preservative- Treated Materials
   a. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
      i. Preservative Chemicals: Acceptable to authorities having jurisdiction and the following:
         1. Ammoniacal, or amine, copper quat (ACQ).
   b. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber. Do not use material that is warped or does not comply with requirements for untreated material.
   c. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
   d. Application: Treat items indicated on Drawings, and the following:
      i. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
      ii. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

8. Miscellaneous Lumber
   a. General: Provide lumber for support or attachment of other construction, including the following:
      i. Rooftop equipment bases and support curbs.
      ii. Blocking.
      iii. Nailers.
   b. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and the following species:
      i. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
   c. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
      i. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.

9. Sheathing
   a. Plywood Roof Sheathing: Exterior, Structural I sheathing.
      i. Span Rating: Not less than24/0.
      ii. Thickness: Not less than 1/2 inch (13 mm).

10. Plywood Backing Panels
    a. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.

11. Fasteners
    a. General: Provide fasteners of size and type indicated that comply with requirements

specified in this Article for material and manufacture.
b. Nails, Brads, and Staples: ASTM F 1667.
c. Power-Driven Fasteners: CABO NER-272.
d. Wood Screws: ASME B18.6.1.
e. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
f. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
g. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
h. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
    i. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

12. Metal Framing Anchors
    a. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
        i. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
        ii. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
    b. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

13. Miscellaneous Materials
    a. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.
    b. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

14. Installation, General

15. Wood Blocking and Nailer Installation

16. Building Paper Application

SECTION 061600- GYPSUM SHEATHING

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Quality Assurance
6. Deliver, Storage & Handling
7. Coordination
8. Gypsum Sheathing
    a. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.
        i. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corporation.
        ii. Type and Thickness: As indicated.
        iii. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.
9. Sheathing Joint and Penetration Treatment Materials
    a. Glass-Mat Gypsum Sheathing Board:
        i. Silicone Emulsion Sealant: ASTM C 834, compatible with sheathing tape and sheathing, recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
        ii. Glass-Fiber Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.
10. Accessory Materials
    a. Fasteners: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
        i. For steel framing less than 0.0329 inch (0.835 mm) thick, attach sheathing with steel drill screws complying with ASTM C 1002.
11. Gypsum Sheathing Installation
12. Sheathing Joint and Penetration Treatment

SECTION 064023- INTERIOR ARCHITECTURAL WOODWORK

1. Related documents

2. Summary
    a. Plastic Laminate cabinets.
    b. Solid-surfacing-material countertops and windowsills.

3. Definitions

4. Submittals

5. Quality assurance

6. Delivery, storage, and handling

7. Project conditions

8. Coordination

9. Materials
    a. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
    b. Wood Products: Comply with the following:
        i. Hardboard: AHA A135.4.
        ii. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
        iii. Particleboard: ANSI A208.1, Grade M-2.
    c. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
    d. Products: Subject to compliance with requirements, provide one of the following:
        i. See Editing Instruction No. 1 in the Evaluations for cautions about naming products and manufacturers.
        ii. Avonite; Avonite, Inc.
        iii. Corian; DuPont Polymers.
        iv. Surell; Formica Corporation.
        v. Gibraltar; Wilsonart International, Div. of Premark International, Inc.

10. Cabinet hardware and accessories
    a. Where close matching of cabinet hardware and door hardware is required, it may be preferable to specify cabinet hardware in Division 8.
    b. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by Naming Products)."
    c. See Evaluations. Retain paragraph below if BHMA is used to specify or schedule hardware.
    d. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
    e. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
    f. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
    g. Wire Pulls: Back mounted, 4 inches long, 5/16 inches in diameter.

h. Catches: Magnetic catches, BHMA A156.9, B03141.
i. Shelf rests below are installed in holes drilled in cabinet sides and partitions.
j. Shelf Rests: BHMA A156.9, B04013.
k. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings:
   i. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated steel ball-bearing slides.
   iii. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
   iv. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

a. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
b. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc. or equal.
c. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
d. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
e. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

11. Installation materials

12. Fabrication, general
   a. If all woodwork is same grade, retain paragraph below and delete separate grades in other articles; otherwise, delete paragraph below.
   b. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.
   c. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
   d. Fabricate woodwork to dimensions, profiles, and details indicated.
   e. Drawers: Drawer boxes shall be constructed so that the top of the drawer box is within 1 ½" of the top of the face.
   f. For highest-quality work, delete two subparagraphs above and retain subparagraph below; otherwise, delete below.
   g. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   h. Retain subparagraph below if Architect will visit woodwork shop and examine work before it is shipped to Project site.
   i. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
   j. Retain subparagraph below for high-quality and large or complex work.
   k. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

l. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

13. Plastic-laminate cabinets
    a. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
        i. Horizontal Surfaces Other Than Tops: Grade HGS.
        ii. Vertical Surfaces: Grade VGS.
        iii. Retain one edge construction from subparagraph below. Coordinate with standards and grade selection.
        iv. Edges: Minimum of 3mm PVC edgebanding to be used in all exposed edge conditions.

    b. Materials for Semiexposed Surfaces:
        i. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
        ii. Front and Back Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
        iii. Retain first subparagraph below if required to provide balanced construction.
        iv. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
    c. Drawer Sides and Backs: Thermoset decorative panels.
    d. Drawer Bottoms: Thermoset decorative panels.
    e. Colors: As selected by Architect from range of colors including at minimum white, gray, almond and black.
    f. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
    g. Color and Pattern: Provide Architect's selections from manufacturer's full range of colors and finishes

14. Solid-surfacing-material countertops
    a. Quality Standard: Comply with AWI Section 400 requirements for countertops.
    b. Solid-Surfacing-Material Thickness: 1/2 inch.
    c. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
        i. Provide Architect's selections from manufacturer's full range of colors and finishes.
        ii. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
        iii. Install integral sink bowls at all vanity countertops in shop.
        iv. Delete both paragraphs below if no sinks.
        v. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

15. Execution

16. Preparation

17. Installation

18. Adjusting and cleaning

DIVISION 7: THERMAL AND MOISTURE PROTECTION

SECTION 071113- BITUMINOUS DAMPPROOFING

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Project Conditions
6. Manufactures
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Cold-Applied, Emulsified-Asphalt Dampproofing:
            1. Euclid Chemical Company (The).
            2. Gardner Asphalt Corporation.
            3. Henry Company.
            4. Karnak Corporation.
            5. Koppers Industries, Inc.
            6. Malarkey Roofing Company.
            7. Meadows, W. R., Inc.
            8. Sonneborn, Div. of ChemRex, Inc.
            9. Tamms Industries.
7. Bituminous Dampproofing
    a. Cold-Applied, Emulsified-Asphalt Dampproofing:
        i. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
8. Miscellaneous Materials
    a. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.
9. Examination
10. Preparation
11. Application, General
12. Cold-Applied, Emulsified-Asphalt Dampproofing
13. Cleaning

SECTION 071326- SELF-ADHERING SHEET WATERPROOFING

1. Related Documents
2. Summary
3. Performance Requirements
4. Submittals
5. Quality Assurance
6. Delivery, Storage & Handling
7. Project Conditions
8. Warranty
    a. Warranty Period: Five years after date of Substantial Completion.
9. Manufacturers
    a. Products: Subject to compliance with requirements, provide one of the following products:
        i. Rubberized-Asphalt Sheet Waterproofing:
            1. American Hydrotech, Inc.; VM 75.
            2. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW 701.
            3. W. R. Grace & Co.; Bituthene.
            4. W. R. Meadows, Inc.; Mel-Rol.
            5. T. C. Miradri; Miradri.
            6. Pecora Corporation; Duramem 700-SM.
            7. Polyguard Products, Inc.; Polyguard 650.
10. Rubberized-Asphalt Sheet Waterproofing
    a. Rubberized-Asphalt Sheet: 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
        i. Physical Properties: As follows, measured per standard test methods referenced:
            1. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
            2. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
            3. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
            4. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
            5. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
            6. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D 5385.
            7. Water Absorption: 0.15 percent weight-gain maximum after 48-hour

immersion at 70 deg F (21 deg C); ASTM D 570.
8. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

11. Auxiliary Materials
    a. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
        i. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
    b. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
    c. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
    d. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.
    e. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
    f. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
    g. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

12. Examination

13. Surface Preparation

14. Rubberized-Asphalt Sheet Application

15. Protection and Cleaning

SECTION 071354- THERMOPLASTIC SHEET WATERPROOFING

1. Related Documents

2. Summary

3. Performance Requirements

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Warranty
    a. Warranty Period: 10 years after date of Substantial Completion.

9. Manufacturers

a. Products: Subject to compliance with requirements, provide one of the following products:
    i. Sarnafil Waterproofing Systems, Inc.; System 1000.

10. Sheet Waterproofing
    a. PVC Sheet: 120-mil- (3-mm-) thick flexible sheet compounded from PVC resin, plasticizers, stabilizers, fillers, and pigments and reinforced with nonwoven fiberglass with the following properties measured per standard test methods referenced:
        i. Tensile Strength: 1600 psi (11 MPa) minimum; ASTM D 638 (ASTM D 638M).
        ii. Elongation at Break: 300 percent minimum, machine direction; ASTM D 638 (ASTM D 638M).
        iii. Seam Strength: 90 percent minimum of tensile strength; ASTM D 638 (ASTM D 638M).
        iv. Retention of Properties after Heat Aging: 95 percent minimum retention of tensile strength and elongation; ASTM D 638 (ASTM D 638M) after 168 hours at 194 deg F (90 deg C); ASTM D 3045.
        v. Tear Resistance: 17 lbf (76 N) minimum; ASTM D 1004.
        vi. Low-Temperature Bend: Pass at minus 40 deg F (minus 40 deg C); ASTM D 2136.
        vii. Linear Dimension Change: 0.01 percent maximum after 6 hours at 176 deg F (80 deg C); ASTM D 1204.
        viii. Water Absorption: 2 percent maximum weight gain after 168 hours' immersion at 158 deg F (70 deg C); ASTM D 570.

11. Auxiliary Materials
    a. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
        i. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
    b. Geotextile Leveling Layer: Manufacturer's standard nonwoven polypropylene.
    c. Waterproofing and Sheet Flashing Accessories: Provide PVC discs, sealants, pourable sealers, cone and vent flashings, inside and outside corner flashings, termination reglets, clamps, compression bars, tapes, and other accessories recommended by waterproofing manufacturer for intended use.
    d. Metal Termination Bars: Manufacturer's standard stainless-steel or aluminum bars, approximately 1 inch (25 mm) wide, prepunched, with nylon anchors and stainless-steel pins.

12. Examination

13. Surface Preparation

14. Loose Laid Sheet Installation

15. Seam Installation

16. Sheet Flashing Installation

17. Protection and Cleaning

SECTION 072100- THERMAL INSULATION

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Delivery, Storage & Handling
6. Manufacturer
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Extruded-Polystyrene Board Insulation:
            1. DiversiFoam Products.
            2. Dow Chemical Company.
            3. Owens Corning.
            4. Tenneco Building Products.
        ii. Glass-Fiber Insulation:
            1. CertainTeed Corporation.
            2. Johns Manville Corporation.
            3. Knauf Fiber Glass.
            4. Owens Corning.
        iii. Slag-Wool-/Rock-Wool-Fiber Insulation:
            1. Fibrex Insulations Inc.
            2. Owens Corning.
            3. Thermafiber.
        iv. Polyisocyanurate Board Insulation:
        i. Manufacturers:
            1. Atlas Roofing Corporation.
            2. Celotex Corporation.
            3. GAF Materials Corporation.
7. Insulating Materials
    a. General: Provide insulating materials that comply with requirements and with referenced standards.
        i. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
    b. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
        i. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m), against foundation walls.
    c. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics. Provide where fire-rated safing insulation is required (in fire-rated assemblies).

d. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.
e. Polyisocyanurate Board Insulation: ASTM C 1289
   i. Type II, felt or fiber mat facer on both major surfaces, square edged, at cavity walls.

8. Auxiliary Insulating Materials
   a. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

9. Examination

10. Preparation

11. Installation, General

12. Installation of Cavity Wall and Masonry Cell Insulation

13. Installation of General Building Insulation

14. Protection

SECTION 07 2726-FLUID-APPLIED MEMBRANE AIR BARRIERS (To be Provided at a later date)

SECTION 074213- METAL WALL PANELS

1. Related documents

2. Summary
   b. This Section includes the following:
      i. Factory-formed and field-assembled, concealed-fastener, lap-seam metal wall panels.

3. Definitions

4. Performance requirements

5. Submittals

6. Quality assurance
.
7. Delivery, storage, and handling.

8. Project conditions

9. Coordination.

10. Warranty
    a. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
        i. Failures include, but are not limited to, the following:
    b. Structural failures, including rupturing, cracking, or puncturing.
    c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    d. Warranty Period: Two years from date of Substantial Completion.
    e. .Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
    f. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
        i. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
        ii. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
        iii. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
    g. Finish Warranty Period: 20 years from date of Substantial Completion.
    h. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal wall panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

11. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

12. Panel materials
    a. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    b. Surface: Smooth, flat finish.
    c. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
    High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
        i. Fluoropolymer Three-Coat System: Manufacturer's standard three-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, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
        ii. Humidity Resistance: 2000 hours.
        iii. Salt-Spray Resistance: 2000 hours.
    d. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
    e. Panel Sealants:
        i. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

ii. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
iii. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

13. Thermal insulation for field-assembled metal wall panels
    a. Refer to Division 7 Section "Building Insulation."

14. Miscellaneous metal framing
    a. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
    b. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.
        i. Nominal Thickness: 0.025 inch (0.64 mm).
    c. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

15. Miscellaneous materials
    a. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
    b. Provide EPDM or neoprene sealing washers.
    c. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated.

16. Concealed-fastener, lap-seam metal wall panels
    a. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
    b. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with horizontal panel edges; with 1 inch reveal joint between panels.
    c. Flush-profile, concealed-Fastener Metal Soffit Panels: Formed with horizontal panel edges; flush joints between panels.
    d. Basis of Design Products: Subject to compliance with requirements, provide IW-40 wall panels, IW-10A soffit panels; Centria Architectural Systems or comparable product by one of the following:
        i. AEP-Span.
        ii. Berridge Manufacturing Company.

iii. Petersen Aluminum Corporation.

e. Material: Zinc-coated (galvanized) steel sheet, [0.049 inch (1.19 mm)] thick.
   i. Exterior Finish: Fluoropolymer.
   ii. . Color: As selected by Architect from manufacturer's full range including metallic finishes.
f. Panel Coverage: 12 inches (305 mm).
g. Panel Height: 1 ½ inch (22 mm).

17. Accessories
   a. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
      i. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
      ii. . Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
      iii. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
   b. Flashing and Trim: Formed from 0.018-inch (0.46-mm) minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

18. Fabrication

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19. Finishes, general
   a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   c. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

20. Examination

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21. Preparation

22. Metal wall panel installation, general
   a. Fasteners:

iv. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

b. Metal Protection:

c. Joint Sealers:

23. Thermal insulation installation for field-assembled metal wall panels

a. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

24. Field-assembled metal wall panel installation

a. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

i. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

ii. . Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.

iii. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

iv. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

v. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.

vi. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.

vii. At panel splices, nest panels with minimum 6-inch (150-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

b. Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

25. Accessory installation

26. Field quality control

27. Cleaning and protection

SECTION 074213.23 – METAL COMPOSITE WALL PANELS

1. RELATED DOCUMENTS

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

2. SUMMARY
   a. Section includes metal-faced composite wall panels designed and installed as a rain-screen principle installation.
   b. Related Sections:
      1. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal-faced composite wall panels.
      2. Division 07 Section "Sheet Metal Flashing and Trim" for field-formed flashings and other sheet metal work not part of metal-faced composite wall panel assemblies.

3. DEFINITION
   a. Metal-Faced Composite Wall Panel Assembly: Metal-faced composite wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

4. PERFORMANCE REQUIREMENTS
   b. General Performance: Metal-faced composite wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   c. Delegated Design: Design metal-faced composite wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   d. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E 283 at the following test-pressure difference:
      1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
   e. Water Penetration Under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
      1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
   f. Structural Performance: Provide metal-faced composite wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
      1. Wind Loads: Determine loads based on the following minimum design wind pressures:
         a. Uniform pressure as indicated on Drawings.
      2. Deflection Limits: Metal-faced composite wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel.
   g. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
      1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

5. SUBMITTALS
   a. Product Data: For each type of product indicated. Include construction

details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal-faced composite wall panel and accessory.

b. Shop Drawings: Show fabrication and installation layouts of metal-faced composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.
   1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
      a. Flashing and trim.
      b. Anchorage systems.

c. Samples for Initial Selection: For each type of metal-faced composite wall panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.
   2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

d. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Metal-Faced Composite Wall Panels: Minimum 12 x 12 inches (300 x 300 mm). Include fasteners, closures, and other metal-faced composite wall panel accessories.
      a. Composite Panels: Include four-way joint.
   2. Trim and Closures: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
   3. Accessories: 12-inch- (300-mm-) long Samples for each type of accessory.

e. Delegated-Design Submittal: For metal-faced composite wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

f. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Wall panels and attachments.
   2. Stud framing.
   3. Penetrations of wall by pipes and utilities.

g. Qualification Data: For professional engineer and testing agency.

h. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

i. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

j. Field quality-control reports.

k. Maintenance Data: For metal wall panels to include in maintenance manuals.

l. Warranties: Samples of special warranties.

6. QUALITY ASSURANCE
   a. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
   b. Source Limitations: Obtain each type of metal-faced composite wall panel from single source from single manufacturer.
   c. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact joint sealants to joint-sealant manufacturers for testing indicated in subparagraphs below:
      1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
         a. Perform tests under environmental conditions replicating those that will exist during installation.
      2. Submit no fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
      3. Schedule enough time for testing and analyzing results to prevent delaying the Work.
      4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
   d. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
      1. Include one-way joint for metal-faced composite wall panels.
      2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   e. Preinstallation Conference: Conduct conference at Project site.
      1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal-faced composite wall panel Installer, metal-faced composite wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal-faced composite wall panels including installers of doors, windows, and louvers.
      2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      3. Review methods and procedures related to metal-faced composite wall panel installation, including manufacturer's written instructions.
      4. Examine support conditions for compliance with requirements, ng alignment between and attachment to structural members.
      5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal-faced composite wall panels.
      6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
      7. Review temporary protection requirements for metal-faced composite wall panel assembly during and after installation.

8. Review wall panel observation and repair procedures after metal-faced composite wall panel installation.

7. DELIVERY, STORAGE, AND HANDLING

8. PROJECT CONDITIONS

9. WARRANTY
   a. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-faced composite wall panel assemblies that fail in materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
         a. Structural failures, including rupturing, cracking, or puncturing.
         b. Deterioration of metals and other materials beyond normal weathering.
      2. Warranty Period: Two years from date of Final Completion.
   b. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal-faced composite wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
      1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
         a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
         b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
         c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
      2. Finish Warranty Period: 20 years from date of Final Completion.

10. PANEL MATERIALS
   a. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
      1. Surface: Smooth, flat finish.
      2. Exposed Coil-Coated Finishes:
         a. Mica Fluoropolymer: AAMA 620. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
11. MISCELLANEOUS METAL FRAMING
   a. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275) hot-dip galvanized or

coating with equivalent corrosion resistance unless otherwise indicated.

b. Subgirts: Manufacturer's standard C- or Z-shaped sections 0.064-inch (1.63-mm) nominal thickness.

c. Zee Clips: 0.079-inch (2.01-mm) nominal thickness.

d. Base or Sill Angles: 0.079-inch (2.01-mm) nominal thickness.

e. Hat-Shaped, Rigid Furring Channels:
   1. Nominal Thickness: 0.040 inch (1.02 mm).
   2. Depth: As indicated.

f. Cold-Rolled Furring Channels: Minimum 1/2-inch- (13-mm-) wide flange.
   1. Nominal Thickness: 0.064 inch (1.63 mm).
   2. Depth: As indicated.
   3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of 0.040 inch (1.02 mm).
   4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.57-mm-) diameter wire, or double strand of 0.048-inch- (1.22-mm-) diameter wire.

g. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

12. MISCELLANEOUS MATERIALS

a. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated.

b. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide stainless steel concealed fasteners.

13. METAL-FACED COMPOSITE WALL PANELS

a. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.
   1. Fire-Retardant Core: Noncombustible, with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Alcan Composites USA Inc.; Alucobond.
      b. Alcoa Inc.; Reynobond PE.
      c. ALPOLIC, Division of Mitsubishi Chemical America, Inc.; ALPOLIC.
      d. CENTRIA Architectural Systems; Formabond Wall System.

b. Aluminum-Faced Composite Wall Panels: Formed with 0.032-inch- (0.813-mm-) thick, coil-coated aluminum sheet facings.
   1. Panel Thickness: 8 mm).
   2. Face Sheet Surface: Smooth.
   3. Core: Standard.

4. Exterior Finish: Mica fluoropolymer.
   a. Color: As selected by Architect from manufacturer's full range.

c. Attachment System Components: Formed from material compatible with panel facing.

14. ACCESSORIES

a. Wall Panel Accessories: Provide components required for a complete metal-faced composite wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal-faced composite wall panels unless otherwise indicated.

b. Flashing and Trim: Formed from 0.018-inch- (0.46-mm-) minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal-faced composite wall panels.

15. FABRICATION

a. General: Fabricate and finish metal-faced composite wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

b. Fabricate metal-faced composite wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

c. Metal-Faced Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.
   1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
   2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
   3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
   4. Dimensional Tolerances:
      a. Panel Bow: 0.8 percent maximum of panel length or width.
      b. Squareness: 0.25 inch (5 mm) maximum.

d. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Aluminum: Fabricate nonmoving seams with flat-

lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal-faced composite wall panel manufacturer.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal-faced composite wall panel manufacturer for application, but not less than thickness of metal being secured.

16. GENERAL FINISH REQUIREMENTS
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
    c. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. 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.

17. EXAMINATION

18. PREPARATION

19. METAL-FACED COMPOSITE WALL PANEL INSTALLATION

20. ACCESSORY INSTALLATION

21. ERECTION TOLERANCES

22. FIELD QUALITY CONTROL

23. CLEANING

SECTION 075423: THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

2. Related Documents

3. Summary

4. Definitions

5. Performance Requirements

6. Submittals

7. Quality Assurance

8. Delivery, Storage & Handling

9. Project Conditions

10. Warranty
    a. Warranty Period: 20 years from date of Substantial Completion.

11. Manufacturers
    a. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
        i. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

12. TPO Roofing Membrane
    a. TPO Sheet: ASTM D 4434, Type II, Grade I.
        i. Manufacturers:
            1. Carlisle, Inc
            2. Sarnafil Inc.
        ii. Thickness: 60 mils , minimum, fleece backed.
        iii. Exposed Face Color: White.

13. Auxiliary Materials
    a. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
        i. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
    b. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO sheet membrane.
    c. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
    d. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
    e. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
    f. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch (25 mm) wide by 0.05 inch (1.3 mm) thick, prepunched.
    g. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
    h. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

14. Substrate Boards

a. Substrate Board: ASTM C 36, Type X gypsum wall board, 1/2 inch thick.
b. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening substrate panel to roof deck.

15. Roof Insulation
    a. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
    b. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or fiber mat facer on both major surfaces, square edged.
        i. Manufacturers:
            1. Atlas Roofing Corporation.
            2. Celotex Corporation.
            3. GAF Materials Corporation.
    c. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches (1:48), unless otherwise indicated.
    d. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

16. Insulation Accessories
    a. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
    b. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
    c. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
    d. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch (6 mm) thick.
        i. Product: Subject to compliance with requirements, provide "Dens-Deck" by Georgia-Pacific Corporation.

17. Walkways
    a. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

18. Examination

19. Preparation

20. Substrate Board Installation

21. Insulation Installation

22. Mechanically Fastened Roofing Membrane Installation

23. Base Flashing Installation

24. Walkway Installation

25. Field Quality Control

26. Protecting and Cleaning

SECTION 076200- SHEET METAL FLASHING AND TRIM

1. Related Documents
2. Summary
3. Performance Requirements
4. Submittals
5. Quality Assurance
6. Delivery, Storage & Handling
7. Coordination
8. Sheet Metals
    a. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
        i. Product: Subject to compliance with requirements, provide "TCS II" by Follansbee Steel.
    b. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
        i. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
        ii. Exposed Finishes: Apply the following coil coating:
            1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
                a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below
                    i. Humidity Resistance: 2000 hours.
                    ii. Salt-Spray Resistance: 2000 hours.
                b. Color: As selected by Architect from manufacturer's full range.
9. Underlayment Materials
    a. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.

b. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
c. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

10. Miscellaneous Materials
    a. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
    b. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
        i. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
        ii. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
        iii. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
        iv. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
    c. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
    d. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
    e. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide, or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
    f. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
    g. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
    h. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

11. Fabrication, General
    a. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
    b. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
    c. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
        i. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
    d. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
    e. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

f. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
g. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
    i. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

12. Roof Drainage Sheet Metal Fabrication
    a. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
        i. Gutter Style: F.
        ii. Expansion Joints: Built-in.
        iii. Accessories: Wire ball downspout strainer.
    b. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
        i. Manufactured Hanger Style: Front strap, 1/16” x 1”, same material as downspout.
        ii. Fabricate downspouts from the following material:
            1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

13. Low-Slope Roof Sheet Metal Fabrication
    a. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide joint cover plates.
        i. Joint Style: Butt, with 12-inch- (300-mm-) wide concealed backup plate and 6-inch- (150-mm-) wide exposed cover plates.
    b. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
        i. Joint Style: Butt, with 12-inch- (300-mm-) wide concealed backup plate and 6-inch- (150-mm-) wide exposed cover plates.
        ii. Fabricate copings from the following material:
            1. Prepainted, Metallic-Coated Steel: 0.0396 inch (1.0 mm) thick
    c. Roof and Roof to Wall Transition Expansion-Joint Cover: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0336 inch (0.85 mm) thick.
    d. Base Flashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
    e. Counterflashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
    f. Flashing Receivers: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
    g. Roof-Penetration Flashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick
    h. Roof-Drain Flashing: Fabricate from the following material:

i. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.4 mm) thick.

14. Steep-Slope Rood Sheet Metal Fabrication
    a. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
    b. Eave, Rake Flashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

15. Wall Sheet Metal Fabrication
    a. Openings Flashing in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high end dams. Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

16. Miscellaneous Sheet Metal Fabrication
    a. Equipment Support Flashing: Fabricate from the following material:
        i. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.

17. Finishes
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
    c. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

18. Examination

19. Installation, General

20. Roof Drainage System Installation

21. Roof Flashing Installation

22. Wall Flashing Installation

23. Miscellaneous Flashing Installation

24. Cleaning and Protection

SECTION 077200- ROOF ACCESSORIES

1. Related Documents

2. Summary

3. Submittals

4. Delivery, Storage & Handling

5. Project Conditions

6. Coordination

7. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

8. Metal Materials
    a. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coated and mill phosphatized for field painting.
    b. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.
        i. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coated.
        ii. Exposed Finishes: High-Performance Organic Finish (2-Coat Fluoropolymer): Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
            1. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements in AAMA 2605, except as modified below:
                a. Humidity Resistance: 2000 hours.
                b. Salt-Spray Resistance: 2000 hours.
    c. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.
    d. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.
    e. Galvanized Steel Pipe: ASTM A 53/A 53M

9. Miscellaneous Materials
    a. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, 1 inch (25 mm) thick.
    b. Glass-Fiber Board Insulation: ASTM C 726, 1 inch (25 mm) thick.
    c. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
    d. Polyethylene Sheet: 6-mil- (0.15-mm-) thick, polyethylene sheet complying with ASTM D 4397.
    e. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
        i. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
    f. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
    g. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

h. Elastomeric Sealant: ASTM C 920, polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight
i. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

10. Roof Hatches
    a. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
        i. Manufacturers:
            1. Babcock-Davis; a Cierra Products Inc. Company.
            2. Bilco Company (The).
            3. Bristolite Skylights.
            4. Custom Curb, Inc.
            5. Dur-Red Products.
            6. Hi Pro International, Inc.
            7. J. L. Industries, Inc.
            8. Metallic Products Corporation.
            9. Milcor Inc.; a Gibraltar Company.
            10. Nystrom, Inc.
            11. O'Keeffe's Inc.
            12. Precision Ladders, LLC.
            13. Roof Products & Systems Corporation.
            14. ThyCurb; Div of Thybar Corporation.
            15. Wasco Products, Inc.
            16. Western Canwell.
        ii. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. (1.9-kPa) external and 20-lbf/sq. ft. (0.95-kPa) internal loads.
        iii. Type and Size: Single-leaf lid, 30 by 36 inches (750 by 900 mm).
        iv. Curb and Lid Material: Galvanized steel sheet, 0.079 inch (2.0 mm) thick.
            1. Finish: High-performance organic coating.
        v. Insulation: Cellulosic-fiber and Glass-fiber board.
        vi. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
        vii. Lid Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
        viii. Fabricate units to minimum height of 12 inches (300 mm), unless otherwise indicated.
        ix. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate hatch curbs with height constant.
        x. Hardware: Galvanized steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
        xi. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation
            1. Test Load: Same as guardrails in Section 05521.
            2. Height: 42 inches (1060 mm) above finished roof deck.
            3. Pipe or Tube: 1-1/4-inch (31-mm) ID galvanized pipe or 1-5/8-inch

(41-mm) OD galvanized tube
4. Flat Bar: 2-inch- (50-mm-) high by 3/8-inch- (9-mm-) thick galvanized steel.
5. Chain Passway Enclosure: Galvanized proof coil chain with quick link on fixed end.
6. Pipe Ends and Tops: Covered or plugged with weather-resistant material.
7. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
8. Fabricate joints that will be exposed to weather in a watertight manner.
9. Close exposed ends of handrail and railing members with prefabricated end fittings.
10. Fasteners: Manufacturer's standard.

11. Examination

12. Installation

13. Touch-Up

14. Cleaning

SECTION 078413- PENETRATION FIRESTOPING

1. Related Documents

2. Summary

3. Performance Requirements

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Coordination

9. Manufacturers
    a. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:
        i. Hilti, Inc.
        ii. 3M; Fire Protection Products Division.
        iii. Tremco; Sealant/Weatherproofing Division.

10. Firestopping, General
    a. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
    b. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items
        i. Permanent forming/damming/backing materials, including the following:
            1. Slag-/rock-wool-fiber insulation.
            2. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
            3. Fire-rated form board.
            4. Fillers for sealants.
        ii. Temporary forming materials.
        iii. Substrate primers.
        iv. Collars.
        v. Steel sleeves.

11. Fill Materials
    a. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
    b. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
    c. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
    d. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
    e. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
    f. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
    g. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
    h. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
    i. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
    j. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
        i. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other

surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

k. Intumescent Acrylic Sealant: Firestop sealant that expands when exposed to hear, and protects penetrations containing combustible and non-combustible penetrants.

l. Foam “Sponge-Like” Blocks: Re-penetratable intumescent blocks that may be friction fit, deformed, or cut to fit in through-penetration openings.

12. Mixing
    a. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

13. Examination

14. Preparation

15. Through-Penetration Firestop System Installation

16. Identification

17. Cleaning and Protecting

18. Through-Penetration Firestop System Schedule

SECTION 079200- JOINT SEALANTS

1. Related Documents

2. Summary

3. Performance Requirements

4. Submittals

5. Quality Assurance

6. Project Conditions

7. Manufacturers
    a. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

8. Materials, General
    a. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

b. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

9. Elastomeric Joint Sealants
   a. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   b. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
   c. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
   d. Single-Component Pourable Neutral-Curing Silicone Sealant:
      i. Products:
         1. Dow Corning Corporation; 890-SL
         2. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
      ii. Type and Grade: S (single component) and P (pourable).
      iii. Class: 100/50.
      iv. Uses Related to Exposure: NT and T (traffic).
      v. Uses Related to Joint Substrates: O, as applicable to joint substrates indicated.
         1. Use O Joint Substrates: Concrete.
   e. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:
      i. Products:
         1. Pecora Corporation; 898.
         2. Tremco; Tremsil 600 White.
      ii. Type and Grade: S (single component) and NS (nonsag).
      iii. Class: 25.
      iv. Use Related to Exposure: NT (nontraffic).
      v. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
         1. Use O Joint Substrates: ceramic tile, plastic laminate, stainless steel, gypsum board, solid surfacing.
   f. Single-Component Neutral-Curing Silicone Sealant:
      i. Available Products:
         1. Dow Corning Corporation; 790.
         2. GE Silicones; SilPruf SCS2000.
         3. Pecora Corporation; 864.
         4. Tremco; Spectrem 3.
      ii. Type and Grade: S (single component) and NS (nonsag).
      iii. Class: 50 or 100/50.
      iv. Use Related to Exposure: NT (nontraffic).
      v. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
         1. Use O Joint Substrates: color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, and limestone.
      vi. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

10. Latex Joint Sealants
    a. Latex Sealant (LS-1): Comply with ASTM C 834, Type P, Grade NF.
    b. Products:
        i. Pecora Corporation; AC-20+.
        ii. Tremco; Tremflex 834.

11. Joint-Sealant Backing
    a. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
    b. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

12. Miscellaneous Materials
    a. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
    b. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
    c. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

13. Examination

14. Preparation

15. Installation of Joint Sealants

16. Cleaning

17. Protection

SECTION 079500- EXPANSION CONTROL (To be Provided at a later date)

DIVISION 8: OPENINGS

SECTION 081113- HOLLOW METAL DOORS AND FRAMES

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Coordination

9. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Amweld Building Products, LLC.
        ii. Ceco Door Products; an ASSA ABLOY Group Company.
        iii. CURRIES Company; an ASSA ABLOY Group Company.
        iv. Pioneer Industries, Inc.
        v. Republic Builders Products Company.
        vi. Steelcraft; an Ingersoll-Rand Company.

10. Materials
    a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
    b. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
    c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 (ZF180) zinc-iron-alloy (galvannealed) coating designation.
    d. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized
    e. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B
    f. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
    g. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
    h. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."
    i. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
    j. Glazing: Comply with requirements in Division 8 Section "Glazing."
    k. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

11. Standard Steel Doors
    a. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless

otherwise indicated. Comply with ANSI A250.8.

i. Design: Flush panel.
ii. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
    1. Typical Interior Door Core: Vertical steel stiffeners with mineral sound deadening insulation in cavities.
    2. Typical Exterior Door Core: Insulated polyurethane core.
    3. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
iii. Vertical Edges for Single-Acting Doors: Beveled edge unless square edge is indicated.
    1. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).
iv. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
v. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick end closures or channels of same material as face sheets.
vi. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

b. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
    i. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
c. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
    i. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
d. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
    i. Hinges: Minimum 0.123 inch (3.0 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
    ii. Pivots: Minimum 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
    iii. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
    iv. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.
e. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

12. Standard Steel Frames
    a. General: Comply with ANSI A250.8 and with details indicated for type and profile.
    b. Exterior Frames: Fabricated from metallic-coated steel sheet.
        i. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
        ii. Frames for Level 3 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet, unless otherwise indicated.
    c. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
        i. Fabricate frames with mitered or coped and welded face corners and seamless

face joints.
ii. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
iii. Frames for Borrowed Lights: 0.053-inch- (1.3-mm-) thick steel sheet.

d. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
i. Hinges: Minimum 0.123 inch (3.0 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
ii. Pivots: Minimum 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
iii. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
iv. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.

e. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

f. Jamb Anchors:
i. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
ii. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
iii. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

g. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
i. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
ii. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

h. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

13. Stops and Moldings
a. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.
b. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch (16 mm) high, unless otherwise indicated.
c. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

14. Fabrication
a. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
b. Standard Steel Doors
i. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to

permit moisture to escape. Seal joints in top edges of doors against water penetration.

ii. Glazed Lites: Factory cut openings in doors.

c. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

i. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

ii. Sidelight Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as doorframe. Fasten members at crossings and to jambs by butt welding.

iii. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated

iv. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

v. Jamb Anchors: Provide number and spacing of anchors as follows:

1. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
   a. Two anchors per jamb up to 60 inches (1524 mm) in height.
   b. Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
   c. Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) in height.
   d. Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 120 inches (3048 mm) in height.
2. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
   a. Three anchors per jamb up to 60 inches (1524 mm) in height.
   b. Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
   c. Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
   d. Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 96 inches (2438 mm) in height.
   e. Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
3. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

vi. Head Frame Reinforcing: Reinforce the head of frames over 48” wide with roll formed steel channels fitted tightly into the frame, flush with frame top.

vii. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

1. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
2. Double-Door Frames: Drill stop in head jamb to receive two door

silencers per door.

d. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
    i. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
    ii. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
e. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
    i. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
    ii. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
    iii. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
    iv. Provide loose stops and moldings on inside of doors and frames.
    v. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

15. Steel Finishes
    a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
        i. Finish standard steel door and frames after assembly.
    b. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
        i. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
    c. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
    d. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.018 mm).
        i. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

16. Examination

17. Preparation

18. Installation

19. Adjusting and Cleaning

SECTION 081416- FLUSH WOOD DOORS

1. Related Documents

2. Summary

3. Submittals

4. Quality Assurance

5. Delivery, Storage and Handling

6. Project Conditions

7. Warranty
    a. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.
        i. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
        ii. Warranty shall be in effect during the following period of time from date of Substantial Completion:
            1. Solid-Core Interior Doors: Life of installation.

8. Manufacturers
    a. Flush Wood Doors:
        i. Algoma Hardwoods Inc
        ii. Eggers Industries; Architectural Door Division.
        iii. GRAHAM Manufacturing Corp.
        iv. VT Industries Inc.
        v. Weyerhaeuser Company.

9. Door Construction, General
    a. Doors for Transparent Finish:
        i. Grade: Premium, with Grade A faces.
        ii. Species and Cut: Red oak, rotary cut.
        iii. Match between Veneer Leaves: Slip match.
        iv. Assembly of Veneer Leaves on Door Faces: Balance match.
        v. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
        vi. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

vii. Stiles: Same species as faces or a compatible species.

10. Solid-Core Doors
    a. Particleboard Cores: Comply with the following requirements:
        i. Particleboard: ANSI A208.1, Grade LD-2.
        ii. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
        iii. Provide doors with either glued-block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
    b. Interior Veneer-Faced Doors:
        i. Core: Particleboard.
        ii. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
    c. Fire-Rated Doors:
        i. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
        ii. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware, and as follows:
            1. 5-inch (125-mm) top-rail blocking.
            2. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
            3. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
        iii. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile matching face veneer, and laminated backing at hinge stiles for improved screw-holding capability and split resistance.
        iv. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

11. Louvers and Light Frames
    a. Wood Beads for Light Openings in Wood Doors:
        i. Wood Species: Species compatible with door faces.
        ii. Profile: Manufacturer's standard shape.
        iii. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.
    b. Metal Frames for Light Openings in Fire Doors: Manufacturer's standard frame formed of 0.0478-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed and approved for use in doors of fire rating indicated.

12. Fabrication
    a. Fabricate doors in sizes indicated for Project-site fitting.
    b. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
        i. Light Openings: Trim openings with moldings of material and profile indicated.

13. Examination

14. Installation

15. Adjusting

SECTION 083113- ACCESS DOORS AND FRAMES

1. Related Documents

2. Summary

3. Submittals

4. Quality Assurance

5. Coordination

6. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Acudor Products, Inc.
        ii. Bar-Co, Inc. Div.; Alfab, Inc
        iii. Cendrex, Inc.
        iv. Cesco Products.
        v. Elmdor/Stoneman; Div. of Acorn Engineering Co.
        vi. Jensen Industries.
        vii. J. L. Industries, Inc.
        viii. Karp Associates, Inc.
        ix. Larsen's Manufacturing Company.
        x. MIFAB Manufacturing, Inc.
        xi. Milcor Limited Partnership.
        xii. Nystrom Building Products Co.
        xiii. Precision Plumbing Products, Inc.
        xiv. Williams Bros. Corporation of America (The).

7. Materials
    a. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.
    b. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.

8. Paint
    a. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

9. Access Doors and Frames
    a. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.
        i. Locations: Masonry, ceramic-tile, or painted gypsum wall surfaces.
        ii. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal, set flush with exposed face flange of frame.
        iii. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch- (25-mm-) wide, surface-mounted trim
        iv. Hinges: Spring-loaded concealed pin type.
        v. Lock: Key-operated cylinder lock.

10. Fabrication
    a. General: Provide access door assemblies manufactured as integral units ready for installation.
    b. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
    c. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
        i. Exposed Flanges: Nominal 1 to 1-1/2 inches (25 to 38 mm) wide around perimeter of frame.
        ii. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction. Furnish adjustable metal masonry anchors.
    d. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

11. Finishes, General
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Finish metal fabrications after assembly.

12. Steel Finishes
    a. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
        i. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
        ii. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
    b. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

13. Preparation

14. Installation

15. Adjusting and Cleaning

SECTION 083213- SLIDING ALUMINUM-FRAMED GLASS DOORS

1. General

2. Related documents

3. Summary
    a. This Section includes sliding aluminum-framed glass doors for interior locations.
4. Definitions

5. Performance requirements

6. Submittals

7. Quality assurance

8. Project conditions

9. Warranty
    a. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sliding aluminum-framed glass doors that fail in materials or workmanship within specified warranty period.
    b. Failures include, but are not limited to, the following:
        i. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
        ii. Faulty operation of movable panels and hardware.
        iii. Deterioration of insulated glazing, metal finishes, and other materials beyond normal weathering.
    c. Warranty Period:
        i. Door: Five years from date of Substantial Completion.
        ii. Glazing: Five years from date of Substantial Completion.
        iii. Finish: 10 years from date of Substantial Completion.

10. Manufacturers
    a. Basis of Design Product: "1010 Sliding Mall Front" by Kawneer Company, Inc. Provide the specified product or a comparable product by one of the following:
        i. TRACO.
        ii. Tubelite.

11. Materials
    a. Delete this Article if materials specified in AAMA/NWWDA 101/I.S.2 are acceptable. If control over some materials is required, retain or edit applicable paragraphs.
    b. Aluminum Extrusions: Provide alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and panel members.
    c. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with sliding aluminum-framed glass door members, trim, hardware, anchors, and other components.
    d. Retain subparagraph below for least-expensive workmanship.
    e. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2

mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.

f. Generally retain subparagraph below. Revise if exposed fasteners are permitted.
g. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
h. Paragraph below is adequate for most projects; structural calculations may be required on major projects.
i. Anchors, Clips, and Accessories: Provide anchors, clips, and sliding aluminum-framed glass door accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 (Severe) service conditions; provide enough strength to withstand design pressure indicated.
j. Delete two paragraphs and associated subparagraphs below if doors are not weather stripped; otherwise, select appropriate method.
k. Retain paragraph and subparagraphs below for weather-stripped doors. Compression-type weather stripping is required to prevent air infiltration when sliding glass door is closed and locked.
l. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when sliding aluminum-framed glass door is closed.
m. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.
n. Retain paragraph and subparagraph below for complete weather stripping, which is sometimes omitted on interior or low-cost doors.
o. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

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12. Glazing
    a. Revise first paragraph below if other than insulating-glass units are required or if site glazing is required or allowed. Delete below and insert detailed glazing requirements if glass and glazing requirements for doors must be specified entirely in this Section. Some manufacturers offer several glazing options, including special units for hot or cold climates.
    b. Glass: Provide insulating-glass units that comply with safety glazing requirements and with Division 8 Section "Glazing."
    c. Glazing System: Provide manufacturer's standard glazing system that produces weathertight seal.

13. Hardware
    a. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock sliding aluminum-framed glass doors. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze; extruded, cast, or wrought aluminum; solid white metal with special coating finish; or nonmagnetic stainless steel.

    b. Roller Assemblies: Provide movable panels with rollers and roller assemblies that comply with AAMA 906.3.

    c. Threshold and Sill Cap/Track: Provide extruded-aluminum threshold and track of

thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated; with manufacturer's standard finish.

d. Interior Floor Track: Low profile, with stainless-steel cap.

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e. Door Pulls: Provide manufacturer's standard extruded-aluminum pull grips.

f. Locks: Install manufacturer's standard pull and outside keyed cylinder lock, and latching device on each movable panel, lockable from the outside. Adjust latching device to allow unobstructed movement of the panel across adjacent panel in the direction indicated.

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14. Fabrication
    a. General: Fabricate sliding aluminum-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

15. Aluminum finishes
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
    c. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
    d. Color: As selected by Architect from full range of industry colors and color densities.

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16. Execution

17. Examination

18. Installation

19. Adjusting

20. Cleaning

21. Protection

SECTION 083323- OVERHEAD COILING DOORS

1. General

2. Summary
    a. Section includes:
        iv. Insulated service doors.
        v. Counter doors.

3. Related Section:

4. Performance requirements

5. Submittals

6. Quality assurance

7. Door curtain materials and construction
    a. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
        i. Vision-Panel Glazing: Manufacturer's standard clear glazing, fabricated from transparent acrylic sheet or fire-protection rated glass as required for type of door.
        ii. Retain three subparagraphs below as required for thermally insulated doors; revise to suit Project.
        iii. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
        iv. Two subparagraphs below describe different interior facings for insulated slats; facing in first subparagraph is most common.
        v. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
        vi. Subparagraph below is not applicable to fire-rated assemblies. Verify availability with manufacturer.
        vii. Retain one or both of first two paragraphs below or revise to suit Project.
        viii. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from metal to match curtain slats and finish.
        ix. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from metal to match curtain slats and finish.
        x. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
        xi. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
    b. Hood
        i. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
        ii. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

iii. Counter doors
iv. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:

c. Locking devices
i. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
ii. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
iii. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware."and keyed to building keying system.
iv. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

d. Curtain accessories
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i. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
ii. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.[Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.]

e. Counterbalancing mechanism
i. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
ii. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

f. Manual door operators
i. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
ii. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed [25 lbf (111 N)] <Insert force>.
iii. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum [25 lbf (111 N)] [30 lbf (133 N)] <Insert force> force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide..

g. Electric door operators
i. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door[and operation-cycles requirement] specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
ii. Comply with NFPA 70.
iii. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
iv. Durability requirement in first paragraph below is separate from operation

cycles, which apply to the whole door system.

v. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

vi. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

vii. Electrical Characteristics:

iv. Phase: Single phase. Volts: 208, Hertz: 60.

v. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.

vi. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.

vii. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

viii. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

ix. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.[Provide self-monitoring capability designed to interface with door operator control circuit to detect damage to or disconnection of sensing device.]

x. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

xi. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

xii. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

xiii. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

xiv. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

xv. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

xvi. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

xvii. Radio-Control System: Consisting of three-channel universal coaxial receiver to open, close, and stop door; two per operator.

8. Door assembly .
   a. Insulated Service, Counter Door, Overhead coiling door: Formed with curtain of

interlocking metal slats.

b. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   i. Dynamic, Metro, and QMI, listed below, do not produce fire-rated doors.
   ii. Cookson Company.
   iii. Cornell Iron Works, Inc.
   iv. Overhead Door Corporation.
   v. Raynor.
c. Operation Cycles: Not less than 50,000.
d. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu (0.881 K x sq. m/W).
e. Door Curtain Material: [Galvanized steel] [Stainless steel] [Aluminum].
f. Door Curtain Slats: Flat profile slats.
g. Vision Panels: Approximately 10- by 1-5/8-inch (254- by 41-mm) openings spaced approximately 2 inches (51 mm) apart and beginning 12 inches (305 mm) from end guides; in [two] [three] <Insert number> rows of slats at height indicated on Drawings; installed with [insulated] [fire-rated] vision-panel glazing.
h. Insulated-Slat Interior Facing: Metal.
i. Curtain Jamb Guides: [Galvanized steel] [Stainless steel] [Aluminum] with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
j. Hood: Galvanized steel] [Stainless steel] [Aluminum]..
k. Shape: As shown on Drawings.
l. Mounting: [Face of wall] [Between jambs] .
m. Integral Frame, Hood, and Fascia for Counter Door: [Galvanized steel] [Stainless steel].
n. Mounting: [Face of wall] [Between jambs] .
o. Sill Configuration for Counter Door: No sill.
p. Locking Devices: Equip door with locking device assembly .
q. Locking Device Assembly: inside and outside with cylinders.
r. Manual Door Operator: Push-up operation.

9. Electric Door Operator:
   a. Usage Classification: Standard duty, up to 60 cycles per hour.
   b. Motor Exposure: Interior.
   c. Emergency Manual Operation: Push-up.
   d. "Pneumatic sensor" option in first subparagraph below may be limited to a width of 18 feet (5.5 m). Verify availability with manufacturer.
   e. Obstruction-Detection Device: Automatic photoelectric sensor.
   f. Remote-Control Station: Interior.
   g. Other Equipment: Audible and visual signals, Radio-control system.

10. Door Finish:
   a. Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
   b. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
   c. Factory Prime Finish: Manufacturer's standard color..
   d. Stainless-Steel Finish: No. 4 (polished directional satin)finish.
   e. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

11. Execution

12. Installation

13. Demonstration

SECTION 084113- ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1. Related documents

2. Summary
    a. This Section includes the following:
        i. Exterior and interior aluminum-framed storefronts.
        ii. Glazing is retained mechanically with gaskets on four sides.
        iii. Exterior and interior manual-swing aluminum doors.
        iv. Exterior aluminum-framed windows.

3. Performance requirements
    a. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
        i. Structural loads.
        ii. Thermal movements.
    b. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
    c. Dimensional tolerances of building frame and other adjacent construction.
    d. Failure includes the following:
        i. Deflection exceeding specified limits.
        ii. Thermal stresses transferred to building structure.
        iii. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
        iv. Noise or vibration created by wind and thermal and structural movements.
        v. Loosening or weakening of fasteners, attachments, and other components.
        vi. Sealant failure.
        vii. Failure of operating units to function properly.
    e. Deflection of Framing Members:
        i. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
        ii. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
    f. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
        i. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
        ii. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
        iii. Design Displacement: As indicated on Drawings.

iv. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
v. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
vi. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..
vii. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
viii. Maximum Water Leakage: No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.
ix. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 62 when tested according to AAMA 1503.
x. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.44 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

4. Submittals

5. Quality assurance

6. Project conditions

7. Warranty
   a. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
   b. Failures include, but are not limited to, the following:
      i. Structural failures including, but not limited to, excessive deflection.
      ii. Noise or vibration caused by thermal movements.
      iii. Deterioration of metalsand other materials beyond normal weathering.
      iv. Water leakage through fixed glazing and framing areas.
      v. Failure of operating components to function properly.
   c. Warranty Period: Two years from date of Substantial Completion.
   d. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   e. Warranty Period: 20 years from date of Substantial Completion.

8. Manufacturers

a. Basis-of-Design Product: "Trifab VG 451T" by Kawneer Company, Inc. Subject to compliance with requirements provide the listed product, or a comparable product of one of the following:
   i. Arch Aluminum & Glass Co., Inc.
   ii. EFCO Corporation.
   iii. Tubelite Inc.
   iv. Vistawall Architectural Products.

9. Materials
   a. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   b. Sheet and Plate: ASTM B 209.
   c. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
   d. Extruded Structural Pipe and Tubes: ASTM B 429.
   e. Structural Profiles: ASTM B 308/B 308M.

10. Framing systems
   a. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   b. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.
   c. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
   d. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   e. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   f. Reinforce members as required to receive fastener threads.
   g. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
   h. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
   i. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

11. Glazing systems
   a. Glazing: As specified in Division 8 Section "Glazing."
   b. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
   c. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

12. Doors
   .
   a. Doors: Manufacturer's standard glazed doors, for manual swing operation.
   b. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
   c. Coordinate door design with hardware requirements. Narrow stile doors may not be able to accommodate some exit devices.

d. Door Design: As indicated.

e. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
f. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
g. Provide nonremovable glazing stops on outside of door.
h. Door Hardware: As specified in Division 8 Section "Door Hardware."

13. Accessory materials

14. Fabrication

15. Examination
.
16. Installation
.
17. Adjusting

SECTION 084413- GLAZED ALUMINUM CURTAIN WALLS

1. General

2. Related documents

3. Summary
   a. Section includes conventionally glazed aluminum curtain walls installed as stick assemblies.

4. Allowances

5. Performance requirements
   a. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   b. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   c. Failure also includes the following:
      i. Thermal stresses transferring to building structure.
      ii. Glass breakage.
      iii. Noise or vibration created by wind and thermal and structural movements.
      iv. Loosening or weakening of fasteners, attachments, and other components.
      v. Failure of operating units.
   d. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   e. Structural Loads:

i. Wind Loads: As indicated on Drawings.
ii. Blast Loads: 3 - second, complying with ASTM F2248.

f. Structural-Test Performance: Test according to ASTM E 330 as follows:
i. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
ii. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

g. Test Durations: As required by design wind velocity, but not less than 10 seconds.

h. Deflection of Framing Members: At design wind pressure, as follows:
i. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of clear span.

ii. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span.
iii. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
iv. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

i. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 4.

j. Large-Missile Test: For glazed openings located within 30 feet of grade.

k. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7

l. Component Importance Factor is 1.0.

m. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement.

n. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12.0 lbf/sq. ft..

o. AAMA 501.1's definition of water leakage allows up to 1/2 oz. (15 mL) of water to accumulate on an interior stop or stool integral to assembly in a 15-minute period.

p. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation.

q. Thermal Movements: Allow for thermal movements resulting from the following maximum change in ambient and surface temperatures:

r. Temperature Change : 120 deg F, ambient; 180 deg F, material surfaces.

s. Test Interior Ambient-Air Temperature: 75 deg F.

t. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.

u. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.48 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

v. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.45 as determined according to NFRC 200.

w. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lb/sq. ft..

x. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.
y. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:
z. Outdoor-Indoor Transmission Class: Minimum 34 when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

6. Submittals

7. Quality assurance

8. Project conditions

9. Warranty
    a. When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.
    b. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
    c. Failures include, but are not limited to, the following:
        i. Structural failures including, but not limited to, excessive deflection.
        ii. Noise or vibration created by wind and thermal and structural movements.
        iii. Delete option in first subparagraph below if retaining "Special Finish Warranty" Paragraph.
        iv. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
        v. Water penetration through fixed glazing and framing areas.
        vi. Failure of operating components.
    d. Warranty Period: Two years from date of Substantial Completion.
        i. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period
        ii. Warranty Period: Five years from date of Substantial Completion.
10. Products

11. Manufacturers
    e. Manufacturers:
        i. EFCO Corporation.
        ii. Kawneer North America; an Alcoa company.
        iii. United States Aluminum.
        iv. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
12. Materials
    f. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
        i. Sheet and Plate: ASTM B 209.
        ii. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
        iii. Extruded Structural Pipe and Tubes: ASTM B 429.
        iv. Structural Profiles: ASTM B 308/B 308M.

v. Retain subparagraph below for welding.
vi. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

g. Retain paragraph below for internal steel reinforcement of aluminum framing members; revise to suit Project.
h. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
i. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
j. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
k. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

13. Framing
    a. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
    b. Construction: Thermally broken.
    c. Glazing System: Retained mechanically with gaskets on four sides.
    d. Glazing Plane: Front.
    e. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
    f. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
    g. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
    h. Reinforce members as required to receive fastener threads.
    i.
    j. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system , fabricated from 300 series stainless steel.
    k. Anchors: Three-way adjustable anchors with minimum adjustment of [1 inch] <Insert dimension> that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
    l. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
    m. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
    n. Framing Sealants: Manufacturer's standard sealants.

14. Glazing
    a. Glazing: Comply with Division 8 Section "Glazing."
    b. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
    c. Glazing Sealants: As recommended by manufacturer.
    d. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

15. Operable units
    e. Doors: Comply with Division 8 Section "Aluminum-Framed Entrances and Storefronts."

16. Accessory materials
    a. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

17. Fabrication
    a. Form or extrude aluminum shapes before finishing.
    b. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
    c. Fabricate components that, when assembled, have the following characteristics:
        i. Profiles that are sharp, straight, and free of defects or deformations.
        ii. Accurately fitted joints with ends coped or mitered.
        iii. Physical and thermal isolation of glazing from framing members.
        iv. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
        v. Provisions for field replacement of glazing from exterior and exterior for spandrel glazing or metal panels.
        vi. Provisions for safety railings mounted between mullions at interior.
        vii. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
    d. Fabricate components that, when assembled, have the following characteristics:
    e. System in first subparagraph below uses internal drainage method to protect against both water leakage and excessive air infiltration.
    f. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
    g. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
    h. Curtain-Wall Framing: Fabricate components for assembly using shear-block system..
    i. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

18. Aluminum finishes
    a. Clear Anodic Finish: AA-M12C22A41, Class I, 0.018 mm or thicker.

19. Execution

20. Examination

21. Installation

22. Erection tolerances

23. Field quality control

SECTION 087111- DOOR HARDWARE (SCHEDULE BY NAMING PRODUCTS)

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Delivery, Storage & Handling
6. Coordination
7. Warranty
8. Maintenance Service
9. Scheduled Door Hardware
10. Hinges and Pivots
11. Door Bolts
12. Locks and Latches
13. Cylinders and Keying
14. Exit Devices
15. Closers
16. Operating and Protective Trim Units
17. Stops and Holders
18. Door Thresholds, Weatherstripping & Gasketing
19. Fabrication
20. Finishes
21. Examination
22. Preparation
23. Installation
24. Field Quality Control
25. Adjusting

26. Cleaning and Protection

27. Demonstration

28. Door Hardware Schedule

SECTION 088000- GLAZING

1. Related Documents

2. Summary

3. Definitions

4. Performance Requirements

5. Submittals

6. Quality Assurance

7. Delivery, Storage & Handling

8. Project Conditions

9. Warranty
    a. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
        i. Warranty Period: 10 years from date of Substantial Completion.
    b. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
        i. Warranty Period: 10 years from date of Substantial Completion.

10. Manufacturers
    a. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
        i. Products: Subject to compliance with requirements, provide one of the products specified.
        ii. Product: Subject to compliance with requirements, provide product specified.
        iii. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

11. Glass Products
    a. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
    b. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

c. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

12. Fire-Rated Glazing Products
    a. Monolithic Ceramic Glazing Material: Proprietary product in the form of clear flat sheets of 3/16-inch (5-mm) nominal thickness weighing 2.5 lb/sq. ft. (12.2 kg/sq. m), and as follows:
        i. Fire-Protection Rating: As indicated for the fire window in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
        ii. Product: "Premium FireLite" (polished on both surfaces) by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

13. Glazing Tapes
    a. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
        i. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
        ii. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
    b. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
        i. Type 1, for glazing applications in which tape acts as the primary sealant.
        ii. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

14. Miscellaneous Glazing Materials
    a. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
    b. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer
    c. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
    d. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
    e. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
    f. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
    g. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

15. Fabrication of Glazing Units
    a. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
    b. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
    c. Grind smooth and polish exposed glass edges and corners.

16. Monolithic Float-Glass Units
    a. Uncoated Clear Float-Glass Units (#4): Class 1 (clear) float glass.
        i. Thickness: 6.0 mm.
        ii. Kind FT (fully tempered).
    b. Uncoated Clear Float-Glass Units (#6): Class 1 (clear) float glass.
        i. Thickness: 6.0 mm.

17. Insulating Glass Units
    a. Solar-Control Low-E Insulating-Glass Units (#1):
        i. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
        ii. Interspace Content: Argon.
        iii. Outdoor Lite: Class 2 (tinted) float glass.
            1. Tint Color: Gray.
            2. Kind FT (fully tempered).
        iv. Indoor Lite: Class 1 (clear) float glass.
            1. Laminated
        v. Low-E Coating: Pyrolytic on second surface.
        vi. Visible Light Transmittance: 44 percent minimum.
        vii. Winter Nighttime U-Factor: 0.35 maximum
        viii. Summer Daytime U-Factor: 0.39 maximum.
        ix. Solar Heat Gain Coefficient: 0.45 maximum.
        x. Outdoor Visible Reflectance: 9 percent maximum.

18. Fire-Rated Glass Units
    a. Fire-Rated Monolithic Ceramic Glass Units (#8):
        i. "Premium FireLite" (polished on both surfaces) by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
        ii. Thickness: 3/8 inch.

19. Examination

20. Preparation

21. Glazing, General

22. Tape Glazing

23. Cleaning and Protection

SECTION 088300- MIRRORS

1. Related Documents
2. Summary
3. Definitions
4. Performance Requirements
5. Submittals
6. Quality Assurance
7. Deliver, Storage & Handling
8. Project Conditions
9. Warranty
    a. Special Warranty: Manufacturer's standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below:
        i. Warranty Period: Five years from date of Substantial Completion.
10. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide mirrors by one of the following:
        i. Arch Aluminum & Glass Co., Inc.
        ii. Gardner Glass Products.
        iii. Gilded Mirrors, Inc.
        iv. Guardian Industries Corp.
        v. Independent Mirror Industries, Inc.
        vi. Lenoir Mirror Company.
        vii. Messer Industries, Inc.
        viii. Stroupe Mirror Co., Inc.
        ix. Sunshine Mirror.
        x. Virginia Mirror Company, Inc.
        xi. VVP America, Inc.; Binswanger Mirror Products.
        xii. Walker Glass Co., Ltd.
11. Silvered Flat Glass Mirror Materials
    a. Tempered Clear Glass Mirrors: Comply with ASTM C 1503, Mirror Glazing Quality, for blemish requirements in annealed float glass before silver coating is applied, for coating requirements, and with other requirements not affected by tempering process; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
        i. Nominal Thickness: 6.0 mm.
12. Miscellaneous Materials
    a. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
    b. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors

and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

i. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Gunther Mirror Mastics.
   2. Palmer Products Corporation.

13. Mirror Hardware
    a. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
       i. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch (9.5 and 22 mm) in height, respectively, and a thickness of not less than 0.05 inch (1.3 mm).
       ii. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch (16 and 25 mm) in height, respectively, and a thickness of not less than 0.062 inch (1.57 mm).
       iii. Products: Subject to compliance with requirements, provide one of the following:
          1. Bottom Trim:
             a. Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.
             b. Sommer & Maca Industries, Inc.; Medium Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.
             c. Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.
          2. Top Trim:
             a. Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
             b. Sommer & Maca Industries, Inc.; Medium Gauge Aluminum Deep Nose "J" Moulding Upper Bar.
             c. Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.
    b. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
    c. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

14. Fabrication
    a. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes.
    b. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

15. Examination

16. Preparation

17. Installation

18. Cleaning and Protection

DIVISION 9: FINISHES

SECTION 092900- GYPSUM BOARD ASSEMBLIES

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Quality Assurance
6. Delivery, Storage & Handling
7. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Steel Framing and Furring:
            1. Clark Steel Framing Systems.
            2. Consolidated Systems, Inc.
            3. Dale Industries, Inc. - Dale/Incor.
            4. Dietrich Industries, Inc.
            5. MarinoWare; Division of Ware Ind.
            6. National Gypsum Company.
            7. Scafco Corporation.
            8. Unimast, Inc.
            9. Western Metal Lath & Steel Framing Systems.
        ii. Gypsum Board and Related Products:
            1. American Gypsum Co.
            2. G-P Gypsum Corp.
            3. National Gypsum Company.
            4. United States Gypsum Co.
8. Steel Suspended Ceiling and Soffit Framing
    a. Components, General: Comply with ASTM C 754 for conditions indicated.
    b. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.
    c. Hangers: As follows:
        i. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.
    d. Furring Channels (Furring Members): Commercial-steel sheet with manufacturer's standard corrosion-resistant zinc coating.
        i. Steel Studs: ASTM C 645.
            1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
            2. Depth: As indicated.

9. Steel Partition and Soffit Framing
    a. Components, General: As follows:
        i. Comply with ASTM C 754 for conditions indicated.
        ii. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with manufacturer's standard corrosion-resistant zinc coating.
    b. Steel Studs and Runners: ASTM C 645.
        i. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
        ii. Depth: As indicated.
    c. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges.
    d. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
        i. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
        ii. Depth: 7/8 inch (22.2 mm).
    e. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

10. Interior Gypsum Wallboard
    a. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
    b. Gypsum Wallboard: ASTM C 36.
        i. Regular Type:
            1. Thickness: As indicated.
            2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
            3. Location: As indicated.
        ii. Type X:
            1. Thickness: As indicated.
            2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
            3. Location: As indicated and where required for fire-resistance-rated assembly.
    c. Proprietary Abuse-Resistant Gypsum Wallboard: ASTM C 36, manufactured to produce greater resistance to surface indentation and through-penetration than standard gypsum panels.
        i. Products: Subject to compliance with requirements, provide one of the following:
            1. National Gypsum Company; Gold Bond Hi-Abuse Wallboard.
            2. United States Gypsum Co.; SHEETROCK Brand Abuse-Resistant Gypsum Panels.
        ii. Core: As indicated.
        iii. Long Edges: Tapered.
        iv. Location: As indicated, typically provide on the lower 48 inches in corridor applications.

11. Trim Accessories
    a. Interior Trim: ASTM C 1047.
        i. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
        ii. Shapes:
            1. Cornerbead: Use at outside corners, unless otherwise indicated.
            2. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.

3. L-Bead: L-shaped; exposed long leg receives joint compound; use where indicated.
4. Expansion (Control) Joint: Use where indicated.

12. Joint Treatment Materials
    a. General: Comply with ASTM C 475.
    b. Joint Tape:
        i. Interior Gypsum Wallboard: Paper.
    c. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
        i. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
        ii. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
        iii. Fill Coat: For second coat, use setting-type, sandable topping compound.
        iv. Finish Coat: For third coat, use setting-type, sandable topping compound.

13. Auxiliary Materials
    a. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
    b. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
        i. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
    c. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
        i. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

14. Texture Finishes
    a. Products: Subject to compliance with requirements, provide one of the following:
        i. Acoustical Finish:
            1. International Cellulose Corp.; SonaSpray "fc."
            2. United States Gypsum Co.; USG Acoustical Plaster Finish.
    b. Primer: As recommended by textured finish manufacturer.
    c. Acoustical Finish: Water-based, chemical-setting or drying-type, job-mixed texture finish for spray application.
        i. Application Thickness: 1/2 inch (12.7 mm).
        ii. Fire-Test-Response Characteristics: Indices when tested according to ASTM E 84 as follows:
            1. Flame Spread: Less than 25
            2. Smoke Developed: Less than 450.
        iii. NRC: 0.55 according to ASTM C 423.
        iv. Style: Spatter/Knockdown
        v. Location: Gypsum board soffits.

15. Examination

16. Preparation

17. Installing Steel Framing, General

18. Installing Steel Suspended Ceiling and Soffit Framing
19. Installing Steel Partition and Soffit Framing
20. Applying and Finishing Panels, General
21. Panel Application Methods
22. Installing Trim Accessories
23. Finishing Gypsum Board Assemblies
24. Applying Texture Finishes
25. Field Quality Control

SECTION 093000- TILING

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Quality Assurance
6. Delivery, Storage & Handling
7. Project Conditions
8. Extra Materials
9. Manufacturers
    a. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
        i. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
10. Products, General
    a. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
        i. Provide tile complying with Standard grade requirements, unless otherwise indicated.
        ii. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
    b. ANSI Standards for Tile Installation Materials: Provide materials complying with

ANSI standards referenced in "Setting and Grouting Materials" Article.

c. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
    i. As selected by Architect from manufacturer's full range. Assume field tile will be from price groups 1 and/or 2. Accent tile will be from price groups 3 and/or 4.
d. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
e. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
    i. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

11. Tile Products
    a. Manufacturers:
        i. American Olean; Div. of Dal-Tile International Corp.
        ii. Daltile; Div. of Dal-Tile International Inc.
        iii. Florida Tile Industries, Inc.
    b. Glazed Wall Tile: Flat tile as follows:
        i. Module Size: 4-1/4 by 4-1/4 inches (108 by 108 mm).
        ii. Thickness: 5/16 inch (8 mm).
        iii. Face: Plain with cushion edges.
        iv. Finish: Bright, opaque or Bright, clear glaze, depending on manufacturer’s options.
        v. Mounting: Factory back-mounted.
    c. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:
        i. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size 4-1/4 by 4-1/4 inches (108 by 108 mm).
        ii. External Corners for Thin-Set Mortar Installations: Surface bullnose.
        iii. Internal Corners: Field-butted square corners except with coved base and cap angle pieces designed to fit with stretcher shapes.

12. Setting and Grouting Materials
    a. Manufacturers:
        i. Bonsal, W. R., Company.
        ii. MAPEI Corporation.
        iii. TEC Specialty Products Inc.
    b. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
        i. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
        ii. Prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive.
            1. For wall applications, provide nonsagging mortar that complies with

Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

c. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.
    i. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
        1. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.

13. Miscellaneous Materials
    a. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
        i. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
    b. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

14. Mixing Mortars and Grout
    a. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
    b. Add materials, water, and additives in accurate proportions.
    c. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

15. Examination

16. Preparation

17. Installation, General

18. Wall Tile Installation

19. Cleaning and Protecting

SECTION 095113- ACOUSTICAL PANEL CEILINGS

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Coordination

9. Extra Materials

10. Manufacturers
    a. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
        i. Products: Subject to compliance with requirements, provide one of the products specified.
        ii. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

11. Acoustical Panels, General
    a. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
        i. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
    b. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
        i. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
    c. Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273.

12. Cast or Molded, Mineral-Base Acoustical Panels for Acoustical Panel Ceilings
    a. Products:
        i. Basis of Design: “F-Fissured” by USG.
    b. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
        i. Type and Form: Type III, mineral base with painted finish; Form 4, cast or molded.
        ii. Pattern: D (fissured).
    c. Color: White
    d. LR: Not less than 0.79.
    e. NRC: Not less than 0.70.
    f. CAC: Not less than 35.
    g. Edge Detail: Reveal sized to fit flange of exposed suspension system members.
    h. Thickness: 3/4 inch (19 mm).
    i. Size: 24 by 24 inches (610 by 610 mm).

j. Antimicrobial Treatment: Coating based.

13. Metal Suspension Systems, General
    a. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
    b. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
        i. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
    c. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
        i. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
    d. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
        i. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
        ii. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
        iii. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire

14. Metal Suspension Systems for Acoustical Panel Ceilings
    a. Manufacturers:
        i. Armstrong World Industries, Inc.
        ii. Celotex Corporation; Architectural Ceilings Marketing Dept.
        iii. Chicago Metallic Corporation.
        iv. USG Interiors, Inc.
    b. Wide-Face, Capped, Double-Web, Fire-Rated (where required) Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.
        i. Structural Classification: Heavy-duty system.
        ii. End Condition of Cross Runners: Override (stepped) or butt-edge type.
        iii. Face Design: Flat, flush.
        iv. Cap Material: Steel or aluminum cold-rolled sheet.
        v. Cap Finish: Painted white.
        vi. Provide non-rated system where APC-1 is required.

15. Metal Edge Moldings and Trim
    a. Manufacturers:

i. Armstrong World Industries, Inc.
ii. Celotex Corporation; Architectural Ceilings Marketing Dept.
iii. Chicago Metallic Corporation.
iv. USG Interiors, Inc.

b. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
i. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
ii. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

16. Examination

17. Preparation

18. Installation, General

19. Cleaning

SECTION 096513- RESILIENT BASE AND ACESSORIES (To be Provided at a later date)

SECTION 096519- RESILIENT TILE FLOORING

1. Related Documents

2. Summary

3. Submittals

4. Quality Assurance

5. Delivery, Storage & Handling

6. Project Conditions

7. Extra Materials

8. Manufacturers
a. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

9. Colors and Patterns
a. Colors and Patterns: As selected by Architect from manufacturer's full range.

10. Vinyl Composition Tile

a. Vinyl Composition Tile (VCT): ASTM F 1066.
    i. Armstrong World Industries, Inc.; Standard Excelon - Multicolor and Imperial Texture.
    ii. Mannington Mills, Inc.; Essentials and Designer Essentails.
    iii. Tarkett Inc.; Expressions.
b. Class: 2 (through-pattern tile).
c. Wearing Surface: Smooth.
d. Thickness: 0.125 inch (3.2 mm).
e. Size: 12 by 12 inches (305 by 305 mm).
f. Fire-Test-Response Characteristics:
    i. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

11. Resilient Wall Base
    a. Wall Base: ASTM F 1861
        i. Armstrong World Industries, Inc.
        ii. Azrock Commercial Flooring, DOMCO.
        iii. Burke Mercer Flooring Products.
        iv. Johnsonite.
        v. Marley Flexco (USA), Inc.
        vi. Roppe Corporation.
    b. Type (Material Requirement): TS (rubber, vulcanized thermoset).
    c. Group (Manufacturing Method): I (solid).
    d. Style: Cove (with top-set toe).
    e. Minimum Thickness: 0.125 inch (3.2 mm).
    f. Height: 4 inches (102 mm).
    g. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.
    h. Outside Corners: Job formed or premolded.
    i. Inside Corners: Job formed or premolded.
    j. Surface: Smooth.

12. Resilient Stair Accessories
    a. Treads: FS RR-T-650.
        i. Burke Mercer Flooring Products.
        ii. Johnsonite.
        iii. Marley Flexco (USA), Inc.
        iv. Roppe Corporation.
    b. Material: Rubber, Composition A.
    c. Surface Design: Type 2 design (designed).
        i. Type 2 Design: Raised-disc pattern.
    d. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
    e. Nosing Height: 1-1/2 inches (38 mm).
    f. Thickness: 0.125 inch (3.2 mm).
    g. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.
    h. Risers: Smooth, flat, coved-toe, 7 inches (178 mm) high by length matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
        i. Thickness: 0.125 inch (3.2 mm).
    i. Fire-Test-Response Characteristics:

i. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648

13. Resilient Molding Accessory
    a. Description: Carpet edge for glue-down applications, Reducer strip for resilient floor covering, and Joiner for tile and carpet.
        i. Burke Mercer Flooring Products.
        ii. Johnsonite.
        iii. Marley Flexco (USA), Inc.
        iv. Roppe Corporation.
    b. Material: Rubber.
    c. Profile and Dimensions: As indicated.

14. Installation Material
    a. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
    b. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
    c. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

15. Examination

16. Preparation

17. Tile Installation

18. Resilient Wall Base Installation

19. Resilient Accessory Installation

20. Cleaning and Protection

SECTION 096813- TILE CARPETING

1. Related Documents

2. Summary

3. Submittals

4. Quality Assurance

5. Deliver, Storage & Handling

6. Project Conditions

7. Warranty

a. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
b. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
    i. Warranty Period: 10 years

8. Extra Materials

9. Carpet Tile

CPT-1
a. Basis of Design:
    i. Design Weave, Never Too Much Collection Modular
        1. Color: As selected by Architect from manufacturer's full range.
    ii. Fiber Content: 100% Nylon
    iii. Gauge: 1/12
    iv. Density: 4,528 ozs./ yd.
    v. Flamibility: Class I
    vi. Backing: ecoworx\
    vii. Size: 24”x24”

CPT-2
a. Basis of Design:
    i. J&J Invision, Stacked, Modular
        1. Color: As selected by Architect from manufacturer's full range.
    ii. Fiber Content: 100% Ultron Nylon
    iii. Gauge: 1/10 (3.94 rows.cm)
    iv. Density: 6,253 ozs./ yd.
    v. Flamibility: Class I
    vi. Backing: eko modular
    vii. Size: 24”x24”

10. Installation Accessories
a. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:
    i. Carpet manufacturer.
b. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by carpet manufacturer.
c. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

11. Examination

12. Preparation

13. Installation

14. Cleaning and Protection

SECTION 099100- PAINTING (PROFESSIONAL LINE PRODUCTS)

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Extra Materials

9. Manufacturers
    a. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
    b. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
        i. Benjamin Moore & Co. (Benjamin Moore).
        ii. Sherwin-Williams Co. (Sherwin-Williams).

10. Paint Materials, General
    a. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
    b. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
        i. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
    c. Colors: As selected by Architect from manufacturer's full range.

11. Concrete Unit Masonry Block Fillers
    a. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.
        i. Benjamin Moore; Moorcraft Super Craft Latex Block Filler No. 285: Applied at a dry film thickness of not less than 8.1 mils (0.206 mm).
        ii. Sherwin-Williams; PrepRite Interior/Exterior Block Filler B25W25: Applied at a dry film thickness of not less than 8.0 mils (0.203 mm).

12. Exterior Primers
    a. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
        i. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
        ii. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).
    b. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
        i. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
        ii. Sherwin-Williams; primer not required over this substrate.

13. Interior Primers
    a. Interior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.
        i. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
        ii. Sherwin-Williams; PrepRite Masonry Primer B28W300: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).
    b. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
        i. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
        ii. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).
    c. Interior Plaster Primer: Factory-formulated latex-based primer for interior application.
        i. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils (0.030 mm).
        ii. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).
    d. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
        i. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
        ii. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).
    e. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
        i. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).

ii. Sherwin-Williams; Galvite HS B50WZ30: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).

14. Exterior Finish Coats
    a. Exterior Full-Gloss Alkyd Enamel: Factory-formulated full-gloss alkyd enamel for exterior application.
        i. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel M22: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
        ii. Sherwin-Williams; Industrial Enamel B-54 Series: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).

15. Interior Finish Coats
    a. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel
        i. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
        ii. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series: Applied at a dry film thickness of not less than 1.6 mils (0.041 mm).
    b. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.
        i. Benjamin Moore; Moorcraft Super Spec Alkyd Semi-Gloss Enamel No. 271: Applied at a dry film thickness of not less than 1.4 mils (0.036 mm).
        ii. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200 Series: Applied at a dry film thickness of not less than 1.7 mils (0.043 mm).

16. Examination

17. Preparation

18. Application

19. Field Quality Control

20. Cleaning

21. Protection

22. Exterior Paint Schedule

23. Interior Paint Schedule

SECTION 099300- STAINING AND TRANSPARENT FINISHING

1. General

2. Related documents

3. Summary

a. This Section includes surface preparation and the application of wood finishes on the following substrates:
    i. Interior Substrates:
    ii. Dressed lumber (finish carpentry).
    iii. Exposed wood panel products.

4. Related Sections

5. Submittals

6. Quality assurance

7. Delivery, storage, and handling

8. Project conditions

9. Extra materials

10. Products

11. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. PPG Architectural Finishes, Inc.
        ii. Sherwin-Williams Company (The)

12. Materials, general
    a. Material Compatibility:
        i. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
        ii. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
    b. Stain Colors: As selected by Architect from manufacturer's full range.

13. Wood fillers
    a. Wood Filler Paste: MPI #91.

14. Stains
    a. Interior Wood Stain (Semitransparent): MPI #90.

15. Polyurethane finishes
    a. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4..
    b. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.

16. Execution

17. Examination

18. Preparation.

19. Application

20. Field quality control

21. Cleaning and protection

INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

1. Finish Carpentry Substrates:
    b. Polyurethane Varnish Over Stain System: MPI INT 6.3E.
        i. Stain Coat: Interior wood stain (semitransparent).
        ii. Three Finish Coats: Interior, oil-modified, clear urethane (satin).

2. Exposed Wood Panel-Product Substrates:
    c. Polyurethane Varnish Over Stain System: MPI INT 6.4E.
        i. Stain Coat: Interior wood stain (semitransparent).
        ii. Three Finish Coats: Interior, oil-modified, clear urethane (satin).

SECTION 099600- HIGH-PERFORMANCE COATINGS

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Extra Materials

9. Manufacturers
    a. Products: Subject to compliance with requirements, provide one of the products indicated in the coating system descriptions.
    b. Manufacturers' Names: The following manufacturers are referred to in the coating system descriptions by shortened versions of their names shown in parenthesis
        i. Moore: Benjamin Moore & Co. (Moore).
        ii. Sherwin Williams; Industrial and Marine Coatings (S-W).

10. Coatings Materials, General
    a. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
    b. Material Quality: Provide manufacturer's highest grade of the various high-

performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

i. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

11. Colors
    a. Colors: As selected by Architect from manufacturer's full range.

12. Interior High-Performance Coating Systems
    a. Concrete and Masonry (Other Than Concrete Masonry Units): Provide the following finish systems over interior concrete and brick masonry surfaces:
        i. Severe Environment (Semigloss Finish): One finish coat over an intermediate coat and a primer.
            1. Primer: Epoxy primer applied at spreading rate recommended by manufacturer.
                a. Moore: M36-00/M37 Polyamide Epoxy Clear Sealer/Finish.
                b. S-W: Primer not required.
            2. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils (0.051 to 0.127 mm).
                a. Moore: M36/M38 Polyamide Epoxy Semi-Gloss Coating.
                b. S-W: Epolon II Multi-Mil Epoxy Series B62V800.
            3. Topcoat: Semigloss polyamide epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils (0.051 to 0.127 mm).
                a. Moore: M36/M38 Polyamide Epoxy Semi-Gloss Coating.
                b. S-W: Epolon II Multi-Mil Epoxy Series B62V800.
    b. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block:
        i. Severe Environment (Semigloss Finish): One finish coat over an intermediate coat and a block filler.
            1. Block Filler: Acrylic or epoxy block filler applied at spreading rate recommended by manufacturer as sufficient to fill pores.
                a. Moore: M31/M32 Waterborne Epoxy Block Filler.
                b. S-W: Epoxy Ester Masonry Filler Sealer B61W2 Series.
            2. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils (0.051 to 0.127 mm), unless otherwise indicated.
                a. Moore: M36/M38 Polyamide Epoxy Semi-Gloss Coating.
                b. S-W: Epolon II Multi-Mil Epoxy Series B62V800.
            3. Topcoat: Semigloss epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils (0.051 to 0.127 mm), unless otherwise indicated.
                a. Moore: M36/M38 Polyamide Epoxy Semi-Gloss Coating.
                b. S-W: Epolon II Multi-Mil Epoxy Series B62V800.

13. Examination

14. Preparation
15. Application
16. Cleaning
17. Protection

DIVISON 10: SPECIALTIES

SECTION 101100- VISUAL DISPLAY SURFACES

1. Related documents
2. Summary
3. Section Includes:
    a. Markerboards.
    b. Tackboards.
    c. Visual Display Rails
4. Definitions
5. Submittals
6. Quality assurance
7. Delivery, storage, and handling
8. Project conditions
9. Materials, general
    a. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
    b. Gloss Finish: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser.
    c. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
    d. Polyester Fabric: Custom Order Material (C.O.M.) allowance of $30.00 per yard. Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.
    e. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.
10. Markerboard assemblies
    a. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and, face sheet indicated.
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

i. Best-Rite Manufacturing.
ii. Claridge Products and Equipment, Inc.
iii. PolyVision Corporation; a Steelcase company.

c. Face Sheet:
i. Porcelain-enamel face sheet with high-gloss finish (Type MB): 0.021-inch- (0.53-mm-) thick.
ii. Capable of using magnates.
iii. Projection/Dry-Erase face sheet consisting of low-gloss, plastic film bonded to fabric backing (Type MB/PS): Not less than 0.012-mil (0.0003-mm) total thickness.

d. Particleboard Core: 1/2 inch (13 mm) thick; with 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet backing.

e. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

11. Tackboard assemblies
a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
i. Best-Rite Manufacturing.
ii. Claridge Products and Equipment, Inc.
iii. PolyVision Corporation; a Steelcase company.

b. Polyester-Fabric-Faced Tackboard: 1/4-inch- (6-mm-) thick, polyester-fabric-faced cork sheet factory laminated to 1/4-inch- (6-mm-) thick hardboard or particleboard backing.

c. Maharam

d. Knoll

12. Visual display rails
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
i. Best-Rite Manufacturing.
ii. Claridge Products and Equipment, Inc.
iii. PolyVision Corporation; a Steelcase company.

b. General: Manufacturer's standard, aluminum-framed, tackable cork visual display surface fabricated into narrow rail shape and designed for displaying material.

c. Visual Display Rail (TS): Factory assembled.

d. Tack Surface: Natural-cork tackboard assembly.

e. Size: 2 inches (50 mm) high by length indicated on Drawings.

f. Edges: Extruded-aluminum trim.

g. Ends: Aluminum.

h. Manufacturers' standard is clear anodic finish. Verify availability of other finishes with manufacturers and add color if required.

i. Aluminum Finish: Clear anodic finish.

13. Markerboard and tackboard accessories.
a. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape..

b. Factory-Applied Trim: Manufacturer's standard.

c. Chalktray: Manufacturer's standard, continuous.

d. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

e. Map Rail: Provide the following accessories:
    i. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches (25 to 50 mm) wide.
    ii. End Stops: Located at each end of map rail.
    iii. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches (1219 mm) of map rail or fraction thereof.
    iv. Flag Holder: Two for each room.
    v. Paper holders in subparagraph below can also be applied directly to chalkboards and markerboards rather than to map rails.
    vi. Paper Holder: Extruded aluminum; designed to hold paper by clamping action. Six per room.
f. Special-Purpose Graphics: Fuse or paint the following graphics into surface of porcelain-enamel visual display unit:
g. Music staff lines (on one board in Band Room).

14. Fabrication

15. General finish requirements

16. Aluminum finishes
    a. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

17. Execution

18. Examination

19. Preparation

20. Installation, general

21. Installation of factory-fabricated visual display boards and assemblies

22. Installation of visual display wall covering

23. Cleaning and protection

SECTION 101300- DIRECTORIES

1. General

2. Related documents

3. Summary
    a. This Section includes the following: Non-illuminated, changeable-letter directories.

4. Performance requirements

5. Submittals
6. Quality assurance
7. Coordination
8. Warranty
9. Products
10. Materials
    a. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
    b. Clear Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), with Finish 1 (smooth or polished), and 6 mm thick, unless otherwise indicated; colorless sheet with visible light transmittance of 92 percent measured per ASTM D 1003.
    c. Fasteners: Provide screws, bolts, and other fastening devices made from same material as items being fastened, except provide hot-dip galvanized, stainless-steel, or aluminum fasteners for exterior applications. Provide types, sizes, and lengths to suit installation conditions. Use security fasteners where exposed to view.
11. Changeable-letter directories
    a. Enclosed-Face, Changeable-Letter Directory: Factory-fabricated unit consisting of manufacturer's standard, 2-inch- (50-mm-) deep perimeter frame with removable letterboard on back inside surface and with glazed doors.
    b. Basis-of-Design Product: Nelson-Harkins “244 Series” or a comparable product by one of the following:
    c. Manufacturers:
        i. AARCO Products, Inc.
        ii. Nelson-Harkins Industries.
        iii. Tablet & Ticket Co. (The).
    d. Aluminum Perimeter Frame: Extruded aluminum[, with weather-resistant backing for exterior use].
        i. Perimeter Frame Profile: Quarter round.
        ii. .Perimeter Frame Corners: Radius.
        iii. Finish: Color anodic.
        iv. Color: Dark bronze.
    e. Glazed, Hinged Doors: Clear acrylic sheet set in door frame equipped with full-height continuous hinge and cylinder lock with two keys.
        i. .Door Frame: Same material and finish as perimeter frame.
        ii. .Number of Doors: One.
    f. Letterboard: Manufacturer's standard [vinyl]-covered panel material, with grooves spaced at 1/4 inch (6 mm) o.c. to receive changeable letters.
        i. Color: Black.
    g. Letters: Molded plastic with tabs for engaging grooves in letterboard. Provide manufacturer's standard assortment of not less than 300 characters for each size, style, color, and case required; include letters, numbers, and characters. Package letters in compartmentalized carrying box.
        i. .Height: 1 inch (25 mm) to top of capitals.
        ii. .Style: Helvetica.
        iii. .Color: White.
        iv. .Case: All capitals.

h. Width: 24 inches (610 mm).
i. Height: 36 inches (914 mm).
j. Mounting: Surface mounted.
k. Mounting Height: 72 inches (1829 mm) above finished floor to top of directory.
l. Provide a total quantity of 3 complete units (including one 300-character letter package for each unit) to be installed in locations verified with Architect.

12. Fabrication

13. Finishes, general

14. Aluminum finishes
    a. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
    b. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.

15. Execution

16. Examination

17. Installation

18. Adjusting and cleaning

SECTION 101400- SIGNAGE

1. General

2. Related documents

3. Summary
    a. This Section includes the following:
        i. Panel signs.
        ii. Dimensional characters (letters and numbers) for exterior use.
        iii. Signage accessories.
    .

4. Submittals

5. Quality assurance

6. Project conditions

7. Coordination

8. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by the

manufacturers specified.

9. Panel signs
    a. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
    b. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally.
    c. Provide panel signs as specified herein for Interior Code Signage as noted in paragraph 1.4C and as detailed.
    d. Provide panel signs as specified herein for restroom signage as detailed.
    e. Manufacturers:
        i. Andco Industries Corp.
        ii. ASI Sign Systems, Inc.
        iii. Best Manufacturing Co.
        iv. Innerface Sign Systems, Inc.
        v. Mills Manufacturing, Inc.
        vi. Supersine Company (The).
    f. Cast-Acrylic Sheet: Manufacturer's standard and as follows:
        i. Color: As selected by Architect from manufacturer's full range.
    g. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
        i. Edge Condition: Square cut.
        ii. Corner Condition: Rounded to radius indicated.
    h. Graphic Content and Style: Provide sign copy that complies with requirements indicated in the Sign Schedule on Drawings for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
    i. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of slide-in inserts or transparent covers with paper inserts printed by Owner.
    j. ADA Accessibility Guidelines and ICC/ANSI A117.1 require tactile and braille characters to be raised a minimum of 1/32 inch (0.8 mm) from face of sign.
    k. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
    l. Panel Material: Opaque acrylic sheet.
    m. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).
    n. Colored Coatings for Acrylic Sheet: For copy colors, provide Pantone Matching System (PMS) colored coatings, including inks and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for application intended.

10. Dimensional characters
    a. Manufacturers:
        i. A.R.K. Ramos.
        ii. ASI Sign Systems, Inc.
        iii. Innerface Sign Systems, Inc.
        iv. Metal Arts; Div. of L&H Mfg.
        v. Mills Manufacturing, Inc.
        vi. Southwell Co. (The).
    b. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated,

and with not less than the strength and durability properties of 6063-T5.

c. Fabricated Characters: Fabricate letters and numbers to required sizes and styles, using metals and thicknesses indicated. Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories. Comply with requirements indicated for finish, style, and size.
d. Aluminum Sheet: Not less than 0.090 inch (2.30 mm) thick.
e. Character Height: As indicated.
f. Character Style: Helvetica.
g. Character Depth: 1 inch.

11. Accessories
    a. Mounting Methods: Use double-sided vinyl tape fabricated from materials that are not corrosive to sign material and mounting surface.
    b. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

12. Finishes, general

13. Execution

14. Examination

15. Installation

16. Cleaning and protection

SECTION 102113- TOILET COMPARTMENTS

1. Related Documents

2. Summary

3. Submittals

4. Quality Assurance

5. Project Conditions

6. Metal Units
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. All American Metal Corp.
        ii. Bradley Corporation; Mills Partitions.
        iii. Global Steel Products Corp.

iv. Knickerbocker Partitions Corp.
v. Metpar Corp.
vi. Sanymetal; a Crane Plumbing Company.

b. Baked-Enamel Units: Facing sheets and closures fabricated from ASTM A 591/A 591M, 80Z (24G) (electrolytically zinc-coated) or ASTM A 653/A 653M (hot-dip galvanized or galvannealed), commercial steel sheet for exposed applications, that is mill phosphatized, and selected for smoothness.
   i. Facing Sheet Thicknesses: Minimum base-metal (uncoated) thicknesses as follows:
      1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm).
      2. Panels: Manufacturer's standard thickness, but not less than 0.0269 inch (0.7 mm).
      3. Doors: Manufacturer's standard thickness, but not less than 0.0269 inch (0.7 mm).
      4. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.0269 inch (0.7 mm).
   ii. Finish: Manufacturer's standard pigmented, organic coating, including thermosetting, electrostatically applied, and powder coatings. Provide coating system that complies with coating manufacturer's written instructions for pretreatment, application, baking, and minimum dry film thickness.
      1. Color: One color in each room as selected by Architect from manufacturer's full range of colors.

c. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets are pressure laminated to core material. Units have continuous, interlocking molding strip or lapped and formed edge closures. Exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections. Corners are sealed by welding or clips. Exposed welds are ground smooth.
   i. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
   ii. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
   iii. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
   iv. Urinal-Screen Construction: Matching panels.

d. Pilaster Shoes: Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch (0.8 mm) specified thickness and 3 inches (75 mm) high, finished to match hardware.

e. Brackets (Fittings):
   i. Stirrup Type: Ear or U-brackets, chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.

7. Accessories
   a. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
      i. Material: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.
   b. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

c. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

8. Fabrication
   a. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
   b. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.
      i. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
      ii. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
      iii. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
      iv. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
      v. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

9. Installation

10. Adjusting

SECTION 102213- WIRE MESH PARTITIONS

1. Related Documents

2. Summary

3. Definitions

4. Submittals

5. Quality Assurance

6. Delivery, Storage & Handling

7. Project Conditions

8. Coordination

9. Extra Materials

10. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Acorn Wire & Iron Works, Inc.
        ii. California Wire Products Corporation.
        iii. G-S Company (The).
        iv. Indiana Wire Products, Inc.
        v. Jesco Industries, Inc.
        vi. King Wire Partitions, Inc.
        vii. Miller Wire Works, Inc.
        viii. Newark Wire Works Inc.
        ix. SpaceGuard Products.
        x. Standard Wire & Steel Works.
        xi. Wire Crafters, Inc.

11. Materials
    a. Steel Wire: ASTM A 510 (ASTM A 510M).
    b. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
    c. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
    d. Square Steel Tubing: Cold-formed structural-steel tubing, ASTM A 500.
    e. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts.
    f. Postinstalled Expansion Anchors in Concrete: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
        i. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
        ii. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
        iii. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.
    g. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated and fabricated from corrosion-resistant materials; with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by wire mesh construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

12. Standard-Duty Wire Mesh Partitions
    a. Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate-crimp steel wire woven into 1-1/2-inch (38-mm) diamond mesh.
    b. Vertical Panel Framing: 1-1/4-by-5/8-by-0.0966-inch (32-by-16-by-2.5-mm) cold-rolled, C-shaped steel channels with 1/4-inch- (6-mm-) diameter bolt holes spaced not more than 18 inches (450 mm) o.c. along center of framing.
    c. Horizontal Panel Framing: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels.
    d. Horizontal Panel Stiffeners: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled

steel channels with wire woven through, or two 1-by-3/8-by-1/8-inch (25-by-9.5-by-3-mm) cold-rolled steel channels bolted or riveted toe to toe through mesh

e. Top Capping Bars: 2-1/4-by-1-inch (57-by-25-mm) cold-rolled steel channels.
f. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angles with 1/4-inch- (6-mm-) diameter bolt holes aligning with bolt holes in vertical framing; with floor anchor clips.
g. Line Posts: 3-inch-by-4.1-lb (76-mm-by-1.9-kg) or 3-1/2-by-1-1/4-by-0.1265-inch (89-by-32-by-3.2-mm) steel channels; with 5-by-18-by-1/4-inch (125-by-450-by-6-mm) steel base plates punched for attachment to floor.
h. Three- and Four-Way Intersection Posts: 1-1/4-by-1-1/4-inch (32-by-32-mm) tubular steel, with 1/4-inch- (6-mm-) diameter bolt holes aligned for bolting to adjacent panels
i. Floor Shoes: Steel, cast iron, or cast aluminum, 2 inches (50 mm) high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
j. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm) steel channels or C-channels, banded with 1-1/4-by-1/8-inch (32-by-3-mm) flat steel bar cover plates on 3 sides, and with 1/8-inch- (3-mm-) thick angle strike bar and cover on strike jamb.
    i. Hinges: Full-surface type, 3-by-3-inch (76-by-76-mm) steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.
    ii. Cylinder Lock: Mortise type with cylinder specified in Division 8 Section "Door Hardware" operated by key outside and recessed knob inside.
    iii. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.
k. Accessories:
    i. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch (25 mm) of adjustment.
l. Finishes for Interior Locations: Hot-dip galvanized.

13. Fabrication
    a. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-size components as recommended by wire mesh item manufacturer. Provide bolts, hardware, and accessories as required for complete installation.
        i. Fabricate wire mesh items to be readily disassembled.
        ii. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint.
    b. Standard-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
        i. Mesh: Securely clinch mesh to framing.
        ii. Framing: Fabricate framing with mortise and tenon corner construction.
            1. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
            2. Fabricate three- and four-way intersections using intersection posts and manufacturer's standard connecting clips and fasteners.
            3. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
        iii. Fabricate wire mesh partitions with 3 inches (76 mm) of clear space between finished floor and bottom horizontal framing.
        iv. Extend wire mesh partitions to within 3 inches (76 mm) of clear space around

structural framing and MEP penetrations.
v. Doors: Align bottom of door with bottom of adjacent panels.
1. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
vi. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

14. Finishes
a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
i. Finish wire mesh items after assembly
ii. 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.
b. Galvanizing: Where indicated, hot-dip galvanize wire mesh items to comply with ASTM A 123/A 123M. Hot-dip galvanize hardware for hot-dip galvanized wire mesh items to comply with ASTM A 153/A 153M.

15. Examination

16. Erection

17. Adjusting and Cleaning

SECTION 102800- TOILET AND BATH ACCESSORIES

1. Related Documents

2. Description of Work

3. Quality Assurance

4. Submittals

5. Acceptable Manufacturers
a. Subject to compliance with indicated requirements, provide toilet accessories as manufactured by one of the following:
i. American Specialties, Inc. (ASI)
ii. Bobrick Washroom Equipment, Inc.
iii. Bradley Corp.
iv. McKinney/Parker
v. American Shower Door
vi. Century Shower Door
vii. Easco

6. Products

a. General: Provide toilet accessories in locations shown and as otherwise indicated.
    i. Specification Basis: Products listed are as manufactured by Bobrick, unless noted otherwise. Equivalent products must meet function, quality and appearance of Bobrick products, as judged solely by Architect.
    ii. Finish: All stainless steel surfaces shall have satin finish except as otherwise indicated.
b. Grab Bars: B6206 Series, 1 1/2" diameter, in lengths and configurations as shown or required to comply with accessibility standards.
    i. Finish: Non-slip finish on gripping surface; satin finish on ends and caps.
    ii. Mounting Method: Concealed mounting plates with grab bar attached to it with set screws in caps. Secure with through-bolts with chrome head cap nuts on opposite side of toilet partitions, and appropriate hardware to secure to indicated substrates elsewhere. Anchorage methods must be approved by Architect.
c. Toilet Tissue Dispenser: B-2740, roll tissue, two roll holder with no controlled paper flow. (Provide one per water closet.)
d. Paper Towel Dispenser: B-263, single fold. (Provide minimum of one per toilet room).
e. Framed Mirrors: Satin finish, fully welded, stainless steel frame and shelf, where indicated, with tempered glass mirror and concealed vandalproof mounting. Sizes and types as indicated for each location.
    i. Model B-2908 Series, framed mirrors (18" x 36"). Provide one per each lavatory, except locations where ADA mirrors are provided.
f. ADA Framed Mirrors: Adjustable-tilt, stainless steel frame, similar to regular framed mirrors.
    i. Model B-294, 18” x 36”. Provide one per each toilet room. Verify locations in multi-lavatory rooms with Owner.
g. Sanitary Napkin Disposer: B-270 (Provide one per women's water closet).
h. Sanitary Napkin Dispenser: B-2800, 25-cent operation.
i. Towel Bars: B-530 Series, grab bars except 1" diameter, satin finish, lengths as indicated, 3" clearance to wall.
j. Shower Curtain/Coat Rods: B-6047. Curtains to be Bobrick 204-2 vinyl and hooks to be 204-1 stainless steel.
k. Coat Hooks: B-2116, heavy-duty, 300-lb. downward pull capacity, concealed mounting. (Provide six per multi-person restroom, and one per each single occupant restroom.)
l. Soap Dispensers: B2014; provide one per lavatory.

7. Inspection

8. Installation

9. Adjust and Clean

SECTION 104413- FIRE EXTINGUISHER CABINETS

1. Related Documents

2. Summary

3. Submittals

4. Coordination

5. Manufacturers
    a. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
        i. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

6. Materials
    a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
    b. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 6 mm thick, with Finish 2 (patterned, textured).

7. Fire-Protection Cabinet
    a. Basis-of-Design Products: “Gemini Series G2409-R3” by Larsen's Manufacturing Company. Subject to compliance with requirements provide the listed products, or comparable products of the following:
        i. JL Industries, Inc.
    b. Cabinet Construction: Nonrated.
    c. Cabinet Material: Enameled-steel sheet.
    d. Semirecessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
        i. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
    e. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall; with no trim.
    f. Cabinet Trim Material: Steel sheet.
    g. Door Style: Fully glazed, frameless, backless, acrylic panel.
    h. Door Glazing: Acrylic sheet.
        i. Acrylic Sheet Color: Clear transparent acrylic sheet painted red on unexposed side.
    i. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
        i. Provide projecting door pull and friction latch.
        ii. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
    j. Accessories:
        i. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
            1. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
                a. Location: Applied to cabinet door.
                b. Application Process: Pressure-sensitive vinyl letters.
                c. Lettering Color: White.
                d. Orientation: Vertical.
    k. Finishes:
        i. Manufacturer's standard baked-enamel paint for the following:
            1. Exterior of cabinet trim, except for those surfaces indicated to receive

another finish.
2. Interior of cabinet.
ii. Steel: Baked enamel.
1. Color and Texture: As selected by Architect from manufacturer's full range.

8. Mounting Brackets
a. Manufacturers:
i. JL Industries, Inc.
ii. Larsen's Manufacturing Company.
b. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers required, with plated or baked-enamel finish.
i. Color: Red.
ii. Locations: As indicated on Drawings.
iii. Extinguisher Type and Capacity: Coordinate with owner and authorities having jurisdiction.
c. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
i. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
1. Orientation: Horizontal.

9. Fabrication
a. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
i. Weld joints and grind smooth.
b. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
c. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

10. Finishes, Generals
a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish fire-protection cabinets after assembly.
c. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

11. Steel Finishes
a. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
b. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

12. Examination

13. Preparation

14. Installation

15. Adjusting and Cleaning

SECTION 105113- METAL LOCKERS

1. General

2. Related documents

3. Summary
    a. Section Includes:
        i. Standard metal lockers.
        ii. KHP Personnel Lockers
4. Submittals

5. Quality assurance

6. Delivery, storage, and handling

7. Project conditions

8. Coordination

9. Warranty

10. Extra materials

11. Materials
    a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
    b. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 (ZF180) zinc-iron, alloy (galvannealed) coating designation.
    c. Stainless-Steel Sheet: ASTM A 666, Type 304.
    d. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
    e. Steel Tube: ASTM A 500, cold rolled.
    f. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
    g. Anchors: Material, type, and size required for secure anchorage to each substrate.
    h. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
    i. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

12. Standard and KHP metal lockers

a. Standard Locker Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    i. Penco Products, Inc.; Vanguard Lockers.
    ii. Republic Storage Systems Company; Quiet Lockers.
b. KHP Personnel Lockers: Spaceaver Freestyle Personal storage Lockers.
c. Locker Arrangement: Double tier.
d. Material: Cold-rolled, steel sheet.
e. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet as follows:
    i. Tops, Bottoms, and Intermediate Dividers: 0.024-inch (0.61-mm) nominal thickness, with single bend at sides.
    ii. Backs and Sides: 0.024-inch (0.61-mm) nominal thickness, with full-height, double-flanged connections.
    iii. Shelves: 0.024-inch (0.61-mm) nominal thickness, with double bend at front and single bend at sides and back.
f. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
g. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
h. Frame Vents: Fabricate face frames with vents.
i. Doors: One piece; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
j. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
k. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet; welded to inner face of doors.
l. Door Style: Vented panel as follows:
    i. Louvered Vents: No fewer than three louver openings at top and bottom for double-tier lockers.
m. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
n. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches (51 mm) high. Provide no fewer than three hinges for each door more than 42 inches (1067 mm) high.
o. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
p. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
q. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
r. Combination Padlocks: Provided by Owner.
s. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:
t. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not

less than 0.036-inch (0.91-mm) nominal-thickness steel sheet.

u. Closures: Hipped-end type.
v. Sloping-top corner fillers, mitered.
w. Panels in first subparagraph below are for filling gaps between groups of metal lockers created by columns, piping, and other obstructions; retain if required.
x. Filler Panels: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch (0.91-mm) nominal-thickness steel sheet.
y. Boxed End Panels: Fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet.
z. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet.
aa. Finish: Baked enamel or powder coat.
bb. Color(s): As selected by Architect from manufacturer's full range.
cc. Integral Bench storage unit: KHP Personnel Lockers to receive bench drawer unit with hardwood butcher block bench top.

13. Fabrication
    a. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
    b. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
    c. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
    d. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.
    e. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project site.
    f. Accessible Lockers: Fabricate as follows:
        i. Locate bottom shelf no lower than 15 inches (381 mm) above the floor.
        ii. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches (1219 mm) above the floor.
    g. Coat Rods: Fabricated from 1-inch- (25-mm-) diameter steel, nickel plated.
    h. Identification Plates: Manufacturer's standard, etched, embossed, or stamped plastic plates, with numbers and letters at least 3/8 inch (9 mm) high.
    i. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
    j. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
    k. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
    l. Provide one-piece panels for double-row (back-to-back) locker ends.
    m. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
    n. Provide one-piece panels for double-row (back-to-back) locker ends.

14. Steel sheet finishes

a. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.
b. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

15. Examination

16. Installation

17. Adjusting, cleaning, and protection

SECTION 105300- PREMANUFACTURED ALUMINUM CANOPIES
(To be Provided at a later date)

SECTION 107500- FLAG POLES

1. Related documents

2. Summary
   a. Section includes
      i. Ground-mounted flagpoles made from aluminum.

3. Owner-Furnished Material: Flags.

4. Related Sections:

5. Performance requirements

6. Submittals

7. Quality assurance

8. Delivery, storage, and handling

9. Products

10. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
       i. American Flagpole; a Kearney-National Inc. company.
       ii. Atlantic Fiberglass Products, Inc.
       iii. Baartol Company.
       iv. Concord Industries, Inc.
       v. Eder Flag Manufacturing Company, Inc.
       vi. Ewing Flagpoles.

vii. Lingo Inc.; Acme Flagpole Company Division.
viii. Millerbernd Manufacturing Company.
ix. Morgan-Francis; Division of Original Tractor Cab Co., Inc.
x. PLP Composite Technologies, Inc.
xi. Pole-Tech Company Inc.
xii. U.S. Flag & Flagpole Supply, LP.
xiii. USS Manufacturing Inc.

11. Flagpoles
    a. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
        i. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
        ii. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
    b. Exposed Height: 35 feet.
    c. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).
    d. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
    e. Provide flashing collar of same material and finish as flagpole.
    f. Provide steel ground protectors extending 12 inches (300 mm) aboveground and 6 inches (150 mm) belowground for steel flagpoles where flashing collars are not provided.
    g. Sleeve for Aluminum Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.
    h. Provide flashing collar of same material and finish as flagpole.

12. Fittings
    a. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
        i. 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.
    b. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
    c. Halyard Flag Snaps: Provide two sets of stainless-steel swivel snap hooks per halyard.
    d. Provide with neoprene or vinyl covers..
    e. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two sets of flag clips per halyard.
    f. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Lingo.

13. Miscellaneous materials
    a. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
    b. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT

(nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
c. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

14. General finish requirements
    a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    b. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

15. Aluminum finishes
    a. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.
    b. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

16. Execution

17. Examination

18. Preparation

19. Flagpole installation

DIVISION 11: EQUIPMENT

SECTION 113100- RESIDENTIAL APPLIANCES

1. General

2. Related documents

3. Retain or delete this article in all sections of project manual.

4. Summary
    c. Section Includes:
        i. Cooking appliances.
        ii. Refrigeration appliances.

5. Submittals

6. Quality assurance

7. Warranty

8. Products

9. Microwave ovens
    a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
        i. General Electric Company (GE).
        ii. Viking Range Corporation.
        iii. Wolf Appliance, Inc.
    b. Basis-of-Design Product: Viking Professional Microwave Oven, no. VMOS200, with no. VMTK Trim Kit.
    c. Mounting: Wall cabinet.
    d. Type: Conventional.
        i. Width: 24 inches .
        ii. Depth: 19-1/4 inches .
        iii. Height: 13-3/8 inches .
        iv. Capacity: 2.0 cu. ft. .
        v. Oven Door: Door with observation window and push-button latch release.
        vi. Microwave Power Rating: 1650 W
        vii. Retain first subparagraph below for convection-type ovens only.
        viii. Electric Power Supply: 120 V, 60 Hz, 1 phase, 20 A.
        ix. Controls: Digital panel controls and timer display.
        x. Other Features: Turntable, lock-out feature, and interior light.
        xi. Material: Stainless steel.
        xii. Color/Finish: Stainless Steel.

10. Refrigerator/freezers
    a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
        i. General Electric Company (GE).
        ii. Sub-Zero, Inc.
        iii. Viking Range Corporation.
    b. Refrigerator: Two-door refrigerator/freezer complying with AHAM HRF-1.
    c. Basis-of-Design Product: G.E. Monogram Stainless Steel, _____
    d. Type: Freestanding.
    e. Coordinate "Dimensions" and "Storage Capacity" subparagraphs below. If retaining both dimension and capacity requirements, verify availability with manufacturers.
    f. Dimensions:
        Width: _____ inches .
        Depth: _____inches .
        Height: _____inches .
    g. Storage Capacity:
    h. Refrigeration Compartment Volume: _____ cu. ft..
    i. Shelf Area: _____.
    j. General Features:
        i. Controls: Electronic upfront temperature controls and digital temperature display.
        ii. Door: Reversible.
        iii. Toe kick: Stainless Steel.
    k. Refrigerator Features:
        i. Interior light in refrigeration compartment.
        ii. Door Storage: Glazed door without storage.
        iii. Full extension shelf slides.
        iv. Stainless steel tubular handle.

v. Front Panel: Stainless steel.
vi. Appliance Color/Finish: Stainless steel.

11. General finish requirements
    a. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
    b. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

12. Execution

13. Examination

14. Installation, general

15. Demonstration

DIVISION 12: FURNISHINGS

SECTION 122413- ROLLER WINDOW SHADES (To be Provided at a later date)

DIVISION 13: (Not Used)

DIVISION 14 CONVEYING EQUIPMENT

SECTION 142400 - HYDRAULIC ELEVATORS

1. RELATED DOCUMENTS
    a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. SUMMARY
    a. This Section includes hydraulic passenger elevator for installation in existing hoistwa
    b. Related Sections include the following:
        1. Division 03 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
        2. Division 04 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
        3. Division 05 Section "Metal Fabrications" for the following:
            a. Attachment plates and angle brackets for supporting guide-rail brackets.
            b. Hoist beams.
            c. Structural-steel shapes for subsills.
            d. Pit ladders.

4. Division 09 Section "Tile Carpeting" for finish flooring in elevator cars.
5. Division 26 Sections for electrical service for elevators to and including fused disconnect switches at machine room door and standby power source, transfer switch, and connection from auxiliary contacts in transfer switch to controller.
6. Division 27 Section "Data/Phone Systems Requirements" for telephone service to elevators.
7. Division 28 Section "Fire Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

3. DEFINITIONS
   a. Definitions in ASME A17.1 apply to work of this Section.
   b. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

4. SUBMITTALS
   a. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
      1. Car enclosures and hoistway entrances.
      2. Operation, control, and signal systems.
   b. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
   c. Samples for Initial Selection: For finishes involving color selection.
   d. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
   e. Qualification Data: For Installer.
   f. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
      1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
   g. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
   h. Warranty: Special warranty specified in this Section.
   i. Continuing Maintenance Proposal: Service agreement specified in this Section.

5. QUALITY ASSURANCE
   a. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   b. Source Limitations: Obtain elevators through one source from a single manufacturer.

1. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

c. Regulatory Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.
1. Effective peak velocity acceleration (Av) for Project's location is greater than or equal to 0.10, but less than 0.20 (seismic risk zone 2).

d. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

6. DELIVERY, STORAGE, AND HANDLING
a. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging.
b. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

7. COORDINATION
a. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
b. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
c. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.
d. Contractor shall be responsible for field-verification of existing hoistway size including width, depth, height, overhead clearance, pit depth and entrance clear opening size. Modification of existing elements as required to accommodate installation of specified elevator shall remain the responsibility of the Contractor.

e. Contractor shall provide and install all supplemental structural steel and miscellaneous steel support members including, but not limited to, hoist beam, supports for guide rails, supports for door sills and other materials as required by the manufacturer for a complete and operational system.
f.. Contractor shall be responsible for field-verification of existing machine room size including width, depth, height, overhead clearance, and entrance clear opening size. Modification of existing elements as required to accommodate installation of specified elevator shall remain the responsibility of the Contractor.

8. WARRANTY
a. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
9. Warranty Period: One year from date of Substantial Completion.

10. MAINTENANCE SERVICE
a. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and

adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
   a. Response Time: Two hours or less.

b. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

11. MANUFACTURERS
    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
       1. Minnesota Elevator, Inc. Basis-of-Design Manufacturer:
       2. Thyssen-Krupp Elevator

12. SYSTEMS AND COMPONENTS
    a. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.
    b. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide either of the following:
       1. Pump, with fan-cooled squirrel-cage induction motor, mounted on oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch- (25-mm-) thick, glass-fiber insulation board.
       2. Submersible pump, with submersible squirrel-cage induction motor, suspended inside oil tank from vibration isolation mounts.
       3. Provide motor with wye-delta or solid-state starting.
    c. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
    d. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
    e. Hydraulic Fluid: Nontoxic, readily biodegradable made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Hydraulic fluid is approved by elevator manufacturer for use with elevator equipment.
       1. Product: Subject to compliance with requirements, provide "Hydro Safe" by Hydro Safe Oil Division, Inc.
    f. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.
    g. Car Frame and Platform: Welded steel units.
    h. Guides: Provide either roller guides or sliding guides at top and bottom of car and counterweight frames. If sliding guides are used, provide guide-rail lubricators or polymer-coated, nonlubricated guides.

13. OPERATION SYSTEMS
    a. General: Provide manufacturer's standard microprocessor operation system for each elevator as required to provide type of operation system indicated.
    b. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
        1. Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at fire command station. Manual operation causes automatic operation to cease.
    c. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
        1. Card-Reader Operation: System uses card readers at hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. .
            a. Security access system equipment is specified in Division 28 Section "Access Control."

14. DOOR REOPENING DEVICES
    a. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
    b. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

15. FINISH MATERIALS
    a. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
    b. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
    c. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
        1. Textured Stainless-Steel Sheet: Product with coined texture rolled into exposed surface.
            a. Metal surface is satin polished after rolling.
    d. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
    e. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications and Type HGP for postformed applications.

16. CAR ENCLOSURES
    a. General: Provide enameled-steel car enclosures to receive removable wall panels, with car roof, access doors, power door operators, and ventilation.
        1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
        2. Provide finished car including materials and finishes specified below.
    b. Materials and Finishes: Provide manufacturer's standards, but not less than the following:
        1. Subfloor: Underlayment grade, exterior plywood, 5/8-inch (16-mm) nominal thickness.

2. Floor Finish: Specified in a Division 09 Section.
3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
4. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch (13-mm) fire-retardant-treated particleboard with plastic-laminate panel backing and manufacturer's standard protective edge trim. Panels have a flame-spread index of 25 or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range. Plastic laminate selections shall not be limited to those normally used by the elevator manufacturer as the "manufacturer's standard".
5. Fabricate car with recesses and cutouts for signal equipment.
6. Fabricate car door frame integrally with front wall of car.
7. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
8. Sight Guards: Provide sight guards on car doors.
9. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
10. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
11. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

17. HOISTWAY ENTRANCES
    a. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
        1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
    b. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
        1. Stainless-Steel Frames: Formed from stainless-steel sheet.
        2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or]by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
        3. Sight Guards: Provide sight guards on doors matching door edges.
        4. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
        5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

18. SIGNAL EQUIPMENT
    a. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers or LEDs.
    b. Car Control Stations: Provide manufacturer's standard recessed car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.
        1. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and

Braille.

2. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

c. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

d. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."

e. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

f. Hall Push-Button Stations: Provide one hall push-button station at each landing.

1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
2. Equip units with buttons for calling elevator and for indicating desired direction of travel.

g. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide one of the following:

1. Units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.

h. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

1. At manufacturer's option, audible signals may be placed on car.

i. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above hoistway entrance at ground floor. Provide units with flat faceplate for mounting and with body of unit recessed in wall.

1. Integrate ground-floor hall lanterns with hall position indicators.

j. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.

K. Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

l. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating

that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

19. ELEVATORS
    a. Basis-of-Design Product: Twin jack Holess Hydraulic Elevator; Minnesota Elevator Corporation.

        1. Type: Holeless, beside-the-car, telescoping, dual cylinder.
        2. Rated Loads: 2500 lb .
        3. Rated Speed: 150 fpm (0.51 m/s).
        4. Operation System: Single automatic operation.
        5. Auxiliary Operations:
            a. Standby power operation.

        6. Car Enclosures:
            a. Inside Width: 81 inches from side wall to side wall.
            b. Inside Depth: 51.5 inches from back wall to front wall.
            c. Inside Height: 96 inches to underside of ceiling.
            d. Front Walls : Polished stainless steel, No. 4 finish with integral car door frames.
            e. Side and Rear Wall Panels: Plastic laminate.
            f. Reveals: Polished stainless steel, No. 4 finish.
            g. Door Faces (Interior): Polished stainless steel, No. 4 finish.
            h. Ceiling: Luminous ceiling.
            i. Handrails: 1-1/2 inches (38 mm) round satin stainless steel, No. 4 finish, at sides and rear of car.
            j. Floor prepared to receive carpet (specified in Division 09 Section "Tile Carpeting").
        7. Hoistway Entrances:
            a. Width: 42 inches .
            b. Height: 84 inches (2134 mm).
            c. Type: Single-speed center opening.
        8. Additional Requirements:
            a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from polished stainless steel, No. 8 finish.
            b. Provide blanket hooks in all cars and two complete set(s) of full-height protective blankets.

3.1 EXAMINATION

3.2 INSTALLATION

3.3 FIELD QUALITY CONTROL

3.4 PROTECTION

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL PROVISIONS

1.1 CONTRACT DOCUMENTS

A. All contract documents including drawings, alternates, addenda and modifications preceding this division of this specification are applicable to contractors, subcontractors, and material suppliers.

1.2 SPECIFICATION FORM AND DEFINITIONS

A. These Specifications are abbreviated form and contain incomplete sentences. Omissions of words or phrases such as "the contractor shall", "shall be", "as noted on the Drawings", "according to the drawings", "a", "an", "the" and "all" are intentional. Omitted words and phrases shall be supplied by inference.

B. The term “Engineer”, "Engineer", or “Engineer” wherever used in these specifications, shall mean LATIMER, SOMMERS & ASSOCIATES, P.A., 3639 SW SUMMERFIELD DRIVE, SUITE A, TOPEKA, KANSAS 66614, PHONE 785-233-3232, FAX 785-233-0647.

C. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with Owner to perform this work.

D. When a word, such as "proper", "satisfactory", "equivalent", and "as directed", is used, it requires Engineer's review.

E. "Provide" means furnish and install.

F. Engineer hereinafter abbreviated A/E shall mean both the Design Engineers and the Design Engineers.

G. Equipment and/or materials manufacturer hereinafter abbreviated E/M shall mean the manufacturer of equipment or materials specified or referred to.

H. When the term “equivalent” is used in context to products or manufacturer’s, the equivalency of the proposed product or manufacturer to be used in lieu of the specified product or manufacturer is the sole decision of the A/E.

1.3 QUALIFICATIONS

A. The contractor responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractor shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and quality work and workmanship required by this contract and all other regulations, codes and practices. At all times the contractor shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.4 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.5 CONTRACT CHANGES

A. Changes or deviations from Contract, including those for extra or additional work must be submitted in writing for review of Engineer. No verbal orders will be recognized.

1.6 LOCATIONS AND INTERFERENCES

A. Location of equipment, piping and other mechanical work is indicated diagrammatically on the Drawings. Determine exact locations on job, subject to structural conditions, work of other sections of the Specifications, access requirements for installation and maintenance and approval of Engineer.

B. Study and become familiar with the Drawings of other trades and in particular the general construction plans and details in order to obtain necessary information for figuring installation. Cooperate with work of other trades, and install work in such a way as to avoid interference with work of other trades. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed by Engineer prior to installation.

C. Any pipe, apparatus, appliance or other item interfering with proper placement of other work as indicated on Drawings, specified, or required, shall be removed and if so shown, relocated and reconnected without extra cost. Damage to new or existing work caused by Contractor shall be restored as specified for new work.

D. Do not scale Drawings for dimensions. Accurately lay-out work from dimensions indicated on Drawings unless such be found in error.

E. Report any conflict stated above to supervisor for coordination.

1.7 PERFORMANCE

A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.

1.8 TEMPORARY UTILITIES

A. Contractor shall provide temporary utilities as indicated in 015000 during construction.

1.9 WARRANTY

A. The plumbing systems are to be warranted to Owner and Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from acceptance of electrical systems by Owner.

B. Contractor warrants to Owner and Engineer that on receipt of notice from either of them within one year of warranty period following date of acceptance all defects that have appeared in materials and/or workmanship, shall be promptly corrected to condition required by contract documents at contractor expense.

C. The warranty above expressed shall not supersede any separately stated warranty or requirements required by law or by these specifications.

1.10 ALTERNATES

A. Refer to General Requirements and description for alternate bid items.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SUBSTITUTIONS

A. The intent of these specifications is to allow ample opportunity for bidder to use its ingenuity and abilities to perform the work to its and the Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.

B. Material and equipment provided shall be first class quality, new, unused and without damage unless noted otherwise.

C. In general, these specifications identify required materials and equipment by naming first the manufacturer whose product was used as the basis for the project design and specifications. The manufacturer's product, series, model, catalog and/or identification numbers shall set quality and capacity requirements for comparing the equivalency of other manufacturer's products. Where other manufacturer's names are listed they are considered an approved manufacturer for the product specified, however; the listing of their names implies no prior approval of any product they may propose to furnish as equivalent to the first named product unless specific model or catalog numbers are listed in these specifications or in subsequent addenda. Where other than first named products are used for base bid proposal it shall be the responsibility of the Contractor to determine prior to bid time that the proposed materials and equipment selections are products of approved manufacturers which meet or exceed the specifications and are acceptable to the Engineer.

D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Engineer for review prior to procurement.

E. Prior to receipt of bids, if the Contractor wishes to incorporate products other than those named in the specifications or drawings they shall submit a request for approval of equivalency in writing to the A/E no later than (10) ten calendar days prior to bid date. Engineer will review requests and acceptable items will be listed in an Addendum issued to principal bidders. Equivalents will ONLY be considered approved when listed by project addendum. Substitutions after this may be refused at Engineers option.

F. Materials and equipment proposed for substitution shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two (2) copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison. .In proposing a substitution prior to receipt of bids, include in such proposal cost of altering other elements of project, including adjustments in mechanical/electrical service requirements necessary to accommodate such substitution.

G. In proposing a substitution prior to receipt of bids, include in such bid all costs of altering other elements of the project, including such items as adjustments in mechanical/electrical service requirements necessary to accommodate such substitutions. In addition, all physical space and weight requirements requiring additional structural support, modifications to the base floor plans, equipment concrete pad/roof curb dimensions shall be incorporated as required into such bid to accommodate such substitutions.

H. Within ten (10) working days after bids are received, apparent low bidder shall submit to A/E for approval three copies of a list of all major items of equipment he intends to provide. As soon as practicable and within ten (10) working days after award of contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work for Engineer's review. Where ten (10) working day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certifications that order was placed within ten (10) working day limit.

PART 3 EXECUTION

3.1 SHOP DRAWINGS

A. Contractor shall furnish a minimum of ten (10) sets of shop drawings of all materials and equipment. A/E will return 6 sets to the Contractor. A copy of fully processed product data submittal shall be included as a part of each operating and maintenance manual.

B. Where catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, fitting sizes, etc., that are to be provided. Mark each submitted item with applicable section and paragraph numbers of these specifications, or Drawing sheet number when item does not appear in specifications. Where equipment submitted does not appear in specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization. Each submittal shall contain at least four sets of original catalog cuts. Each catalog sheet shall bear Equipment Manufacturer's name and address. All shop drawings on materials and equipment listed by UL shall indicate UL approval on submittal.

C. Contractor shall be required to submit all applicable equipment/material assembly mock-ups as required by the Contract Documents for Engineer approval. Contractor shall provide changes and resubmit mock-ups until Engineer is satisfied final product meets or exceeds stated specifications and quality of specified product.

D. Contractor shall check all shop drawings to verify that they meet specifications and/or drawings requirements before forwarding submittals to the Engineer for their review.

E. All shop drawings submitted to Engineer shall bear Contractor's approval stamp which shall indicate that Contractor has reviewed submittals and that they meet specification and drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed, electrical characteristics, provisions for supply, return and drainage connections to building systems. All shop drawings not meeting Contractor's approval shall be returned to its supplier for resubmittal.

F. No shop drawing submittals will be considered for review by the Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of Contractor's review. All comments or minor notations on shop drawings shall be flagged to indicate originator of comment.

G. Engineer will not be responsible for or the cost of returning shop drawing submittals that are submitted without Contractor's review and approval stamp. A letter will be sent to Contractor by either the Engineer or Engineer indicating receipt of an improper submittal for pick-up by Contractor or supplier for 15 working days after date of receipt. If not picked up by the 16th working day, submittals not bearing Contractor's review and approval stamp will be disposed of by Engineer.

H. Engineer's review of shop drawings will not relieve Contractor of responsibility for deviations from drawings and specifications unless such deviations have been specifically approved in writing by Owner or its representative, nor shall it relieve Contractor of responsibility for errors in shop drawings. No work shall be fabricated until Engineer's review has been obtained with "no exceptions" or "as noted" language. Any time delay caused by correcting and resubmitting shop drawings will be Contractor's responsibility.

I. Furnish ¼" = 1'-0" scale fabrication drawings for review of ductwork and piping systems to coordinate all trades prior to fabrication. Drawings shall be furnished and approved in a timely manner to avoid construction delays. These drawings must be approved prior to the ordering, fabrication, or installation of ductwork and piping. Subcontractor shall submit one set of reproducible drawings and one set of blue line prints of piping and ductwork coordination drawings. Cost of drawing preparation, printing, and distribution shall be paid for by Subcontractor and included in its base bid.

J. Contractor shall submit the following items for this project:

1. All valves
2. All domestic water piping and all associated hangers/mounting devices.

3.2 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

A. Submit an outline copy of installation, operating, and maintenance manuals for review and comment.

B. Submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. After receiving comments from outline review. Instructions shall be prepared by equipment manufacturer.

C. Keep in safe place, keys and wrenches furnished with equipment under the Contract. Present to Owner and obtain receipt for same upon completion of project.

D. Prepare a complete notebook, covering systems and equipment provided and installed under this contract. Submit notebooks to Engineer for review before delivery to Owner. Contractor at his option may prepare this notebook, or retain an individual to prepare it for him. Contractor shall include cost of this service in bid. Notebook shall contain following:

1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined under this specification.
2. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
3. A complete set of approved final shop drawings.
4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of the systems installed.
5. As-Built Drawings: The Contractor shall mark up a set of contract documents during construction noting all changes and deviations including change orders. These will be delivered to A/E at end of the project for review and correction as required. After the originals are changed to reflect the blue line set, a complete set of reproducible set of project record drawings drawn at the original scale indicated shall be included in the brochure.
6. All required warranties and guarantees, including start and end date of warranties/guarantees.

E. Provide notebooks bound in black vinyl three-ring binders. Reinforce binding edge of each sheet of looseleaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:

1. Project name and address.
2. Section of work covered by brochure, e.g. "Plumbing", etc.

3.3 CUTTING AND PATCHING

A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Cut no structural members without Engineer's approval and in an approved manner.

B. Patching shall be by mechanics of particular trade involved and shall meet approval of Engineer.

C. Drilling and cutting of openings through building materials requires Engineer's review and approval. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work is not acceptable.

3.4 MUTILATION

A. Mutilation of building finishes or existing/new equipment, caused by demolition or installation of new work shall be repaired at Contractor's expense to approval of Engineer.

3.5 WALL PENETRATIONS

A. Include the installation of all boxes, access panels and sleeves for openings required to install the work. All floor and wall penetrations shall be sealed to meet fire rating requirements using materials tested in accordance with ASTM E814.

3.6 OPENINGS, ACCESS PANELS & SLEEVES

A. Include the installation of all boxes, access panels and sleeves for openings required to install this work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all pipes passing through structural slabs and walls. Set and verify the location of sleeves as shown on structural plans that pass through beams, only if so shown. All floor and wall penetrations be sealed to meet fire rating requirements. Access panels shall include those required to access fire dampers, VAV boxes, valves, smoke dampers, pipe chases, manual and automatic dampers, etc. Locations and sizes of panels are to be determined by the contractor and are not specifically shown on the drawings.

3.7 FIRE STOPPING

A. All holes or voids created by the mechanical Subcontractor to extend pipe through fire rated floors and walls and shall be sealed with an intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures of 250 degrees F. It shall be ICBO, BOCAI and SBCCI (NRB 243) approved ratings to 3 hours per ASTM E-814 (UL 1479). Acceptable Material: 3M Fire Barrier Caulk, putty, strip and sheet forms. Equivalent by SpecSeal.

B. Submit for review firestopping methods and sleeve drawings indicating all required application, methods and sleeves. Refer to engineering drawing for locations of fire rated partitions and floors.

C. All wall and floor penetrations will require firestopping.

3.8 SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

A. Work shall include mounting, alignment and adjustment of systems and equipment. Set all equipment level on adequate supports and provide proper anchor bolts and isolation as shown or specified. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.

B. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best recognized practice. Contractor shall arrange for attachment to building structure, unless otherwise indicated on drawings or as specified. Provide hangers with vibration eliminators where required. Contractor shall verify that structural members of building are adequate to support equipment. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Engineer for review before proceeding with fabrication or installation.

3.9 START-UP, CHANGEOVER, TRAINING AND OPERATION CHECK

A. Contractor shall be responsible for training Owner's operating personnel to operate and maintain systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructor's name, names of Owner's personnel attending and total hours of instruction given each individual.

B. All owner training sessions shall be orderly and well organized and shall be professionally videotaped using digital tape format. Contractor shall produce a DVD of each training session and submit to Owner with original digital tape as part of the Operation and Maintenance Manual submittal.

3.10 PRE-FINAL AND FINAL CONSTRUCTION REVIEW

A. At Contractor's request, Engineer will make pre-final construction review to determine if to the best of its knowledge project is completed in accordance with Contract Documents.

B. Items found by Engineer as not complete or not in accordance with requirements of contract will be outlined in report to Engineer for forwarding to Subcontractors. Subcontractor shall complete and/or correct these items, before notifying Engineer it is ready for final review.

C. All necessary system adjustments, including air systems balancing, shall be completed and all specified records and reports submitted in sufficient time to be received by Engineer at least ten working days prior to date of final construction review.

D. At final construction review, Contractors shall be present or shall be represented by a person of authority. Each shall demonstrate, as directed by Engineer that work complies with purpose and intent of contract documents and shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

END OF SECTION 220500

SECTION 220501 - EXTENT OF CONTRACT WORK AND CODES

PART 1 - GENERAL (Reference Section 220500)

1.1 GENERAL EXTENT OF WORK INCLUDED IN CONTRACT

A. Provide plumbing systems indicated on Drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of plumbing systems. In no case will claims for "Extra Work" be allowed for work about which Contractor could have been informed before bids were taken.

B. Become familiar with equipment provided by other Subcontractors which require plumbing connections and controls.

C. Electrical work required to install and control plumbing equipment which is not indicated on Drawings or specified under Division 26 shall be included.

D. The cost and provision of larger wiring, conduit, control, and protective devices resulting from installation of equipment which was not used for basis of design as outlined in specifications shall be provided at no increase in contract price.

E. Provide supervision to subcontractor to insure that required connections, interlocking and interconnection of mechanical and electrical equipment are made to attain intended control sequences and system operation.

F. Furnish ten complete sets of electrical wiring diagrams to Engineer and three complete sets to Electrical Subcontractor. Diagrams shall show factory and field wiring of components and controls. Control devices and field wiring to be provided by Electrical Subcontractor shall be clearly indicated by notation and drawing symbols on wiring diagrams.

G. Obtain complete electrical data on mechanical shop drawings and list this data on an approved form which shall be presented monthly or on request, to Electrical Subcontractor. Data shall be complete with wiring diagrams received to date and shall contain necessary data on electrical components of plumbing equipment such as capacity, HP, voltage, amperes, watts, locked rotor current to allow Electrical Subcontractor to order electrical equipment.

1.2 CODES, ORDINANCES, RULES AND REGULATIONS

A. Provide work in accordance with applicable rules, codes, ordinances and regulations of Local, State, Federal Governments, and other authorities having lawful jurisdiction.

B. Conform to latest editions and supplements of following codes, standards or recommended practices.

1. International Plumbing Code-2006.
2. International Mechanical Code-2006
3. International Building Code-2006.
4. National Electrical Safety Code Handbook H30- National Bureau of Standards- 2005.
5. Occupational Safety and Health Standard (OSHA) - Department of Labor.
6. NFPA No. 54 Gas Appliance & Gas Piping Installation
7. NFPA No. 70 National Electrical Code-2005
8. NFPA No. 90A Air Conditioning and Ventilating Systems
9. NFPA No. 91 Blower & Exhaust System
10. International Fuel Gas Code –2006
11. International Fire Code – 2006

MISCELLANEOUS CODES:
ANSI A117.1 - Handicapped Accessibility
Americans with Disabilities Act (ADA)

C. Drawings and specifications indicate minimum construction standard, should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Engineer in writing before proceeding with work so that necessary changes can be made. However, if Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations he shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

D. Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Engineer with request for final review.

PART 2 - PRODUCTS

2.1 DRAWINGS

A. Drawings are to be considered diagrammatic for all systems. All plumbing fixtures require waste, water and vent connections and they should be provided. Any plumbing vents, relief air openings, flues, exhaust openings, etc. must be placed 10'-0" from any outside air intakes. Piping and drawings do not show all required offsets and fittings. Contractor shall include in bid costs to provide systems which will avoid and coordinate will all other building trades and systems.

END OF SECTION 220501

SECTION 220523 – GENERAL - DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment or fixture, and on each main and branch service loop.

B. Valves installed in piping systems shall be compatible with system maximum test pressure, pipe materials, pipe joining method, and fluid or gas conveyed in system.

C. Valves 2-1/2" and smaller shall have soldered or screwed end connections as required by piping materials unless otherwise specified or shown on drawings. Install union connection in the line within two feet of each screw end valve unless valve can be otherwise easily removed from line. Valves 3" and over shall have flange end connections.

D. Each valve shall be installed so that it is easily accessible for operation, visual inspection, and maintenance.

E. Non-rising stem valves shall not be installed at any point in the piping systems. With permission of Engineer non-rising stem valve may be installed at particular points where space is restricted.

F. Provide 6" and below butterfly valves with latchlock handles for On-Off applications and with Twist-Lock infinite position handle for throttling applications.

G. Install globe valves with pressure on top of disc except that must be completely drained for inspection, maintenance or to prevent freezing shall be installed with stem in horizontal position to insure complete drainage of pipe lines.

H. Gate valves shall not be installed in pipe lines where intended for throttling service or where piping is subject to vibration as part of normal operating conditions.

I. Valves shall be designed for repacking under pressure when fully opened and backseated.

J. All valve type used in plumbing systems shall be equivalent valves listed on current comparison charts of specified valve manufacturers by Crane, Centerline, Dyna Quip, Demco, Hammond, Jenkins, Jamesbury, Keystone, or Powell will be acceptable.

PART 2 - PRODUCTS

2.1 BALL VALVES

A. Provide valves based on sizes, piping system served, and piping material indicated in the valve schedule shown on plans.

2.2 CHECK VALVES

A. Provide valves based on sizes, piping system served, and piping material indicated in the valve schedule shown on plans.

2.3 BALANCE VALVES

A. Provide valves based on sizes, piping system served, and piping material indicated in the valve schedule shown on plans.

PART 3 - EXECUTION

END OF SECTION 220523.

SECTION 220529 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL (Reference Section 220500)

PART 2 - PRODUCTS

2.1 PIPE SLEEVES AND SEALS

A. Pipe insulation shall run continuous through pipe sleeves with 1/4" minimum clearance between insulation and pipe sleeve. Provide metal jackets over insulated pipes passing through fire walls, floors and smoke partitions. Jacket shall be 0.018 stainless steel extending 12 inches on either side of barrier and secured to insulation with 3/8" wide band. Seal annular space between jacket and pipe sleeves by installing backing rod and 3M Fire barrier caulk.

B. Pipe wall penetrations exposed to view shall have tight fitting escutcheons or flanges to cover all voids around openings.

2.2 PIPE HANGERS AND SUPPORTS

A. Provide and be responsible for locations of piping hangers, supports and inserts, etc., required for installation of piping under this contract. Design of hangers and supports shall conform to current issue of Manufacturers Standardization Society Specification (MSS) SP-58.

B. Pipe hangers shall be capable of supporting piping in all conditions of operation. They shall allow free expansion and contraction of piping, and prevent excessive stress resulting from transferred weight being induced into pipe or connected equipment. Support horizontal or vertical pipes at locations of least vertical movement.

C. Where horizontal piping movements are such that hanger rod angularity from vertical is greater than 4 degrees from cold to hot position of pipe, offset hanger, pipe, and structural attachments to that rod is vertical in hot position. Hangers shall not become disengaged by movements of supported pipe.

D. Provide sufficient hangers to adequately support piping system at specified spacing, at changes in piping direction and at concentrated loads. Hangers shall provide for vertical adjustment to maintain pitch required for proper drainage, and for longitudinal travel due to expansion and contraction of piping. Fasten hangers to building structural members wherever practicable.

E. Unless indicated otherwise on drawings support horizontal copper tubing as follows:

NOM. TUBING SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1"	3/8"	6Ft.
1-1/4" to 1-1/2"	3/8"	8 Ft.
2"	3/8"	9 Ft.

F. Provide continuous threaded electro galvanized hanger rods wherever possible. No chain, wire, or perforated straps shall be used. Hanger rods shall be subject to tensile loading only, where lateral or axial pipe movement occurs provide suitable linkage to permit swing. Provide pipe support channels with galvanized finish for concealed locations and painted finish for exposed locations. Submit design for multiple pipe supports indicating pipe sizes, service and support detail to Engineer for review prior to fabrication.

G. Provide Grinnell pipe hangers for vertical pipe risers as follows:

PIPE MATERIAL	PIPE SIZE	HANGER FIG. NO.
Copper	1/2" thru 4"	CT-121

H. Provide Grinnell Fig. 194, 195, or 199 steel wall brackets for piping suspended or supported from walls. Brackets shall be prime coated carbon steel.

I. Mount hangers for insulated piping on outside of pipe insulation sized to allow for full thickness of pipe insulation. Provide Grinnell Fig. 167 insulation protection shields sized so that line compressive load does not exceed one-third of insulation compressive strength. Shield shall be galvanized steel and support lower 180 degrees of pipe insulation on copper tubing. Provide wood block at each pipe hanger in thickness of insulation. Insulation vapor barrier jacket shall overlap wood block to maintain vapor barrier.

J. Structural attachments for pipe hangers shall be as follows:

1. Concrete Structure: Provide expansion bolt or drop in expansion anchor for loads up to 400 lbs.

K. Provide Grinnell pipe hangers for horizontal single pipe runs as follows:

PIPE MATERIAL	PIPE SIZE	HANGER FIG. NO.
Copper	1/2" thru 4"	CT-65

L. Provide Grinnell Fig. 296 vibration control hangers at locations where piping vibrations would be transmitted to building structure by conventional hangers. Apply hangers within their load supporting range.

M. Provide necessary structural steel and attachment accessories for installations of pipe hangers and supports. Where heavy piping loads are to be attached to building structure verify structural loading with Engineer prior to installations.

2.3 EQUIPMENT ANCHORS

A. Provide floor or foundation mounted equipment such as pumps, boilers, air handling units, etc. with concrete expansion anchors.

B. Anchors shall be proper type and size recommended by manufacturer for equipment to be anchored.

C. Equivalent hangers by Autogrip, B-Line, CHD Inc., or Power Strut.

END OF SECTION 220529

SECTION 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIRED WORK

A. Provide the reasonable identification of Plumbing piping as specified below.

PART 2 - PRODUCTS

2.1 PIPING IDENTIFICATION

A. Identify piping for all new domestic water piping at intervals indicated below. Provide color coded stencil markings for each type of pipe utilized and provide flow direction arrows. Provide standard stencils, prepared with letter sizes conforming to recommendations of ASME A13.1. Stencil paint shall be exterior use, oil-based, alkyd gloss enamel in colors according to ASME A13.1. Paint may be in pressurized spray-can form.

B. All letter stenciling shall be minimum 1-1/4" high. Colors and wording shall be as directed by the Owner, using standard colors and standard abbreviations of all services being identified. Contractor shall submit for approval list of colors and wording prior to purchase of pipe marking equipment/material/installation. Pipe markers shall meet applicable ANSI Standard and OSHA requirements.

Piping Section	Pipe Identification Spacing (max spacing)
Within tunnel system	20'-0" on center
Within any building	8'-0" on center
Within any basement of Any building	8'-0" on center
Within basement/tunnel Area below Power Plant	8'-0" on center

2.2 VALVE IDENTIFICATION

A. Mark all valves with Seaton No. 300-BL brass identification tags with system legend, valve number and size stamped on tag. Lettering shall be black 1/2" high. Tags shall be minimum 2" in diameter and attached to valve with Seaton No. 16 brass jack chain. Contractor shall submit for approval list of identification markings and letterings prior to ordering tag material.

B. Prepare four copies of typewritten list of valve tags. List shall be typed in upper case and contain tag number, valve size, type, function and location. Provide (1) copy of list to Engineer prior to ordering tag material. Provide (1) copy of final list to Owner for mounting in location required by Owner. Submit a copy of list with each Operation and Maintenance Manual.

END OF SECTION 220553

SECTION 221213 – DOMESTIC WATER DRAIN, WASTE AND VENT

PART 1 - GENERAL (Reference Section 230500)

PART 2 - PRODUCTS

2.1 PIPING MATERIALS AND FITTINGS

A. Piping used throughout project shall conform to the following specifications. Piping shall be plainly marked with manufacturers name and weight. All materials listed may not be required on this project. See piping material schedule on the plans for materials to be used for each piping system. Piping materials shall be as follows:

B. Hubless Cast Iron Soil Pipe:

1. Pipe and fittings shall be gray cast iron with spigot bead and positioning lug. Pipe and fittings shall be coated inside and out with asphaltum preservative and shall meet requirements of current Cast Iron Pipe Institute Standard 301-69T.
2. Pipe joints shall be heavy-duty, no-hub joint couplings consisting of neoprene rubber sleeve, stainless steel shield and clamp assembly. ASTM A 74 “Extra Heavy” class.
3. Pipe and fittings shall be by Alabama Pipe, Tyler Pipe or Charlotte.
4. Pipe couplings shall be ANACO “Husky” or equal.

C. Polyvinyl Chloride Drain Waste:

1. Provide Schedule 40 polyvinyl chloride plastic drain waste and vent pipe conforming to ASTM D2665-88. Joints shall be properly cleaned, primed and glued.
2. Pipe by Charlotte, Genova, Crest or equal.

D. Copper Tube:

1. Provide hard temper copper water tube conforming to requirements of current ASTM Specification B-88. Tubing shall be Type K, L, or M as listed in schedule.
2. Tubing joints shall be soldered or brazed. See schedule for joining method to be used.
3. Provide wrought solder joint fillings conforming to ANSI Standard B16.22.
4. T-Drill is not approved for this project.
5. Pipe by Anaconda, Cerro, Chase, Mueller.

2.2 PIPING FITTINGS

A. Piping fitting used throughout project shall be proper type for installation method used and shall be compatible with piping system material. Fittings listed in piping material schedule shall conform to the following specifications:

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Piping systems materials and installation shall conform with the following standards and codes.

System:	Plumbing System Piping
Code:	International Association of Plumbing & Mechanical Official's "Uniform Plumbing Code"

B. Pipe sizes indicated on plans and as specified refer to nominal size in inches for steel pipe, cast iron pipe and copper tubing, unless otherwise indicated. Pipes are sized to nearest 1/2". In no case shall piping smaller than size specified be used.

C. Contractor shall provide and be responsible for proper location of pipe sleeves, hangers, supports, and inserts. Install hangers, supports, inserts, etc., as recommended by manufacturer and as specified and detailed on drawings. Verify construction types and provide proper hangers, inserts and supports for construction used. Install inserts, hangers and supports in accordance with manufacturers load ratings and provide for thermal expansion of piping without exceeding allowable stress on piping or supports. Provide solid type hangers and supports where pipe travel exceeds manufacturer's recommendations for fixed hanger and supports.

D. Install piping parallel with building lines and parallel with other piping to obtain a neat and orderly appearance of piping system. Secure piping with approved anchors and provide guides where required to insure proper direction of piping expansion. Piping shall be installed so that allowable stress for piping, valves and fittings used are not exceeded during normal operation or testing of piping system.

E. Provide piping materials and wall thickness for specific piping systems as listed in piping schedule at end of this Section. Steel piping systems 2" and under shall be thread pipe and fittings. Steel pipe systems 2-1/2" and above shall be welded and shall utilize standard welding fittings.

F. Provide unions or flanged joints in each pipe line preceding connections to equipment to allow removal for repair or replacement. Provide all screwed and control valves with unions adjacent to each piping connection. Provide screwed end valves with union adjacent to valve unless valve can be otherwise easily removed from line.

G. Piping fitting materials for specific piping systems shall be as listed in piping schedules. Fitting shall be approved factory made type with threaded or weld ends as required. Fittings pressures and temperature ratings shall be equal to or exceed maximum operating temperature and working pressure of piping system. No mitered or field fabricated pipe fittings will be permitted.

H. Brazed socket type joints shall be made with suitable brazing alloys. Minimum socket depth shall be sufficient for intended service. Brazing alloy shall be end fed into socket, and shall fill completely annular clearance between socket and pipe or tube. Brazed joints depending solely upon a fillet rather than a socket type joint will not be acceptable.

I. Soft soldered socket type joints shall be made with sill-floss or 95-5 tin-antimony solder as required by temperature and pressure rating of piping system or as indicated on schedules. Soldered socket-type joints shall be limited to systems containing non-flammable and non-toxic fluids. Soldered socket-type joints shall not be used on piping systems subject to shock vibration. Soldered joints depending solely upon a fillet rather than a socket-type joint will not be acceptable.

J. Make changes in piping size and direction with approved factory made fittings.

END OF SECTION 221213

DIVISION 22: PLUMBING

SECTION 221313 – FACILITY SANITARY SEWERS

1. RELATED DOCUMENTS

2. SUMMARY

3. DEFINITIONS

4. PERFORMANCE REQUIREMENTS

5. SUBMITTALS

6. DELIVERY, STORAGE, AND HANDLING

7. PROJECT CONDITIONS

8. PIPING MATERIALS

9. PIPES AND FITTINGS
   a. Ductile-Iron Sewer Pipe: Ductile iron pipe shall meet the requirements of AWWA C151/ANSI A21.51 and AWWA C150/ANSI 21.50. Minimum wall thickness shall be Class 50 unless otherwise specified on the plans for pipe greater than 6” and Class 51 on 4” pipe.
      1. Mechanical joints for ductile-iron pipe shall be gasketed and bolted joints meeting the requirements of the latest revision of ANSI A21.10 (AWWA C110).
      2. Except when mechanical joints are specified in the Plans, ductile-iron pressure pipe may be joined with a single rubber gasket push-on joint. Push-on joints used shall meet the requirements of the latest revision of ANSI A21.10 (AWWA C110), "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings".
      3. Fittings: All fittings used with ductile-iron pipe shall be cast-iron or ductile-iron fittings meeting the requirements of the latest revision of ANSI S21.10 (AWWA C110), "Gray-Iron and Ductile-Iron Fittings, 3 Inch through 48 Inch, for Water and Other Liquids."
      4. Protective Coatings: The exterior of all underground ductile iron pipe and fittings shall have a bituminous coating according to AWWA C151/A21.51.

5. All buried ductile iron pipe and fittings shall be encased in sealmless, 8 mil, polyethylene (PE) tube conforming to ANSI/AWWA C105/A21.5. Encasement shall be installed in accordance with the following installation:

   a. Method A: Ends of tubing shall be overlapped at least 12” and shall be thoroughly sealed with PE adhesive tape.
   b. Repairs: All cuts, tear, punctures, or other damage to the PE be repaired using adhesive tape or with a short length of PE sheet or tube cut open, wrapped around the pipe to cover the damaged area and secured in place.

6. Protective Lining: All pipe and fittings shall be lined with 1/16" cement-mortar lining with a seal coat of bituminous material complying with AWWA C104/ANSI A21.4.

b. Polyvinyl Chloride (PVC) Pressure Pipe and Fittings:
   1. ASTM D 1785, Schedule 40 pipe, with plain ends for solvent-cemented joints with ASTM D 2466, Schedule 40, socket-type fittings.

c. Polyvinyl Chloride (PVC) Plastic Pipe:
   1. Gravity Sewer Lines: Polyvinyl Chloride (PVC) solid wall pipe and fittings with integral bell elastomeric seal joints, shall conform to the requirements of ASTM Designation: D-3034 for nominal sizes of 8 inch through 15 inch and ASTM Designation F679-PS46 for nominal sizes of 18 inch through 27 inch, with a standard dimension ratio (SDR) of 35 or better for all gravity sewers. Pipe and fittings shall be manufactured from Type I, Grade I, Polyvinyl Chloride (PVC) compound and materials conform to the requirements of ASTM Designation: D 1784, Class 12454-B. The materials shall have a tensile strength and tensile modulus tested in accordance with ASTM Designation: D 638.
   2. PVC pipe fittings shall have the same pressure rating as the pipe and shall be marked on the body or hub on both sides. The markings shall include the manufacturer's name or trademark, nominal size, grade rating and symbol PVC type designation: i.e. PVC Type 1.
   3. Joints: The pipe shall be joined with a bell-and-spigot type of rubber gasketed joint. Each joint shall consist of a formed bell complied with a single rubber gasket. All fittings shall utilize rubber gasketed joints. The gaskets shall meet the requirements of ASTM Designation: F 477 with configuration conforming to the requirements of ASTM Designation: D 3212.
   4. Gasket Joint Pipe (PVC): The following requirements shall be applicable to all varieties of Polyvinyl Chloride (PVC) plastic pipe provided under this Contract.
      a. Gasket joint pipe shall meet all of the manufacturing requirements specified herein. The pipe shall be coupled and sealed against infiltration and exfiltration by means of rubber rings seated in the integral bell. Pipe that has an integral bell as a part of the pipe with a single gasket will be approved. All integral bells shall having a seating depth recommended by the manufacturer and acceptable to the Engineer. The male ends of the pipe shall be fabricated for ease of entry into the coupling.
      b. The manufacturer shall deliver the pipe to the job site by means which will adequately support it and not subject it to undue stress. The load shall be so supported that the bottom rows of pipe are not damaged by crushing. The pipe shall be carefully unloaded and stored on the

project at a site prepared and furnished by the Contractor.

c. All gasketed joints shall be lubricated as recommended by the pipe manufacturer and as approved by the Engineer.

d. Service Lines: Four (4) inch and Six (6) inch PVC pipe and fittings shall conform to the requirements of ASTM D1785 & ASTM D2665 Schedule 40.

1. Materials used in manufacturing of the pipe shall conform to the com- pound requirements of ASTM Designation: D 1784, Cell Class 12454 B.
2. A prefabricated adapter shall be used between the SDR branch fitting and the Schedule 40 service line. The adapter shall be an IPS hub by sewer spigot model manufactured by GPK or approved equal. A concrete cradle under the wye will not be required for PVC Pipe unless shown on the plans or directly by the Engineer.

10. MANHOLES

a. Normal-Traffic Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 8-inch (200-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
4. Riser Sections: 4-inch (100-mm) minimum thickness, and lengths to provide depth indicated.
5. Top Section: concentric-cone type, unless eccentric-cone type or flat-slab-top type is indicated or use eccentric-cone if manhole is greater than 4’ in diameter. Top of cone of size that matches grade rings.
6. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 229-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and cover.
7. Steps: No Steps within Sanitary Sewer Manholes

b. Manhole Frames and Covers: ASTM A 48, Class 35B or higher, except as modified or supplemented herin, ductile-iron castings designed for heavy-duty service. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4-inch (100-mm) minimum width flange, and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.

1. Manhole frames and covers shall be manufactered so as to be fully interchangeable. All of the covers projided shall be suitable for installation on any of the frames provided and shall not rock or tip under an applied load.
2. All castings imported into the United States shall conform to the applicable provisions of the United States Customs regulations.

c. Resilient Connectors between reinforced concrete manhole structures and pipes shall conform to the requirements of ASTM C 923 and shall be of two types:

1. Type cast into manhole wall at the manufacturing facility. the connection is completed by inserting end of pipe through connector. Connector shall be A-Lok or approved equal.
2. Type clamped around end of pipe and grouted into opening in manhole wall. this type is suitable for connecting to an existing structure. Connector shall be Fernco Concrete Manhole Adaptor or approved equal. Non-shrink grout must be used.
3. The purpose of the resilient connector shall be to achieve a positive watertight

connection between pipe and structure. The connectors cast into manhole wallls may be used as flexible connections between pipe and manhole. the connectors clamped to pipes and grouted into manhole walls must be used as rigid connections.

11. CONCRETE
    a. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
        1. Cement: ASTM C 150, Type II.
        2. Fine Aggregate: ASTM C 33, sand.
        3. Coarse Aggregate: ASTM C 33, crushed gravel.
        4. Water: Potable.
    b. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio.
        1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
        2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 400), deformed steel.
    c. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
        1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to one-half of pipe diameter. Form curved channels with smooth, uniform radius and slope.
            a. Invert Slope: 2 percent through manhole (minimum) or as indicated on plans
        2. Benches: Concrete, sloped to drain into channel. Slope: 4 percent.
    d. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.
        1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
        2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 400), deformed steel.
12. CLEANOUTS
    a. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
        1. Place top in 2’x2’ Concrete pad and slope to drain away (2.00% min.) on 3” washed gravel.
        2. Provide housing in paved areas .
            a. Deeter foundry #1815 or approved equal.
    b. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered- thread, brass closure plug.
        1. Top Loading Classification: Heavy duty.
        2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service Class, Cast-Iron soil pipe and fittings.

13. EARTHWORK
    a. Excavating, trenching, and backfilling are specified in Division 2 Section "Storm drainage" (2630).

14. CONSTRUCTION REQUIREMENTS
    a. Handling Pipe and Pipe Fittings `
    b. Cutting of Ductile-Iron Pipe

c. Cutting of PVC Pipe
d. Location and Grade of Sewers
    1. Sewer Pipe Installation

15. INSTALLATION OF PIPE:
    a. Installation of Ductile-Iron Pipe
    b. Installation of PVC Force Main Pipe:
    c. Installation of PVC Gravity Pipe
    d. Concrete Embedment and Encasement of Sewer Pipe
    e. Installation of pipe joints
        1. Ductile-Iron Pipe
        2. Polyvinyl Chloride (PVC) Pipe
    f. Sewer Lines to be Kept Clean
    g. Tees and Wye Branches
    h. Separation of Water Mains and Sewers
    i. General Locations and Arrangements
    j. Installation of piping.
    k. Use of manholes.
    m. Installation of gravity-flow piping and connect to building's sanitary drains.
    n. Tunneling

16. MANHOLE INSTALLATION

17. CONCRETE PLACEMENT

18. CLEANOUT INSTALLATION

19. TAP CONNECTIONS

20. CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS

21. FIELD QUALITY CONTROL
    a. ACCEPTANCE TESTS: All sewer lines shall undergo and pass tests to determine the soundness and workmanship regarding alignment grade, infiltration, exfiltration and/or pressure. Sewer lines which do not conform to the requirements shall be repaired and/or replaced along with all appurtenant work necessary to complete the entire work at no additional cost to the Owner and shall be retested until the sewer line is of a condition meeting the requirements. Results of each test shall be recorded by the Contractor and not less than three (3) copies of the test transcripts shall be submitted to the Engineer. The transcripts shall include sufficient information to readily identify the type of test, location tested, dated, person(s) performing the test, and the test results.
        1. Visual Internal Inspection
        2. Infiltration Testing
        3. Exfiltration Tests

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL PROVISIONS

1.1 CONTRACT DOCUMENTS

A. All contract documents including drawings, alternates, addenda and modifications preceding this division of this specification are applicable to contractors, subcontractors, and material suppliers.

1.2 SPECIFICATION FORM AND DEFINITIONS

A. These Specifications are abbreviated form and contain incomplete sentences. Omissions of words or phrases such as "the contractor shall", "shall be", "as noted on the Drawings", "according to the drawings", "a", "an", "the" and "all" are intentional. Omitted words and phrases shall be supplied by inference.

B. The term “Engineer” wherever used in these specifications, shall mean LATIMER, SOMMERS & ASSOCIATES, P.A., 3639 SW SUMMERFIELD DRIVE, SUITE A, TOPEKA, KANSAS 66614, PHONE 785-233-3232, FAX 785-233-0647.

C. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with Owner to perform this work.

D. When a word, such as "proper", "satisfactory", "equivalent", and "as directed", is used, it requires Engineer's review.

E. "Provide" means furnish and install.

F. Engineer hereinafter abbreviated “Eng” shall mean the Design Engineers.

G. Equipment and/or materials manufacturer hereinafter abbreviated E/M shall mean the manufacturer of equipment or materials specified or referred to.

H. When the term “equivalent” is used in context to products or manufacturer’s, the equivalency of the proposed product or manufacturer to be used in lieu of the specified product or manufacturer is the sole decision of the A/E.

1.3 QUALIFICATIONS

A. The contractor responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractor shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and quality work and workmanship required by this contract and all other regulations, codes and practices. At all times the contractor shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.4 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.5 CONTRACT CHANGES

A. Changes or deviations from Contract, including those for extra or additional work must be submitted in writing for review of Engineer. No verbal orders will be recognized.

1.6 LOCATIONS AND INTERFERENCES

A. Location of equipment, piping and other mechanical work is indicated diagrammatically on the Drawings. Determine exact locations on job, subject to structural conditions, work of other sections of the Specifications, access requirements for installation and maintenance and approval of Engineer.

B. Study and become familiar with the Drawings of other trades and in particular the general construction plans and details in order to obtain necessary information for figuring installation. Cooperate with work of other trades, and install work in such a way as to avoid interference with work of other trades. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed by Engineer prior to installation.

C. Any pipe, apparatus, appliance or other item interfering with proper placement of other work as indicated on Drawings, specified, or required, shall be removed and if so shown, relocated and reconnected without extra cost. Damage to new or existing work caused by Contractor shall be restored as specified for new work.

D. Do not scale Drawings for dimensions. Accurately lay-out work from dimensions indicated on Drawings unless such be found in error.

E. Report any conflict stated above to supervisor for coordination.

1.7 PERFORMANCE

A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.

1. At the completion of construction, all piping systems must be cleaned and properly treated by appropriate chemical treatment contractor. Systems which are not determined acceptable to the A-E shall be re-cleaned.
2. All systems, whether used for temporary construction conditioning or not, shall have a 1 year warranty from the date of substantial completion, irregardless of start-up date.
3. Contractor shall make arrangements for all necessary power to operate equipment during construction and shall include in bid all costs for such use.

1.8 TEMPORARY UTILITIES

A. Contractor shall provide temporary utilities as indicated in Section 015000.

1.9 WARRANTY

A. The electrical systems are to be warranted to Owner and Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from acceptance of electrical systems by Owner.

B. Contractor warrants to Owner and Engineer that on receipt of notice from either of them within one year of warranty period following date of acceptance all defects that have appeared in materials and/or workmanship, shall be promptly corrected to condition required by contract documents at contractor expense.

C. The warranty above expressed shall not supersede any separately stated warranty or requirements required by law or by these specifications.

1.10 ALTERNATES

A. Refer to General Requirements and description for alternate bid items.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SUBSTITUTIONS

A. The intent of these specifications is to allow ample opportunity for bidder to use its ingenuity and abilities to perform the work to its and the Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.

B. Material and equipment provided shall be first class quality, new, unused and without damage unless noted otherwise.

C. In general, these specifications identify required materials and equipment by naming first the manufacturer whose product was used as the basis for the project design and specifications. The manufacturer's product, series, model, catalog and/or identification numbers shall set quality and capacity requirements for comparing the equivalency of other manufacturer's products. Where other manufacturer's names are listed they are considered an approved manufacturer for the product specified, however; the listing of their names implies no prior approval of any product they may propose to furnish as equivalent to the first named product unless specific model or catalog numbers are listed in these specifications or in subsequent addenda. Where other than first named products are used for base bid proposal it shall be the responsibility of the Contractor to determine prior to bid time that the proposed materials and equipment selections are products of approved manufacturers which meet or exceed the specifications and are acceptable to the Engineer.

D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Engineer for review prior to procurement.

E. Prior to receipt of bids, if the Contractor wishes to incorporate products other than those named in the specifications or drawings they shall submit a request for approval of equivalency in writing to the A/E no later than (10) ten calendar days prior to bid date. Engineer will review requests and acceptable items will be listed in an Addendum issued to principal bidders. Equivalents will ONLY be considered approved when listed by project addendum. Substitutions after this may be refused at Engineers option.

F. Materials and equipment proposed for substitution shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two (2) copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison. In proposing a substitution prior to receipt of bids, include in such proposal cost of altering other elements of project, including adjustments in mechanical/electrical service requirements necessary to accommodate such substitution.

G. In proposing a substitution prior to receipt of bids, include in such bid all costs of altering other elements of the project, including such items as adjustments in mechanical/electrical service requirements necessary to accommodate such substitutions. In addition, all physical space and weight requirements requiring additional structural support, modifications to the base floor plans, equipment concrete pad/roof curb dimensions shall be incorporated as required into such bid to accommodate such substitutions.

H. Within ten (10) working days after bids are received, apparent low bidder shall submit to A/E for approval three copies of a list of all major items of equipment he intends to provide. As soon as practicable and within ten (10) working days after award of contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work for Engineer's review. Where ten (10) working day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certifications that order was placed within ten (10) working day limit.

PART 3 - EXECUTION

3.1 SHOP DRAWINGS

A. Contractor shall furnish a minimum of ten (10) sets of shop drawings of all materials and equipment. A/E will return 6 sets to the Contractor. A copy of fully processed product data submittal shall be included as a part of each operating and maintenance manual.

B. Where catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, fitting sizes, etc., that are to be provided. Mark each submitted item with applicable section and paragraph numbers of these specifications, or Drawing sheet number when item does not appear in specifications. Where equipment submitted does not appear in specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization. Each submittal shall contain at least four sets of original catalog cuts. Each catalog sheet shall bear Equipment Manufacturer's name and address. All shop drawings on materials and equipment listed by UL shall indicate UL approval on submittal.

C. Contractor shall be required to submit all applicable equipment/material assembly mock-ups as required by the Contract Documents for Engineer approval. Contractor shall provide changes and resubmit mock-ups until Engineer is satisfied final product meets or exceeds stated specifications and quality of specified product.

D. Contractor shall check all shop drawings to verify that they meet specifications and/or drawings requirements before forwarding submittals to the Engineer for their review.

E. All shop drawings submitted to Engineer shall bear Contractor's approval stamp which shall indicate that Contractor has reviewed submittals and that they meet specification and drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed, electrical characteristics, provisions for supply, return and drainage connections to building systems. All shop drawings not meeting Contractor's approval shall be returned to its supplier for resubmittal.

F. No shop drawing submittals will be considered for review by the Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of Contractor's review. All comments or minor notations on shop drawings shall be flagged to indicate originator of comment.

G. Engineer will not be responsible for or the cost of returning shop drawing submittals that are submitted without Contractor's review and approval stamp. A letter will be sent to Contractor by either the Engineer or Engineer indicating receipt of an improper submittal for pick-up by Contractor or supplier for 15 working days after date of receipt. If not picked up by the 16th working day, submittals not bearing Contractor's review and approval stamp will be disposed of by Engineer.

H. Engineer's review of shop drawings will not relieve Contractor of responsibility for deviations from drawings and specifications unless such deviations have been specifically approved in writing by Owner or its representative, nor shall it relieve Contractor of responsibility for errors in shop drawings. No work shall be fabricated until Engineer's review has been obtained with "no exceptions" or "as noted" language. Any time delay caused by correcting and resubmitting shop drawings will be Contractor's responsibility.

I. The preparation of coordination drawings are not a requirement of the project unless otherwise indicated on the drawings. It is strongly recommended, however, that the various contractors work together to prepare detailed coordination drawings in an effort to minimize conflicts created as the various trades install their particular portion of the work. The design team will assist the contractor in resolving coordination conflicts by reviewing these coordination drawings; however, this review will not constitute any approval of said drawings. There will be no additional compensation for deviations in pipe, ductwork or conduit routing required to achieve coordination of the material and equipment scheduled or indicated to be installed as a part of the project. There will be no additional compensation for the rework of pipe ductwork or conduit should this become required as a result of a lack of coordination between the various trades..

J. Contractor shall submit the following items for this project:

1. Exhaust Fans
2. Grilles/registers/diffusers/louvers
3. Steam and condensate piping
4. All valves
5. Pressure relief valves
6. Pressure reducing valves
7. Expansion compensators
8. Steam and condensate specialties (i.e. condensate traps, etc.)
9. Steam and condensate piping insulation
10. Chilled water piping insulation

3.2 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

A. Submit an outline copy of installation, operating, and maintenance manuals for review and comment.

B. Submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. After receiving comments from outline review. Instructions shall be prepared by equipment manufacturer.

C. Keep in safe place, keys and wrenches furnished with equipment under the Contract. Present to Owner and obtain receipt for same upon completion of project.

D. Prepare a complete notebook, covering systems and equipment provided and installed under this contract. Submit notebooks to Engineer for review before delivery to Owner. Contractor at his option may prepare this notebook, or retain an individual to prepare it for him. Contractor shall include cost of this service in bid. Notebook shall contain following:

1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined under this specification.
2. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
3. A complete set of approved final shop drawings.
4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of the systems installed.
5. As-Built Drawings: The Contractor shall mark up a set of contract documents during construction noting all changes and deviations including change orders. These will be delivered to A/E at end of the project for review and correction as required. After the originals are changed to reflect the blue line set, a complete set of reproducible set of project record drawings drawn at the original scale indicated shall be included in the brochure.
6. All required warranties and guarantees, including start and end date of warranties/guarantees.

E. Provide notebooks bound in black vinyl three-ring binders. Reinforce binding edge of each sheet of looseleaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:

1. Project name and address.
2. Section of work covered by brochure, e.g. "Heating, Ventilating and Air Conditioning", and "Plumbing", etc.

3.3 CUTTING AND PATCHING

A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Cut no structural members without Engineer's approval and in an approved manner.

B. Patching shall be by mechanics of particular trade involved and shall meet approval of Engineer.

C. Drilling and cutting of openings through building materials requires Engineer's review and approval. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work is not acceptable.

3.4 MUTILATION

A. Mutilation of building finishes or existing/new equipment, caused by demolition or installation of new work shall be repaired at Contractor's expense to approval of Engineer.

3.5 WALL PENETRATIONS

A. Include the installation of all boxes, access panels and sleeves for openings required to install the work. All floor and wall penetrations shall be sealed to meet fire rating requirements using materials tested in accordance with ASTM E814.

3.6 OPENINGS, ACCESS PANELS & SLEEVES

A. Include the installation of all boxes, access panels and sleeves for openings required to install this work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all pipes passing through structural slabs and walls unless otherwise noted on plans. Set and verify the location of sleeves as shown on structural plans that pass through beams, only if so shown. All floor and wall penetrations be sealed to meet fire rating requirements. Access panels shall include those required to access fire dampers, valves, smoke dampers, pipe chases, manual and automatic dampers, etc. Locations and sizes of panels are to be determined by the contractor and are not specifically shown on the drawings.

3.7 FIRE STOPPING

A. All holes or voids created by the mechanical Subcontractor to extend pipe through fire rated floors and walls and shall be sealed with an intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures of 250 degrees F. It shall be ICBO, BOCAI and SBCCI (NRB 243) approved ratings to 3 hours per ASTM E-814 (UL 1479). Acceptable Material: 3M Fire Barrier Caulk, putty, strip and sheet forms. Equivalent by SpecSeal.

B. Submit for review firestopping methods and sleeve drawings indicating all required application, methods and sleeves. Refer to Engineering drawing for locations of fire rated partitions and floors.

C. Penetrations through all walls and/or floors shall be firestopped.

3.8 SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

A. Work shall include mounting, alignment and adjustment of systems and equipment. Set all equipment level on adequate supports and provide proper anchor bolts and isolation as shown or specified. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.

B. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best recognized practice. Contractor shall arrange for attachment to building structure, unless otherwise indicated on drawings or as specified. Provide hangers with vibration eliminators where required. Contractor shall verify that structural members of building are adequate to support equipment. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Engineer for review before proceeding with fabrication or installation.

3.9 START-UP, CHANGEOVER, TRAINING AND OPERATION CHECK

A. Contractor shall be responsible for training Owner's operating personnel to operate and maintain systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructor's name, names of Owner's personnel attending and total hours of instruction given each individual.

B. All owner training sessions shall be orderly and well organized and shall be professionally videotaped using digital tape format. Contractor shall produce a DVD of each training session and submit to Owner with original digital disk as part of the Operation and Maintenance Manual submittal.

3.10 PRE-FINAL AND FINAL CONSTRUCTION REVIEW

A. At Contractor's request, Engineer will make pre-final construction review to determine if to the best of its knowledge project is completed in accordance with Contract Documents.

B. Items found by Engineer as not complete or not in accordance with requirements of contract will be outlined in report to Engineer for forwarding to subcontractors. Subcontractor shall complete and/or correct these items, before notifying Engineer it is ready for final review.

C. All necessary system adjustments, including air systems balancing, shall be completed and all specified records and reports submitted in sufficient time to be received by Engineer at least ten working days prior to date of final construction review.

D. At final construction review, Contractors shall be present or shall be represented by a person of authority. Each shall demonstrate, as directed by Engineer that work complies with purpose and intent of contract documents and shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

END OF SECTION 230500

SECTION 230501 - EXTENT OF CONTRACT WORK AND CODES

PART 1 - GENERAL (Reference Section 230500)

1.1 GENERAL EXTENT OF WORK INCLUDED IN CONTRACT

A. Provide mechanical systems indicated on Drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of mechanical systems. In no case will claims for "Extra Work" be allowed for work about which Contractor could have been informed before bids were taken.

B. Become familiar with equipment provided by other Subcontractors which require mechanical connections and controls.

C. Electrical work required to install and control mechanical equipment which is not indicated on Drawings or specified under Division 16 shall be included.

D. The cost and provision of larger wiring, conduit, control, and protective devices resulting from installation of equipment which was not used for basis of design as outlined in specifications shall be provided at no increase in contract price.

E. Provide supervision to subcontractor to insure that required connections, interlocking and interconnection of mechanical and electrical equipment are made to attain intended control sequences and system operation.

F. Furnish ten complete sets of electrical wiring diagrams to Engineer and three complete sets to Electrical Subcontractor. Diagrams shall show factory and field wiring of components and controls. Control devices and field wiring to be provided by Electrical Subcontractor shall be clearly indicated by notation and drawing symbols on wiring diagrams.

G. Obtain complete electrical data on mechanical shop drawings and list this data on an approved form which shall be presented monthly or on request, to Electrical Subcontractor. Data shall be complete with wiring diagrams received to date and shall contain necessary data on electrical components of mechanical equipment such as HP, voltage, amperes, watts, locked rotor current to allow Electrical Subcontractor to order electrical equipment.

1.2 CODES, ORDINANCES, RULES AND REGULATIONS

A. Provide work in accordance with applicable rules, codes, ordinances and regulations of Local, State, Federal Governments, and other authorities having lawful jurisdiction.

B. Conform to latest editions and supplements of following codes, standards or recommended practices.

1. International Plumbing Code-2006.
2. International Mechanical Code-2006
3. International Building Code-2006.
4. National Electrical Safety Code Handbook H30- National Bureau of Standards- 2005.
5. Occupational Safety and Health Standard (OSHA) - Department of Labor.
6. NFPA No. 70 National Electrical Code-2005
7. NFPA No. 90A Air Conditioning and Ventilating Systems
8. NFPA No. 91 Blower & Exhaust System
9. International Fire Code – 2006

MISCELLANEOUS CODES:

ANSI A117.1 - Handicapped Accessibility
Americans with Disabilities Act (ADA)
Kansas State Boiler Code

C. Drawings and specifications indicate minimum construction standard, should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Engineer in writing before proceeding with work so that necessary changes can be made. However, if Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations he shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

D. Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Engineer with request for final review.

PART 2 - PRODUCTS

2.1 DRAWINGS

A. Drawings are to be considered diagrammatic for all systems. Piping and drawings do not show all required offsets and fittings. Contractor shall include in bid costs to provide systems which will avoid and coordinate will all existing conditions and all other building trades and systems.

END OF SECTION 230501

SECTION 230510 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 23.

B. Related Sections: The following Division 23 sections contain requirements that relate to this section:

1. "Basic Mechanical Materials and Methods," for materials and methods common to the remainder of Division 23, plus general related specifications including:

a. Access to mechanical installations.

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

1. Submittals.
2. Coordination drawings.
3. Record documents.
4. Maintenance manuals.
5. Rough-ins.
6. Mechanical installations.
7. Cutting and patching.
8. Substitutions.

1.3 QUALITY ASSURANCE

A. Comply with IBC "International Building Code" for plumbing and mechanical materials, components, and installations.

B. Comply with IPC "International Plumbing Code" for plumbing materials, components, and installations.

C. Comply with IMC "International Mechanical Code" for mechanical materials, components, and installations.

D. NFPA Compliance: Components and installation shall comply with the following where applicable:

1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
2. NFPA 101 - Life Safety Code.

1.4 SUBMITTALS

A. General: Follow the procedures specified in Division 1 Section "Submittals."

B. Increase the number of mechanical related shop drawings, product data, and samples submitted, to allow for required distribution plus one copy of each submittal required, which will be retained by the Mechanical Consulting Engineer.

C. Additional copies may be required by individual sections of these Specifications.

1.5 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, indicate the following installed conditions:

1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Refer to Division 23 Section "Mechanical Identification." Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified in Division 1 Section "Field Engineering" to record the locations and invert elevations of underground installations.

1.6 OPERATION AND MAINTENANCE MANUALS

A. Prepare three (3) bound Operation and Maintenance Manuals in accordance with Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, complete nomenclature and commercial numbers of replacement parts and complete parts listing with part name and number.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.
5. Reviewed shop drawings and submittals.
6. Record of spare parts provided to Owner with a signature of receipt by Owner's representative.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products in factory-fabricated type containers or wrappings which properly protect product from damage.

C. Store products indoors in clean, dry space in original containers. Protect products from weather, construction traffic and debris. When necessary to store outdoors, take similar precautions and store above grade and enclose with waterproof covering.

D. Handle products carefully to prevent physical damage. Do not install damaged products; replace damaged products with new.

PART 2 - PRODUCTS

2.1 GENERAL

A. All equipment and material provided shall be “lead paint free” and asbestos free.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and

equipment to provide the maximum headroom possible.

7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with reviewed submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install access panels or doors where units are concealed behind finished surfaces. Access panels and doors are specified in "Basic Mechanical Materials and Methods."
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 EQUIPMENT ELECTRICAL CONNECTIONS

A. Electrical: Conform to applicable requirements in Division 16 Sections.

B. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

C. Provide all accessories required for complete installation of equipment provided in Division 23 Sections. Mount accessories in appropriate locations to insure access and proper operation. Accessories include equipment control panels, solenoid valves, aquastats, flow switches and similar devices.

D. Arrange for the project electrical contractor to install all control wiring in conduit associated with any accessories provided in Division 23 Sections. Mechanical contractor is responsible for the cost of the electrical installation and for providing all equipment control wiring diagrams to the electrical contractor to insure proper connections. Control diagrams shall clearly identify factory-installed wiring and field-installed wiring. In the absence of a temperature control contractor, the mechanical contractor shall include any wiring associated with temperature control devices with the wiring to be installed by the electrical contractor.

3.4 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1 Section "Cutting and Patching." In addition to the requirements specified in Division 1, the following requirements apply:

1. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

   a. Uncover Work to provide for installation of ill-timed Work.

b. Remove and replace defective Work.
c. Remove and replace Work not conforming to requirements of the Contract Documents.
d. Remove samples of installed Work as specified for testing.
e. Install equipment and materials in existing structures.
f. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

2. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
7. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.5 SUBSTITUTIONS

A. General: All changes and additional work required by this Contractor or any other Contractor because of a substitution of an equivalent piece of equipment by this Contractor shall be the responsibility of this Contractor. Substitutions will only be considered when the quality of the product is maintained and it is advantageous to the Owner to consider.

3.6 CLEANING

A. All equipment and installed materials shall be cleaned inside and outside. All construction dust and loose materials shall be removed. Any printed information attached to the equipment shall be removed and included in the Operation and Maintenance Manuals. Equipment nameplates shall NOT be removed. Any scratched paint surfaces shall be repaired with manufacturer's touch-up paint.

END OF SECTION 23 0510

SECTION 230516 – EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 – GENERAL

1.1 EXPANSION JOINTS

A. Provide expansion joints on all steam and steam condensate piping as indicated on the plans. Refer to the expansion joint schedule at the end of this section for proper sizing and model numbers.

B. All equivalents not listed in schedule shall be by Engineer approval as listed by addendum only.

PART 2 – PRODUCTS

2.1 EXPANSION JOINTS - STEAM AND STEAM CONDENSATE RETURN

A. Thermal expansion joints shall be Hyspan model 6502 weld end, single slip expansion configuration. Expansion joints shall be designed for packing injection under full line pressure.

B. Materials: Traverse chamber and stuffing box shall be seamless steel A-53 GRB pipe or equivalent tubing. Slip shall be machined from A-53 GRV seamless pipe (Schedule 80). Slip shall be plated with 1 mil. of hard chrome applied over 1 mil. of crack-free hard chrome and certified by permascope inspection per ASTM Standard B-499.

C. Equivalent by Advance Thermal System.

2.2 EXPANSION LOOPS –STEAM CONDENSATE RETURN

A. Thermal expansion loops shall be Hyspan Series 4500 V-Flex Connectors with welded ends. Refer to schedule on plans.

B. Provide “3-phase V” configuration with braided metal hose connector and 90 degree elbows between hose section.

C. Connectors shall be manufactured and tested by metal hose and braid manufacturer. Unit shall be tested and certified for pressures and fluid indicated in schedule by manufacturer.

D. Fittings shall match adjacent piping system.

E. Equivalent by Flexicraft, Flex Hose.

END OF SECTION 230516

SECTION 230519 – METERS AND GAUGES FOR HVAC

PART 1 – GENERAL

1.1 THERMOMETERS AND GAUGES

A. Provide thermometers and gauges as hereinafter specified and shown on the plans and so that proper testing and balancing and trouble shooting can be accomplished.

PART 2 – PRODUCTS

2.1 PRODUCTS

A. GAUGES

1. Gauges shall be bourdon tube with minimum 4-1/2" dial and die cast aluminum case with black enamel finish. The movement shall be all stainless steel with Grade A phosphor bronze bourdon tube brazed at socket and tip. The accuracy of the gauge shall be within ½ percent of the scale range. The pointer shall be the micrometer adjustment type recalibrated from the front. Pressure, compound, and differential pressure gauges shall have suitable scale ranges, shall be submitted and are subject to the review of the Engineer. Graduations shall be one pound or less on all gauges where this is standard for the required range.

2. Gauges shall have ¼" IPS connections and shall be Moeller "Vantage" gauges with Case Style No. 2, or approved equal. If it complies with these specifications, equipment manufactured by one of the following manufacturers will be acceptable: Ashcroft, Marsh, Trerice, Moeller, Weksler, Taylor, Weiss, or Midwest.

B. TEST PLUG

1. Install a SISCO ¼" or ½" NPT fitting (Test Plug) of solid brass at desired indicated locations. Test plug shall be capable of receiving either a pressure or temperature probe 1/8" o.d. Dual seal core shall be neoprene for temperature to 200°F and shall be rated zero leakage from vacuum to 1000 psig.

C. STEAM CONDENSATE FLOW METERS

1. Steam condensate flow meters shall be Badger Meter, Inc. "Magnetoflow Mag Meter". Meter shall have flanged ends and be equipped with a Model Primo Amplifier capable of operation in temperatures ranging from -4° to 140°F. All flow meters shall be 2" size.
2. Provide 120V single phase power to meter and analogue output signal to existing JCI control panel for remote monitoring.

2.2 SCHEDULE

INSTALLATION SCHEDULE

	Pressure Gauge & Gauge Cock	Pete's Plug	Flow Meter
INLET STEAM PIPE AT PRESSURE REDUCING VALVE	X		
OUTLET AT PRESSURE REDUCING VALVE	X		
OUTLET PIPE FOR EACH NEW CONDENSATE RETURN PUMP			X
SUCTION & DISCHARGE FLANGE OF NEW CONDENSATE RETURN PUMP	X	X	

PART 3 – INSTALLATION

3.1 INSTALLATION

A. Gauges shall be installed as hereinafter specified. Gauge cocks shall be polished brass A10 ¼" tee handle type with threaded ends. 125 psi rated for all systems rated less than 100 psi and shall be 200 psi rated for systems that are rated 100 psi or more. Provide gauge cock with ¼" pipe nipple for connection to gauge cock.

B. Flow meters shall be installed in 2" vertical condensate receiver discharge piping. Increase size of piping line according to documents in the horizontal run following the flow meter. Where meter requires installation more than 60" AFF, provide meter with junction box for remote Primo Amplifier. No equivalents shall be used on this project.

END OF SECTION 230519

SECTION 230523 – GENERAL – DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment or fixture, and on each main and branch service loop.

B. Valves installed in piping systems shall be compatible with system maximum test pressure, pipe materials, pipe joining method, and fluid or gas conveyed in system.

C. Provide valves with screwed end connections or flange connections as required by piping materials, piping system and piping sizes indicated in the valve schedule shown on the plans. Install union connection in the line within two feet of each screw end valve unless valve can be otherwise easily removed from line. Each valve shall be installed so that it is easily accessible for operation, visual inspection, and maintenance.

D. Non-rising stem valves shall not be installed at any point in the piping systems. With permission of Engineer non-rising stem valve may be installed at particular points where space is restricted.

E. Gate valves shall not be installed in pipe lines where intended for throttling service or where piping is subject to vibration as part of normal operating conditions.

PART 2 – PRODUCTS

2.1 SHUT-OFF VALVES, BALANCE VALVES AND CHECK VALVES

A. Provide valves based on pipe sizes, piping system served, and piping material as indicated in the valve schedule shown on the plans.

PART 3 – EXECUTION

3.1 GENERAL

A. Provide valves as indicated in schedule on plans.

B. Install valves with proper “spiral wound” flange gasket where installed in piping system requiring gasket where installed in piping system connection and requiring flange union where installed in threaded configuration.

C. Where gate valve is installed at elevations above 8’-0” AFF provide chain operator to allow actuation from floor.

END OF SECTION 230523

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING

PART 1 - GENERAL (Reference Section 230500)

PART 2 - PRODUCTS

2.1 PIPE SLEEVES AND SEALS

A. Furnish proper type and size pipe sleeves to General Contractor for installation in concrete or masonry walls or floors. Unless specifically noted on plans that penetration is core drilled. Mechanical Contractor shall supervise installation of sleeves to insure proper location and installation.

B. Each sleeve shall be continuous through wall floor or roof and shall be cut flush on each side except where indicated otherwise. Sleeves shall not be installed in structural member except where indicated or approved.

D. Provide steel pipe sleeves in bearing walls and masonry walls. Opening in non-bearing walls, floors and ceilings may be 20 gauge galvanized pipe sleeves or openings cut with concrete core drill.

E. Pipe insulation shall run continuous through pipe sleeves with 1/4" minimum clearance between insulation and pipe sleeve. Provide metal jackets over insulated pipes passing through fire walls, floors and smoke partitions. Jacket shall be 0.018 stainless steel extending 12 inches on either side of barrier and secured to insulation with 3/8" wide band. Seal annular space between jacket and pipe sleeves by installing backing rod and 3M Fire barrier caulk.

F. Pipe wall penetrations exposed to view shall have tight fitting escutcheons or flanges to cover all voids around openings.

2.2 PIPE HANGERS AND SUPPORTS

A. Provide and be responsible for locations of piping hangers, supports and inserts, etc., required for installation of piping under this contract. Design of hangers and supports shall conform to current issue of Manufacturers Standardization Society Specification (MSS) SP-58.

B. Pipe hangers shall be capable of supporting piping in all conditions of operation. They shall allow free expansion and contraction of piping, and prevent excessive stress resulting from transferred weight being induced into pipe or connected equipment. Support horizontal or vertical pipes at locations of least vertical movement.

C. Where horizontal piping movements are such that hanger rod angularity from vertical is greater than 4 degrees from cold to hot position of pipe, offset hanger, pipe, and structural attachments to that rod is vertical in hot position. Hangers shall not become disengaged by movements of supported pipe.

D. Provide sufficient hangers to adequately support piping system at specified spacing, at changes in piping direction and at concentrated loads. Hangers shall provide for vertical adjustment to maintain pitch required for proper drainage, and for longitudinal travel due to expansion and contraction of piping. Fasten hangers to building structural members wherever practicable.

E. Unless indicated otherwise on drawings support horizontal steel piping as follows:

PIPE SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1-1/4"	3/8"	8Ft.
1-1/2" to 2"	3/8"	10 Ft.
2-1/2" to 3-1/2"	1/2"	12 Ft.
4" and 5"	5/8"	15 Ft.

F. Provide continuous threaded electro galvanized hanger rods wherever possible. No chain, wire, or perforated straps shall be used. Hanger rods shall be subject to tensile loading only, where lateral or axial pipe movement occurs provide suitable linkage to permit swing. Provide pipe support channels with galvanized finish for concealed locations and painted finish for exposed locations. Submit design for multiple pipe supports indicating pipe sizes, service and support detail to Engineer for review prior to fabrication.

G. Provide Grinnell pipe hangers for vertical pipe risers as follows:

PIPE MATERIAL	PIPE SIZE	HANGER FIG. NO.
Steel	3/4" thru 20"	261

H. Provide Grinnell Fig. 194, 195, or 199 steel wall brackets for piping suspended or supported from walls. Brackets shall be prime coated carbon steel.

I. Mount hangers for insulated piping on outside of pipe insulation sized to allow for full thickness of pipe insulation. See 2.4 for insulation insert requirements at all hangers.

J. Structural attachments for pipe hangers shall be as follows:

1. Concrete Structure: Provide Grinnell Fig. No. 285 cast in concrete insert for loads up to 400 lbs. and Grinnell Fig. 281 wedge cast in type concrete insert for loads up to 1200 lbs.

K. Provide Grinnell pipe hangers for horizontal single pipe runs as indicated on drawings.

L. Pipe guides for horizontal piping mounted on pipe racks or stanchions shall be low friction graphite and/or teflon slide supports. Where racks and supports are not detailed on drawings submit detailed support drawings to Engineer for review prior to fabrication.

M. Provide necessary structural steel and attachment accessories for installations of pipe hangers and supports. Where heavy piping loads are to be attached to building structure verify structural loading with Engineer prior to installations.

2.3 EQUIPMENT ANCHORS

A. Provide floor or foundation mounted equipment with anchors as indicated on plans.

B. Anchors in floor shall be stainless steel.

2.4 PIPING ANCHORS AND SUPPORTS

A. Refer to drawings for detail of pipe supports and anchors.

B. Insert supports for all insulated piping shall conform to the following requirements:

1. Insulated pipe supports shall be supplied and installed by the Mechanical Contractor on all insulated pipe and tubing.
2. All insulated pipe supports shall be load rated. Load ratings shall be established by pipe support manufacturer based upon testing and analysis in conformance with the latest edition of the following codes: ASME B31.1, B31.3, MSS SP-58, MSS SP-69, MSS SP-89.
3. Load tests for the load bearing insulation material in the configuration of the support being considered shall be available upon request to the owner or the owner's representative. A minimum safety factor of 5 to 1 at the design temperature shall be used in determining the insulated support load rating.

4. Factory fabricated insulated supports shall consist of two 180 degree segments of high-density insulation material encased in a galvanized sheet metal jacket. On all hot lines the insulation shall consist of calcium-silicate and high density marinite structural inserts. Supports shall be selected based on support spacing, medium being transported and support method and shall adequately support the piping system with the 5 to 1 safety factor. All supports shall utilize an A36 hot dip galvanized rolled plate welded to the lower galvanized jacket of the insulated support. Insulation thickness of individual pipe supports shall match that of the adjacent pipe insulation as indicated on the pipe insulation schedule. Supports and alignment guides shall be manufactured by Rilco Manufacturing, Pipe Shields, Inc. or approved equal.
5. Pipe supports shall be as indicated in details on the drawings. Pipe supports shall be manufactured by Grinnel or approved equal.

2.5 INSULATION SCHEDULE

A. Refer to the plans for required insulation schedule of all piping systems.

END OF SECTION 230529

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIRED WORK

A. Provide the reasonable identification of HVAC piping as specified below.

PART 2 - PRODUCTS

2.1 PIPING IDENTIFICATION

A. Identify piping for all new HVAC piping including chilled water, high pressure steam, medium pressure steam, low pressure steam, pumped or gravity flow steam condensate return, drain lines, etc. at intervals indicated below. Provide color coded stencil markings for each type of pipe utilized and provide flow direction arrows. Provide standard stencils, prepared with letter sizes conforming to recommendations of ASME A13.1. Stencil paint shall be exterior use, oil-based, alkyd gloss enamel in colors according to ASME A13.1. Paint may be in pressurized spray-can form.

B. All letter stenciling shall be minimum 1-1/4" high. Colors and wording shall be as directed by the Owner, using standard colors and standard abbreviations of all services being identified. Contractor shall submit for approval list of colors and wording prior to purchase of pipe marking equipment/material/installation. Pipe markers shall meet applicable ANSI Standard and OSHA requirements.

Piping Section	Pipe Identification Spacing (max spacing)
Within tunnel system	20'-0" on center
Within any building	8'-0" on center
Within any basement of Any building	8'-0" on center
Within basement/tunnel Area below Power Plant	8'-0" on center

2.2 VALVE IDENTIFICATION

A. Mark all valves with Seaton No. 300-BL brass identification tags with system legend, valve number and size stamped on tag. Lettering shall be black 1/2" high. Tags shall be minimum 2" in diameter and attached to valve with Seaton No. 16 brass jack chain. Contractor shall submit for approval list of identification markings and letterings prior to ordering tag material.

B. Prepare four copies of typewritten list of valve tags. List shall be typed in upper case and contain tag number, valve size, type, function and location. Provide (1) copy of list to Engineer prior to ordering tag material. Provide (1) copy of final list to Owner for mounting in location required by Owner. Submit a copy of list with each Operation and Maintenance Manual.

C. Provide valve identification on all ball, gate, globe or butterfly style shut-off or control valves 1 ½" or larger. Check valves do not need identification tags. Provide valve identification on any pressure reducing valve or pressure relief valve.

END OF SECTION 230553

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL (REFERENCE SECTION 230500)

1.1 TESTING AND BALANCING

A. Testing and balancing of the hydronic systems will be completed near the end of construction. The Subcontractor has responsibility to cooperate with, make adjustments for, and provide any equipment necessary for the TAB agency to complete the job. Include all testing and balancing costs in subcontractor's bid.

1.2 ACCEPTABLE TESTING AND BALANCING FIRMS:

Energy Management & Control Corporation
3639 SW Summerfield Dr. Suite B
(785) 233-0289

Allied Labs
303 S. Topeka
Wichita, KS 67202
(316) 262-6457

Doyle Field Services, Inc.
646 W. 58th St.
Kansas City, MO 64113
(816) 444-7103

ViroCon
1627 Main St. Suite 600
Kansas City, MO 64108
(816) 842-9225

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 SYSTEM PREPARATION FOR TESTING AND BALANCING

A. Prior to requesting testing and balancing agency to perform their work the installing Subcontractor shall make all necessary inspections and adjustments to insure that systems are completely installed and operating in accordance with the manufacturer's recommendations and the contract documents.

B. The following checks shall be performed on each system installed under this contract. A report sheet shall be prepared by the testing and balancing firm for each system indicating checks made, corrective action taken where required, date, and name of person making inspection. Submit two copies of the checklist to the A/E.

1. Air Handling Systems:

a. Clear system of all foreign objects & clean system.
b. Verify fan rotation.
c. Check bearing condition and lubrication.
d. Check fan wheel clearances & fan alignment.
e. Check motor security to mounting base.
f. Check alignment of drive.

g. Check vibration isolator adjustment.
h. Verify that proper filter media is installed.
i. Verify that all control dampers are installed and operable without binding or sticking.
j. Confirm that all fire, smoke and volume dampers are installed and in full open position.
k. Verify that all air terminal units are installed.
l. Confirm that all air openings in walls above ceilings have been provided.
m. Check for and repair all excessive air leaks in duct systems, at equipment connections and at coils. Air leaks shall not exceed SMACNA parameters for system pressure.
n. Verify that ductwork is constructed and installed in accordance with contract drawings and/or approved ductwork shop drawings.

2. Hydronic Systems:

a. Confirm that total system has been hydrostatically tested, flushed, filled, vented and water treated as required.
b. Confirm that all strainer baskets are in place, clean and are the proper type.
c. Verify that all pressure reducing and control valves are operating properly.
d. Verify that access to all balancing valves and flow stations in walls and ceilings have been provided.
e. Confirm that fittings have been provided for flow and temperature measurements at all coils, heat exchangers and pumps.

3.2 COORDINATION & RESPONSIBILITIES

A. Attend initial Construction meeting scheduled by the Commissioning Agent and all other construction meetings as necessary.

B. Submit the draft and final TAB procedures and all proposed test forms to the design professional for review and acceptance.

C. Attend any construction meetings scheduled by the design professional. Be prepared to discuss the procedures that shall be followed in testing, adjusting and balancing the HVAC system.

D. Notify the Engineer a minimum of (2) two weeks in advance of the time for start of the TAB work.

E. Begin TAB work only after Pre-Functional Procedures, leak testing, start-up, etc. have been completed, documented, reviewed and approved.

F. Work with the Owner to assist in properly calibrating the system.

G. Provide Engineer with copies of in-progress, hand-written reports of TAB work, when requested on a regular basis.

3.3 AIR BALANCE

A. The Owner shall procure the services of the independent air balance and testing agency, approved by the Engineer, which specializes in the balancing and testing of heating, ventilating and air conditioning systems, to balance, adjust, and test air moving equipment and air distribution and exhaust systems and all water flow circuits. All work by this agency shall be done under direct supervision of a qualified heating and ventilating engineer employed by them. All instruments used by this agency shall be accurately calibrated within six months of performing work and maintained in good working order. If requested the tests shall be conducted in the presence of the Engineer responsible for the project and/or its representative. The testing and balancing firm shall be certified by NEBB or AABC and all work shall be performed in accordance with these organizations' published procedure manuals.

B. Air balance and testing shall not begin until systems have been completed and are in full working order. All heating, ventilation, and air conditioning systems and equipment shall be in full operation during each working day of testing and balancing.

C. The Subcontractor shall make changes in pulleys, belts, dampers, etc., as required by the test and balance agency, at no additional cost to the Owner.

D. The Subcontractor shall install new filters in the air handlers and clean all strainers in the water system just prior to the beginning of the testing and balancing.

E. The control manufacturer or its representative shall assist the test and balance agency in setting automatic dampers, valves, etc., as required.

F. The balancing agency shall prepare a certified report of all tests performed. The report shall be written on standard forms prepared by NEBB or AABC or facsimiles thereof. The balancing agency shall submit 3 copies of this report to the Subcontractor who shall submit them to the A/E for review and distribution.

G. The air flows shall be balanced to within $\pm$ 10% of design requirements.

3.4 WATER BALANCE

A. The Subcontractor shall procure the services of the independent air balance and testing agency, approved by the Engineer, which specializes in the balancing and testing of heating, ventilating and air conditioning systems, to balance, adjust, and test all new pumping equipment. All work by this agency shall be done under direct supervision of a qualified heating and ventilating engineer employed by them. All instruments used by this agency shall be accurately calibrated within six months of performing work and maintained in good working order. If requested the tests shall be conducted in the presence of the Engineer responsible for the project and/or its representative. The testing and balancing firm shall be certified by NEBB or AABC and all work shall be performed in accordance with these organizations' published procedure manuals.

B. The balancing agency shall prepare a certified report of all tests performed. The report shall be written on standard forms prepared by NEBB or AABC or facsimiles thereof. The balancing agency shall submit 8 copies of this report to the Subcontractor who shall submit them to the A/E for review and distribution.

C. The Balancing reports shall include a line drawing of the heating water piping as installed; record of pump data at idle and full load conditions, water flows, and water temperatures. The balancing report shall also include all NEBB or AABC forms completed as required by each respective certification.

D. During installation of the mechanical systems the testing and balancing agency shall make no less than (1) inspection visits to the project site. Proper placement and installation of all control and balancing devices shall be verified by these inspections. The mechanical contractor shall make all corrections in control and balancing device locations as requested by the TAB firm. Following each inspection visit the TAB firm shall report to the A/E all items noted, action taken, and progress of control device installation. The last inspection and balancing shall be performed in the presence of a professional engineer active in the design of mechanical building systems.

END OF SECTION 230593

SECTION 230700 – HVAC INSULATION

PART 1 - GENERAL (Reference Section 230500)

1.1 GENERAL REQUIREMENTS

A. Provide necessary materials and accessories for installation of insulation for plumbing and mechanical systems as specified and/or detailed on drawings insulation type, jacket, and thickness for specific piping systems or equipment shall be as listed in insulation schedule.

B. Provide insulation materials manufactured by Armstrong Cork Co. Certain/Teed Saint Gobain, Dow Chemical, Johns-Manville or Owens-Corning Fiberglass.

C. Insulation, except where specified otherwise, shall have composite fire and smoke hazard ratings as rested by ASTM E-84, NFPA 255, and UL 723 procedures not exceeding:

FLAME SPREAD	25
SMOKE DEVELOPED	50
FUEL CONTRIBUTED	50

D. Provide insulation accessories such as adhesives, mastics, cements, tape and glass fabric with same component ratings as listed above. Products or their shipping cartons shall bear label indicating their flame and smoke safety shall be permanent. Use of water soluble treatments such as corn paste or wheat paste is prohibited. This does not exclude approved lagging adhesives.

E. Install insulation over clean dry surfaces with joints firmly butted together. Insulation at equipment, flanges, fittings, etc. shall have straight edges with box type joints with corner beads as required. Where plumbing and heating insulation terminates at equipment or unions, taper insulation at 30 degree angle to pipe with one coat finishing cement and finish same as fittings. Total insulation system shall have neat smooth appearance with no wrinkles, or folds in jackets, joint strips or fitting covers.

F. Undamaged insulation systems on cold surface piping and equipment shall perform their intended functions as vapor barriers and thermal insulation without premature deterioration of insulation or vapor barrier. Contractor shall take every reasonable precaution to provide insulation systems with continuous unbroken vapor barriers.

G. Where glass fabric is specified in the following insulation methods provide resin impregnated white open weave glass fabric with 10/20 thread count. Provide glass cloth similar to Alpha Martex wettable glass cloth.

H. Abbreviations for manufacturers of adhesive, mastics and coating specified shall be C.M. for Chicago Mastic Company and B.F. for Benjamin Foster Company.

I. Insulation of removable heads, manholes access covers, etc., shall be fabricated to allow removal without damage to insulation. Provide removable units with vapor-proof cover fabricated to be sealed to equipment vapor barrier.

J. Insulation failing to meet workmanship and appearance standards shall be replaced with an acceptable installation before final acceptance of project will be given. Insulation failing to meet performance requirements of this specification for a period of one year after date of final acceptance or through one heating season and one cooling season, whichever is longer shall be replaced with an acceptable installation. All costs to correct insulation deficiencies and costs to repair damages to other work shall be at Mechanical Contractors expense at no cost to owner.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS AND APPLICATION METHODS (PIPING)

A. Pipe insulation by type shall be as follows:

1. TYPE 1-PHC: Insulation for hot and cold surface piping systems with -60 degrees F to +650 degrees F operating range shall be Owens-Corning Fiberglass ASJ/SSL-11, 4.2 lb. density pipe insulation with white fire retardant ASJ jacket and double self-sealing lap. Average thermal conductivity shall not exceed .26 BTU/Hr. at 75 degrees F mean temperature. Seal longitudinal jacket laps and butt strips with C.M. No. 17-465 or B.F. No. 85-75 vapor barrier adhesive. Insulate valves and fittings as follows:

a. Insulate exposed and concealed valves and fittings with 2" thick glass fiberglass inserts or blankets. Cover fittings with Zeston Products PVC fitting covers or approved equal. PVC fitting covers shall be secured with mechanical fasteners such as tacks or staples for temperatures above 75 degrees F. For cold service all joints shall be sealed with vapor barrier adhesive or by pressure sensitive vapor barrier vinyl tape.

b. Insulate expansion compensators with self contained, fully jacketed blanket with eyelets to allow the blanket to be laced into place. Jacket shall be rated for anticipated temperatures and shall be durable and shall remain flexible in anticipation of periodic removal and replacement.

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 230700

SECTION 230701 - DUCTWORK INSULATION

PART 1 – GENERAL (Reference Section 230500)

PART 2 – PRODUCTS

2.1 DUCTWORK INSULATION

A. Provide necessary materials and accessories for installation of interior and exterior ductwork insulation as specified and/or detailed on drawings. Insulation type and thickness for specific ductwork systems shall be as listed in insulation schedule in this section of specification. Provide insulation materials manufactured by Schuller, Knauf Fiberglass, Certain/Teed, or Owens-Corning Fiberglas.

B. Insulation and application adhesives, except where specified otherwise, shall have fire and smoke hazard rating as tested by ASTM E-84 procedure not exceeding:

FLAME SPREAD	25
SMOKE DEVELOPED	50
FUEL CONTRIBUTED	50

C. Insulation shall meet ASTM C411 performance test and shall be installed in conformance with NFPA Standard 90A.

D. Install interior duct liner insulation cut to insure tight fitting corner, and longitudinal joints. Apply liner to sheet metal with 100% coverage of adhesive applied in accordance with manufacturers recommended applications rate. Coat all edges of liner with adhesive. Provide mechanical fasteners on surfaces 18" or wider in addition to liner adhesive with fastener clips set flush with duct liner surface. Provide fasteners as follows:

1. Low Velocity Ductwork (Velocities less than 2000 FPM): Provide fasteners within 3" of leading edge of each section 12" O.C. around joint perimeter and 3" from longitudinal joints 12" O.C. Elsewhere space fasteners 18" O.C. except not more than 6" from longitudinal joints and not 12" from corner break.

E. Provide round sheet metal ductwork with exterior thermal insulation of type and thickness listed in insulation schedule. Apply insulation with joints tightly butted together with longitudinal and end joint strips sealed with vapor barrier adhesive. Insulate fittings with insulation thickness equal to adjoining insulation with cover overlapping 2" onto adjacent covering.

F. Eliminate ductwork insulation on exposed round ductwork unless noted otherwise in ductwork insulation schedule.

G. Duct insulation materials by type shall be as follows:

1. Type 1-DIL: Internal acoustical and thermal duct insulation for low and high velocity ductwork shall be 2 lb. density for 1/2" thick and 1.5 lb. density for 1" thick duct liner with 1.08 @ 1000 FPM friction coefficient and .24 BTUH thermal conductivity at 75 degrees mean temperature.
2. Type 2-DEW: External thermal insulation for low, medium and high pressure duct shall be 1.0 lb. density standard duct insulation type IV with foil-scrim-craft facing and .27 BTUH thermal conductivity at 75 degrees mean temperature.
3. Type 3-DEW: External thermal insulation for low pressure ductwork. Fiberglass with .23 Btuh thermal conductivity at 75^{o}F mean temperature and fire retardant polyethylene .003" thick jacket. Insulation shall be premanufactured sleeve type for installation over round low velocity ductwork.

H. Specific insulation materials and installation methods for ductwork systems shall be as follows:

DUCTWORK SYSTEM	DUCT INSULATION TYPE	THICKNESS
Low PressureRectangular		
Supply & Return, Exhaust	1-DIL	1/2"
Rectangular Outside Air	2-DEW	1-1/2”
Relief and Return Air Boots	1-DIL	1/2"
Round Ductwork	3-DEW or 2-DEW	1-1/2"
Low Pressure Round (>12”)	2-DEW	1-1/2”

END OF SECTION 230701

SECTION 230900 – HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. System commissioning is a part of the construction process. Documentation and testing of systems, as well as training of the Owner's operation and maintenance personnel, is required. Final Completion is dependent on successful completion of all commissioning procedures, documentation, and issue closure.

1.2 DEFINITIONS

A. ACP: Area Control Panel.

B. DDC: Direct-digital controls.

C. LAN: Local area network.

D. MS/TP: Master-slave/token-passing.

E. PICS: Protocol Implementation Conformance Statement.

F. PC: Personal Computer.

G. BIBBS: BACnet Interoperability Building Blocks.

H. TCP/IP: Transmission Control Protocol/Internet Protocol.

I. EMCS: Energy Management Control System.

J. RCAS: Reserve Component Automation System.

1.3 SYSTEM DESCRIPTION

A. Provide additions to the existing Control Systems as indicated on plans. These additions shall be by Johnson Controls, and shall be acquired via the existing State contract that the Capitol Complex has with Johnson Controls, State contract #33634. Johnson Controls will contract directly with the Capitol Complex for the required Building Automation and Control Systems modifications, and will not flow through the General and Mechanical Contracts. The General and Mechanical Contractors will be required to coordinate with Johnson Controls on this project. The system s hall be complete in all respects including labor, materials, equipment, and services necessary, and shall be installed by personnel regularly employed by Johnson Controls.

B. All automation and control components shall be integrated into a distributed network system communicating over a nonproprietary local area network. This system shall consist of field Stand-alone Direct Digital Controllers (DDC), Smart Local DDC's and interface into existing PC based operator workstations.

1.4 SEQUENCE OF OPERATION (SEE PLANS)

1.5 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. Each control device labeled with setting or adjustable range of control.

B. Shop Drawings: Detail equipment assemblies for each DDC and/or pneumatic control system and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices. Included shall be diagrams depicting the system architecture complete with a communications riser.
2. Wiring Diagrams: Power, signal, and point-to-point control wiring diagrams. Differentiate between manufacturer-installed and field-installed wiring.
3. Details of control panel faces, including controls, instruments, and labeling.
4. Written description of sequence of operation.
5. Schedule of dampers including size, leakage, and flow characteristics.
6. Schedule of valves including leakage and flow characteristics.
7. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
8. Listing of connected data points, including connected control unit and input device.
9. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
10. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

C. ANSI/ASHRAE 135 BACnet Statement: PICS for each DDC system component (panel, zone controller (at VAV terminals), field devices, and operator workstation) proposed.

D. Samples: For each color required, of each type of thermostat cover.

E. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems. All software shall be licensed in the name of the Owner.

F. Software Upgrade Kit: For Authorized Representative to use in modifying software to suit future power system revisions or monitoring and control revisions.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

H. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:

1. Maintenance instructions and lists of spare parts for each type of control device.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

I. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

J. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is a certified installer of the BAS control system manufacturer for both installation and maintenance of units required for this Project and shall include all necessary debugging and calibration of each component of the system.

B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance. Equipment and Installer shall have a support facility within 100 miles of the site with technical support staff, spare parts inventory and all necessary test and diagnostic equipment.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Underwriters Laboratory (UL 916).

E. FCC Regulation, Part 15, Section 156.

F. National Electric Manufacturers Associations (NEMA).

G. Building Officials and Code Administrator's International (BOCA) Mechanical Code.

H. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

I. Comply with ASHRAE 135 for DDC system control components.

J. Year-2000 Compliant: Computer hardware and software shall be capable of accurately processing, providing, and receiving date data from, into, and between the twentieth and twenty-first centuries, including leap-year calculations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.8 COORDINATION

A. Coordinate location of thermostats, and other exposed control sensors with plans and room details before installation.

B. Coordinate supply of conditioned electrical circuits for control units and operator workstation.

1.9 WORK BY OTHERS

A. Contractor Responsibilities/Coordination with building Automation and Control System Contractor. It shall be the responsibility of the General, Mechanical, and Electrical Contractors to coordinate with the Capitol Complex BACS contractor, Johnson Control, to procure a fully functional mechanical system. Responsibilities of the Contractors are as follows:

B. Sheet Metal Subcontractor:

1. Setting of automatic control dampers, and blank off plates.
2. Access doors where and as required.

3. Provide necessary mechanical equipment submittals to Johnson Controls.

C. Piping Contractor:

1. Installation of immersion wells.
2. Installation of flow switches.
3. Setting of automatic control valves.
4. Installation of pressure tappings and associated shut-off cocks.
5. Provide necessary mechanical equipment submittals to Johnson Controls.

D. Electrical Contractor:

1. All power wiring and line voltage interlock wiring such as exhaust fan interlocked to supply fan.
2. All control wiring specifically shown on electric plans, such as unit heater room thermostats.
3. Provide submittal drawings to the BACS contractor on any items that will require and interface between the two.

E. Electrical Work for Controls:

1. All electrical work for automatic controls, except as otherwise specified, or shown on the electrical drawings shall be included in this Division by Johnson Controls.
2. Electrical work shall, in general, comply with the following:

a. All low voltage wiring in finished rooms shall be concealed below working heights and exposed above.
b. Electrical work may include both line voltage and low voltage wiring, as required.
c. Conduit network from power systems may be used for running control high voltage wiring.
d. All electrical work shall comply with the NEC and the local electrical codes.
e. All safety devices shall be wired through both hand and auto positions of motor starting device to insure 100% safety shut-off.
f. All magnetic starters furnished by Electrical Contractor for mechanical equipment shall be furnished with integral control transformers, sized to handle the additional VA needed for the controls – pilots, EP valves, etc.
g. The motor starter supplier shall provide auxiliary contacts as required for interlock by BACS Contractor, the supplier shall estimate an allowance of at least one auxiliary contract per starter. All interlock and control wiring shown on the electrical prints is by the electrical subcontractor.

1.10 GUARANTEE

A. All components, parts and assemblies shall be guaranteed against defects in material and workmanship for a period of one year after acceptance. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations. Guarantee commences at the time of acceptance and continues for the previously indicated duration. Individual or aggregate beneficial use shall bean that the Owner's operators are able to use the System and receive reliable information from inputs and outputs completed by the Building Automation Contractor.

B. The following procedures shall govern the guarantee period. Within thirty (30) days after the Owner is receiving beneficial use of approved operation, the Building Automation Contractor shall initiate the guarantee period by formally transmitting to the Owner commencement notification of the period of the system(s), subsystem(s) and devices previously accepted. Guarantee notification will be formally transmitted in like manner for subsequent phases or portions thereof which remain incomplete at the time of initial notification.

1.11 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Replacement Materials: One replacement diaphragm or relay mechanism for each unique valve motor, controller, thermostat and positioning relay.

C. Spare points on individual controllers will not be required; however, the entire system must have the ability to be expanded in the future through the addition of application specific controllers.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide products compatible with existing automatic temperature controls and as required for a complete and functional system as indicated on plans.

2.2 STATUS AND SAFETY SWITCHES

A. General Requirements

1. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the FMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

B. Current Sensing Switches

1. The current sensing switch shall be self-powered with solid state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
2. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.
3. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.

C. Air Flow Switches

1. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.

2.3 HVAC OUTPUT DEVICES

A. Actuators

1. General Requirements

a. Damper and valve actuators shall be electronic.

2. Electronic Damper Actuators

a. Electronic damper actuators shall be direct shaft mount.
b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.

c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.
e. Acceptable manufacturers: Johnson Controls, Belimo

3. Electronic Valve Actuators

a. Electronic valve actuators shall be manufactured by the valve manufacturer.
b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.
d. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
e. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.

B. Control Dampers

1. The FMS Contractor shall furnish all automatic dampers. All automatic dampers shall be sized for the application by the FMS Contractor or as specifically indicated on the Drawings.
2. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.
3. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.
4. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 48". Damper blades shall be 16-gauge minimum and shall not exceed six (6) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. Additional stiffening or bracing shall be provided for any section exceeding 48" in height. All damper bearings shall be made of stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48" x 48" size shall not leak in excess of 8.5 cfm per square foot when closed against 4" w.g. static pressure when tested in accordance with AMCA Std. 500.

5. Air foil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" w.g., but no more than 4000 FPM or 6" w.g. Acceptable manufacturers are Johnson Controls D-1300, Ruskin CD50, and Vent Products 5650.
6. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below.
7. Acceptable manufacturers are: Johnson Controls D-1100, Ruskin CD36, and Vent Products 5800.
8. Multiple section dampers may be jack-shafted to allow mounting of direct connect electronic actuators. Each end of the jack shaft shall receive at least one actuator to reduce jack shaft twist.

C. Control Relays

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.
b. Mounting bases shall be snap-mount.
c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.
d. Contacts shall be rated for 10 amps at 120VAC.
e. Relays shall have an integral indicator light and check button.
f. Acceptable manufacturers: Johnson Controls, Lectro

D. Control Valves

1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.
2. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI.
3. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all hot and chilled water applications, except those described hereinafter. The valve discs shall be composition type. Valve stems shall be stainless steel.
4. Ball or Globe valves shall be acceptable for water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units.

a. Globe Valves NPS 2 and Smaller: Bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity replaceable under pressure.
b. Globe Valves NPS 2 ½" and Larger: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc
c. Hydronic system globe valves shall have the following characteristics:

1) Rating: Class 125 for service at 125 psig and 250 degrees F operating conditions.
2) Internal Construction: Replaceable plugs and seats of stainless steel or brass. Single-seated valves with cage trim provides seating and guiding surfaces for plug on top and bottom of guide plugs. Double-seated valves with balancing plug; caged trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.

d. Sizing: 3-psig maximum pressure drop at design flow rate.
e. Flow characteristics: Two-way valves shall have equal percentage characteristics. Operators shall close valves against pump shutoff head.

E. Electronic Signal Isolation Transducers

1. A signal isolation transducer shall be provided whenever an analog output signal from the Facility Management System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input signal from a remote system.
2. The signal isolation transducer shall provide ground plane isolation between systems.
3. Signals shall provide optical isolation between systems.

2.4 HVAC MISCELLANEOUS DEVICES

A. Local Control Panels

1. All control panels shall be factory constructed, incorporating the FMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with sub-panel, hinged door, and key-locking latch.
2. In general, the control panels shall consist of the DDC controller(s), display module, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. The display module shall be flush mounted in the panel face unless otherwise noted.
3. All I/O connections on the DDC controller shall be extended to a numbered, color-coded, and labeled terminal strip for ease of maintenance and expansion. Wiring to I/O devices shall be made from this terminal strip.
4. All other wiring in the panel, internal and external, shall be made to additional line or low voltage color-coded and labeled terminal strips. Low and line voltage wiring shall be segregated. All terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.
5. All wiring for every control panel shall follow a common color-coded format. All terminal strip color coding and numbering shall follow a common format. All wiring shall be neatly installed in plastic trays or tie-wrapped.
6. A convenience 120 VAC duplex receptacle shall be provided in each enclosure, fused on/off power switch, and required transformers.

B. Power Supplies

1. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.
2. Input: 120 VAC +10%, 60Hz.
3. Output: 24 VDC.
4. Line Regulation: +0.05% for 10% line change.
5. Load Regulation: +0.05% for 50% load change.
6. Ripple and Noise: 1 mV rms, 5 mV peak to peak.
7. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.
8. A power disconnect switch shall be provided next to the power supply.

C. Thermostats

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

2.5 CONTROL CABLE

A. Electronic and Fiber-Optic Cable for Control Wiring: As specified in Division 16 Section "Control/Signal Transmission Media."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation.

B. Verify that duct-, pipe-, and equipment-mounted devices and wiring and pneumatic piping are installed before proceeding with installation.

3.2 INSTALLATION

A. Install equipment level and plumb.

B. Install software in control units and operator workstation. Implement all features of programs to specified requirements and as appropriate to sequence of operation.

C. Connect and configure equipment and software to achieve sequence of operation specified.

D. Verify location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. Locate all 60 inches above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

E. Install guards on thermostats in the following locations:

1. Entrances.
2. Public areas.
3. Where indicated.

F. Install automatic dampers according to Section 15820 “Duct Accessories.”

G. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

H. Install labels and nameplates to identify control components according to Section 15050 “Basic Mechanical Materials and Methods.”

I. Install labels and nameplates to identify control components according to Section 15075 “Mechanical Identification.”

J. Install hydronic instrument wells, valves, and other accessories according to Section 15181 “Hydronic Piping.”

K. Install duct volume-control dampers according to Division 15 Sections specifying air ducts.

L. Install electronic and fiber-optic cables according to Division 16 Section “Control/Signal Transmission Media.”

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 16 Section “Raceways and Boxes.”

B. Install building wire and cable according to Division 16 Section “Conductors and Cables.”

C. Install signal and communication cable according to Division 16 Section “Control/Signal Transmission Media.”

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.

4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.

D. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Install piping adjacent to machine to allow service and maintenance.

B. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.
3. Calibration test electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.

B. Engage a factory-authorized service representative to perform startup service.

C. Replace damaged or malfunctioning controls and equipment.

1. Start, test, and adjust control systems.
2. Demonstrate compliance with requirements, including calibration and testing, and control sequences.
3. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.

D. Verify DDC as follows:

1. Verify software including automatic restart, control sequences, scheduling, reset controls, and occupied/unoccupied cycles.
2. Verify operation of operator workstation.
3. Verify local control units including self-diagnostics.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Authorized Representative's maintenance personnel to adjust, operate, and maintain control systems and components.

1. Train Authorized Representative's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

2. Provide operator training on data display, alarm and status descriptors, requesting data, executing commands, calibrating and adjusting devices, resetting default values, and requesting logs. Include a minimum of 40 hours' dedicated instructor time on-site.
3. Review data in maintenance manuals. Refer to Section 01770 "Project Closeout."
4. Schedule training with Authorized Representative, through Architect, with at least seven days' advance notice.
5. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Consultant. A training agenda shall be prepared by the Contractor and approved by the Commissioning Consultant prior to training performance.

3.7 ON-SITE ASSISTANCE

A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested by Authorized Representative, to adjust and calibrate components and to assist Authorized Representative's personnel in making program changes and in adjusting sensors and controls to suit actual conditions.

END OF SECTION 230900

SECTION 232213 – CHILLED WATER, STEAM & STEAM CONDENSATE PIPING & STEAM/PIPING SPECIALTIES

PART 1 - GENERAL (Reference Section 230500)

PART 2 - PRODUCTS

2.1 PIPING MATERIALS AND FITTINGS

A. Piping used throughout project shall conform to the following specifications. Piping shall be plainly marked with manufacturers name and weight. All materials listed may not be required on this project. See piping material schedule on the plans for materials to be used for each piping system. Piping materials shall be as follows:

B. Carbon Steel Pipe (1/8" thru 2"):

1. Provide seamless carbon steel conforming to ASTM specification A-106.
2. Pipe joints shall be threaded conforming to ANSI Standard B2.1.
3. Pipe by Armco, Jones, Laughlin Steel Corp., Youngstown Sheet and Tube Co., or United States Steel.

C. Carbon Steel Pipe (2-1/2" and above):

1. Provide electric resistance welded carbon steel pipe conforming to ASTM Specification A-53.
2. Pipe ends shall be beveled for welding.
3. Pipe by Armco, Jones and Laughlin Steel Corp., Youngstown Sheet and Tube Co., or United States Steel.

2.2 PIPING FITTINGS

A. Piping fitting used throughout project shall be proper type for installation method used and shall be compatible with piping system material. Fittings listed in piping material schedule shall conform to the following specifications:

B. Carbon Steel Welding Fittings:

1. Provide carbon low alloy seamless steel welding fittings conforming to current ANSI Standard B16.9 and ASTM Specification A234.
2. Fittings by Grinnell, Midwest or Tube Turn.

C. Branch Connection Welding Fittings:

1. Provide carbon steel weldolet fittings conforming to ANSI Standards B16.9, B16.11, B31.1.0 and ASTM specification A105, Grade 11.
2. Fittings by Bonney Forge.

D. Branch Connection, Welding to Screwed Fitting:

1. Provide carbon steel threadolet fitting conforming to ANSI Standards B16.9, B16.11, B31.1, and ASTM Specification A105, Grade 11.
2. Fittings by Bonney Forge.

E. Carbon Steel Flanges:

1. Provide carbon steel flanges conforming to ASTM Specification A181, Grade 1, and ANSI Standard B16.5.

2. Use only weld neck flanges unless allowed in writing by engineer to use slip on flanges.
3. Flanges by Babcock and Wilcox, Grinnell, Midwest or Tube Turn.

2.3 INSULATING UNIONS AND FLANGES

A. Provide insulating unions and flanges conforming to following specifications and plainly and permanently marked with manufacturers name and pressure class rating. Unions and flanges shall be as follows:

1. Steel pipe to steel pipe screwed end:
2. Provide Stockham malleable iron No. 693-1/2 insulating union with high dielectric strength insulating sleeve and gasket.
3. Steel pipe to steel pipe flanged end:
4. Provide two weld neck flanges of proper pressure rating insulated on both sides with Central or Klingerit Flange Insulation Kit.
5. Iron or steel pipe to copper pipe:
6. Provide Epco Dielectric union or flange with screwed or solder joint as required. Union shall have 250 PSI rating and flange 175 PSI rating at 190 degrees F.

2.4 STRAINERS

A. Install strainers where shown on plans and upstream from all steam traps. Strainers shall be same size as piping. Provide strainers with proper isolation and blow down valves to allow basket removal for cleaning.

B. Provide Fabrotech Industries, Inc. No. I9-250 cast iron body “U” type strainer rated for 150 psi saturated steam at 425 deg. F.

C. Strainer shall be self cleaning with screwed and gasketed caps and screwed connections. Provide stainless steel screen with standard mesh for steam service as follows: Strainer for steam trap service shall be 40 mesh. Equivalent by Mueller, Mepco.

2.5 INVERTED BUCKET STEAM TRAPS

A. Inverted bucket type traps shall be Armstrong 3/4" Model 2011 with stainless steel body and Universal connector that stays in line when steam trap is removed for service. All internals shall be stainless steel. Provide trap with 3 year warranty. No equivalents shall be allowed for this project.

2.6 FLOAT AND THERMOSTATIC STEAM TRAPS

A. Armstrong float and thermostatic traps for steam operating pressures to 15 psi. Traps shall have Monel float valve and seat and all working parts constructed of non-corrosive material that can be removed, inspected, or repaired without disturbing piping.

B. Provide inlet size or condensate capacity as indicated on plans.

C. No equivalents shall be allowed for this project.

2.7 STEAM SYSTEM VACUUM BREAKERS

A. Provide Mepco #VB-1A , Spirax/Sarco or Armstrong vacuum breakers for steam operating pressures to 65 psi. Vacuum breakers shall be factory set at 2" Hg of vacuum, the vacuum breakers may be field adjusted from 1" to 8" Hg.

2.8 UNIONS

A. Unions shall be installed where shown on plans and in each line proceeding connections to equipment, valves and steam traps.

B. Unions shall be AAR malleable iron rated 300 psi steam pressure at 550 deg. F. Union shall have bronze to iron ground joint seat.

2.9 STEAM PRESSURE REDUCING VALVES

A. Provide Spence pressure reducing valves in the model, size and capacity as indicated in the pressure reducing station schedule shown on the plans.

B. All pressure reducing valves utilized within the steam piping system shall be by Spence Engineering Company, Inc. only. No equivalents shall be allowed for this project.

2.10 STEAM PRESSURE RELIEF VALVES

A. Provide Spence pressure relief valves in the model, size and capacity as indicated in the pressure reducing station schedule shown on the plans.

B. Provide each pressure relief valve outlet with a drip pan ell manufactured by Spence Engineering Company, Inc.

C. All pressure relief valves and associated drip pan ell utilized within the steam piping system shall be by Spence Engineering Company, Inc. only. No equivalents shall be allowed for this project.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Piping systems materials and installation shall conform with the following standards and codes.

System:	Heating and Air Conditioning Piping
Code:	ANSI Standard B31.1.0 "Power Piping" International Mechanical Code – 2006 Kansas State Boiler Code
System:	Plumbing System Piping
Code:	International Plumbing Code – 2006

B. Pipe sizes indicated on plans and as specified refer o nominal size in inches for steel pipe, unless otherwise indicated. Pipes are sized to nearest 1/2". In no case shall piping smaller than size specified be used.

C. Contractor shall provide and be responsible for proper location of pipe sleeves, hangers, supports, and inserts. Install hangers, supports, inserts, etc., as recommended by manufacturer and as specified and detailed on drawings. Verify construction types and provide proper hangers, inserts and supports for construction used. Install inserts, hangers and supports in accordance with manufacturers load ratings and provide for thermal expansion of piping without exceeding allowable stress on piping or supports. Provide solid type hangers and supports where pipe travel exceeds manufacturer's recommendations for fixed hanger and supports.

D. Install piping parallel with building lines and parallel with other piping to obtain a neat and orderly appearance of piping system. Secure piping with approved anchors and provide guides where required to insure proper direction of piping expansion. Piping shall be installed so that allowable stress for piping, valves and fittings used are not exceeded during normal operation or testing of piping system.

E. Provide piping materials and wall thickness for specific piping systems as listed in piping schedule on plans.

F. Provide unions or flanged joints in each pipe line preceding connections to equipment to allow removal for repair or replacement. Provide all screwed and control valves with unions adjacent to each piping connection. Provide screwed end valves with union adjacent to valve unless valve can be otherwise easily removed from line.

G. Piping fitting materials for specific piping systems shall be as listed in piping schedules. Fitting shall be approved factory made type with threaded or weld ends as required. Fittings pressures and temperature ratings shall be equal to or exceed maximum operating temperature and working pressure of piping system. No mitered or field fabricated pipe fittings will be permitted.

H. All pipe threads shall meet ANSI Standard B2.1 for taper pipe threads. Lubricate pipe threads with Astroseal teflon thread sealant and lubricating compound applied full strength. Powdered or made-up compound will not be permitted. Pipe thread compound shall be applied only to male pipe threads.

I. Welded pipe joints shall be made by certified welding procedures and welders. Welding electrodes shall be type and material recommended by electrode manufacturer for materials to be welded. All pipe and fittings ends shall be beveled a minimum of 30 degrees prior to welding. Refer to the Part 3.2 Welding for additional welding requirements.

J. Make changes in piping size and direction with approved factory made fittings. Refer to piping material and fitting schedule on plans for type of fittings to be used for each type of system utilized. Provide fittings suitable for pressure ratings indicated on piping material and fitting schedule on the plans.

3.2 WELDING

A. Contractor shall be responsible for quality of welding and suitability of welding procedures. All welding shall be in accordance with American Welding Society Standard B3.0 and ANSI Standard B31.9.

B. Welding shall be done only by welders who have successfully passed welder qualifications tests in previous 12 months for type of welding required. Each welder shall identify his work with a code marking before starting any welded pipe fabrication. Contractor shall submit three copies of a list of welders who will work on project listing welders code, date and types of latest qualification test passed by each welder.

C. Welded joints shall be fusion welded.

D. Bevel all piping and fittings in accordance with recognized standards by flame cutting or mechanical means. Align and position parts so that branches and fittings are set true. Make changes in direction of piping systems with factory made welding fittings. Make branch connections with welding tees or forged weldolets.

E. Quality Control

1. Prior to the start of any welding, submit a summary of the procedures to be followed by all welders performing work on this project.

2. A sampling of the welds provided by the Contractor for this project may be x-rayed by the Owner in an effort to assure quality welding.

   a. The welds to be x-rayed will be selected by the engineer.
   b. The x-rayed welds will be analyzed by a certified x-ray technician.
   c. Allowable anomalies in the welds that are x-rayed shall be as follows:

      (1) Cracks – None permitted.
      (2) Lack of Fusion – The length of unfused areas shall not be more then 20% of the circumference of the pipe, or of the total length of the weld, and no more than 1½ in. any 6 in. of weld.
      (3) Incomplete Penetration – The total joint penetration shall not be less than the thickness of the thinner of the components being joined, except that incomplete root penetration is acceptable if it does not exceed the lesser of 1/32 in. or 20% of the required thickness, and its extent is not more than 1½ in. in any 6 in. of weld.
      (4) Undercut and Reinforcement – Undercut shall not exceed the lesser of 1/32 in. or 12 ½ % of wall thickness. Thickness of weld reinforcement shall not exceed 3/16 in.
      (5) Concave Root – concavity of the root surface shall not reduce the total thickness of the joint, including reinforcement, to less than the thickness of the thinner of the components being joined.
      (6) Excess Root Penetration – The excess shall not exceed the lesser of the 1/8 in. or 5% of the inside diameter of the pipe.
      (7) Weld Surfaces – There shall be no overlaps or abrupt ridges and valleys.

3. If the x-ray of any of the various welds reveal deficiencies greater than allowable as indicated herein, the deficient weld shall be ground out, the joint rewelded, and the new weld x-rayed to prove that the criteria indicating maximum allowable anomalies is adhered to.

   In addition, the Contractor shall x-ray an additional 10 welded joints not previously x-rayed in locations selected by the engineer. All joints shall meet or exceed the criteria stated. If they do not, the deficient weld shall again be ground out and the joint rewelded.

   This process shall be continue until the engineer is satisfied that all welded joints meet or exceed the criteria indicating maximum allowable anomaly in any given weld.

4. The cost for the original x-ray procedure as stated in E2 above shall be by the Owner. All required x-ray procedures or required corrective action subsequent to the original x-ray procedure as stated in E2 above shall be provided by the Contractor.

3.3 TESTING PROCEDURES FOR PIPING SYSTEMS

A. Test all lines and systems before they are insulated, painted or concealed by construction or backfilling. Provide fuel, water, electricity, materials, labor and equipment required for tests.

B. Where entire system cannot be tested before concealment, test system in sections. Upon completion, each system shall be tested as an entire system.

C. Repair or replace defects, leaks and material failures revealed by tests and then retest until satisfactory. Make repairs with new materials.

D. Verify that system components are rated for maximum test pressures to be applied. Where specified test pressures exceed component ratings remove or isolate components from system during tests.

3.4 TEST METHODS AND PRESSURES

A. Test methods and pressures shall be as follows:

1. Hydrostatic Test (Closed Systems – Steam Condensate Piping):

a. Hydrostatic test shall be performed using clean unused domestic water. Test pressures shall be as scheduled for system or 150% of operating pressure where not specified.

2. Pneumatic Test (Steam Piping):

a. Test entire system with compressed air. Systems operating above 25 PSI shall be tested at 75 PSI or 150% of operating pressure or whichever is greater.
b. Completely isolate entire system from compressor or other sources of air pressure and allow at least 1 hour after test pressure has been applied before making initial test.

3. Pressure Relief and Safety Valve:

a. Before installation, test pressure temperature, and safety relief valves to confirm relief settings comply with specifications.
b. Tag items that pass test with date of test, observed relief pressure setting and inspector's signature.
c. Items installed in systems without test tag attached will be rejected.

B. All systems shall hold scheduled test pressures for specified time without loss of initial test pressure.

C. Upon completion of testing submit five copies of a typewritten report to A/E. Report shall list systems tested, test methods, test pressures, holding time and all failures with corrective action taken.

D. For test pressure schedules refer to plans.

3.5 CLEANING OF STEAM AND CONDENSATE PIPING SYSTEMS

A. After pressure testing of system and equipment and before operational test thoroughly clean interiors of piping and equipment. Clean equipment as recommended by equipment manufacturers.

B. Contractor shall install temporary outlet nozzle sized full pipe diameter directed to the building exterior in location as directed by Engineer. Full pressure steam shall be discharged from this pipe for a minimum of 30 min. After pipe cleaning the temporary nozzle shall be removed. This procedure shall be repeated as required to achieve proper pipe cleaning as determined by the Engineer.

END OF SECTION 232213

SECTION 232214 – PRE-INSULATED PIPING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 230500 – Common Work Results for HVAC

1.2 SUMMARY

A. This section includes specifications for a factory pre-insulated steel piping system to transport underground steam and condensate service. The piping system manufacturer shall provide a pre-engineered system including all pipe, fittings, insulating materials and technical support during installation. The system shall be provided as specified below and shown on the drawings for both material construction and performance requirements.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. American Society of Mechanical Engineers (ASME)

C. American Association of State Highway and Transportation Officials (AASHTO)

1.4 SUBMITTALS

A. Submit product data on carrier pipe, insulation, jacket and field joining materials. Submit procedures for installation of field joints. Submit system layout drawing and stress analysis.

1.5 QUALITY ASSURANCE

A. Provide materials in accordance with ASTM specifications.

B. Carrier piping system shall meet the requirements of ASME B31.1 for design, materials, fabrication, erection, testing and inspection.

2.1 APPROVED MANUFACTURERS

A. Thermacor Process, Inc. ,Duo-Therm “505” Pre-Insulated Piping

2.2 PRE-INSULATED PIPING

A. Service Pipe: Internal piping shall be standard weight carbon steel except for condensate piping which shall be schedule 40 (for steam service) and 80 (for steam condensate service) carbon steel. All joints shall be butt welded for sized 2.5 inches and larger, and socket welded for 2 inches and below. Where possible, straight sections shall be supplied in 40-foot random lengths with 6 inches of piping exposed at each end for field joint fabrication.

B. Prefabricated ells, loops and tees shall be furnished and installed where shown on plans, and shall consist of pipe, insulation, and conduit conforming to the same specification as stated for straight runs. Expansion loops shall be designed in accordance with the stress limits indicated by the Power Piping

Cods, ASME B31.1. Loop piping shall be installed in conduit suitably sized to handle indicated pipe movement.

C. Subassemblies: End seals, gland seals, and anchors shall be designed and factory prefabricated to prevent the ingress of moisture into the system. All subassemblies shall be designed to allow for complete draining and drying of the conduit system.

D. Service Pipe Insulation: Class "A" insulation shall be mineral wool having a K factor of .29 at 200 deg F. The insulation shall be secured to the pipe by stainless steel bands. Insulation thickness shall be as shown on the drawings. High temp foam insulation with watertight galvanized metal jacket providing the same heat loss as the mineral wool may be provided. Maintain a 1-inch air space between carrier pipe insulation and steel conduit casing for airflow and possible water drainage.

E. Outer Conduit: The steel conduit casing shall be smooth wall, welded steel conduit of the thicknesses specified below:

Conduit Size	Conduit Thickness
6" – 26"	10 Gauge

Changes in casing size as required at oversized casing to allow for carrier pipe expansion shall be accompanied by eccentric and/or concentric fittings and shall provide for continuous drainage.

F. Pipe Supports: All pipes within the outer casing shall be supported at not more than 10-foot intervals. These supports shall be designed to allow for continuous airflow and drainage of the conduit in place. The straight supports shall be designed to occupy not more than 10% of the annular air space. Supports shall be of the type where insulation thermally isolates the carrier pipe from the outer conduit. The surface of the insulation shall be protected at the support by a sleeve not less than 12 inches long, fitted with traverse and, where required, rotational arresters.

G. Outer Conduit Insulation and Jacket: Conduit insulation shall be polyurethane foam, having a nominal 2 pound per cubic foot density for all straight lengths and fittings. The insulation thickness shall be 1 inch and be rated for system service temperature. Quality assurance procedures for the insulation shall insure there are no insulation voids. The urethane foam shall meet ASTM C591 and have the minimum characteristics of .14 K factor, density of 2 pcf and a closed cell content of 90 to 95%.

The outer jacket shall be seamless high density polyethylene conforming to ASTM D1248 and 03350 and a minimum thickness of 150 mils. No frp wrapped thin jackets shall be allowed. All straights and fittings shall be factory jacketed.

H. Moisture barrier end seals shall be factory-applied, sealed to the HDPE jacket and conduit. End seals shall be certified to passing a 20-foot head pressure test. End seals shall be HDPE heat shrink type, completely sealing the exposed end of the insulation. Field applied end seals shall be installed at each field cut to the piping before continuing with the insulation for pumped condensate system.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Prefabricated, pre-engineered systems shall be provided with all straight pipe and fittings factory pre-insulated and prefabricated to job dimension. At least 6 inches on each end of straight pipe sections shall be provided for field welding of joints.

B. Straight run and fitting joints shall be insulated using polyurethane foam to the thickness specified, and jacketed with an HDPE sleeve installed in accordance with the manufacturer's instructions. Sleeve shall overlap the adjoining pipe jacket a minimum of 2 inches.

C. Underground piping shall be buried in a trench not less than two feet deeper than the top of the pipe and not less than eighteen inches wider than the combined O.D. of all piping systems. Where applicable, a minimum thickness of 24 inches of compacted backfill shall be placed over the top of the pipe to meet AASHTO H-20 highway loading.

D. Trench bottom shall have a minimum of 6 inches of sand to serve as a cushion for the piping. All field cutting of the pipe shall be performed in accordance with the manufacturer's installation instructions.

E. Prior to insulating and jacketing of all field joints, a hydrostatic pressure test shall be performed on the entire system at a minimum of 200 PSIG for the steam piping and 100 PSIG for the steam condensate return piping for not less than two hours. Care shall be taken to insure all trapped air is removed from the system prior to the test.

F. Prior to installing conduit insulation, HDPE jacket closure sleeve and HDPE heat shrink material a pressure test of 15 PSIG for four hours shall be performed.

G. A certified manufacturer's representative shall provide field service assistance. The representative shall be present during critical stages of installation and testing including, but not limited to, unloading and handling of pipe, placing of pie in trench, joint installation, hydrostatic testing and backfill. After each visit, the field service representative shall submit a report to the owner certifying that the underground piping is being installed in accordance with the manufacturer's requirements. The representative shall report to the owner, immediately, any deviation from accepted installation procedures.

H. Upon completion of installation, the contractor shall furnish the owner with certification from the manufacturer that the underground piping system was installed in accordance with the manufacturer's requirements.

END OF SECTION 232214

SECTION 232223 - STEAM CONDENSATE RECEIVERS AND PUMPS

PART 1 - GENERAL (Reference Section 15010)

1.1 MANUFACTURERS

A. Provide custom built steam condensate receivers/pumping units as indicated in schedules and details on plans.

B. Condensate receivers shall be fabricated by Messplay.

C. Condensate pumps shall be manufactured by Grundfos.

D. Each entire unit shall be factory tested and certified for proper operation and tightness prior to shipment.

E. No equivalents will be entertained.

PART 2 – PRODUCTS

2.1 STEAM CONDENSATE RECEIVER AND PUMPS

A. Provide as specified as indicated in the schedule and in accordance with the manufacturer's instructions duplex, custom built receivers and pumps.

B. The unit shall consist of a carbon steel tank with capacity as scheduled on plans, a float operated control device with high water alarm contacts, and close coupled pumps unless otherwise noted on plans.

C. Provide valves and accessories as indicated on the plans and in the schedule.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Units shall be installed in strict accordance with Messplay installation instructions.

B. Unit installation shall be certified by Messplay authorized technician.

C. Initial start up of equipment shall be by Messplay authorized start up/service technician.

END OF SECTION 232223

SECTION 232500 – HVAC WATER TREATMENT

PART 1 - GENERAL (Reference Section 230500)

1.1 CHILLED WATER AND STEAM SYSTEM CHEMICAL TREATMENT

A. Chemical treatment shall be provided for the steam system thru the use of the existing chemical injection equipment located within the power plant.

B. The Owner shall be responsible to provide appropriate chemical treatment throughout the duration of construction and upon completion of construction. Contractor shall be responsible to coordinate system shutdowns and startups with chemical treatment personnel to allow for proper treatment of the system.

C. The Owner currently provides regular testing of all steam condensate and power plant equipment to maintain proper chemical levels in the overall system.

D. The existing chemical treatment contractor currently utilized by the facility shall be responsible to provide any additional treatments required to properly clean and flush the system once all new system components have been installed.

END OF SECTION 232500

SECTION 233113 - DUCTWORK

PART 1 – GENERAL (Reference Section 230500)

1.1 GENERAL REQUIREMENTS

A. Construct ductwork as detailed on drawings and as detailed in the latest edition of the Sheet Metal and Air Conditioning Contractor's Association (SMACNA) Duct Manual. Details shown on project plans shall indicate specific construction methods to be used on this project, and shall be used in lieu of any alternate methods shown in SMACNA Duct Manual.

B. Construct and install ductwork to be completely free from vibration under all conditions of operation. Support and securely anchor ductwork and equipment from structural framing of building. Provide suitable intermediate metal framing where required between building structural framing.

C. Construct ductwork in accordance with operating static pressure range. Ductwork pressure classifications shall be as follows:

1. Low Pressure Ductwork: System operating static pressure 1.5" positive or negative of W.G. or less and velocities less than 2500 FPM.
2. Medium Pressure Ductwork:

D. All metal ductwork scheduled for interior thermal and acoustical liner is not sized on plans to include the proper thickness of insulation. Add 1" or 2" in height and width of ductwork as required to accommodate insulation thickness. Mount specialties such as turning vanes, campers, etc., to ductwork with that section insulated "Build Outs" to maintain continuity of thermal barrier.

E. Construct low pressure system ductwork to conform to latest edition of low pressure duct construction standards of SMACNA Duct Manual.

F. Sealing of low pressure ductwork shall be as follows:

1. Option #1: Low pressure ductwork: Including supply, return and exhaust. Provide Hard Cast, Inc. mineral impregnated woven fiber tape and activator/adhesive in accordance with manufacturers' directions on all joints, connectors, etc.
2. Option #2: Low pressure rectangular ductwork: Provide "Ductmate" systems as manufactured by Ductmate Industries, Inc. or an approved equal system.
3. Option #3: Miracle metal duct sealer model No. 617.

G. Provide external insulation on exhaust fan and intake hood ductwork.

1.2 RECTANGULAR STEEL

A. Provide new commercial quality, bright spangled galvanized sheet steel manufactured in the U.S.A.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

1.1 INSTALLATION

A. All ductwork shall be installed in strict accordance with the most current edition of the SMACNA "HVAC Duct Construction Standards" 1995.

END OF SECTION 233113

GEOTECHNICAL ENGINEERING REPORT

Proposed Kansas Energy and Service Center
SW 7th Street and SW Van Buren Street
Topeka, Kansas

Project No. D14G1399

December 31, 2014

Prepared for:

Kansas Department of Administration
HTK Architects, PA

Prepared by:

GeoSource
Your Source for Geotechnical and Materials Engineering

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GeoSource
Your Source for Geotechnical and Materials Engineering

December 31, 2014

Ms. Ramona A. Flower
State of Kansas
Office of Facilities & Procurement Management
800 SW Jackson Street, Suite 600
Topeka, Kansas 66612-1216

Subject: **Geotechnical Engineering Report**
Proposed Kansas Energy and Service Center
SW 7th Street and SW Van Buren Street
Topeka, Kansas
Project No. D14G1399

Dear Ms. Flower:

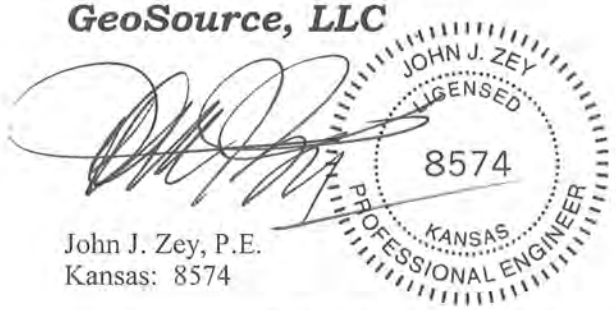
We have completed the subsurface exploration and geotechnical engineering evaluation for the above referenced project. The purpose of the exploration was to obtain information on the subsurface conditions within the building site and, based on this information to provide geotechnical engineering recommendations for design and construction of foundations for the proposed structures.

In summary, the borings encountered existing fill and naturally deposited soils underlain by shale and limestone bedrock that continued to the depths explored. The existing fill was quite variable and contained some rubble. Because of this, we have recommended that the proposed building be supported on drilled pier foundations that extend through the fill to the underlying limestone bedrock.

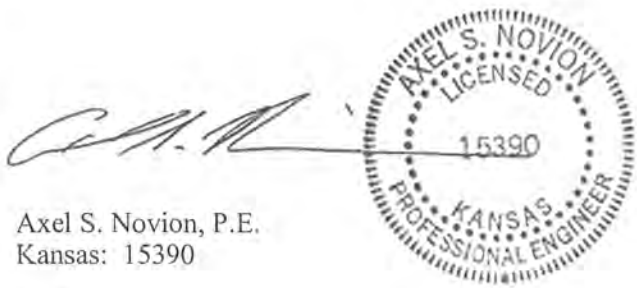
This report completes our current scope of services for this project. The enclosed report describes our exploration procedures and presents the results of the testing and evaluation along with design and construction recommendations for this project. We appreciate the opportunity to work with you on this project and are prepared to provide the recommended construction services.

Respectfully submitted,

GeoSource, LLC



John J. Zey, P.E.
Kansas: 8574



Axel S. Novion, P.E.
Kansas: 15390

Cc: Mr. Dennis A. Haugh, AIA – HTK Architects, PA
Mr. Clark Basinjer, PE – Bob D. Campbell & Company

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GEOSOURCE

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APPENDIX

Figure 1: Boring Location Sketch
Figure 2: Generalized Subsurface Profile
Boring Logs
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GEOTECHNICAL ENGINEERING REPORT
PROPOSED ENERGY AND SERVICE CENTER
SW 7TH STREET AND SW VAN BUREN STREET
TOPEKA, KANSAS

Project No. D14G1399
December 31, 2014

INTRODUCTION

GeoSource has completed the subsurface exploration and geotechnical engineering evaluation of the site for the proposed Kansas Energy and Service Center building, which is located southeast of the intersection of SW 7th Street and SW Van Buren Street in Topeka, Kansas. Our services for this project were provided in general accordance with our November 26, 2014 proposal. The exploration work was authorized on December 4, 2014 with the issuance of Purchase Order No. 17300-0000017324 by the Kansas Department of Administration.

PROJECT DESCRIPTION

We understand that the proposed building will be a two story, steel frame structure, with metal stud infill walls and brick veneer or stone panel exterior facing. The new building will have overall plan dimensions of approximately 120 by 160 feet. Maximum column loads for the new building were estimated by the Structural Engineer to be less than 260 kips. The finished floor elevation of the new building has tentatively been set at elevation 928.76 feet, USGS datum. The floor for the service base on the east side of the building will be stepped to follow the grade of the existing alley. The floor slab elevation at the northeast corner of the building will be at elevation 925.54 feet, the floor slab elevation at the southeast corner will be at 928.76 feet, and the intermediate floor slab elevation will be at 927.04 feet. The bottom of the elevator pit has tentatively been set at elevation 924.76 feet. At this proposed floor elevation up to 6 feet of new fill will be required to establish grades for the proposed building area.

Light duty parking lots are planned for the areas on the north and south sides of the new building. The parking lots will provide space for about 40 automobiles and other light personnel vehicles.

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Drives will connect the parking lots to SW 7th Street and/or to the existing alley. No other specific information was provided regarding the design life of the pavement section.

A new utility tunnel will extend from the proposed Energy and Service Center building to the Kansas Statehouse along SW Van Buren Street. The plan and profile drawing of the tunnel that was provided to GeoSource indicated that the bottom of the tunnel will extend to about elevation 912 ± feet at the proposed building site and will be at about elevation 915 ± feet at the Statehouse parking garage. The tunnel will have a height of about 8 ± feet and will be constructed of reinforced concrete.

The scope of the exploration and engineering evaluation for this study, as well as the conclusions and recommendations in this report, were based on our understanding of the project as described above. If pertinent details of the project have changed or otherwise differ from our descriptions, we must be notified and engaged to review the changes and modify our recommendations, if needed.

DRILLING AND SAMPLING PROCEDURES

The field work for this project was performed between December 17 and 19 of 2014. A total of sixteen exploratory test borings were drilled for this project. Figure 1 in the Appendix shows the approximate locations of the borings with reference to the proposed building lines and other site features. The boring locations were established by GeoSource personnel. Distances from the existing city streets and other reference features to the boring locations were measured using a calibrated wheel. Right angles for locating the borings were estimated. The ground surface elevations shown on the boring logs are approximate and were determined using an engineer's level and rod. The elevations were referenced to the rim of the existing storm water manhole (SWMH), located on the west side of SW Van Buren Street about 165 feet south of SW 7th Street. The elevation of the manhole was given as 924.49 feet, USGS datum, on the site plan that was provided to GeoSource. The locations and elevations of the borings should be considered accurate only to the degree implied by the methods used to make these measurements.

The borings were performed with a truck-mounted, rotary drill rig using 4-inch diameter flight augers to advance the boreholes. Representative samples of the overburden soils and bedrock units were obtained at selected intervals using the Shelby tube and split-barrel sampling procedures as outlined in ASTM Specifications D-1587 and D-1586, respectively. The Shelby tube sampling procedure utilizes a thin-walled, steel tube with a sharp cutting edge that is pushed hydraulically into the bottom of the boring to obtain relatively undisturbed samples of cohesive or moderately cohesive soils. The samples were sealed and returned to our laboratory for further examination, classification and testing.

The split-barrel sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with an automatic hammer. The number of blows required to advance the sampler the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Resistance Value (N). These "N" values are indicated on the boring logs at their depth of occurrence and provide an indication of the consistency of clays and the relative hardness of weathered bedrock units. A higher efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the Standard Penetration Resistance Values (N). The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Borings B-2 and B-4 were continued below the point of auger refusal through use of NQ3-diamond bit coring procedures. This diameter core barrel provides a sample having a diameter that is slightly smaller than 2 inches. Descriptions of the rock core are presented on the respective boring logs in addition to recovery and Rock Quality Designation (RQD) for the core recovered. Recovery is defined as the length of core obtained expressed as a percentage of the total length cored. Rock Quality Designation is defined as the total length of core pieces, 4 inches or greater in length, expressed as a percentage of the total length cored. Rock Quality Designation provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

Boring logs are included in the Appendix of this report and present such data as soil and bedrock descriptions, consistency and relative hardness evaluations, depths, sampling intervals and observed groundwater conditions. Conditions encountered in each of the borings were monitored and recorded by the drill crew. Field logs were prepared by the drill crew that included visual classification of the materials encountered during drilling, as well as drilling characteristics. Our final boring logs represent the geotechnical engineer's interpretation of the field logs combined with laboratory observation and testing of the samples. Stratification boundaries indicated on the boring logs were based on observations during our field work, an extrapolation of information obtained by examining samples from the borings and comparisons of soils and/or bedrock types with similar engineering characteristics. Locations of these boundaries are approximate, and the transitions between soil and bedrock types may be more gradational in nature rather than clearly defined.

LABORATORY TESTING PROGRAM

The laboratory testing program consisted of performing water content, dry unit weight and unconfined compression tests on representative portions of undisturbed samples obtained with the Shelby tube sampler. A calibrated hand penetrometer was used to determine the approximate unconfined compressive strength of samples that were deformed or otherwise unsuitable for unconfined compression testing. The hand penetrometer has been correlated with unconfined compression tests, and provides a better estimate of the consistency and strength than visual observation alone. Moisture content determinations were also performed on samples obtained using the split-barrel sampler. The results of the laboratory tests are presented on the respective boring logs.

Atterberg Limits tests were conducted on representative samples of the onsite soils. These tests provide information on the plasticity of the soil, which is a basis for soil classification and for estimating the potential of subgrade soils to change volume with variations in moisture content. Results of these tests are also indicated on the respective boring logs.

In addition, unconfined compression tests were performed on selected rock cores to evaluate the compressive strength of the bedrock units encountered in the borings. The results of the unconfined

compression tests are shown on the respective boring logs in the Appendix of this report. The unconfined compressive strengths are in psi (pounds per square inch).

As part of the testing program, the soil samples were classified by a geotechnical engineer using visual and manual procedures outlined in ASTM D-2487 and D-2488. The descriptions of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Estimated group symbols according to the Unified Soil Classification System are shown on the boring logs. A brief description of this classification system is included in the Appendix of this report.

The bedrock units encountered in the borings were described in accordance with the enclosed General Notes for Bedrock on the basis of visual classification of disturbed auger cuttings and drilling characteristics. Core samples may reveal other rock types.

SITE CONDITIONS

The proposed building site is located southeast of the intersection of SW 7th Street and SW Van Buren Street in Topeka, Kansas. The site was bounded on the north by SW 7th Street, on the west by SW Van Buren Street and on the east by an existing alley. At the time the borings were performed, the site was a paved parking lot. Historical photographs indicated that the site was previously occupied by a power plant and several other buildings in the past. The borings encountered undocumented clay fill, most of which contained variable amounts of bricks, cinders, gravel and other miscellaneous construction debris from the former buildings. Auger refusal was encountered on rubble at boring locations B-8 and B-15, suggesting that buried foundations or basement walls and slabs or large concrete or limestone fragments are buried beneath portions of the proposed building site. At Boring B-2, a strong fuel odor was detected in the undocumented fill encountered between depths of about 5 to 10.3 feet.

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SUBSURFACE CONDITIONS

The following presents a general summary of the major strata encountered during our subsurface exploration and includes a discussion of the results of field and laboratory tests conducted. Specific subsurface conditions encountered at the boring locations are presented on the individual boring logs in the Appendix of this report. Figure 2 in the Appendix shows a Generalized Subsurface Profile, based on the information obtained from the borings. The stratification lines shown on the boring logs and profile represent the approximate boundaries between soil and bedrock types; in-situ, the transition between materials may be more gradational in nature rather than clearly defined.

All of the borings were drilled in paved areas and encountered about 3 to 5 inches of asphaltic concrete pavement at the surface. Borings B-10 through B-13 were drilled on SW Van Buren Street along the alignment of the proposed utility tunnel and encountered brick pavers below the asphalt pavement.

The pavement section was underlain by undocumented fill that continued to depths of about 5.5 to 14.3 feet below the existing ground surface at the boring locations. The upper 2-½ to 3 feet of the fill was generally comprised of medium stiff to very stiff, light brown lean clay (CL), with a trace of fine sand. Laboratory tests performed on samples of this lean clay fill indicated moisture contents in the range of 13.4 to 25.6 percent, with dry densities of 102 to 115 pcf and unconfined compressive strengths of 1,450 to 5,990 psf. Atterberg Limits performed on this material indicated Liquid Limits in the range of 34 to 39, with Plasticity Indices of 15 to 20.

Beneath the upper fill layer, the borings encountered moderate to high plasticity fill that contained variable amounts of brick, cinders, gravel and other miscellaneous construction debris. No significant amounts of wood, trash or other unsuitable materials were encountered at the boring locations. As previously discussed, fuel contaminated soils were encountered in Boring B-2 below a depth of about 5 feet. In addition, significant amounts of rubble, including large size debris were encountered in Borings B-7, B-8 and B-15. Buried obstructions within the rubble fill were encountered in Borings B-8 and B-15. These obstructions could be buried foundation or large size

fragments of concrete or limestone. Laboratory tests performed on samples of the undocumented fill indicated moisture contents in the range of 11.4 to 55.7 percent, with dry densities of 97 to 106 pcf and unconfined compressive strengths of 1,420 to 5,300 psf. Standard Penetration Tests performed in the existing fill yielded "N" values ranging from 4 to 76 blows for one foot of penetration or less.

The undocumented fill was underlain by naturally deposited clay soils at 9 of the 16 boring locations. The natural clay soils were deposited by glacial ice that covered northeast Kansas in the Pleistocene Period. The glacial soils were visually classified as stiff to very stiff, lean clays (CL) and fat clays (CH). Laboratory tests performed on samples of the natural clay soils indicated moisture contents in the range of 17.1 to 28.0 percent, with dry densities of 102 to 107 pcf and unconfined compressive strengths of 2,050 to 4,440 psf. Soil colors varied from brown to light brown to reddish brown, with light gray and rust mottling. Standard Penetration Tests performed in the natural clay soils yielded "N" values in the range of 7 to 12 blows for one foot of penetration or less.

The undocumented fill and naturally deposited glacial clay soils were underlain by interbedded layers of shale and limestone bedrock that are part of the Topeka Limestone Formation of the Pennsylvanian Age Shawnee Group. The bedrock was encountered in the borings at depths ranging from about 10.3 to 14.3 feet across the proposed building site. The uppermost bedrock unit encountered was the weathered remnants of the Turner Creek Shale Member. The Turner Creek Shale is typically 2 to 5 feet thick and consists of weathered, olive tan to gray brown, clayey to silty shale. The Turner Creek Shale was underlain by the Sheldon Limestone Member. The Sheldon Limestone was described as a buff to light gray, fossiliferous limestone. The thickness of this limestone unit varied from about 1.5 feet to 2.8 feet across the site. The Jones Point Shale Member was encountered below the Sheldon Limestone and this bedrock unit typically consists of gray, silty to clayey shale that was about 1.8 to 2.2 feet thick at the boring locations where it was encountered.

The Jones Point Shale was underlain by the Curzon Limestone, which is the thickest limestone unit of the Topeka Formation. The Curzon Member is typically comprised of two or more beds of medium to thick-bedded, buff to light gray, fossiliferous limestone. The thickness of the Curzon

Limestone ranged from about 5.9 to 6.3 feet at the boring locations where it was encountered. The Curzon Member was underlain by the Iowa Point Shale Member. The Iowa Point Member is typically a hard, gray, clayey to silty shale that locally contains sandstone layers. At the proposed building site, the Iowa Point Shale had a thickness of only about 1 to 2 feet. The Iowa Point Shale was underlain by the Hartford Limestone Member, which is the basal member of the Topeka Limestone Formation. The Hartford Member typically has a total thickness of about 5 to 6 feet and consisted of massive, gray to bluish gray, fossiliferous limestone. Core samples of the bedrock from Borings B-2 and B-4 had recovery rates of 78 to 100 percent, with Rock Quality Designation (RQD) values in the range of 56 to 100 percent, indicating fair to good quality rock. The unconfined strength of the limestone units ranged from about 1,970 to 9,520 psi.

GROUNDWATER OBSERVATIONS

Groundwater observations were made in the boreholes both during and following completion of the drilling operations. Groundwater was encountered in Borings B-1, B-5, B-9 and B-15 at depths ranging from about 0.5 to 12.0 feet below the existing ground surface. At Boring B-15, groundwater was encountered very near the existing ground surface. The other borings remained, dry prior to coring, and no visible groundwater seepage was observed at the time the borings were performed.. The materials encountered in the test borings have relatively low permeabilities and observations over an extended period of time through use of piezometers or cased borings would be required to better define current groundwater conditions.

Coring of the bedrock at boring locations B-2 and B-4 required the introduction of water into the borehole as a drilling fluid to cool the bit and to flush the cuttings from the hole. No noticeable loss of drilling fluid was noted. The water levels indicated on the boring logs where coring procedures were used represent the water level in the borings after removal of casing and drill tools and is generally not an indicated of a true water table.

Groundwater in the underlying bedrock typically flows through joints and fissures in the limestone bedrock units. The shale bedrock units are generally less permeable and do not transmit significant amounts of groundwater seepage.

The composition of the glacial soils is often erratic due to the random nature of its deposition. Glacial deposits frequently contain isolated pockets of water bearing sands and gravel, as well as cobbles and large boulder size materials. Water bearing lenses within natural glacial deposits are generally limited in extent. Excavations encountering such lenses typically experience a sudden influx of groundwater due to the high permeability of the materials within the lens. Foundation and other excavations that encounter trapped water within the glacial soils can normally be dewatered using conventional sump pumps.

Fluctuations of groundwater levels can occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our evaluation, it is our professional opinion that the proposed project site can be developed for the proposed building and utility tunnel using conventional grading and foundation construction techniques. The existing undocumented fill was quite variable across the site and contained significant amounts of rubble and construction debris at some of the boring locations. Because of this, the undocumented fill is not suitable for support of shallow spread footings.

We have recommended that the proposed building be supported on drilled pier foundations that extend through the undocumented fill and naturally deposited glacial clay soils and are founded in the Curzon Limestone Member that underlies the proposed building site. Recommendations for

design and construction of drilled pier foundations are presented in the follow sections of this report.

As an alternative to supporting the proposed building on drilled pier foundations, shallow foundation support bearing on a *Geopier*® reinforced subgrade would appear to be a viable foundation option for this project that may potentially provide an economic benefit to this project. Geopiers are rammed aggregate piers that are installed by a specialty contractor using a proprietary method. Recommendations for design and construction of geopiers is normally provided by Geopier US, the company that developed this method of ground improvement and foundation support.

The major concern, from a geotechnical engineering standpoint, is the presence of undocumented fill and the potential for encountering old foundations, walls and other buried structures, as well as large concentrations of rubble from the former buildings that previously occupied the site. If buried structures and/or large concentration rubble are encountered, they could hamper the installation of the drilled pier foundations and/or the drilling of the boreholes for the Geopiers. Removal and replacement of the existing undocumented fill does not appear to be an economical option for this project. One way to deal with the uncertainty, would be to establish a contingency fund for removal of old buried structures and/or rubble in areas affected by the new construction.

The construction of the proposed utility tunnel between the proposed building and Statehouse Parking Garage should be relatively straight forward. The borings indicated that some rock excavation will likely be required to install the tunnel at the currently proposed bottom elevations. Removal of the rock will likely require the use of pneumatic breakers, rock teeth or some other method of hard rock removal. Groundwater was not encountered in the borings that were drilled along the proposed tunnel alignment. However, it would be prudent to include underdrains below the floor slab of the tunnel and adjacent to the tunnel walls to prevent hydrostatic loading of the walls and seepage into the tunnel, should groundwater levels change in the future.

To reduce the potential for subgrade volume change and floor slab movement, we have recommended that a minimum of 24 inches of select, low volume change material be placed below building floor slabs. Thorough site preparation will be required to correct areas that were disturbed by previous construction activity at the proposed building site. The recommendations given in the following sections of this report describe subgrade preparation for building foundations, floor slabs and pavements, as well as undercutting procedures to remove existing fill, soft soils, expansive clays and other unsuitable materials. Proper fill placement techniques are also discussed and include: recommended types of fill materials, maximum lift thickness, as well as soil moisture content and compaction criteria for structural fill sections.

The recommendations submitted herein are based, in part, upon data obtained from our subsurface exploration. It should be recognized that subsurface conditions may vary between the exploration points and that the nature and extent of any subsurface variations that may exist at the proposed site will not become evident until exposed during construction. If variations appear evident, then the recommendations presented in this report should be reevaluated. In the event that any changes in the nature, design, location or floor slab elevations of the proposed building are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed by the geotechnical engineer and our recommendations modified in writing, if necessary.

SITE PREPARATION

Initial site preparation for the proposed project should commence with the removal of the existing pavement section and the demolition of any existing structures that are located within proposed construction areas. Demolition should include complete removal of all grade supported slabs, pavements, sidewalks and shallow spread footings. All broken concrete, asphalt and other debris from demolition of these structures should be removed from the site. Areas disturbed during demolition of the existing structures should be thoroughly evaluated by the geotechnical engineer prior to placement of structural fill. All disturbed soils should be undercut prior to placement of structural fill.

Relocation of any existing utility lines within the zone of influence of proposed construction areas should also be completed as part of the site preparation. The lines should be relocated to areas outside of the proposed construction. Excavations created during the removal of the existing lines should be cut wide enough to allow for use of heavy construction equipment to recompact the fill. In addition, the base of the excavations should be thoroughly evaluated by a geotechnical engineer or engineering technician prior to placement of fill. All fill should be placed in accordance with the recommendations presented in the Structural Fill section of this report.

Following completion of the demolition work, it is recommended that the exposed grade be scarified to a minimum depth of 8 inches and be moisture conditioned to bring the moisture content of the soils into the range recommended for structural fill. Moisture conditioning is the process of adjusting the moisture content of the scarified materials to a moisture content that is within a range of 0 to 4 percent above the optimum moisture content as determined by the Standard Proctor (ASTM D-698) compaction procedure. Following moisture conditioning, the scarified materials should be recompacted to a minimum of 95 percent of Standard Proctor (ASTM D-698) maximum dry density. Soft or unstable areas that hamper compaction of the subgrade should be undercut and replaced with structural fill.

Following moisture conditioning and prior to placement of any new fill, it is recommended that the exposed grade be proofrolled. Proofrolling of the subgrade provides a more stable base for placement of structural fill and aids in identifying soft or disturbed areas. Unsuitable areas identified by the proofrolling operation should be undercut and replaced with structural fill. Proofrolling can be accomplished through use of a fully-loaded, tandem-axle dump truck or similar equipment providing an equivalent subgrade loading. Suitable structural fill should then be placed to design grades as soon as practical after reworking the subgrade to avoid moisture changes in the underlying soils.

If soft or unstable conditions are encountered during the proofrolling operation, stabilization of the soils may be required. Clean crushed rock having a particle diameter of 3 to 6 inches could be used to stabilize the subgrade prior to placement of structural fill. After initial undercutting, the large rock would be spread over the unstable subgrade and worked into the soft soils by close tracking with a

bulldozer or other suitable construction equipment. Additional rock would be added until the subgrade becomes firm enough to support construction equipment. The use of a geotextile fabric, in conjunction with crushed rock, could also be considered as a means of stabilizing the exposed grade.

CLIMATIC CONDITIONS

Weather conditions will influence the site preparation required. In spring and late fall, following periods of rainfall, the moisture content of the near surface soils may be significantly above the optimum moisture content. Additionally, it is common to encounter wet, unstable soils upon removal of the site pavements or flatwork as a result of moisture becoming trapped beneath relatively impervious concrete or asphalt pavements. These conditions could seriously impede grading by causing an unstable subgrade condition. Typical remedial measures include aerating the wet subgrade, removal of the wet materials and replacing them with dry materials or treating the wet material with fly ash.

If site grading commences during summer months, the moisture contents of the onsite soils may be abnormally low, which can significantly increase the swell potential of the clay soils. Typically, discing and moisture conditioning of the exposed subgrade materials to the moisture content criteria outlined in the Structural Fill section will reduce this swell potential of the dry materials. As an alternative, the dry materials could be undercut and replaced with structural fill.

EXCAVATIONS

Excavations will be required for foundations, underground utilities and a utility tunnel for this project. It is anticipated that the foundation excavations will be in undocumented fill and naturally deposited clay soils above the water table. These materials can generally be excavated with conventional earthmoving equipment such as backhoes and large track hoes. Rubble fill and buried structures within the undocumented fill could hamper excavations in some areas of the site. Utility excavations that extend into the underlying weathered shale bedrock with a Standard Penetration Resistance (N) value of less than 25 blows per foot can generally be excavated with conventional earthmoving

equipment such as backhoes, large track hoes, loaders, etc. The borings indicated that the proposed utility tunnel excavation along SW Van Buren Street will extend into harder, less weathered shale and/or limestone bedrock units. Removal of the hard shale and limestone will be more difficult and will probably require the use of rock teeth, pneumatic breakers, or some other method of hard rock removal to complete the excavation for the utility tunnel.

Temporary construction slopes should be designed in strict compliance with the most recent governing regulations. The naturally deposited clay soils encountered in the borings would generally be classified as Type B soils, under Part 1926 of the OSHA regulations pertaining to open excavations. For these soils, it is recommended that temporary construction slopes be no steeper than 1(H) to 1(V). Construction slopes should be closely observed for signs of mass movement: tension cracks near the crest, bulging at the toe, etc. If potential stability problems are observed, the geotechnical engineer should be immediately contacted. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor.

STRUCTURAL FILL

All structural fill should consist of approved materials, free of organic matter and debris. Fill placed within 24 inches below the building floor slab and leveling course materials should consist of a lower plasticity cohesive soil having a liquid limit less than 45. Higher plasticity soils could be used as structural fill in the lower portion of deep fill sections in the building area and/or as structural fill in pavement areas where more movement can generally be tolerated. Fill should be placed in lifts having a maximum loose lift thickness of 9 inches. All fill should be compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D-698 (standard Proctor compaction). The moisture content of the fill at time of compaction should be within a range of 0 to 4 percent above optimum moisture content as defined by the standard Proctor compaction procedure. Moisture contents should be maintained within this range until completion of the building floor slab.

Granular materials that do not have a well-defined moisture-density relationship that are placed below foundations and other structures should be compacted to a minimum of 70 percent of the materials

maximum relative density as determined by ASTM Specifications D-4253 and 4254. Granular backfill materials placed next to structures should be compacted to a minimum of 65 percent of the materials maximum relative density. There is no specific moisture content requirement for compaction of sands and sandy soils and the moisture content of these soils should be maintained in a suitable range that facilitates the compaction of the sand.

Based on the proposed floor slab elevations, it appears that it will be necessary to import fill material to the site. It is recommended the low volume change material be imported to complete the required fill sections.

FOUNDATIONS

The borings encountered undocumented fill with variable amounts of rubble and construction debris. The undocumented fill is not considered suitable for support of shallow spread footings. Because of this, we have recommended that the proposed building be supported on drilled pier foundations that extend through the undocumented fill and naturally deposited glacial clay soils and are founded in the Curzon Limestone that underlies the proposed building site. As an alternate to supporting the proposed building on drilled pier foundations, shallow foundation support bearing on a *Geopier*® reinforced subgrade would appear to be a viable foundation option for this project. As previously discussed, Geopiers are rammed aggregate piers that are installed by a specialty contractor using a proprietary method. Recommendations for design and construction of geopiers is normally provided by Geopier US, the company that developed this method of ground improvement and foundation support.

DRILLED PIER FOUNDATIONS

Based on the subsurface conditions encountered at the site, it recommended that the proposed building be supported by a drilled pier and grade beam foundation system. It is recommended that all drilled piers be founded in the Curzon Limestone. Based on the borings, it is anticipated that the bearing elevations of the drilled piers will range from about 908 to 913 feet, across the proposed

building site. Greater penetration into the bedrock may be required at some locations depending on the extent and severity of bedrock weathering. Drilled piers that are founded in suitable limestone may be designed and proportioned using an allowable end bearing pressure of 60,000 psf.

Any uplift loads acting on the foundations can be resisted by the effective dead weight of the piers plus an allowable side friction value of 250 psf for the portion of the shaft in soils and 2,000 psf for the portion of the shaft in weathered shale and/or limestone bedrock.

Properly reinforced drilled piers are also capable of resisting transient lateral loads from wind and/or earthquakes. It has been our experience that drilled piers with a minimum shaft diameter of 30 inches and an embedment length of at least 10 feet are capable of resisting lateral loads of 25 kips or more, with maximum top of pier deflections of ½ inch or less. If desired, GeoSource can perform a more comprehensive lateral load analysis and provide additional recommendations, when final loads become available. All piers subject to lateral loads should be properly reinforced.

All piers should have a minimum shaft diameter of 36-inches in order to accommodate dewatering equipment and/or to permit access for proper hand cleaning and observation of the base. Some groundwater seepage should be anticipated during the installation of drilled piers and use of temporary casing and dewatering techniques may be required. Temporary casing may also be required in areas where significant amounts of debris and/or rubble are present in the undocumented fill. To minimize disturbance to the bearing surfaces caused by ponding of water, it is recommended that concrete be placed the same day that the piers are drilled. It is also recommended that temporary casing be installed when personnel are required to enter a drilled pier excavation to clean or observe the bearing surface.

To minimize disturbance to the bearing surfaces caused by ponding of water, it is recommended that concrete be placed the same day that the drilled shafts are completed. The bottom of the pier excavation should be clean and free of water and loose materials prior to placement of the reinforcing steel and concrete. Concrete placement should be continuous from the bottom to the top elevation of the shaft. For dry excavations, concrete may be placed by the free fall method,

provided that it can be directed down the center of the shaft without hitting the reinforcing steel or sides of the excavation. Wet excavated shafts will require that the concrete either be pumped from the bottom up or placed using a tremie. The tremie pipe should be clean and have a sufficient inside diameter for use with the specific concrete mix, but not less than 10 inches. The discharge end of the tremie should allow free radial flow of the concrete and be immersed at least 5 feet in concrete and maintain a positive pressure differential during placement to prevent water or spoil intrusion.

It is anticipated that the drilled piers can be installed with conventional drilling equipment. It is possible that obstructions, such as rubble fill or old buried foundations, walls and other structures from the former buildings may be encountered during the installation of the drilled piers. Core barrels, rock augers or special construction methods may be required to remove obstructions and/or to remove loose rock and other materials to properly prepare the foundation bearing surface for the drilled piers.

Temporary steel casing and dewatering procedures may be required for proper installation of the drilled piers. If concrete will be placed in conjunction with the use of temporary casing, there must be a sufficient head of concrete inside the casing to prevent soil and water from entering the pier excavation as the temporary casing is pulled. It is recommend that concrete be designed to have a minimum slump in the range of 6 to 8 inches to reduce the potential for arching as the casing is removed.

It is recommended that all drilled pier and/or footing excavations be observed and evaluated by the geotechnical engineer or his representative immediately prior to placement of foundation concrete. Unsuitable areas identified at this time should be corrected. Corrective procedures would be dependent upon conditions encountered and will most probably include deepening of the drilled piers.

Long-term structural settlement of drilled piers designed and constructed as outlined above should be minor; i.e., ½ inch or less.

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GEOPIER FOUNDATION SYSTEM

As an alternate to supporting the proposed building on drilled pier foundations, shallow foundation support bearing on a *Geopier*® reinforced subgrade appears to be a viable option for this project and may potentially provide an economic benefit to this project. Based on our experience with the *Geopier* soil reinforcement system, we anticipate that a *Geopier* reinforced subgrade could be designed to increase the net allowable soil bearing pressure at this site while limiting foundation settlement.

The *Geopier* soil reinforcement system has been used for a number of years to support structures as an alternative to deep foundations and/or to the removal and replacement of soft or unsuitable soils. The system allows the use of conventional spread footings and floor slabs cast on-grade, and reliably controls settlement to within design tolerances.

The *Geopier* soil reinforcement system consists of highly densified aggregate piers. The *Geopier* elements are installed by drilling 30-inch diameter holes, and ramming thin lifts of well-graded aggregate within the holes to form very stiff, high-density aggregate piers. The drilled holes for this project should extend through the undocumented fill to the underlying bedrock, a depth of about 13 to 19 feet below the finished floor elevation of the existing building. Following drilling of the geopier hole, well graded aggregate is compacted in 12-inch loose lifts in the drill hole. Ramming takes place with a high-energy beveled tamper that both densifies the aggregate and forces the aggregate laterally into the sidewalls of the hole. This action increases the lateral stress in surrounding soils, thereby further stiffening the reinforced composite soil mass. The result of *Geopier* installation is a significant strengthening and stiffening of subsurface soils that then support floor slabs and high-capacity footings.

Geopier designs are based on a two-layer settlement analysis as described by Lawton et al. (1994) and in the *Geopier* Reference Manual. Settlements within the "upper zone" (zone of soil that is reinforced with *Geopier* elements) are computed using a weighted modulus method that accounts for the stiffness of the *Geopier* elements, the stiffness of the matrix soil, and the area coverage of *Geopier* elements below supported footings. Settlements within the "lower zone" (zone of soils beneath the upper zone

which receives lower intensity footing stresses) are computed using conventional geotechnical settlement methods.

The *Geopier* soil reinforcement system is a design-build system and *Geopier* US should be contacted to provide engineering analyses and project specific design information for this project. Please contact Mr. Aaron J. Gaul, of *Geopier* Foundation Company – Midwest at (816) 531-6026 regarding the final system design, including the allowable foundation bearing pressure, *Geopier* shaft lengths and spacing, anticipated floor slab thickness, and a cost to support the proposed building.

If the *Geopier* system is selected, Quality Assurance testing should be performed during installation, including documentation of the soil conditions encountered, the shaft lengths, amount of aggregate used, verification of the modulus test readings, and tests on the compacted aggregate lifts. GeoSource would be pleased to provide this service.

SEISMIC HAZARDS DETERMINATION

Earthquake hazard evaluation is a complex task. Seismic sources must be identified and characterized, path effects must be evaluated (i.e., selection of appropriate attenuation relationships), and ground motions must be completed. Finally, an analysis of the motion with respect to the proposed construction must be made. In addition to the multi-discipline nature of this process, there is substantial parameter and modeling uncertainty associated with each of the steps. Typically, code based approaches are used for seismic hazard analyses. Our seismic hazard evaluation follows the IBC 2009 procedures.

United States Geological Society (USGS) has developed and mapped maximum earthquake response spectra for two design levels: an earthquake having a 10% probability of exceedance in 50 years and an earthquake having a 2% probability of exceedance in 50 years. The motions developed by USGS represent soft rock conditions, which are assumed to be representative of the

soil/rock that would be encountered below a depth of approximately 100 feet below existing grades at the site.

The USGS "soft rock" peak ground accelerations for the 10%/50 year and 2%/50 year events are 5.10% g and 18.60% g, respectively. Maximum spectral accelerations at the 0.2 second/1.0 second periods for the 10%/50 year and 2%/50 year events are 5.10% g / 2.10% g and 15.40% g / 5.40% g, respectively. Based on the subsurface information, the project site would be characterized as a Site Class C per the 2009 International Building Code (IBC). In addition, there is no significant risk of liquefaction or mass movement of the on-site soils due to a seismic event.

BUILDING FLOOR SLABS

The recommendations outlined in the Site Preparation and Structural Fill sections of this report are intended to produce subgrades that are suitable for support of building floor slabs. These recommendations include capping the building pad with a minimum of 24 inches of select, low volume change material below the floor slab and leveling course. The select fill layer below the floor slabs has been recommended to reduce the potential for subgrade volume change and floor slab movement. The recommended low plasticity structural fill thickness is in addition to any granular section that will be required below the floor slabs. The moisture content of the subgrade soils should be maintained within the recommended range until floor slabs are completed. Depending upon weather conditions, periodic wetting may be required.

Where possible, floor slabs should be designed and constructed as free slabs to allow for some differential movement between the walls, column points and floor slabs. It is recommended that a granular leveling course, having a minimum thickness of 4 inches, be used below normally loaded building floor slabs supported on soil subgrades. The granular section provides a capillary moisture break and acts as a leveling course. Clean crushed limestone gravel, with a nominal size of ½ to ¾ inch, would be recommended for the leveling course. A modulus of subgrade reaction of 100 pci may be used to design floor slabs constructed on an untreated clay subgrade.

In areas where floor loads are greater than 200 psf, it is recommended that a minimum of 12 inches of crushed limestone aggregate be placed below the building floor slab. The crushed rock may be substituted for a portion of 18 inches of select, low volume change fill layer recommended for normally loaded floor slabs. The purpose of the crushed rock is to provide an improved subgrade for the more heavily loaded floor slab areas. In addition, the crushed rock will also provide a good working surface during construction. It is recommended that the crushed rock have a gradation similar to KDOT AB-3. The crushed rock should be placed in 6 inch lifts and compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D 698. A modulus of subgrade reaction of 250 pci may be used to design floor slabs constructed on 12 inches of compacted crushed limestone aggregate.

Subsurface moisture and moisture vapor naturally migrate upward through the soil and, where the soil is covered by a building or pavement, this moisture will collect. To reduce the impact of this subsurface moisture and the potential impact of future induced moisture (such as landscape irrigation or precipitation), the current industry standard is to place a vapor retarder below the compacted crushed limestone layer. This membrane typically consists of visquene or polyvinyl plastic sheeting, having a thickness of at least 10 mils. It should be noted that although vapor barrier systems are currently the industry standard, this system may not be completely effective in preventing floor slab moisture problems. These systems typically will not necessarily assure that floor slab moisture transmission rates will meet floor covering manufacturer standards and that indoor humidity levels be appropriate to inhibit mold growth. The design and construction of such systems are totally dependent on the proposed use and design of the proposed building and all elements of building design and function should be considered in the slab-on-grade floor design. Building design and construction may have a greater role in perceived moisture problems since sealed buildings/rooms or inadequate ventilation may produce excessive moisture in a building and affect indoor air quality.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking or curling of the

slabs. High water-cement ratio and/or improper curing also greatly increase the water vapor permeability of the concrete. We recommend that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) Manual.

The above procedures should reduce the potential for subgrade moisture variations and consequently reduce floor slab movement and cracking. However, these procedures will not completely eliminate the volume change characteristics of the natural clay soils and, because of the presence of unaltered clay soils that extend to much greater depths, some long-term volume change may occur along with some floor slab movement and cracking. Isolation of floor slabs from walls and columns should be considered to accommodate minor differential movement of floor slabs. If it is desired to further minimize the potential for subgrade volume change, the use of a greater thickness of low volume change material beneath the floor slab should be considered.

LATERAL EARTH PRESSURES

Based on our experience with soils similar to those encountered at the site, it is recommended that the walls of the utility tunnel be designed using an equivalent fluid pressure of 55 pounds per cubic foot. This lateral earth pressure assumes an "at rest" stress distribution condition; i.e., no wall rotation is allowed. The recommended load distribution does not include a factor of safety or take into account the influence of any hydrostatic loading of the walls. Also, the stress distributions do not include the influence of any foundations, pavement or other surcharge loads located in or adjacent to wall backfill.

To prevent hydrostatic loading on the walls and/or seepage into the utility tunnel, it is recommended that perforated drain lines be installed at the base of the walls and also under the bottom floor slab of the tunnel. The drain lines should be sloped to provide positive gravity and should extend to a sump or storm drain where the water is removed. The drain line should be wrapped with filter fabric to prevent intrusion of fines. The drain line should be backfilled with free draining granular material extending vertically above the drain line to within 2 feet of final grade. The remaining portion of the excavation should be backfilled with cohesive soils to minimize the infiltration of surface water. The

granular section behind the wall should have a minimum width of 2 feet and should be encapsulated in the suitable filter fabric to minimize intrusion of fines. The use of a prefabricated drainage blanket on the foundation wall could also be considered to prevent hydrostatic loading. Drainage blankets should be installed in accordance with the manufacturer's recommendations.

PAVEMENTS

Parking and drive area subgrades should be prepared in accordance with the recommendations given in the Site Preparation and Structural Fill sections of this report. The site soils are considered poor subgrade materials for support of pavements. Based on the soil types encountered at this site and previous experience with materials of this type, a design CBR value of 3 is recommended for design of pavement sections. For this design value, a full-depth asphaltic concrete section having a minimum thickness of 6 inches is recommended for automobile parking areas and 7.5 inches is recommended for the access drives. For asphaltic concrete pavements, a minimum surface course thickness of 2 inches is normally recommended.

Service drives used by semi-trailer and other heavy delivery trucks require thicker pavement sections. GeoSource would be pleased to provide specific thickness recommendations for heavy duty pavements, after we receive additional information regarding the type and number of trucks that are projected to use this facility over the design life of the pavement. Portland cement concrete pavements are recommended for approach slabs, dock aprons, truck drives and parking areas, trash dumpster pads and other areas where heavy wheel loads will be concentrated. It is recommended that the concrete pavements in these areas have a minimum thickness of 8 inches. We normally recommend a 4-inch leveling and drainage course of clean, crushed rock be placed below all concrete pavements.

Portland cement concrete pavements are recommended for the trash dumpster pad and other paved areas subjected to concentrated wheel loads and high stresses. The minimum recommended thickness in these areas is 7 inches. Normally, a 4-inch layer of granular fill is placed below concrete pavement sections.

We recommend that the pavement subgrades be evaluated by proofrolling immediately prior to paving. The moisture content and density of the top 8 inches of the subgrade should be checked within two days prior to commencement of actual paving operations. If the material is not in compliance with the required ranges of moisture or density, the subgrade should then be moisture conditioned and recompacted. If any significant event, such as precipitation, occurs after the evaluation, the subgrade should be reviewed by qualified personnel immediately prior to placing the pavement. The subgrade should be in its finished form at the time of the final review.

Proper drainage is a key to the long term performance of any pavement section. It is recommended that all pavements be properly sloped to provide rapid runoff of surface water. Water should not be allowed to pond on or adjacent to pavements, since this could result in saturation of the subgrade and cause premature deterioration of pavements. Pavements in Kansas are normally subjected to 30 or more freeze-thaw cycles in any given year. Because of this, periodic maintenance of all of the pavements is essential to long term performance and should be anticipated. This should include sealing of all cracks and joints and by maintaining proper surface drainage next to paved areas.

PLANS AND SPECIFICATIONS REVIEW

It is recommended that the geotechnical engineer be provided the opportunity to review the plans and specifications so that comments can be made regarding the interpretation and implementation of our geotechnical engineering recommendations in the design and specifications. In the event that GeoSource is not given the opportunity to perform this recommended review, we will assume no responsibility for misinterpretation of our geotechnical engineering recommendations.

CONSTRUCTION OBSERVATION AND TESTING

To effectively achieve the intent of the geotechnical recommendations presented in this report and to maintain continuity from design through construction, GeoSource should be retained to provide observation and testing services during earthwork and foundation construction phases of the project. This will provide the geotechnical engineer with the opportunity to observe the subsurface conditions encountered during construction, evaluate the applicability of the geotechnical recommendations presented in our report as they relate to the soil and bedrock conditions encountered, and to provide follow up recommendations if conditions differ from those described in our report.

LIMITATIONS

The analysis and recommendations submitted in this report are based in part upon the subsurface information obtained from the exploration points performed at the indicated locations and our present knowledge of the proposed construction as outlined in the Project Description. Subsurface conditions may vary between the exploration points and across the site and our report does not reflect any variations which may occur. The nature and extent of such variations may not become evident until construction. If subsurface conditions are encountered during construction that differ from those described in this report, GeoSource should be notified immediately so that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction, including the proposed loads, floor slab elevations or locations, changes from that described in this report, our recommendations should also be reviewed and the recommendations modified accordingly.

This report has been prepared in accordance with the generally accepted geotechnical engineering practice as it exists in the area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that an adequate program of observation and testing will be conducted during the construction phase in order to evaluate

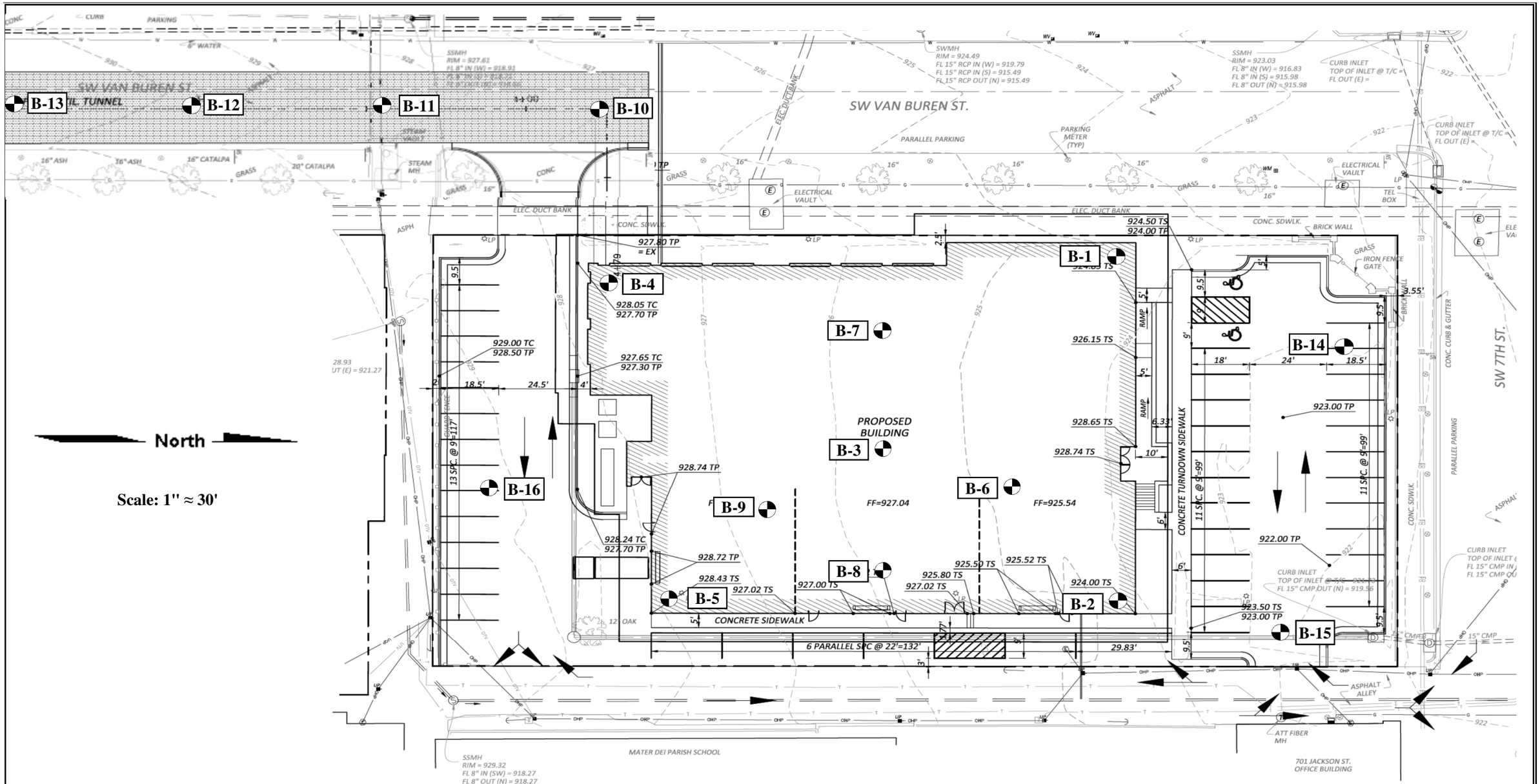
compliance with our recommendations. Our scope of services did not include any environmental assessment or exploration for the presence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, below or around this site.

This report has been prepared for the exclusive use of our client for specific application to the project discussed. Any party other than the client who wishes to use this report shall notify GeoSource in writing of such intended use. Additional work may be required before an updated report can be issued. Non-compliance with any of these requirements will release GeoSource from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify and hold harmless GeoSource from any claim or liability associated with such unauthorized or non-compliance.

GeoSource

APPENDIX

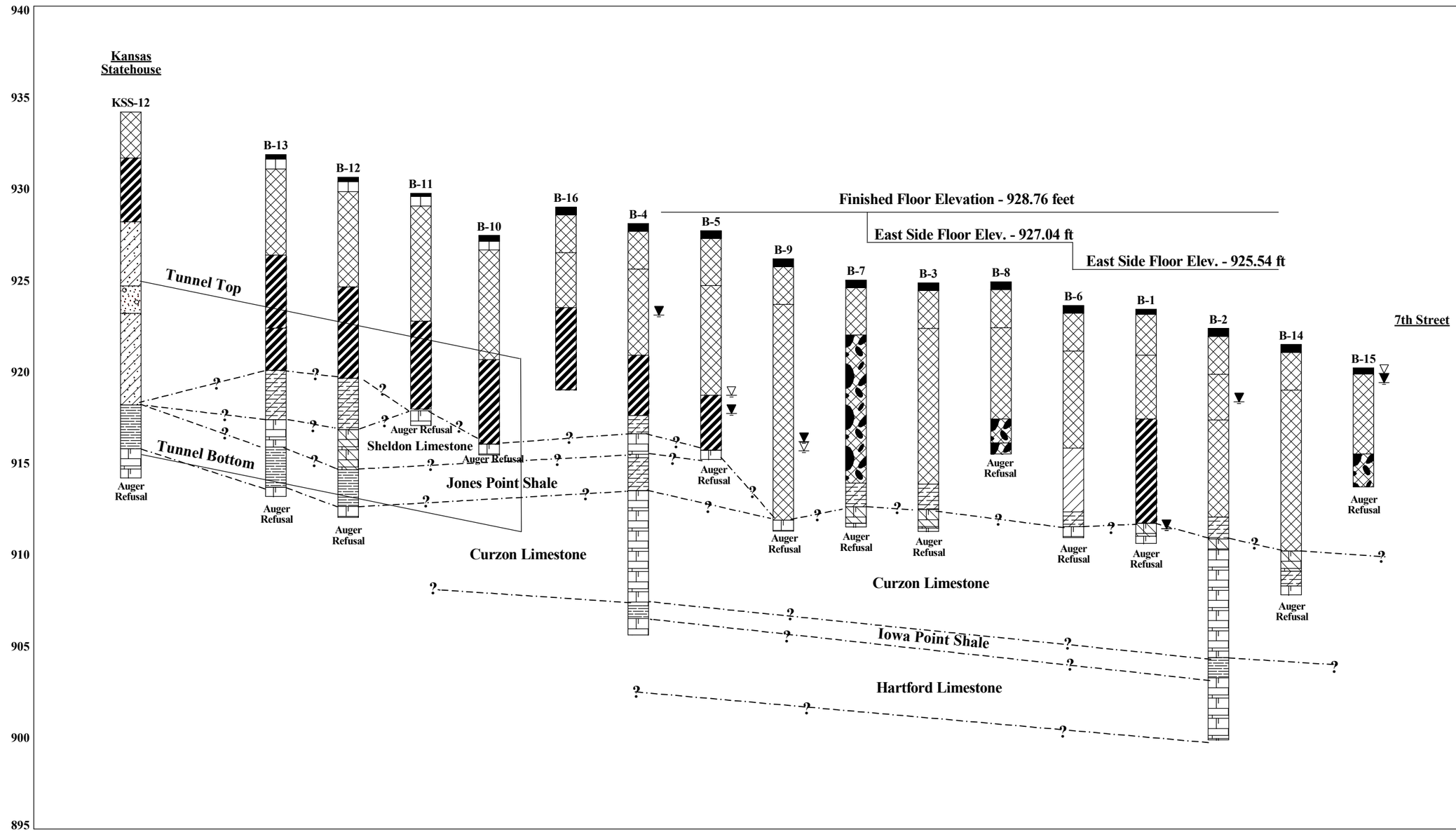
FIGURE 1: BORING LOCATION SKETCH
FIGURE 2: GENERALIZED SUBSURFACE PROFILE
BORING LOGS
GENERAL NOTES AND TERMS
BORING LOG SYMBOLS



Boring Location Sketch **Figure 1**

Proposed Kansas Energy and Service Facility **SW 7th Street and Van Buren Street** **Topeka, Kansas**	GeoSource Your Source for Geotechnical and Materials Engineering
Approved By: JJZ	**Project No. D14G1399**

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GENERALIZED SUBSURFACE PROFILE

FIGURE 2

Proposed Kansas Energy & Service Center
SW 7th Street and Van Buren Street
Topeka, Kansas

Approved By: JJZ | Project No.: D14G1399

LEGEND

Asphalt	Rubble	Silty Sand	Lean to Fat Clay	Sand (SP)	Fat Clay	Weathered Shale	Shale
Brick Pavers	Fill	Sandy Silt	Sandy Lean Clay	Sand (SW)	Lean Clay	Weathered Limestone	Limestone
Baserock	Silt	Clayey Silt	Sandy Clay	Gravel	Fat Clay	Weathered Sandstone	Sandstone

Water Levels: While Drilling; 24 hrs. A.B.

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-1

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Offset 4 feet east due to utilities
										MATERIAL DESCRIPTION
										Approx. Surface Elevation: 923.4
	PA									**Asphaltic Concrete (3")**
1	ST	15		*1500	102	25.6	CL			**FILL**, lean clay, medium stiff, light brown, trace fine sand
									2.5	920.9
	PA									**FILL**, lean to fat clay, stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris
2	SS	18	7	*1500		21.6	CL CH		5	
									6.0	917.4
	PA									**FAT CLAY**, stiff, brown mottled light gray and rust
3	ST	20		4410	101	28.0	CH		10	
	PA								11.7	911.7
										****LIMESTONE**, weathered, broken and seamy to very hard, light gray
									12.8	910.6
										AUGER REFUSAL @ 12.8 FEET

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
37	18	19

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **12.0 feet W.D.**

▼ **12.0 feet A.B.**

Backfilled @ Completion

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BORING STARTED	**12-17-14**
BORING COMPLETED	**12-17-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-2

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Offset 8 feet west due to utilities	
										MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**922.4**
	PA									**Asphaltic Concrete (5")**	
1	ST	13		2420	107	22.7	CL			**FILL**, lean clay, stiff, light brown brown, trace fine sand	
									2.5		919.9
	PA									**FILL**, fat clay, stiff, gray brown ▼	
2	SS	18	8	*4000		29.4	CL CH		5.0		917.4
	PA									**FILL**, lean to fat clay, soft, dark gray brown and geenish gray mixed, trace gravel (Stong Fuel Odor)	
3	ST	18	9	*1000		55.7	CL CH		10		
									10.3		912.1
	PA									**SHALE, weathered, soft, olive tan	
									11.5		910.9
									12.1	**LIMESTONE, weathered, seamy, gray	910.3
R1	NQ3	100%	RQD= 75%	**4990	138	8.7				**LIMESTONE**, hard, solid, medium to thick-bedded, fossiliferous, buff to light gray	
R2	NQ3	78%	RQD= 57%	**8040	150	5.4			15		
				**3180	145	6.5			18.0		904.4
										SHALE, mod. hard, very thin bedded, tan	
									19.1		903.3
									20	**LIMESTONE**, hard, solid, medium bedded, fossiliferous, buff to light gray	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet A.C.R.**

Backfilled @ Completion

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BORING STARTED	**12-17-14**
BORING COMPLETED	**12-17-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-2

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
R3	NQ3	100%	RQD= 100%	**7480	152	3.5			22.5	**LIMESTONE**, hard, solid, thick-bedded, fossiliferous, light gray 899.9
										BOTTOM OF BORING

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **4.0 feet A.C.R.**

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BORING STARTED	**12-17-14**
BORING COMPLETED	**12-17-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-3

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Approx. Surface Elevation: 924.9
	PA									**Asphaltic Concrete (5")**
1	ST	14		4500	115	15.3	CL			**FILL**, lean clay, very stiff, light brown, trace fine sand
									2.5	922.4
	PA									**FILL**, lean to fat clay, medium stiff to stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris
2	SS	18	20	*1500		19.0	CL CH		5	
	PA									
3	SS	18	9	*3000		31.3	CL CH		10	
	PA								11.0	913.9
									12.4	**SHALE, weathered, soft, olive tan 912.5
									13.6	**LIMESTONE, weathered, broken and seamy to very hard, light gray 911.3

AUGER REFUSAL @ 13.6 FEET

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
39	19	20

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-18-14**
BORING COMPLETED	**12-18-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-4

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Approx. Surface Elevation: 928.1
	PA									**Asphaltic Concrete (5")**
1	ST	10		1500	107	19.3	CL			**FILL**, lean clay, medium stiff, light brown, trace fine sand
									2.5	925.6
	PA									**FILL**, fat clay, stiff, dark gray brown mixed, trace gravel and miscellaneous construction rubble
2	SS	18	8	*3000		27.0	CH			▼
	PA								5	
									7.2	920.9
3	ST	18	10	*4500		17.5	CH			**FAT CLAY**, very stiff, light gray mottled light brown
	PA								10	
									10.5	917.6
									11.5	**SHALE, weathered, soft, olive tan 916.6
R1	NQ3	94%	RQD= 56%	**7800	153	5.2			12.8	**LIMESTONE**, hard, solid, thin-bedded, fossiliferous, buff 915.3
				**1970	136	15.2				**SHALE**, weathered, soft, tan to light brown
									14.6	913.5
R2	NQ3	100%	RQD= 65%	**9520	149	5.6			15	**LIMESTONE**, hard, solid, medium to thick-bedded, fossiliferous, buff to light gray
				**4410	146	5.7			20	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet A.C.R.**

Backfilled @ Completion

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BORING STARTED	**12-18-14**
BORING COMPLETED	**12-18-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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BOREHOLE INFORMATION **Page 2 of 2**

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-4

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
									20.9	**SHALE**, hard, very thin bedded, gray	907.2
R3	NQ3	25%	RQD= 0%						21.6	**LIMESTONE**, hard, light gray	906.5
									22.5		905.6
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry Prior to Coring**

▼ **5.0 feet A.C.R.**

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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-5

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**927.7**
	PA									**Asphaltic Concrete (5")**	
1	ST	16		2940	109	20.3	CL			**FILL**, lean clay, stiff, light brown, trace fine sand	
										3.0	924.7
2	ST	13		5300	106	22.1	CL CH		5	**FILL**, lean to fat clay, very stiff to medium stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris	
	PA										
3	ST	10		2050	106	22.1	CL CH			9.0 ▽	918.7
	PA								10	**FAT CLAY**, stiff, reddish brown ▼	
										12.0	915.7
										12.5 ****LIMESTONE**, hard, gray	915.2

AUGER REFUSAL @ 12.5 FEET

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
36	19	17

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **9.0 feet W.D.**

▼ **10.0 feet A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-17-14**		
BORING COMPLETED	**12-17-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-6

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**923.6**
	PA									**Asphaltic Concrete (5")**	
1	ST	14		*2500	104	21.1	CL			**FILL**, lean clay, stiff, light brown, trace fine sand	
									2.5		921.1
	PA										
2	SS	18	16	*2000		22.3	CL CH			**FILL**, lean to fat clay, medium stiff to stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris	
	PA								5		
									7.8		915.8
3	SS	18	7	*2500		20.1	CL			**LEAN CLAY**, stiff, dark gray brown (Possible Fill)	
	PA								10		
									11.3		912.3
									12.1	**SHALE, weathered, soft, olive tan	911.5
									12.7	**LIMESTONE, hard, gray	910.9
										AUGER REFUSAL @ 12.7 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-19-14**		
BORING COMPLETED	**12-19-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-7

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**925.0**
	PA									**Asphaltic Concrete (5")**	
1	ST	20		2950	107	20.0	CL			**FILL**, lean clay, stiff, light brown, trace fine sand	
									3.0		922.0
	PA										
2	SS	12	76			11.4				**RUBBLE FILL**, brick, cinders, limestone and/or concrete rubble in a clay matrix	
	PA								5		
3	SS	3	50/3"			15.1					
	PA								10		
									11.1		913.9
										**SHALE, weathered, soft, grayish tan	
									12.4		912.6
									13.5	**LIMESTONE, weathered, broken and seamy to very hard, light gray	911.5

AUGER REFUSAL @ 13.5 FEET

ATTERBERG LIMITS
Sample 1, Depth 1-3 feet

LL	PL	PI
34	19	15

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-8

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**924.9**
	PA									**Asphaltic Concrete (5")**	
1	ST	10		3630	110	19.0				**FILL**, lean clay, stiff, light brown, trace fine sand	
									2.5		922.4
	PA									**FILL**, lean to fat clay, medium stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris	
2	SS	18	5	*2500		23.3			5		
	PA										
									7.5		917.4
3	SS	4	50/4"							**RUBBLE FILL**, brick, cinders, limestone or concrete debris in a clay matrix	
	PA								9.4		915.5
										AUGER REFUSAL @ 9.4 FEET	
										Driller' Note: Auger refusal on apparent limestone and/or concrete rubble.	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
Your Source for Geotechnical and Materials Engineering

BORING STARTED	**12-18-14**
BORING COMPLETED	**12-18-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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2-2-2016
Att.9A423

BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-9

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL
	PA						
1	ST	8		2590	109	17.8	CL
	PA						
2	SS	18	4	*1500		25.7	CL CH
	PA						
3	SS	18	10	*2000		30.7	CL CH
	PA						

GRAPHIC LOG

DEPTH, Feet.

MATERIAL DESCRIPTION

Approx. Surface Elevation: 926.2

Asphaltic Concrete (5")

FILL, lean clay, stiff, light brown, trace fine sand

2.5 923.7

FILL, lean to fat clay, soft to medium stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris

5

10

▼ ▽

14.3 911.9

14.9 ****LIMESTONE**, hard, gray 911.3

AUGER REFUSAL @ 14.9 FEET

ATTERBERG LIMITS

Sample 1, Depth 1-3 feet

LL	PL	PI
34	18	16

**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **10.5 feet W.D.**

▼ **10.0 feet A.B.**

Backfilled @ Completion

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BORING STARTED	12-17-14
BORING COMPLETED	12-17-14
RIG CME-55	DRILLER MC
APPROVED JJZ	JOB # D14G1399

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2-2-2016
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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-10

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Offset 4 feet east due to parked cars
										Approx. Surface Elevation: 927.6
	PA									**Asphaltic Concrete (4")** **Brick Pavers**
1	ST	6		*1500	98	26.5	CL CH			**FILL**, lean to fat clay, medium stiff, dark gray brown, trace gravel, brick, cinders and miscellaneous construction debris
	PA								5	
									6.8	920.8
2	SS	18	10	*4500		17.1	CH			**FAT CLAY**, very stiff, light grayish tan mottled rust
	PA								10	
									11.4	916.2
									12.0	**LIMESTONE**, hard, gray 915.6
										AUGER REFUSAL @ 12.0 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-11

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Offset 6 feet east due to parked cars
										Approx. Surface Elevation: 929.8
	PA									**Asphaltic Concrete (4")** **Brick Pavers**
1	ST	10		1420	97	25.8	CL			**FILL**, lean clay, medium stiff, dark gray brown, trace fine sand and gravel
	PA								5	
									7.0	922.8
2	SS	18	10	*5500		24.1	CH			**FAT CLAY**, very stiff, light grayish tan mottled rust
	PA								10	
									11.8	918.0
									12.7	**LIMESTONE**, hard, gray 917.1
										AUGER REFUSAL @ 12.7 FEET
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	12-18-14		
BORING COMPLETED	12-18-14		
RIG	CME-55	DRILLER	MC
APPROVED	JJZ	JOB #	D14G1399

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BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-12

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										Offset 6 feet east due to parked cars
										Approx. Surface Elevation: 930.7
	PA									**Asphaltic Concrete (3")** **Brick Pavers**
1	ST	10		1480	98	25.9	CL CH			**FILL**, lean to fat clay, medium stiff, dark gray brown mixed, trace gravel
	PA								5	6.0 924.7
										FAT CLAY, very stiff, light grayish tan mottled rust
3	ST	12		4440	107	20.0	CH			
	PA								10	11.0 919.7
										**SHALE, weathered, soft, olive tan to light gray
4	SS	1	50/1"			6.4				13.8 916.9
	PA								15	**LIMESTONE, weathered, seamy to thin-bedded, buff to light gray
										16.0 914.7
										**SHALE, hard, gray
										18.0 912.7
										18.6 **LIMESTONE, hard, gray 912.1
										AUGER REFUSAL @ 18.6 FEET

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-12

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 1 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-13

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	DEPTH, Feet.	MATERIAL DESCRIPTION	
									Approx. Surface Elevation:	**931.9**
	PA								**Asphaltic Concrete (3")** **Brick Pavers** **FILL**, lean to fat clay, stiff, dark gray brown, trace gravel	
1	ST	9		2830	104	28.3	CH	5		
								5.5		926.4
	PA								**FAT CLAY**, very stiff, gray brown	
3	SS	18	12	*3500		23.6	CH	9.5		922.4
								10	**FAT CLAY**, very stiff, reddish brown	
	PA							11.8		920.1
									**SHALE, weathered, soft, olive tan to gray brown	
4	SS	15	56/9"			20.7		14.5		917.4
								15	**LIMESTONE, weathered, seamy to thin-bedded, light gray	
	PA							16.0		915.9
									**SHALE, hard, gray	
								18.2		913.7
								18.7	**LIMESTONE, hard, gray	913.2
									AUGER REFUSAL @ 18.7 FEET	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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BOREHOLE INFORMATION Page 2 of 2

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-13

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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2-2-2016
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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-14

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**921.5**
	PA									**Asphaltic Concrete (5")**	
1	ST	10		1450	109	21.8	CL			**FILL**, lean to fat clay, medium stiff, light brown, trace fine sand	
									2.5		919.0
	PA									**FILL**, fat clay, medium stiff to stiff, reddish brown, dark brown and brown layers, trace gravel	
2	SS	18	5	*2000		18.5	CH		5		
	PA										
3	SS	18	6	*2500		36.5	CH		10		
	PA										
									11.3		910.2
										**LIMESTONE, weathered, seamy	
									12.4		909.1
									13.2	**SHALE, weathered, soft, tan	908.3
									13.7	**LIMESTONE, hard, gray	907.8
										AUGER REFUSAL @ 13.7 FEET	
										**Rock classification is based on drilling characteristics and visual observation of disturbed samples. Core samples may reveal other rock types.	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

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BORING STARTED	**12-19-14**		
BORING COMPLETED	**12-19-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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2-2-2016
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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-15

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**920.2**
	PA									**Asphaltic Concrete (4")** ▽ ▼	
1	SS	18	14	*1000		19.7	CL CH			**FILL**, lean to fat clay, soft, to medium stiff, dark gray brown, tan and brown mixed, with some gravel and miscellaneous construction rubble	
	PA										
2	SS	14	55/8"			27.4	CL CH				
									4.7		915.5
	PA								5	**RUBBLE FILL**, brick, cinders, limestone or concrete debris in a clay matrix	
									6.5		913.7
										AUGER REFUSAL @ 6.5 FEET	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **0.3 feet W.D.**

▼ **0.8 feet A.B.**

Backfilled @ Completion

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BORING STARTED	**12-18-14**
BORING COMPLETED	**12-18-14**
RIG **CME-55**	DRILLER **MC**
APPROVED **JJZ**	JOB # **D14G1399**

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2-2-2016
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BOREHOLE INFORMATION Page 1 of 1

STATION OFFSET

NORTHING EASTING

DRLLING COMPANY **GeoSource, LLC**

METHOD **4-inch Flight Augers** HAMMER **Auto**

LOG OF BORING NO. B-16

PROJECT NAME **Proposed Kansas Energy & Service Center**

SITE LOCATION **SW 7th Street and Van Buren Street Topeka, Kansas**

OWNER / ARCHITECT **State of Kansas / HTK Architects**

SAMPLE NO.	SAMPLE TYPE	RECOVERY	STANDARD PENETRATION BLOWS/FT.	UNCONFINED STRENGTH PSF	DRY DENSITY PCF	MOISTURE CONTENT, %	UNIFIED SOIL SYMBOL	GRAPHIC LOG	DEPTH, Feet.	MATERIAL DESCRIPTION	
										Approx. Surface Elevation:	**929.0**
	PA									**Asphaltic Concrete (5")**	
1	ST	8		5990	106	13.4	CL			**FILL**, lean clay, very stiff, light brown, trace fine sand	
									2.5		926.5
2	ST	13		4570	105	22.9	CL CH			**FILL**, lean to fat clay, very stiff, brown	
									5		
									5.5		923.5
	PA									**FAT CLAY**, very stiff, light brown to gray brown mottled rust and light gray	
3	SS	18	8	*4500		20.6	CH				
									10		
									10.0		919.0
										BOTTOM OF BORING	

* Calibrated Penetrometer ** Rock Strength in psi

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ the transition may be gradual.

WATER LEVEL OBSERVATIONS

▽ **Dry W.D.**

▼ **Dry A.B.**

Backfilled @ Completion

GeoSource
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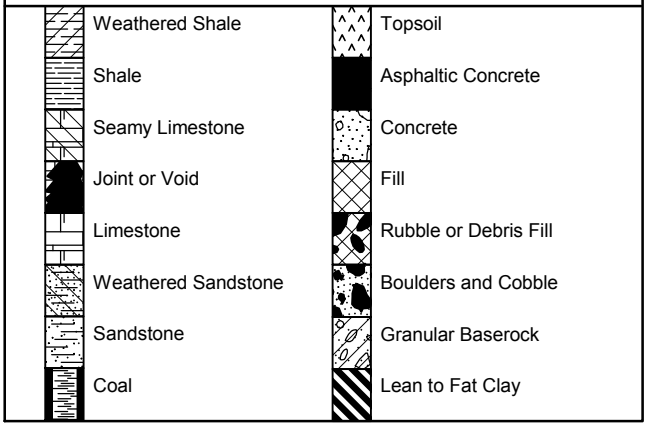
BORING STARTED	**12-18-14**		
BORING COMPLETED	**12-18-14**		
RIG	**CME-55**	DRILLER	**MC**
APPROVED	**JJZ**	JOB #	**D14G1399**

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2-2-2016
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UNIFIED SOIL CLASSIFICATION (ASTM D-2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS<"A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY
			PI PLOTS <"A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

BEDROCK AND OTHER MATERIAL SYMBOLS



BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION

DESCRIPTION	RQD (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 -100

BEDDING CHARACTERISTICS

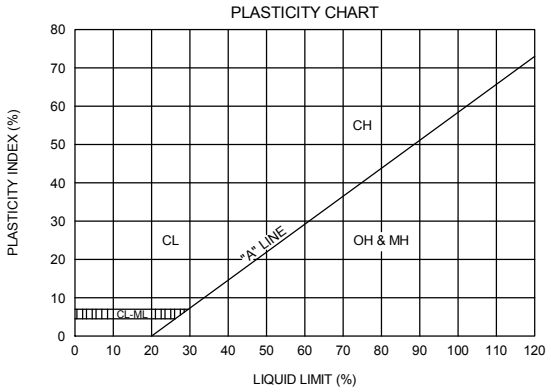
TERM	THICKNESS (inches)
Massive	> 60
Very Thick Bedded	36 - 60
Thick Bedded	12 - 36
Medium Bedded	4 - 12
Thin Bedded	1 - 4
Very Thin Bedded	0.4 - 1
Laminated	< 0.4

DEGREE OF WEATHERING

Slightly Weathered - Slight decomposition of Parent material in joints and seams.
Weathered - Well-developed and decomposed joints and seams.
Highly Weathered - Rock highly decomposed, may be extreemly broken.

BEDROCK DISCONTINUITIES

Bedding Planes — Planes dividing the individual layers, beds or strata of rocks.
Joints — Fractures in rock, generally more or less vertical to the bedding.
Seams — Applies to bedding planes with an unspecified degree of weathering.



PENETRATION RESISTANCE
(RECORDED AS BLOWS / 0.5 FT)

SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

GeoSource
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General Notes and Terms

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BORING LOG SYMBOLS

SURFACE MATERIALS

 TOPSOIL

 FILL MATERIAL

 ASPHALTIC CONCRETE

 CONCRETE

 GRANULAR BASE

COHESIVE SOILS

 SILT

 CLAYEY SILT

 LEAN CLAY

 LEAN TO FAT CLAY

 FAT CLAY

LARGE GRANULAR SOILS

 CLAYEY GRAVEL

 SILTY GRAVEL

 POORLY GRADED GRAVEL

 WELL GRADED GRAVEL

 COBBLES & BOULDERS

GRANULAR SOILS

 SANDY SILT

 SILTY SAND

 FINE SAND

 POORLY GRADED SAND

 WELL GRADED SAND

 GRAVELLY SAND

BEDROCK UNITS

 SHALE

 FISSILE SHALE

 SANDSTONE

 LIMESTONE

 COAL

WEATHERED BEDROCK

 JOINT OR VOID

 WEATHERED SHALE

 WEATHERED SANDSTONE

 WEATHERED LIMESTONE

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SECTION 233300 - DUCTWORK ACCESSORIES

PART 1 – GENERAL (Reference Section 230500)

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 Specification Sections, apply to work of this section.

PART 2 – PRODUCTS

2.1 SHEET METAL SPECIALTIES

A. Specialties shall be factory fabricated items designed for low, medium or high velocity systems as required. Submit shop drawings on all specialties required with shop drawings of ductwork layout. Specialties shall be as follows:

1. Turning Vanes: Provide single width turning vanes with min. 24 gauge blades and runners. Note: Turning vanes to be provided on all low velocity supply, return and exhaust ducts.
2. Extractors (Low Velocity): Carnes #1250 all aluminum air volume extractor. Unit shall be adjustable from full open to full closed position. Provide channel supports where recommended by manufacturer (length over 16", height over 8"). Provide Young end bearings and rod with regulator as hereinafter specified.
3. Dampers: Provide 24 gauge minimum galvanized metal blades supported on duct with metal supports and locked in position with locking type damper arm.
4. Backdraft Dampers: Unless backdraft dampers are specified with a particular piece of equipment. Provide Cesco #BDA or equal with 16 gauge aluminum blade with oiled bearings mounted in steel frame. Blades shall be balanced and connected with tie bar. Provide end seals and blade seals. Equivalent by Ruskin.
5. Backdraft dampers: Where backdraft dampers are shown on plans installed behind wall louvers or roof relief vents, provide Cesco #BDA-101-H heavy-duty construction counter balanced to assist air flow complete with end seals and blade seals.
6. Flexible Connections: Metaledge Ventglas prefabricated flexible connection of 3-1/4" wide heat and fire resistant neoprene coated glass fabric with two 3" wide 24 gauge metal strips attached to each edge. Vent Fabrics, Inc., Duro-dyne Corp. or equal.
7. Access Doors: Provide access doors in ductwork ceiling, walls, or floors for access to ductwork valves, controls, piping etc., installed under this contract. Doors and frame shall be formed of not lighter than USS #14 gauge and #16 gauge steel, respectively. Hinges shall be concealed loose pin spring type. Locks shall be flush, screwdriver, cam action type. Doors and frames shall be furnished in prime coat of Higgins, Milcor, Donley or equal.
8. Round take-off fittings: Round take-off fittings from supply diffusers or registers to low pressure supply ductwork shall be Flexmaster #FLDE complete with locking damper and air scoop. Equivalent by Atco, Air Control Products.
9. Wall Louvers: Provide Carnes #FFLA fabricated steelwall louvers with extended sill and birdscreen where shown on drawings. Verify size shown with architectural drawings to comply with opening sizes required. All louvers are to be one continuous, louver of sizes shown with no mullions or reinforcing strips showing from outside face of louver. Provide louvers in prime coat of paint. Blades shall be a min. 16 gauge. Frame shall be min. 14 gauge. Equivalent by Carnes, Louvers and Dampers, Titus, Greenheck.
10. Fire Dampers: Prefco 'LPB' low profile 1 1/2 hr rated. Stacked blade design for minimum reduction of cross sectional area of penetrations and ducts. 165 degree fusible link. Equivalent by Nailor, Greenheck, Ruskin, Air Balance.

11. Low Pressure Flexible Duct: Thermaflex M-KC rated for 2" W.G. maximum positive and 2" W.G. maximum negative pressure and 2500 FPM maximum velocity. UL listed "UL-181 Standards Class I Duct Material" complying with NFPA Standards 90A and 90B. Duct shall be composed of inner polymeric linner duct bonded to coated steel wire helix. Fiberglass insulation and outer vapor barrier cover suitable for installation in return air plenum. Equivalent by Cleavaflex, Flexmaster.
12. Roof Ventilators: Provide low silhouette ventilators constructed from galvanized steel where located on plans. Ventilator shall be equipped with enlarged hood for protection against water entrainment, PVC coated birdscreen. Unit shall have continuously welded curb cap seams. Provide unit with prime coat finish. Unit shall be field painted by G/C. Refer to schedule on plans. Equivalent by Penn, Greenheck, Titus.

PART 3 – EXECUTION

3.1 INSTALLATION

A. All ductwork accessories shall be installed in strict accordance with manufacturers requirements SMACNA, NFPA 90A and 90B, UL listings and drawing details.

END OF SECTION 233300

SECTION 233416 – INLINE HVAC FANS

PART 1 - GENERAL (Reference Section 15010)

1.1 GENERAL REQUIREMENTS

A. Provide where shown on plans exhaust fans as hereinafter specified. Reference the exhaust fan schedule on plans.

B. Equivalent by Carnes, Cook, Greenheck, Penn, ACME, Powerline, JennAire.

PART 2 - PRODUCTS

2.1 INLINE EXHAUST FANS

A. Exhaust fans shall be inline belt driven type. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure.

B. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators, out of the airstream.

C. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants.

D. Motors shall be readily accessible for maintenance and a means of inspecting, cleaning and servicing the exhaust fan.

E. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.

F. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings.

G. Bearings shall be selected for a minimum of 150% of driven horsepower.

H. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.

I. Motor pulleys shall be adjustable for final system balancing.

J. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment.

L. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance.

M. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Reference mechanical drawings for installation.

END OF SECTION 233416

SECTION 233713 – DIFFUSERS, REGISTERS, GRILLES, AND LOUVERS

PART 1 – GENERAL (Reference Section 230500)

1.1 GENERAL REQUIREMENTS

A. Provide grilles, registers, and diffusers where scheduled on Drawings.

B. Provide submittals of diffusers and grilles used on this project as specified in Section 230500.

PART 2 – PRODUCTS

2.1 GRILLES, REGISTERS, DIFFUSERS, AND LOUVERS

A. Provide grilles, registers, diffusers, and louvers as shown on the Drawings and hereinafter specified. Set all units with rubber gaskets for air tight connection with mounting surface. See drawings for types, sizes, air flow and quantity.

B. Refer to drawings for manufacturer and model for each type that was the basis of design. Provide equipment that meets the sound, pressure drop, and throw characteristics.

C. Equivalent louvers by Greenheck, Louvers and Dampers.

PART 3 – EXECUTION

3.1 GENERAL

A. Install all louvers with curve of louver down.

B. Provide proper mounting supplies and arrangements for areas shown.

END OF SECTION 233713

SECTION 238500 - ELECTRICAL REQUIREMENTS

PART 1 - GENERAL (Reference Section 15010)

1.1 ELECTRICAL REQUIREMENTS

A. Consult Division 26 of specifications for work to be provided by E/C in conjunction with installation of mechanical equipment.

B. The cost of larger wiring, conduit, control and protective devices resulting from installation of equipment which was not used for basis of design shall be paid for by M/C at no cost to Owner or Engineer.

C. M/C shall be responsible for providing supervision to E/C to insure that required connections, interlocking and interconnection of mechanical and electrical equipment are made to attain intended control sequences and system operation.

D. Furnish six complete sets of electrical wiring diagrams to Engineer and three complete sets to E/C. Diagrams shall show factory and field wiring of components and controls. Control devices and field wiring to be provided by E/C shall be clearly indicated by notation and drawing symbols on wiring diagrams.

E. M/C shall obtain complete electrical data on mechanical shop drawings and shall list this data on an approved form which shall be presented on request to A/E. Data shall be complete with wiring diagrams received to date and shall contain necessary data on electrical components of mechanical equipment such as HP, voltage, amperes, watts, locked rotor current to allow E/C to order electrical equipment required in the contract.

F. Safety disconnect switches and manual and magnetic motor starters shall be provided by E/C. Exceptions will be allowed where mechanical equipment is provided with these devices installed as part of factory built control systems.

1.2 ELECTRIC MOTORS 1/3 HP AND SMALLER

A. Motors 1/3 horsepower and smaller shall be Century, General Electric or Westinghouse of type and NEMA frame selected by manufacturer of driven equipment with motor speed and torque characteristics best suited for application.

B. Motors shall have a minimum service factor of 1.15 for open dripproof enclosure and 1.00 for totally enclosed motors.

C. Wherever applicable provide motors with cushion bases. Motor enclosure shall be proper type required for operating environment.

D. Motors shall have a plus or minus 10% voltage tolerance and plus or minus 5% frequency tolerance. Motors shall operate satisfactorily in ambient temperature range of 9 degree C (32 degrees F) to 40 degrees C (104 degrees F) at altitudes below 3300 feet.

E. Provide motors with built-in thermal overload protection. Motors readily accessible to operating personnel shall have manual reset protector. All others shall have automatic reset protectors.

F. Motors shall have AFBMA standard double-shielded ball bearings sized for average life of at least 100,000 hours under normal loading conditions. Bearings housing shall have provisions for adding new lubricant without major motor disassembly and shall have seals to prevent entrance of foreign matter and leakage of bearing lubricant.

G. Motor bolts, screws and other external hardware shall be treated with a corrosion resistant plating and motor enclosure prime painted with corrosion resistant metal primer finished with a durable machinery enamel.

H. Unless indicate otherwise motors shall be rated for continuous operation at 115, 200 or 460 volts single phase, 60 hertz. Where equipment manufacturer offers a choice provide permanent split capacitor motors in lieu of

shade pole motors.

I. Motor leads shall be marked throughout entire length for easy identification and terminated with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.

1.3 ELECTRIC MOTORS (1/2 HP AND LARGER)

A. Provide equipment requiring electric motors with NEMA Standard motors manufactured by Allis Chalmers, Century, General Electric or Westinghouse. Shop drawings submitted on equipment provided with electric motors shall include motor manufacturer, horsepower, voltage, full load amperes, NEMA design type, insulation class, shaft bearing type, mounting base type, and enclosure type. To greatest extent possible motors for this project shall be by one manufacturer.

B. Motors shall conform to current NEMA Standard MG1. Motor shall operate successfully without derating under the following conditions:

1. 40 degrees C (104^{o}F) maximum ambient temperature.
2. 3,300 ft. maximum altitude.
3. Voltage variations of plus or minus 10% of nameplate rating.
4. Frequency variations of plus or minus 5% of nameplate rating.
5. Combined voltage and frequency variation of plus or minus 15% total as long as frequency does not exceed plus or minus 5%.

C. Motors shall meet or exceed locked rotor (starting) and breakdown (maximum torques specified) for the NEMA design rating. Lock rotor currents shall not exceed NEMA maximum values for motor NEMA design rating.

D. Unless indicated otherwise motor insulation may be manufacturers standard for Class A, B or F provided that maximum permissible temperature for insulation is not exceeded when motor is operating at its service factor load in at 40 degree C (104^{o}F) ambient.

E. Motor service factors shall be 1.15 for open dripproof motors and 1.00 for totally enclosed motors.

F. Motor frame/HP relationship shall conform to current NEMA standard for "T" frames. Motors shall have antifriction ball or roller bearings sized for average life of at least 100,000 hours under normal V-belt loading conditions. Bearings shall be AFBMA Standard end shield mounted ball bearings of ample capacity for motor rating. Bearing housing shall have provisions for adding new lubricant and draining out old lubricant without major motor disassembly. Bearing housing shall have seals to protect bearing from entrance of foreign matter and to prevent leakage of bearing lubricant.

G. Conduit box mounting shall rotate to allow conduit entrance from top, bottom or either side. Conduit holes shall conform to NEC Standards.

H. Motor leads shall have same insulation class as motor windings. Leads shall be marked throughout entire length for easy identification and terminated with brass or copper terminal lugs. Motor shall have permanently attached nameplate with electrical characteristics and wiring connection diagram.

I. Motor bolts, screws and other external hardware shall be treated with a corrosion resistant plating. Motor enclosure shall be prime painted with corrosion resisting metal primer and finished with a durable machinery enamel.

J. Unless indicated otherwise motors 1/2 horsepower and larger shall be rated for continuous operation at 200, 230/460, or 555 volts three phase, 60 hertz. Motors shall be T-frame squirrel cage induction. Type NEMA design B with Class B insulation. Motors shall be dripproof, totally enclosed or explosionproof as required by motor environment.

END OF SECTION 238500

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 CONTRACT DOCUMENTS

A. All contract documents including drawings, alternates, addenda and modifications preceding this division of this specification are applicable to contractors, subcontractors, and material suppliers.

1.2 SPECIFICATION FORM AND DEFINITION

A. These Specifications are abbreviated form and contain incomplete sentences. Omissions of words or phrases such as "the Contractor shall", "shall be", "as noted on the drawings", "according to the drawings", "a", "an", "the" and "all" are intentional. Omitted words and phrases shall be supplied by inference.

B. Engineer, wherever used in these specifications shall mean LATIMER, SOMMERS & ASSOCIATES, P.A., 3639 SW SUMMERFIELD DRIVE, SUITE A, TOPEKA, KANSAS 66614, 785-233-3232, FAX 785-233-0647.

C. Contractor, wherever used in these specifications, shall mean the Company that enters into contract with Owner to perform this work.

D. When a word, such as "proper", "satisfactory" and "as directed" is used, it required Engineer's review.

E. "Provide" means furnish and install.

F. Engineer hereinafter abbreviated ENGINEER shall mean both the Design Engineers and the Design Engineers.

G. Equipment and/or materials manufacturer hereinafter abbreviated E/M shall mean the manufacturer of equipment or materials specified or referred to.

H. When the term “equivalent” is used in context to products or manufacturer’s, the equivalency of the proposed product or manufacturer to be used in lieu of the specified product or manufacturer is the sole decision of the ENGINEER.

1.3 QUALIFICATIONS

A. The contractor responsible for work under this section shall have completed a job of similar scope and magnitude within the last 3 years. The contractor shall employ an experienced, competent and adequate work force licensed in their specific trade and properly supervised at all times. Unlicensed workers and general laborers shall be adequately supervised to insure competent and quality work and workmanship required by this contract and all other regulations, codes and practices. At all times the contractor shall comply with all applicable local, state and federal guidelines, practices and regulations. Contractor may be required to submit a statement of qualifications upon request before any final approval and selection. Failure to be able to comply with these requirements is suitable reason for rejection of a bid.

1.4 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered basis for granting additional compensation.

1.5 CONTRACT CHANGES

A. Changes or deviations from contract, including those for extra or additional work must be submitted in writing for review of Engineer. No verbal orders will be recognized.

1.6 LOCATIONS AND INTERFERENCES

A. Locations of equipment, conduit and other electrical work are indicated diagrammatically by electrical drawings. Layout work from dimensions on Engineerural and Structural Drawings. Verify equipment size from manufacturers shop drawings.

B. Study and become familiar with contract drawings of trades and in particular general construction drawings and details in order to obtain necessary information for figuring installation. Cooperate with other workmen and install work in such a way to avoid interference with their Work. Minor deviations, not affecting design characteristics, performance or space limitation may be permitted if reviewed prior to installation by ENGINEER.

C. Should the requirements of work or systems installed by other trades require specific placement of conduit, apparatus, appliances or other electrical item, these requirements shall be adhered to. Should these requirements result in major deviations in placement from that indicated on the plans or specifications, the condition shall be reviewed by ENGINEER prior to the placement of the work.

D. Any conduit, apparatus, appliance or other electrical item interfering with proper placement of other work as indicated on drawings, specified, or required, shall be removed and if so shown relocated and reconnected without extra cost. Damage to other Work caused by this contractor, subcontractor, workers or any cause whatsoever, shall be restored as specified for new work.

E. Do not scale electrical drawings for dimensions. Accurately layout work from dimensions indicated on Engineerural drawings unless such be found in error.

F. Report any conflict stated above to supervisor for coordination.

1.7 PERFORMANCE

A. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification division.

1.8 TEMPORARY UTILITIES

A. Contractor shall provide temporary utilities as indicated in Section 015000 during construction.

1.9 WARRANTY

A. The electrical systems are to be warranted to Owner and Engineer the quality of materials, equipment, workmanship and operation of equipment provided under this specification division for a period of one year from acceptance of electrical systems by Owner.

B. Contractor warrants to Owner and Engineer that on receipt of notice from either of them within one year of warranty period following date of acceptance all defects that have appeared in materials and/or workmanship, shall be promptly corrected to condition required by contract documents at contractor expense.

C. The warranty above expressed shall not supersede any separately stated warranty or requirements required by law or by these specifications.

1.10 ALTERNATES

A. Refer to General Requirements and description for alternate bid items if applicable.

PART 2 – PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SUBSTITUTIONS

A. The intent of these specifications is to allow ample opportunity for Contractor to use ingenuity and ability to perform the work to his and Owner's best advantage, and to permit maximum competition in bidding on standards of materials and equipment required.

B. Material and equipment installed under this contract shall be first class quality, new, unused and without damage unless noted otherwise on plans.

C. In general, these specifications identify required materials and equipment by naming first the manufacturer whose product was used as the basis for the project design and specifications. The manufacturer's product, series, model, catalog and/or identification numbers shall set quality and capacity requirements for comparing the equivalency of other manufacturer's products. Where other manufacturer's names are listed they are considered an approved manufacturer for the product specified, however; the listing of their names implies no prior approval of any product they may propose to furnish as equivalent to the first named product unless specific model or catalog numbers are listed in these specifications or in subsequent addenda. Where other than first named products are used for base bid proposal it shall be the responsibility of the Contractor to determine prior to bid time that the proposed materials and equipment selections are products of approved manufacturers which meet or exceed the specifications and are acceptable to the Engineer.

D. Where materials or equipment are described but not named, provide required items of first quality, adequate in every respect for intended use. Such items shall be submitted to Engineer for review prior to procurement.

E. Prior to receipt of bids, if the Contractor wishes to incorporate products other than those named in the specifications or drawings they shall submit a request for approval of equivalency in writing to the ENGINEER no later than (10) ten calendar days prior to bid date. Engineer will review requests and acceptable items will be listed in an Addendum issued to principal bidders. Equivalents will ONLY be considered approved when listed by project addendum. Substitutions after this may be refused at Engineers option.

F. Materials and equipment proposed for substitution shall be equal to or superior to that specified in construction, efficiency, utility, aesthetic design, and color as determined by Engineer whose decision shall be final and without further recourse. Physical size of substitute brand shall be no larger than space provided including allowances for access for installation and maintenance. Requests must be accompanied by two (2) copies of complete descriptive and technical data including manufacturer's name, model and catalog number, photographs or cuts, physical dimensions, operating characteristics and any other information needed for comparison.

G. In proposing a substitution prior to receipt of bids, include in such bid all costs of altering other elements of the project, including such items as adjustments in mechanical/electrical service requirements necessary to accommodate such substitutions. In addition, all physical space and weight requirements requiring additional structural support, modifications to the base floor plans, equipment concrete pad/roof curb dimensions shall be incorporated as required into such bid to accommodate such substitutions.

H. Within ten (10) working days after bids are received, apparent low bidder shall submit to ENGINEER for approval three copies of a list of all major items of equipment he intends to provide. As soon as practicable and within ten (10) working days after award of contract, Contractor shall submit shop drawings for equipment and materials to be incorporated in work for Engineer's review. Where ten (10) working day limit is insufficient for preparation of detailed shop drawings on major equipment or assemblies, Contractor shall submit manufacturer's descriptive catalog data and indicate date such detailed shop drawings will be submitted along with manufacturer's certifications that order was placed within ten (10) working day limit.

PART 3 – EXECUTION

3.1 SHOP DRAWINGS

A. Contractor shall furnish a minimum of TEN (10) sets of shop drawings of all materials and equipment. Engineer will return 6 sets to the Contractor. A copy of fully processed product data submittal shall be included as a part of each operating and maintenance manual.

B. Where catalog cuts are submitted for review, conspicuously mark or provide schedule of equipment, capacities, controls, sizes, etc., that are to be provided. Mark each submitted item with applicable section and paragraph numbers of these specifications, or plan sheet number when item does not appear in specifications or specified equivalent, mark submittals with applicable alternate numbers, change order number or letters of authorization. Each submittal shall contain at least two sets of original catalog cuts. Each catalog sheet shall bear equipment manufacturer's name, address and phone number. All shop drawings on materials and equipment listed by UL shall indicate UL approval on submittal.

C. Contractor shall be required to submit all applicable equipment/material assembly mock-ups as required by the Contract Documents for Engineer approval. Contractor shall provide changes and resubmit mock-ups until Engineer is satisfied final product meets or exceeds stated specifications and quality of specified product.

D. Contractor shall check all shop drawings to verify that they meet specifications and/or drawing requirements before forwarding submittals to the Engineer for their review.

E. All shop drawings submitted to Engineer shall bear Contractor's approval stamp which shall indicate that Contractor has reviewed submittals and that they meet specification and drawing requirements. Contractor's submittal review shall specifically check for but not be limited to the following: equipment capacities, physical size in relation to space allowed, electrical characteristics, provisions for supply, and drainage connections to building systems. All shop drawings not meeting contractor's approval shall be returned to it's supplier for resubmittal.

F. No shop drawing submittals will be considered for review by the Engineer without Contractor's approval stamp, or that have extensive changes made on the original submittal as a result of contractor's review. All comments or minor notations on shop drawings shall be flagged to indicate originator of comment.

G. Engineer will not be responsible for or the cost of returning shop drawing submittals that are submitted to them without Contractor's review and approval stamp. A letter will be sent to Contractor by either the Engineer or Engineer indicating receipt of an improper submittal for pick-up by Contractor or supplier for 15 working days after date of receipt. If not picked up by the 16th working day, submittals not bearing Contractor's review and approval stamp will be disposed of by Engineer.

H. Engineer's review of shop drawings will not relieve Contractor of responsibility for deviations from drawings and specifications unless such deviations have been specifically approved in writing by Owner or the representative, nor shall it relieve Contractor of responsibility for error in shop drawings. No work shall be fabricated until ENGINEER's review has been obtained. Any time delay caused by correcting and resubmitting shop drawings will be Contractor's responsibility.

I. Furnish ¼" = 1'-0" scale fabrication drawings for review of ductwork and piping systems to coordinate all trades prior to fabrication. Drawings shall be furnished and approved in a timely manner to avoid construction delays. These drawings must be approved prior to the ordering, fabrication, or installation of ductwork and piping. Subcontractor shall submit one set of reproducible drawings and one set of blue line prints of piping and ductwork coordination drawings. Cost of drawing preparation, printing, and distribution shall be paid for by Subcontractor and included in its base bid.

3.2 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

A. Submit an outline copy of installation, operating, and maintenance manuals for review and comment.

B. Submit three copies of installation, operating, maintenance instructions, and parts lists for equipment provided. After receiving comments from outline review. Instructions shall be prepared by equipment manufacturer.

C. Keep in safe place, keys and wrenches furnished with equipment under this contract. Present to Owner and obtain receipt for same upon completion of project.

D. Prepare a complete notebook, covering systems and equipment provided and installed under this contract. Submit notebooks to Engineer for review before delivery to Owner. Contractor at his option may prepare this notebook or retain an individual to prepare it for him. Contractor shall include cost of this service in bid. Notebooks shall contain following:

1. Certified equipment drawings/or catalog data with equipment provided clearly marked as outlined under this specification.
2. Complete installation, operating, maintenance instructions and parts lists for each item of equipment.
3. A complete set of approved final shop drawings.
4. Special emergency operating instructions with a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to various parts of the systems installed.
5. As-Built Drawings: The Contractor shall mark up a set of contract documents during construction noting all changes and deviations including change orders. These will be delivered to ENGINEER at end of the project for review and correction as required. After the originals are changed to reflect the blue line set, a complete set of reproducible set of project record drawings drawn at the original scale indicated shall be included in the brochure.
6. All required warranties and guarantees, including start and end date of warranties/guarantees.

E. Provide notebooks bound in black vinyl three- ring binders with metal hinge. Reinforce binding edge of each sheet of looseleaf type brochure to prevent tearing from continued usage. Clearly print on label insert of each brochure:

1. Project name and address.
2. Section of work covered by brochure, i.e., Electrical.

3.3 CUTTING AND PATCHING

A. Contractor shall do cutting and patching of building materials required for installation of work herein specified. Cut no structural members without Engineer's approval and in a manner approved by him.

B. Patching shall be by mechanics of particular trade involved and shall meet approval of Engineer.

C. Drilling and cutting of openings through building materials requires Engineer's review and approval. Make openings in concrete with concrete hole saw or concrete drill. Use of star drill or air hammer for this work will not be permitted.

3.4 MUTILATION

A. Mutilation of building finishes or existing/new equipment, caused by demolition or installation of new work shall be repaired at Contractor's expense to approval of Engineer.

3.5 WALL PENETRATIONS

A. Include the installation of all boxes, access panels and sleeves for openings required to install the work. All floor and wall penetrations shall be sealed to meet fire rating requirements using materials tested in accordance with ASTM E814. Assume all walls are fire rated.

3.6 OPENINGS, ACCESS PANELS AND SLEEVES

A. Contractor shall provide all boxes, access panels and sleeves for openings required to install his work, except structural openings incorporated in the structural drawings. Sleeves shall be installed for all pipes passing through structural slabs and walls.

3.7 FIRE STOPPING

A. All holes or voids created by the mechanical Subcontractor to extend pipe through fire rated floors and walls and shall be sealed with an intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures of 250 degrees F. It shall be ICBO, BOCAI and SBCCI (NRB 243) approved ratings to 3 hours per ASTM E-814 (UL 1479). Acceptable Material: 3M Fire Barrier Caulk, putty, strip and sheet forms. Equivalent by SpecSeal.

B. Submit for review firestopping methods and sleeve drawings indicating all required application, methods and sleeves. Refer to engineering drawing for locations of fire rated partitions and floors.

C. All penetrations through walls shall be firestopped.

3.8 SETTING, ADJUSTMENT AND EQUIPMENT SUPPORTS

A. Work shall include mounting, alignment and adjustment of systems and equipment. Set all equipment level on adequate supports and provide proper anchor bolts and isolation as shown or specified. Equipment failures resulting from improper installation or field alignment shall be repaired or replaced by Contractor at no cost to Owner.

B. Provide each piece of equipment or apparatus suspended from ceiling or mounted above floor level with suitable structural support, platform or carrier in accordance with best recognized practice. Contractor shall arrange for attachment to building structure, unless otherwise indicated on drawings or as specified. Provide hangers with vibration eliminators where required. Contractor shall verify that structural members of building are adequate to support equipment. Submit details of hangers, platforms and supports together with total weights of mounted equipment to Engineer for review before proceeding with fabrication or installation.

3.9 START-UP, CHANGEOVER, TRAINING AND OPERATION CHECK

A. Contractor shall be responsible for training Owner's operating personnel to operate and maintain systems and equipment installed. Keep a record of training provided to Owner's personnel listing the date, subject covered, instructor's name, names of Owner's personnel attending and total hours of instruction given each individual.

B. All owner training sessions shall be orderly and well organized and shall be professionally recorded using digital format. Contractor shall produce a DVD of each training session and submit to Owner with original digital tape as part of the Operation and Maintenance Manual submittal.

3.10 PRE-FINAL AND FINAL CONSTRUCTION REVIEW

A. At Contractor’s request, Engineer will make pre-final construction review to determine if to the best of its knowledge project is completed in accordance with Contract Documents.

B. Items found by Engineer as not complete or not in accordance with requirements of contract will be outlined in report to Engineer for forwarding to Subcontractors. Subcontractor shall complete and/or correct these items, before notifying Engineer it is ready for final review.

C. All necessary system adjustments, including air systems balancing, shall be completed and all specified records and reports submitted in sufficient time to be received by Engineer at least ten working days prior to date of final construction review.

D. At final construction review, Contractors shall be present or shall be represented by a person of authority. Each shall demonstrate, as directed by Engineer that work complies with purpose and intent of contract documents and shall provide labor, services, instruments or tools necessary for such demonstrations and tests.

3.11 TESTS RECORDING AND REPORTING TESTS AND DATA

A. Record nameplate horsepower, amperes, volts, phase service factor and other necessary data on motors and other electrical equipment furnished and/or connected under this contract.

B. Record motor starter catalog number, size and rating and/or catalog number of thermal-overload units installed in all motor starters furnished and/or connected under this contract. See motor starter specification for instructions for proper sizing of thermal-overload units.

C. Record amperes-per0phase at normal or near-normal loading of each item of equipment furnished and/or connected.

D. Record correct readings of each feeder conductor after energized and normally loaded, and again after balancing of feeder loads as required by current readings.

E. Record voltage and ampere-per-phase readings taken at service entrance equipment after completion of project with building operating at normal electrical load.

F. Submit at least two (2) typewritten copies of data noted above to Engineer for review prior to final inspection.

G. Keep a record of all deviations made from routes, locations, circuiting, etc. shown on contract drawings. Prior to final inspection submit one new set of project drawings with all deviations and changes clearly indicated.

3.12 EXCAVATION AND BACKFILL

A. Perform necessary excavation to receive work. Provide necessary sheathing, shoring, cribbing, tarpaulins, etc. for this operation, and remove same at completion of work. Perform excavation in accordance with appropriate section of these specifications, and in compliance with OSHA Safety Standards.

1. Excavation:

a. Excavate trenches of sufficient width to allow ample working space, and no deeper than necessary for installation work.

b. Conduct excavations so no walls or footings are disturbed or injured. Backfill excavations made under or adjacent to footing with selected earth or sand and tamp to compaction required by ENGINEER. Mechanically tamp backfill under concrete and savings in 6” layers to 95% standard density, Reference Division 2.

2. Backfill:

a. Backfill trenches and excavations to required heights with allowance made for settlement. Tamp fill material thoroughly and moistened as required for specified compaction density. Dispose of excess earth, rubble and debris as directed by Engineer.

3. Soil Conditions:

a. When available, refer to test hole information on Engineerural drawings or specifications for types of soil to be encountered in excavations.

END OF SECTION 260500

SECTION 260501 - EXTENT OF CONTRACT WORK AND CODES

PART 1 - GENERAL (Reference Section 260500)

1.1 GENERAL EXTENT OF WORK INCLUDED IN CONTRACT

A. Provide electrical systems indicated on drawings, specified or reasonably implied. Provide every device and accessory necessary for proper operation and completion of electrical systems. In no case will claims for "Extra Work" be allowed for work about which Contractor could have been informed before bids were taken.

B. Contractor shall be familiar with all equipment provided which requires electrical connections and control. Follow circuiting shown on drawings for lighting, power and equipment connections.

C. Make required electrical connections to equipment provided under this project. Receive and install electric control devices requiring field installation, wiring, and service connection.

D. Check electrical data and wiring diagrams with project voltages, wiring, controls and protective devices shown on electrical drawings. Promptly bring discrepancies found to attention of Engineer for a decision.

1.2 CODES, ORDINANCES, RULES AND REGULATIONS

A. Provide work in accordance with applicable rules, codes, ordinances and regulations of Local, State, Federal Governments, and other authorities having lawful jurisdiction.

B. Conform to latest editions and supplements of following codes, standards or recommended practices.

SAFETY CODES:
National Electrical Safety Code Handbook H30 - National Bureau of Standards - 2005
Occupational Safety and Health Standard (OSHA) Department of Labor
Safety Code for Elevators ANSI A17.1
International Building Code - 2006

NATIONAL FIRE CODES:

NFPA No. 70	National Electrical Code 2005
NFPA No. 90A	Air Conditioning & Ventilation Systems
NFPA No. 91	Blower and Exhaust Systems
NFPA No. 101	Life Safety Code

UNDERWRITERS LABORATORIES INC.:
All materials, equipment and component parts of equipment shall bear UL labels whenever such devices are listed by UL.

MISCELLANEOUS CODES:
ANSI A117.1 - Handicapped Accessibility
Americans with Disabilities Act (ADA)

C. Drawings and specifications indicate minimum construction standard, should any work indicated be sub-standard to any ordinances, laws, codes, rules or regulations bearing on work, Contractor shall promptly notify Engineer in writing before proceeding with work so that necessary changes can be made. However, if Contractor proceeds with work knowing it to be contrary to any ordinances, laws, rules, and regulations he shall thereby have assumed full responsibility for and shall bear all costs required to correct non-complying work.

D. Contractor shall secure and pay for necessary permits and certificates of inspection required by governmental ordinances, laws, rules or regulations. Keep a written record of all permits and inspection certificates and submit two copies to Engineer with request for final review.

E. Contractor shall include in bid any charges by local utility providers to establish new services to the structure. Coordinate with the utility suppliers to verify exact which part of the work is to be performed by whom.

PART 2 - PRODUCTS

2.1 DRAWINGS

A. Drawings are to be considered diagrammatic for all systems. Conduit runs and circuiting do not show all required offsets and fittings. Contractor shall include in bid costs to provide systems which will avoid and coordinate with all other building trades and systems.

B. Contractor may not share neutrals for multiple circuits, unless specifically noted as such on the drawings.

C. Homeruns may be grouped together. Contractor shall be responsible for properly sizing conduits where homeruns are grouped together per requirements of the National Electric Code.

END OF SECTION 260501

SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL (Reference Section 260500)

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Unless noted otherwise conductors referred to are wires and cable. Provide code grade soft annealed copper conductors with specified insulation type in proper colors to conform with color coding specified. Provide conductors No. 8 gauge and larger stranded and conductors No. 10 gauge and smaller shall be solid.

B. Use no conductors smaller than No. 12 gauge unless specifically called for or approved by Engineer. Size wire for volt branch circuits for 3% maximum voltage drop. Size feeder circuits for 2% maximum voltage drop. Combined voltage drop of feeders and branch circuits shall not exceed 5% maximum.

C. Provide conductors for listed applications as follows:

1. Lighting and Receptacle Circuits: Type THWN, or THWN/THHN 600 volt, 75 degrees C (167^{o}F) thermoplastic insulated building conductor or better.
2. Lighting and Receptacles Circuits with No. 8 or larger conductors, motor circuits, power and feeder circuits and building service feeders: Type THHN/THWN 600 volts, 75 degrees C (167^{o}F) thermoplastic insulated building conductor.

D. Provide conductors by Essex, Capitol Southwire Rome, Senator or equivalent.

PART 3 - EXECUTION

3.1 CONDUCTOR INSTALLATION

A. Run conductors in conduit continuous between outlets and junction boxes with no splices or taps pulled into conduits.

B. Neatly route, tie and support conductors terminating at switchboards, motor control centers, panelboards, sound equipment, etc., with Thomas & Betts Ty-Rap cable ties and clamps or equivalent by Electrovert or Panduit.

C. Make circuit conductor splices with appropriately sized “wire nuts” Buchanan crimped-on solderless connectors and snap-on nylon insulators or equivalent.

D. Terminate solid conductors at equipment terminal strips and other similar terminal points with insulated solderless terminal connectors. Terminate all stranded conductor terminal points with insulated solderless terminal connectors. Provide Thomas & Betts Sta-Kon insulated terminals and connectors or equivalent by API/AMP, Blackburn, Buchanan or Scotchlok "Wire Nuts".

E. Where a total of six or more control and feeder conductors terminate in a multiple device panel or enclosure that has no built-in terminal blocks provide Buchanan 600 volt heavy duty Type HO sectional terminal blocks with mounting channel and No. 23 see-thru covers. Equivalent terminal blocks by General Electric, Square D or Westinghouse.

F. Wrap conductor taps and connections requiring additional insulation with a minimum of three overlapped layers of 3M scotch vinyl plastic electrical type No. 88 or equivalent.

3.2 CONDUCTOR COLOR CODING

A. Refer to 260553 "Identification for Electrical Systems."

3.3 CIRCUITING

A. Refer to 260553 "Identification for Electrical Systems."

3.4 FIRE BARRIER

A. Provide sleeves through all fire-rated walls and fill voids surrounding sleeves and interior to sleeves around cables with Nelson "Flameseal" fire stop putty with U.L. listed 3 hour rating installed as per manufacturers recommendations.

B. Equivalent by Dow, Chemelex, 3M.

END OF SECTION 260519

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (Reference Section 260500)

1.1 GENERAL REQUIREMENTS

A. Supplement grounded neutral of secondary distribution system with equipment grounding system, installed so that metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items operate continuously at ground potential and provide low impedance path for ground fault currents.

B. System shall comply with National Electrical Code.

PART 2 - PRODUCTS

2.1 GROUNDING CONNECTIONS

A. Equipment grounding conductors for branch circuit home runs shown on the drawings shall indicate an individual and separate ground conductor for that branch circuit which shall be terminated at the branch circuit panelboard, switchboard, or other distribution equipment. No sharing of equipment grounding conductors sized according to the size of the overcurrent device and NEC Table 250.122 shall be allowed.

B. Required equipment grounding conductors and straps shall be sized in compliance with N.E.C. Table 250.122. Equipment grounding conductors shall be provided with green type TW 600 volt insulation. Related feeder and branch circuit grounding conductors shall be connected to ground bus with approved pressure connectors. Provide feeder servicing several panelboards with a continuous grounding conductor connected to each related panelboard ground bus. Installation shall include necessary precautions regarding terminations with dissimilar metals.

C. Provide low voltage distribution system with a separate green insulated equipment grounding conductor for each raceway containing single or three-phase feeder. Single phase 120 volt branch circuits for lighting and power shall consist of phase and neutral conductors and a green ground conductor installed in common metallic conduit which shall serve as grounding conductor. Provide flexible metallic conduit utilized in conjunction with above single phase branch circuits with suitable green insulated grounding conductors connected to approved grounding terminals at each end of flexible conduit. Single phase branch circuit installed in nonmetallic conduits shall be provided with separate grounding conductor. Install grounding conductor in common conduit with related phase and/or neutral conductors.

D. Where parallel feeders are installed in more than one raceway, each raceway shall have a green insulated equipment grounding conductor.

E. Contractor shall determine number and size of pressure connectors to be provided on equipment grounding bars for termination of equipment grounding conductors in panelboards and other electrical equipment. In addition to active circuits, provide pressure connectors for panel spares and blank spaces.

F. Provide electrical expansion fitting with an external flexible copper ground securely bonded by approved grounding straps on each end of fitting except where UL approved built-in copper grounding device is provided.

G. Provide steel and aluminum conduits which terminate without mechanical connection to metallic housing of electrical equipment with ground bushing and connect each bushing with bare copper conductor to ground bus in electrical equipment. Electrically non-continuous metallic conduits containing ground wiring only shall be bonded to ground wire at both conduit entrance and exit.

H. Provide grounding bushings on all feeder conduits. Bond grounding bushing to ground bus in respective panelboard.

I. Grounding conductors shall be as shown on plans or if not specifically shown shall be no smaller than that required by the NEC.

END OF SECTION 260526

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (Reference Section 260500)

PART 2 - PRODUCTS

2.1 INSERTS, HANGERS

A. Support vertical and horizontal conduit runs at intervals not greater than 10 feet, within 3 feet of any bend and at every outlet or junction box

B. Install multiple runs of conduits as follows:

1. Where a number of conduits are to be run exposed and parallel, group and support with trapeze hangers.
2. Fasten hanger rods to structural steel members with suitable beam clamps and to concrete structures with inserts set flush with surface. Install concrete inserts with reinforced rod through opening provided in inserts.
3. Inserts shall be Grinnell figure 279, 281, 282, or 285 or equivalent as required by load and concrete thickness.
4. Provide beam clamps suitable for structural members and conditions.
5. Provide 3/8" minimum diameter steel hangers rods galvanized or cadmium plated finish.
6. Trapeze hangers shall be Kindorf Series 900 channel with fittings and accessories as required.
7. Attach each conduit to trapeze hanger with Steel City No. C-105 clamps for rigid conduit and Steel City No. C-106 clamps for electrical metallic tubing. (EMT).

C. Install clamps for single conduit runs as follows:

1. Support individual runs by approved pipe straps, secured by toggle bolts on hollow masonry; expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; and wood screws on wood construction. Use of perforated strap not permitted.
2. Install exposed conduits in damp locations with clamp backs under each conduit clamp to prevent accumulation of moisture around conduits.
3. Provide inserts, hangers and accessories with finish as follows:

a. Galvanized: Concrete inserts and pipe straps.
b. Galvanized or Cadmium Plated: Steel bolts, nuts, washers and screws.
c. Painted with Prime Coat: Individual hangers, trapeze hangers and rods.

D. Equivalent hangers and support systems by Binkley, Fee and Mason, Kin-Line or Unistrut.

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 260529.

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (Reference Section 260500)

PART 2 - PRODUCTS

2.1 STEEL CONDUIT

A. Galvanized rigid steel conduit: Conduit shall be hot dipped galvanized and shall bear a UL label. Conduit shall also meet Federal Specification W-WC-581 and ANSI C80.1.

B. EMT Conduit: Conduit shall be galvanized steel electrical metallic tubing and bear and Underwriters' Laboratory label. Conduit shall conform to Federal Specification WWC-563 and ANSI specification C80.3.

C. Contractor may use either rigid steel or EMT for all above grade main feeder circuits to switchboards and panelboards unless specifically indicated on plans.

D. Outside and Wet Location Flexible Conduit: Flexible conduit shall have a water resistant non-sleeving polyvinyl chloride jacket with a general temperature range of -40 degrees C to + 60 degrees C. Conduit shall bear a UL label.

E. MC Flexible Conduit: 3/8" may only be used from JB to lighting fixture as per NEC 330. A ground wire shall be run in the conduit assembly.

F. Flexible metal conduit Type FMC: Flexible metal conduit shall be used for final connection to interior motors or equipment where vibration may be encountered. A maximum length of 6'-0" shall be used. A grounding conductor shall be installed in all conduits to include Flexible metallic conduit. Transition from either EMT conduit or GRS conduit to flexible metal conduit shall be made by use of a junction box. Flexible metalic conduit shall be installed as indicated in NEL Article 348.

G. Liquid tight flexible metal conduit Type LFMC: Liquid tight flexible metal conduit shall be used for final connection to exterior motors or equipment where vibration may be encountered. A maximum length of 6'-0" shall be used. A grounding conductor shall be installed in all conduits to include liquid tight flexible metal conduit. Transition from either EMT conduit or GRS conduit to liquid tight flexible metal conduit shall be made by use of a NEMA 3R junction box. Liquid tight flexible metal conduit shall be installed as indicated in NEC Article 350.

2.2 CONDUIT FITTINGS

A. Rigid Steel Conduit: Couplings shall be steel threaded type and box connectors shall be steel insulated bushings and malleable iron or steel locknuts. Unilets shall be malleable iron with blank cover.

B. EMT Conduit: Couplings and box connectors shall be die cast set screw type. Unilets shall be malleable iron with blank cover.

C. Flexible Conduit: Connectors shall be threaded type iron with insulated throat.

D. Where conduits cross building expansion joints provide O-Z expansion fittings type "AX", "TE", "EX", or "EXE" as required.

E. Provide grounding bushings where feeder conduit attaches to panelboard backbox. Bond grounding bushing to ground bus.

2.3 CONDUIT INSTALLATION

A. Align conduit terminations at panelboards, switchboards, motor control equipment, junction boxes, etc. and install true and plumb. Provide supports or templates to hold conduit alignment during rough-in stage of work.

B. Install conduit continuous between outlet boxes, cabinets and equipment. Make bends smooth and even without flattening or flaking conduit. Radius of bends shall not be shorter than radius listed table 346-10 (b) of NEC. Long radius elbows may be used where necessary.

C. Ream and clean conduit before installation and plug or cover openings and boxes to keep conduit clean during construction.

D. Install no conduits or other raceways sized smaller than permitted in applicable NEC Tables. Where conduit sizes shown on drawings are smaller than permitted by code, Contractor shall include cost for proper size conduit in his base bid. In no case reduce conduit sizes indicated on drawings or specified without written approval of Engineer. Fasten conduit securely in place with approved straps, hangers, and steel supports. Provide O-Z cable support to support conductors in vertical raceways as required by NEC Table 300-19 (a) of NEC.

E. Low voltage wiring including fire alarm, telephone, television, computer cabling and other low voltage wiring shall be installed in conduit unless noted otherwise.

2.4 INSERTS, HANGERS

A. Support vertical and horizontal conduit runs at intervals not greater than 10 feet, within 3 feet of any bend and at every outlet or junction box

B. Install multiple runs of conduits as follows:

1. Where a number of conduits are to be run exposed and parallel, group and support with trapeze hangers.
2. Fasten hanger rods to structural steel members with suitable beam clamps and to concrete structures with inserts set flush with surface. Install concrete inserts with reinforced rod through opening provided in inserts.
3. Inserts shall be Grinnell figure 279, 281, 282, or 285 or equivalent as required by load and concrete thickness.
4. Provide beam clamps suitable for structural members and conditions.
5. Provide 3/8" minimum diameter steel hangers rods galvanized or cadmium plated finish.
6. Trapeze hangers shall be Kindorf Series 900 channel with fittings and accessories as required.
7. Attach each conduit to trapeze hanger with Steel City No. C-105 clamps for rigid conduit and Steel City No. C-106 clamps for electrical metallic tubing. (EMT).

C. Install clamps for single conduit runs as follows:

1. Support individual runs by approved pipe straps, secured by toggle bolts on hollow masonry; expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; and wood screws on wood construction. Use of perforated strap not permitted.
2. Install exposed conduits in damp locations with clamp backs under each conduit clamp to prevent accumulation of moisture around conduits.
3. Provide inserts, hangers and accessories with finish as follows:

a. Galvanized: Concrete inserts and pipe straps.
b. Galvanized or Cadmium Plated: Steel bolts, nuts, washers and screws.

c. Painted with Prime Coat: Individual hangers, trapeze hangers and rods.

D. Equivalent hangers and support systems by Binkley, Fee and Mason, Kin-Line or Unistrut.

2.5 BUSHINGS AND LOCKNUTS

A. Enter outlet boxes squarely and securely clamp conduit to outlet box with bushing on inside and locknut on outside.

2.6 SLEEVES

A. Provide proper type and size sleeves to General Contractor for electrical ducts, busses, conduits, etc. passing through building construction. Supervise installation to insure proper sleeve location. Unless indicated or approved install no sleeves in structural members.

B. Provide cast iron sleeves extending 1 inch above finished floor where sleeves pass through floors subject to flooding such as toilet rooms, bathrooms, equipment rooms and kitchen. Seal opening between pipe and sleeve with Thunderline Corp. Link Seal.

C. Unless specified otherwise provide 18 gauge galvanized sheet metal sleeves through floors and non-bearing walls. Where piping passes through exterior walls, equipment room walls, air plenum walls and walls between areas that must be isolated from occupied areas, seal space between sleeves and piping, air or water tight are required with Thunderline Corp. Link Seal.

D. Provide O-Z Electrical Manufacturing Co., Inc. Type "FSK" or "WSK" or equivalent thruwall and floor seals where conduits pass through concrete foundation walls below grade.

E. Provide Zurn Z-195 or equivalent flashing sleeve through walls and floors with waterproof membrane. Seal annular space between conduit and sleeve with Thunderline Link Seal or O-Z type CSM sealing bushing.

F. All holes or voids created by the electrical contractor to extend pipe through fire rated floors and walls shall be sealed with an intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures of 250 degrees F. It shall have ICBO, BOCAI and SBCCI (NRB 243) approved ratings to 3 hours per ASTM E-814 (UL 1479). Acceptable Material: 3M Fire Barrier Caulk, Putty, Strip and sheet forms.

2.7 OUTLET BOXES

A. Provide electrical service outlets, including plug receptacles, lamp receptacles, lighting fixtures and switches with Steel City, Raco, or equivalent four inch code gauge steel knockout boxes galvanized or sheradized of required depth for service or device.

B. Provide code gauge galvanized steel raised covers on outlet boxes installed in plaster finish. Set to plaster grounds with outside edge of cover flush with plaster finish.

C. Provide 3/8" or larger fixture stud in each outlet box scheduled to receive lighting fixture. Select covers with proper opening for device installed in outlet box.

D. Use of utility of "Handy" boxes acceptable only where single gang flush outlet box in masonry is "dead-end" with only one conduit entering box from end or back.

E. Use no sectional outlet boxes.

F. Provide Appleton FS or FD unilets for surface mounted exterior work. Provide complete with proper device cover and gasket. Provide blank cover and gasket when used as junction box.

G. Floor Box Schedule refer to plans for requirements of floor boxes to be installed as a part of this project.

2.8 LOCATION OF OUTLET BOXES

A. Locate outlet boxes generally from column centers and finished wall lines. Install ceiling outlet boxes at suspended ceiling elevations.

B. Accurately locate lighting fixtures and appliance outlet boxes mounted in concrete or in plaster finish on concrete. Install outlet boxes in forms to dimensions taken from bench marks, columns, walls, or floors. Rough-in lighting fixtures and appliance outlet boxes to general locations before installation of walls and furring and reset to exact dimensions as walls and furring are constructed. Set outlet boxes true to horizontal and vertical finish lines of building.

C. Install outlet boxes accessible. Provide outlet boxes above piping or ductwork with extension stems or offsets as required to clear piping and ductwork.

D. Install bottom of switch outlet boxes 48" above floor unless otherwise called for or required by wainscot, counter, etc. Install bottom of receptacle outlet boxes 16" above floor unless otherwise called for on drawings. Adjust mounting heights to nearest masonry joint for minimum cutting in case of flush outlets.

2.9 PULL BOXES, WIREWAYS AND GUTTERS

A. Provide Alwalt, Keystone, Universal or equivalent code gauge pull boxes, wireways, and gutters indicated or required for installation, sized to conform with NEC rules. Provide complete with necessary fittings, interconnecting nipples, insulating bushings, conductor supports, covers, gaskets, partitions, etc. as required.

B. Special items may be fabricated locally, to same general design and specifications as those listed in specified manufacturer's catalogs. Provide free of burrs, sharp edges, unreamed holes, sharp pointed screws or bolts, and finished with one coat of suitable enamel inside and out, prior to mounting.

C. Provide sectional covers for easy removal.

END OF SECTION 260533

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (Reference Section 260500)

1.1 IDENTIFICATION OF WIRING AND EQUIPMENT

A. Provide identification and warning signs to wiring and equipment as listed in schedule. Signs and tags shall be as follows:

TYPE 1: Laminated phenolic plastic with black Gothic condensed lettering by Seton or Wilco.
TYPE 2: Self-sticking ½" wide plastic tape with high gloss surface and embossed lettering by Brady or Dymo.
TYPE 3: Self-sticking flexible vinyl with oil resistant adhesive for -20 degrees to 300 degrees F. temperatures by Brady or as approved.

B. Provide lighting and power panelboards with Type 1 sign minimum of 1-1/4" x 6" indicating panel designation and electrical characteristics. Mount inside of panel door on circuit breaker trim flange just below breakers.

C. Provide disconnect switches/motor starters with Type 1 sign 3/4" x 5" indicating equipment served and Brady No. AE-46125 danger sign.

D. Provide feeders and branch circuit home runs with Type 3 wire marker indicating circuit number and power source. Provide feeders phase identification letter at each terminal point in addition to its circuit number. Provide label designating area and room number(s) served on inside of panelboard door for each circuit used.

E. Provide Type 2 tape at feeder terminal lugs to switchboards and panelboards. Tape shall indicate conduit size, conductor type and AWG size. Tape shall be located to be easily read with conductors installed.

F. All wires for branch circuit work shall be color coded as follows:

1. Provide continuous color coding for feeder, branch and control circuits. Insulation or identification tape color shall be same color for like circuits throughout. Where specified insulation colors are not available in larger wire sizes color code conductor at all accessible location with Scotch 35 all-weather color code tape.
2. Identify the same phase conductor with same color throughout.
3. Provide conductors with color coding in accordance with NEC. Where more than one standard voltage system is installed, provide same colored conductors with indicated tape or stripe to indicate system voltage.

Phase	208/120	480/277
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
NEUTRAL	WHITE	WHITE
GROUND	GREEN	GREEN

G. Use solid color coating for No. 6 and smaller branch circuit conductors and neutral conductors.

H. Only one neutral may be used for each circuit. When additional circuits occur in conduit run, additional neutrals shall be installed. Contractors shall provide conduit/conductor sizes as required by Code for listed quantities of conductors.

I. A grounding conductor is required in all feeder and branch circuit conduits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 260553

SECTION 262200 – DRY-TYPE TRANSFORMERS (600 V AND LESS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this Section.

C. System commissioning is a part of the construction process. Documentation and testing of systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Consultant. Final Completion is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Commissioning Specification Section 01810 for detailed commissioning requirements.

1.2 SUMMARY

A. This Section includes dry type transformers rated 600V and below.

B. Furnish and install single- and three-phase (Under 600 volts) dry type transformers as shown on the drawings and specified hereinafter.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for products specified in this Section. Include dimensions, ratings, and data on features and components.

C. Maintenance data for products for inclusion in Operating and Maintenance Manual specified in Division 1 and in Section 16050 – Basic Electrical Materials and Methods.

D. Test data forms.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide transformers from manufacturers regularly engaged in the manufacture of equipment of the types and capacities indicated, with such products in satisfactory use in similar service for not less than 5 years.

B. Components and Installation: NFPA 70 "National Electrical Code."

C. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

D. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, and the pricing agreement established for this project, and with the State or Kansas Department of Facilities Management, the product shall be as manufactured by Square D Company, Schneider Electric.

2.2 DRY TYPE TRANSFORMERS

A. It is the responsibility of the Contractor to verify if the final equipment dimensions and if it will fit in the space provided. Design was based on Square D information during design. If manufacturer dimensions change, make any provisions as necessary to make the equipment fit within the allotted space.

B. These transformers to be designed, assembled, and tested in accordance with the applicable standards of NEMA, IEEE, U.L., ANSI. All transformers shall be energy efficient type designed and assembled in accordance with energy Act 2005. Transformers shall meet requirements of Table 4.2 in NEMA TP1 Standard.

C. These transformers to be KVA, primary and secondary voltage rated as shown on the drawings. Transformers 15 KVA and larger shall have a minimum quantity of 6, 2-1/2 percent full capacity primary taps (two above and four below). Exact voltages to be as designated on the plans or the transformers schedule.

D. Transformers 15 KVA and above to be 115 degrees C temperature rise above 40 degrees C ambient. All insulating materials to be in accordance with NEMA ST20 standards for a 220 degrees C UL component recognized insulation system.

E. Transformer coils to be of the continuous wound copper construction and to be impregnated with nonhygroscopic, thermosetting varnish.

F. Where the drawing or other specifications require a shielded transformer, the transformer is to have electrostatic shield between primary and secondary windings. The electrostatic shield to be grounded to the case.

G. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Magnetic Flux densities are to be kept well below the saturation point. The core lamination to be clamped together with structural steel angles. The completed core and oil is then to be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There is to be no metal-to-metal contact between the core and coil and the enclosure. On transformers 500 KVA and smaller, the vibration isolating system to be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable.

H. Transformers 15 KVA and larger to be in a heavy gauge, sheet steel, ventilated enclosure. The ventilating openings to be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standards for ventilated enclosures. Transformers through 75 KVA to be designed so they can be either floor or wall mounted. Above 75 KVA they are to be floor mounted design. Terminal compartment shall be suitable for 75 degrees C insulated wire.

I. The entire transformer enclosure to be degreased, cleaned, phosphatized, primed, and finished with a grey, baked enamel.

J. The maximum temperature of the top of the enclosure is not to exceed 50 degrees C rise above a 40 degrees C ambient.

K. The core of the transformer to be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, ANSI standards.

L. Sound levels to be guaranteed by the manufacturer not to exceed the following:

1. 15 to 50 KVA – 45DB.
2. 51 to 150 KVA – 50DB.
3. 151 to 300 KVA – 55DB.
4. 301 to 500 KVA – 60DB.

M. Impedance: The manufacturer published average impedance shall be as follows:

1. 15 KVA – 3.0%
2. 30 KVA – 3.5%
3. 45 KVA – 3.7%
4. 75 KVA – 3.2%
5. 112.5 KVA – 3.9%
6. 150 KVA – 4.7%
7. 225 KVA – 6.6%
8. 300 KVA – 3.7%
9. 500 KVA – 6.2%

N. Submit complete, guaranteed performance data and physical description for similar transformers. Data to be submitted for each size specified.

O. The transformer shall be listed by Underwriters' Laboratory for the specified temperature rise.

P. The equipment shall have adequate quantity of lugs to terminate the quantity and size of conductors as shown on the Drawings. Lugs shall be suitable for type of conductors to be used as shown on the Drawings and/or as specified elsewhere in these specifications.

Q. Enclosures: For individually mounted contactor and relay devices, comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)." Provide enclosures suitable for the environmental conditions at the controller location except as otherwise indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install independently mounted equipment in accordance with manufacturer's written instructions.

B. Location: Locate equipment as required unless otherwise indicated.

C. Install these transformers on a concrete base, (3-1/2-inch nominal thickness) or on a wall bracket as and where shown on the drawings, use neoprene vibration insulator pads under the transformers or neoprene hangers if suspended from above. Provide all mounting hardware necessary.

D. Secondary wire and conduit shall be run as shown on the drawings.

E. Primary wire and connections shall be as shown on the drawings.

F. Provide transformer ground as shown on the drawings, or as specified elsewhere herein.

G. Connections to be with flexible conduit.

3.2 IDENTIFICATION

A. Identify equipment in accordance with Section 16195 – Electrical Identification.

3.3 CONNECTIONS

A. Tighten connectors, terminals, bus joints, and mountings. Tighten field connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, comply with tightening torques specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Visual and mechanical inspection: Include the following inspections and related work.

B. Inspect for defects and physical damage and nameplate compliance with contract documents.

C. Check tightness of electrical connections of devices with calibrated torque wrench. Use manufacturer's recommended torque values.

D. Verify proper fuse types and ratings in fusible devices.

E. Electrical Tests: Perform the following in accordance with manufacturer's instructions:

F. Test all transformers with a 500-volt megger. Minimum acceptable reading for 120-volt transformers windings, between windings and between winding and ground: 20 megohms. Dry out transformers or control equipment that test lower than the above minimum values by a method approved by the Engineer and retest.

1. Perform all tests as may be required by the equipment manufacturer to ensure full warranties.

3.5 ADJUSTMENTS

A. Adjustments or corrections shall be made immediately where equipment does not operate properly or where operation is outside of the parameters specified herein.

B. If the grounding electrode system resistance specified cannot be met, the Authorized Representative should be notified before taking corrective action.

C. Provide a written statement to the Architect that confirms all field quality control work has been performed and that all installations meet the requirements of the contract documents. Report documentation shall be provided to the Commissioning Consultant.

3.6 CLEANING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally using methods and materials as recommended by manufacturer.

END OF SECTION 262200

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this Section.

C. System commissioning is a part of the construction process. Documentation and testing of systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Consultant. Final Completion is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Commissioning Specification Section 01810 for detailed commissioning requirements.

1.2 SUMMARY

A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V or less.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type panelboard, accessory item, and component specified.

C. Shop drawings from manufacturers of panelboards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, features, accessories, current rating, and voltage rating. Include the following:

1. Enclosure type with details for types other than NEMA Type 1.
2. Bus configuration and current ratings.
3. Short-circuit current rating of panelboard and protective devices.
4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
5. Time-current data curves for protective devices.

D. Wiring diagrams detailing schematic diagram including control wiring, and differentiating between manufacturer-installed and field-installed wiring.

E. Panel schedules for installation in panelboards. Submit final versions after load balancing.

F. Maintenance data for panelboard components, for inclusion in Operating and Maintenance Manual specified in Division 1 and in Section 16050 – Basic Electrical Materials and Methods. Include instructions for testing circuit breakers.

G. Test data forms.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The terms “listed” and “labeled” shall be defined as they are in the National Electrical Code, Article 100.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, “National Electrical Code.”

C. NEMA Standard: Comply with NEMA PB1, “Panelboards.”

D. UL Standards: Comply with UL 61, “Panelboards,” and UL 50, “Cabinets and Boxes.”

1.5 EXTRA MATERIALS

A. Keys: Furnish 10 spares for panelboard cabinet locks.

B. Touch-up Paint for surface-mounted panelboards: One half-pint container.

C. Obtain the Owner-signed receipt for all extra materials. Provide a copy of the receipt to the Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, and the pricing agreement established for this project, and with the State or Kansas Department of Facilities Management, the product shall be as manufactured by Square D Company, Schneider Electric.

B. Design is based on products as supplied by Square D.

2.2 PANELBOARDS, GENERAL REQUIREMENTS

A. Provide panelboards and auxiliary components of types, sizes, and ratings indicated and that comply with manufacturer’s standard materials, design, and construction in accordance with published product information, unless indicated otherwise. Series rated devices, equipment and assemblies shall not be provided. IEC rated devices, equipment and assemblies shall not be provided. All rated devices, equipment, and assemblies shall be NEMA rated. All buses shall be silver plated copper. All connections shall be tightly bolted. AIC shall be as indicated on the drawings or elsewhere herein.

B. Provide dead-front safety type circuit breaker panelboards as indicated, with bolt-on to bus molded case circuit breakers in quantities, ratings, types and arrangement indicated. Provide anti-turn solderless pressure type lug connectors approved for copper conductors on all circuit breakers and bus bars. All connectors shall be listed for 75 degrees C. All bus bars shall be hard drawn silver plated copper of 98 percent conductivity. Provide full size neutral bus. Where noted on the drawings, provide 200 percent neutral bus. Provide ground bus, additionally provide isolated ground bus for isolated ground type panelboards. Provide circuit breakers with toggle handles that indicate when tripped. Provide common trip on multiple pole circuit breakers so overload on one pole will trip all poles simultaneously. Provide 20 ampere, single-pole circuit breakers listed as type SWD. Provide circuit breakers listed as type HACR as required. Select enclosures and front trims fabricated by same manufacturer as panelboard and that mate properly with panelboards.

C. Provide dead-front safety type fusible panelboards as indicated, with fusible switches in quantities, ratings, type, and arrangement indicated. Provide anti-turn solderless pressure type lug connectors approved for copper conductors on all fusible devices and bus bars. All connectors shall be listed for 75 degrees C. All bus bars shall be hard drawn silver plated copper of 98 percent conductivity. Provide full size neutral bus. Provide ground bus, additionally provide isolated ground bus for isolated ground type panelboards. If for service entrance and rate greater than 200 ampere, provide a main bonding jumper per NEC 250-53b and 250-79 between the neutral bus and the ground bus. Provide Class "R" rejection type fuse clips on 600 ampere and less fusible switches. Provide Class "L" fuse mounting provisions on fusible switches rated higher than 600 ampere. Select enclosure and front trims fabricated by same manufacturer as panelboard and that mate properly with panelboards.

D. Provide panelboard enclosures fabricated of code-gauge, minimum 16-gauge thickness, galvanized sheet steel unless required to be of other type of material to meet NEMA type as indicated. Provide enclosures without knock-outs. Provide hinged cover front trims of door-in-door design and hinged door with flush key lock. All locks shall be keyed alike. Provide 10 extra keys. Provide front with interior circuit directory frame and directory card with clear plastic cover.

E. Locks shall be keyed the same.

F. The equipment shall have adequate quantity of lugs to terminate the quantity and size of conductors as shown on the Drawings. Lugs shall be suitable for type, size, and quantity of conductors to be used as shown on the Drawings and/or as specified elsewhere in these specifications.

G. If a panelboard of a manufacturer other than the base manufacturer is supplied, it must have the same available "space" for the addition of future breakers, equivalent to the "space" available in the base manufacturer. Any deviation from this requirement is only with the permission of the Owner's representative.

H. It is the responsibility of the Contractor to verify if the final equipment dimensions and if it will fit in the space provided. Design was based on Square D information during design. If manufacturer dimensions change, make any provisions as necessary to make the equipment fit within the allotted space.

I. 480Y/277V branch circuit panelboards shall be Square D NF and fully rated at 14,000 AIC minimum, including all breakers, unless otherwise noted on the drawing or here-in.

J. 208Y/120V branch circuit panelboards shall be Square D NQOD and fully rated at 10,000 AIC minimum, including all breakers, unless otherwise noted on the drawing or here-in.

2.3 IDENTIFICATION

A. General: Refer to Section 260553 – Electrical Identification for labeling materials.

2.4 FUSES

A. General: Provide fuses in accordance with Section 262813 – Fuses.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less" and manufacturer's written installation instructions.

B. Ground Fault Protection: Install panelboard ground fault circuit interrupter devices (as indicated) in accordance with installation guidelines of NEMA 289, "Application Guide for Ground Fault Circuit Interrupters."

C. Mounting Heights: Top of box 6'-6" above finished floor, except as indicated.

D. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish. Mount surface panels on U-channels in accordance with Section 16050 – Basic Electrical Materials and Methods.

E. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval prior to typing and installing.

F. Install filler plates in unused spaces.

G. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panel into accessible ceiling space or space designated to be ceiling space in future. Stub four 1-inch empty conduits into raised floor space or below slab other than slabs on grade.

3.2 IDENTIFICATION

A. Identify field-installed wiring and components and provide warning signs in accordance with Section 16195– Electrical Identification.

3.3 GROUNDING

A. Connections: Make equipment grounding connection(s) for panelboards unless indicated otherwise.

B. Provide ground continuity to main electrical ground bus(es) unless indicated otherwise.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerances: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

E. Test data documentation shall be provided to the Commissioning Consultant.

3.6 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.7 COMMISSIONING

A. Balancing Loads: After Final Acceptance, conduct load-balancing measurements and circuit changes as follows:

1. Perform measurements during period of normal working load as advised by the Owner. The Owner to determine available test dates.
2. Perform load-balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with the Owner to avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records to the Associate.
4. Tolerance: Difference between phase loads exceeding 20 percent at any one panelboard is not acceptable. Re-balance and recheck as required to meet this minimum requirement.
5. Provide all other work and material associated with the commissioning. Work and material includes, but is not limited to, identification, wiring, and testing.

B. Provide a written statement to the Architect that all commissioning work has been performed per the requirements of the contract documents. Report documentation shall be provided to the Commissioning Consultant.

3.8 DEMONSTRATION

A. Conduct a minimum 4 hours of training in operation and maintenance as specified under "Instructions to the Owner's Employees" in Division 1. Include training relating to equipment operation and maintenance procedures.

B. Schedule training with at least 7 days advance written notification to the Owner.

C. Refer to Commissioning Specification Section 01810 for training requirements for specific systems and equipment. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Consultant. Commissioning Specification Section 01810 lists the specific systems and equipment. A training agenda shall be prepared by the Contractor and approved by the Commissioning Consultant prior to training performance.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES AND COVERPLATES

PART 1 - GENERAL

1.1 SWITCHES, RECEPTACLES AND COVER PLATES

A. Provide where shown on plans Leviton wiring devices. Part numbers shall be as listed for each device specified.

B. Equivalent devices by Bryant, Hubbell, General Electric, Arrow Hart, Pass & Seymour.

1.2 INDUSTRY REFERENCES

A. Underwriter's Laboratories (UL)

1. Switches (UL 20)
2. Receptacles, Plugs & Connectors (UL 498)
3. Pin & Sleeve Connectors (UL 1286)
4. Device Plates (UL 514)
5. GFCI's (UL 943)

B. National Electric Manufacturers Association (NEMA)

1. WD-1 (Devices, Plates, Colors)
2. WD-6

C. Federal Specifications

1. Fed Spec Switches (WS-896E)
2. Fed Spec Receptacles (WC-596F)
3. Fed Spec Device Plates (W-P-455)

PART 1 - PRODUCTS

2.1 GENERAL

A. Provide factory-fabricated wiring devices in types, colors, and electrical ratings for applications indicated. Wherever possible, devices shall be back and side wired. All switches and receptacles shall incorporate a metal mounting strap: non-metallic mounting straps are not acceptable. Switches shall be listed per UL 20 and certified by UL to Fed Spec. WS-596E. Receptacles shall be listed per UL 498 and certified by UL to Fed. Spec. WS-896E. Both switches and receptacles shall be visibly marked with the "UL-FS" mark to confirm certification. All devices shall be from the same manufacturer. Color of devices shall be Ivory.

2.2 SWITCHES

A. Dimmer Switches: 2000W incandescent dimming capacity.

Leviton Part No. #82000

B. Pilot Light Switches: Shall have illuminated toggles in the ON position for visual load monitoring.

Leviton Part No. #12-1-PLR

C. Momentary contact switches: Shall be 20 ampere, double throw, three position, center off toggle switches mounted in matching wall plate.

Leviton #1257

D. See Toggle Switches Schedule at end of section.

E. Receptacles: Standard receptacles shall be equipped with a 20 ampere simplex or duplex plug receptacles as shown on the plans except where otherwise noted. Receptacles shall be 3 wire grounding type NEMA No. 5-20R. Receptacle shall be constructed with Nylon face and base; .050 gauge brass backstrap with one-piece ground design; riveted self-grounding clip; and .040 gauge solid brass, triple-wipe contacts. Receptacles denoted as "Emergency" shall be red in color, and denoted as such with a device plate labeled with the word "EMERGENCY" in capital letters.

F. Isolated Ground Receptacles: IG receptacles shall be 3 wire grounding type NEMA No. 5-20R-IG. Receptacle shall be constructed with Nylon face and base; .050 gauge brass nickel-plated backstrap with isolated ground design; riveted self-grounding clip; and .040 gauge solid brass, nickel-plated, triple-wipe contacts. Receptacles shall be orange.

G. Weatherproof receptacles: Weatherproof receptacles shall be equipped with a ground fault interrupter receptacle which will automatically detect a ground fault current and will de-energize receptacle when fault current exceeds 5 milliamps. GFCI shall be certified Class A by Underwriter's Laboratories.

Leviton #6898 with hinged cover #4987-GY

H. GFCI Receptacles: GFCI receptacles shall detect a ground fault current and shall automatically de-energize receptacle when fault current exceeds 5 milliamps. GFCI shall be certified Class A by Underwriter's Laboratories, and listed under UL Standard 943. Receptacle shall be rated 20A. 120V. 2 pole, 3 wire grounding.

I. Combination 120/208 Volt Receptacles: Shall be 20 ampere duplex, NEMA 5-20R/6-20R.

Leviton #5844

J. Surge Suppression Receptacles: Surge Suppression receptacles shall be isolated ground, duplex receptacle design, rated 20 ampere, 120 Volts and shall contain surge suppression device to protect appliances served by the receptacle. Receptacles shall provide 13,000 Amps Maximum Surge Current Line to Neutral; 6,500 ampere Maximum Surge Current Line to Ground; and 6,500 ampere Max. Surge Current Neutral to Ground; each based on IEEE C62.41, * X 20 us waveform. Receptacle shall be certified by UL 1449 to have maximum clamping voltage of 500 Volts Peak Line to Neutral, Line to Ground, and Neutral to Ground based on Class B, 6KV, 3KA impulse, and shall be suitable for ANSI/IEEE C62.41-1980 installation categories A and B. Receptacles shall have a blue faceplate. Receptacle shall have an audible alarm.

Leviton #5380
Leviton #5380-IG (isolated ground)
Leviton #8380 (Hospital Grade)
Leviton #8380-IG (Hospital Grade w/ isolated ground)

K. Corrosion-Resistant Receptacles: Corrosion-Resistant receptacles shall be provided with a 20 ampere, 125 Volt duplex receptacle, NEMA 5-20R configuration. It shall be constructed with Nylon face and base; .050 gauge brass nickel-plated backstrap with one-piece ground design; riveted self-grounding clip; and .040 gauge solid brass, nickel-plated, triple-wipe contacts. Face shall be yellow in color. Device shall surpass ASTMB-17-13, 500 Hour salt spray and fog test requirements with no visible corrosion.

Leviton #53CM-62

2.3 SWITCH AND RECEPTACLE FLUSH WALL PLATES

A. Wall plates for all flush outlets shall be satin stainless steel Type 302. All plates shall be listed per UL 514 and shall be of the same manufacturer as the devices furnished. Plates for surface mounted device outlets shall be drawn galvanized steel for steel boxes and cast for cast boxes.

B. Provide projecting mounted wiring devices with standard stainless steel wall plates with satin finish conforming to U.S. Bureau of Standards finish #32D.

C. Provide matching blank wall plates to cover outlet or junction boxes intended for future devices.
D. Provide matching blank wall plates with round knock out at all telephone outlet locations.

E. Provide factory engraved wall plates where indicated. Where engraved text is not outlined submit two copies of proposed text to A/E for review.

F. Where wall plates for special devices are available only from manufacturer of device, provide designs and finishes equivalent to above specification.

G. Multiple switch plates shall be engraved to indicate what they control.

PART 3 - EXECUTION

3.1 GENERAL

A. Install wiring devices to manufacturer's recommendations and in strict accordance with applicable sections of NEC.

B. Wall plates shall not support wiring devices. Provide wiring device with accessories as required to properly install devices and wall plates.

C. Provide tamper proof screws for all device coverplates. Refer to Section 08710.

Equivalent Device Manufacturers and Model Numbers

TOGGLE SWITCHES						
TYPE	GE	AH	BRYANT	HUBBELL	LEVITON	P&S
Single Pole	GE5951-2G	1991I	4901-GI	HBL1221I	1221-2I	20AC1-I
Double Pole	GE5952-2G	1992I	4902-I	HBL1222I	1222-2I	20AC2-I
3-Way	GE5953-2G	1993I	4903-I	HBL1223I	1223-2I	20AC3-I
4-Way	GE5954-2G	1994I	4904-GI	HBL1224I	1224-2I	20AC4-I
SP Key Op	GE5951-OLG	1991L	4901-L	HBL1221L	1221-2L	20AC1-L
3-W Key Op	GE5953-OLG	1993L	4903-L	HBL1223L	1223-L	20AC3-L

RECEPTACLES							
TYPE	GE	AH	BRYANT	HUBBELL	LEVITON	EAGLE	P&S
Duplex	GE5362-2	5362I	5362-I	5352I	5352-I	5362V	5362-I
Simplex	GE4102-2	5361I	5361-I	5351I	5351-I	5361V	5361-I
Isolated Ground	GE5362-IG2	IG5362I	5362-IGI	IG5352I	5352-IGI	IG5362V	IG600-I
GFCI	GE5342-2G	GF5342I	GFR53FT-I	GF5352-IA	6898-I	647-2V	2091-IS
Weather-proof				GF5352-GYA	6898		
TVSS w/IG				IG5362S	5380-IG		

END OF SECTION 262726

SECTION 262813 – FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this Section.

1.2 SUMMARY

A. This Section includes fuses rated 600 V and below and accessory items. Types of products in this Section include the following:

1. Cartridge Fuses.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

B. Product Data for fuses. Include descriptive data and time-current curves for all fuses and let-through current curves for those with current limiting characteristics.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

B. UL Listing and Labeling: Items provided under this Section shall be listed and labeled by UL.

1.5 EXTRA MATERIALS

A. Maintenance Stock, Fuses: For types and ratings required, furnish spare fuses, amounting to one unit for every 10 installed units, but not less than one set of 3 of each kind.

B. Obtain Authorized Representative signed receipt for all extra materials. Provide a copy of the receipt to the Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann Div., Cooper Industries, Incorporated.
2. Gould, Incorporated.
3. Littelfuse, Incorporated.

2.2 FUSES, GENERAL

A. General: Provide fuses of types, classes, and current ratings as indicated; where not indicated provide current rating to meet NEC requirements and circuit ampacity. Voltage ratings shall be consistent with the circuits on which used.

B. Fuses for Direct Current Circuits: Marked for such use by the manufacturer on the fuse label.

2.3 CARTRIDGE FUSES

A. General: Comply with ANSI/IEEE Standard FU1, "Low Voltage Cartridge Fuses." Provide nonrenewable-cartridge-type fuses except as indicated.

1. Class L Fuses: Comply with UL 198C, "High-Interrupting Capacity Fuses," Time-Delay Current-Limiting Type.
2. Class RK1 Dual Element Time Delay Current Limiting Fuses: Comply with UL 198E, "Class R Fuses."

PART 3 - EXECUTION

3.1 APPLICATION OF FUSES

A. General: All fuses, 600 volt and below, shall be by the same manufacturer.

B. Apply fuses as indicated:

1. 600 Ampere or less: Class RK1 time-delay current limiting fuse with minimum 200,000 RMS symmetrical AIC rating. Fuses to be Bussmann type #LPN-RK Gould type #A2D-R, Littelfuse type #LLN-RK for 250 volt application, Bussmann type #LPS-RK, Gould type #A6D-R, Littelfuse type #LLS-RK for 600 volt application, or equal.
2. 601-6000 Ampere: Class L time-delay current limiting fuse with minimum 200,000 RMS symmetrical AIC rating. Fuses to be Bussmann Type #KRP-C, Gould type #A4BQ, Littelfuse type #KLP-C.
3. Fuse sizes shown on drawings for motor circuit protection are sized be Bussmann's recommendation for "running back-up overload protection." If an approved equal manufacturer is used. The sizing must be check and changed if necessary per that manufacturer's recommendation.

3.2 INSTALLATION

A. Install fuses in fusible devices.

B. Supply a minimum of 10% spare fuses of each size and type or a minimum of 3 which ever is greater.

C. Coordination Study: Where coordination study recommends changes in types, classes, features, or ratings of fuses or fusible devices from those indicated, and those changes are approved, make them with no change to the contract price or time of completion.

3.3 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 262813

SECTION 262816 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 DISCONNECT SWITCHES

A. Provide heavy duty horsepower rated Safety Switches rated in accordance with NEMA enclosed Switch Standard KS 1-1969 and L98 Standard.

B. Enclosure shall be NEMA type required by switch location and environment. Enclosure door shall latch with means for padlocking and cover interlock with defeater to prevent opening door when switch is energized or closing switch with door open. Switch shall have an embossed nameplate permanently attached to door front with switch rating, short circuit interrupting capacity and application information.

C. Line terminals shall be permanently marked and shielded. Contact shall be tin plated, equipped with arch chutes and have moving contacts visible in off position with door open. Wiring terminals shall be pressure type suitable for copper or aluminum wire. Switching mechanism shall be quick-make, quick-break spring driven anti-tease mechanism and shall be integral part of box. All current carrying parts shall be plated.

D. Fuse holders shall be high pressure suitable for use with dual element fuses or rejection type current limiting fuses where required. Fuse holders shall be completely accessible from front of switch and fuses shall be installed so that the label may be easily read from the front and without removing the fuse.

E. All fuse holders for rejection type current limiting fuses shall have rejection clips installed.

1.2 INSTALLATION

A. All disconnect switches as specified shall be installed in strict accordance with rules set forth by NEC.

B. Approved disconnect switches shall include G.E., Cutler Hammer, or I.T.E. Siemens, Square D.

END OF SECTION 262816

SECTION 262913 – MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Motor controllers are within the scope of the Commissioning Specification 01810. Refer to 01810 for general and specific requirements. Refer to the Commissioning Specification for requirements pertaining to documentation, testing and coordination with the Commissioning Consultant.

1.2 SUBMITTALS

A. Product Data: For products specified in this Section. Include dimensions, ratings, and data on features and components.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

C. Maintenance Data: For products to include in the maintenance manuals specified in Division 1.

D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide full voltage, reduced-voltage, solid-state, and variable-speed controllers from manufacturers regularly engaged in the manufacture of equipment of the types and capacities indicated, with such products in satisfactory use in similar service for not less than 5 years.

B. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.

C. Comply with NFPA 70.

D. Listing and Labeling: Provide motor controllers specified in this Section that are listed and labeled.

1. The Terms “Listed” and “Labeled”: As defined in the National Electrical Code, Article 100.

E. NEMA Compliance: NEMA ICS 2, “Industrial Control Devices, Controllers and Assemblies.”

F. UL Compliance: UL 508, “Electric Industrial Control Equipment.”

1.4 COORDINATION

A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Spare Fuses and Incandescent Indicating Lamps: Furnish 1 spare for every 5 installed units, but not less than 1 set of 3 of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, and the pricing agreement established for this project, and with the State or Kansas Department of Facilities Management, the product shall be as manufactured by Square D Company, Schneider Electric.

2.2 MOTOR CONTROLLERS, GENERAL

A. Coordinate the features of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, the duty cycle of the motor, drive, and load, and the pilot device, and control circuit affecting controller functions. Provide controllers that are horsepower rated to suit the motor controlled. Provide auxiliary devices as indicated; where not indicated as required for a complete operation system as intended. All connectors shall be listed for 75 degrees C. Controllers shall be only NEMA listed/rated. Series rated devices, equipment and assemblies shall not be provided. IEC rated devices, equipment and assemblies shall not be provided. All rated devices, equipment, and assemblies shall be NEMA rated.

B. Contacts shall open each ungrounded connection to the motor.

C. Overload Relays: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of the specific motor to which connected with appropriate adjustment for duty cycle. Overloads to be NEMA Class 20 Type.

D. Enclosures: For individually mounted motor controllers and control devices, comply with NEMA Standard 250, “Enclosures for Electrical Equipment (1,000 Volts Maximum).” Provide enclosures suitable for the environmental conditions at the controller location except as otherwise indicated.

2.3 MANUAL MOTOR CONTROLLERS

A. Description: Provide NEMA ICS 2, general purpose, quick-make, quick-break toggle action controller as indicated; where not indicated, as required to make a complete operational system as intended. Controller to be Allen-Bradley Bulletin #600 Series with neon pilot light except incandescent pilot light for NEMA 4, 7, and 9, or equal.

2.4 MAGNETIC MOTOR CONTROLLERS

A. Full Voltage: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated. Where not indicated, as required to make a complete operation system as intended. Controller shall be Allen-Bradley Bulletin #509 Series or equal.

B. Control Circuit: 120 V; obtained from integral control power transformer, unless otherwise indicated. Include a control power transformer with adequate capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

C. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.

1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type Type RK-1 fuse clips rated for fuses indicated. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a Nationally Recognized Testing Laboratory.
2. Nonfusible Disconnect: NEMA KS 1, heavy-duty, nonfusible switch.
3. Circuit-Breaker Disconnect: NEMA AB 1, motor-circuit protector with field-adjustable short-circuit trip coordinated with motor locked-rotor amperes.
4. Interlock switch with unit cover or door. Controller shall be Allen-Bradley Bulletin #512, #506, #522, #532, #542 Series or equal. Provide fuses as required to meet NEC and the actual motor load full load amperage.

D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect, and with appropriate adjustment for duty cycle.

E. Multi-Speed Motor Controller: Match controller to motor type, application, and number of speeds (constant horsepower/constant torque/variable torque, two-speed-separate-winding/two-speed-consequent pole): Where not indicated, as required to make a complete operational system as intended. Controller shall be Allen-Bradley Bulletin #520 Series or equal. Include the following accessories:

1. Compelling relay ensures motor will start only at low speed.
2. Accelerating relay ensures properly timed acceleration through speeds lower than that selected.
3. Decelerating relay ensures automatically timed deceleration through each speed.

2.5 ENCLOSURES

A. Description: Flush or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

2.6 ACCESSORIES

A. Devices are factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights (Transformer Type), and Selector Switches: NEMA ICS 2, heavy-duty type. Heavy-duty type, Allen Bradley Bulletin #800T Series or equal.

C. Stop and Lockout Push-Button Station: Momentary-break push-button station with a factory-applied hasp arranged so a padlock can be used to lock push button in depressed position with control circuit open. Heavy-duty type, Allen Bradley Bulletin #800T Series or equal.

D. Control Relays: Auxiliary and adjustable time-delay relays as indicated; where not indicated, as required to make a complete operational system as intended. Relays shall be Allen-Bradley Bulletin #700N, #700RT and #700RTA Series or equal.

E. Current-Sensing, Phase-Failure Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase-failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage. Provide adjustable response delay.

F. Transient Voltage Surge Suppressers: IEEE C62.41, selected to meet requirements for a low-exposure category.

G. Impulse sparkover voltage coordinated with system circuit voltage.

H. Factory mounted with Nationally Recognized Testing Laboratory listed and labeled mounting device.

PART 3 - EXECUTION

3.1 APPLICATION

A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.

B. Select horsepower rating of controllers to suit motor controlled.

C. Use fractional-horsepower manual controllers for single-phase motors, unless otherwise indicated.

D. Push-Button Stations: In covers of magnetic controllers for manually started motors where indicated, start contact connected in parallel with sealing auxiliary contact for low-voltage protection shall be provided.

E. Hand-Off-Automatic Selector Switches: Provide in covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

3.2 INSTALLATION

A. Install independently mounted motor-control devices according to manufacturer's written instructions.

B. Manufacturer's Field Services: For reduced voltage and solid state controllers, provide services of a factory-authorized service representative to supervise the field assembly and connection of components, including the pretesting and adjustment of solid-state controllers.

C. Location: Locate controllers within sight of motors controlled, unless otherwise indicated.

D. Mounting: For control equipment at walls, bolt units to structural steel U-channels securely fastened to the wall. For controllers not at walls, provide freestanding racks fabricated of structural steel members and structural steel U-channels. Use feet consisting of 3/8-inch thick steel plates, 6 inches square, bolted to the floor. Use feet for welded attachment of 1-1/2-inch by 1-1/2-inch by 1/4-inch vertical angle posts not over 3 feet on centers. Connect the posts with welded horizontal steel U-channels and bolt the control equipment to the channels.

1. Mount manual controllers at same height as snap switches per Section 16143 – Wiring Devices unless indicated otherwise.
2. Mount top of magnetic, solid state, and variable frequency drive controllers at 6'-0" AFF unless indicated otherwise.

E. Install freestanding equipment on concrete housekeeping bases conforming to Section 03300 – Cast-In-Place Concrete.

F. Motor-Controller Fuses: Install indicated fuses in each fusible switch conforming to requirements of Section 262813 – Fuses.

3.3 IDENTIFICATION

A. Identify motor control components and control wiring in accordance with Section 16195 – Electrical Identification.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between motor-control devices according to Section 16120– Wire and Cables.

B. Bundle, train, and support wiring in enclosures.

C. Connect hand-off-automatic switch and other automatic control devices where available.

1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.
2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

D. Provide wiring between fire alarm system and controllers.

E. Provide wiring between DDC temperature control panels and magnetic motor controllers that are not part of a package unit.

3.5 CONNECTIONS

A. Tighten connectors, terminals, bus joints, and mountings. Tighten field-connected connectors and terminals, including screws and bolts, according to manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.6 FIELD QUALITY CONTROL

A. Testing: After installing motor controllers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.
2. Remove and replace malfunctioning units with new units, and retest.

B. Visual and mechanical inspection: Include the following inspections and related work.

C. Motor-Control Device Ratings and Settings: Verify that ratings and settings, as installed, are appropriate for final loads and final system arrangement and parameters. Recommend final protective-device ratings and settings where differences are found. Use accepted revised ratings or settings to make the final system adjustments. Prepare and submit for review the load current and overload relay heater list.

D. Inspect for defects and physical damage, and nameplate compliance with current project drawings.

E. Exercise and perform operational tests of mechanical components and other operable devices.

F. Check tightness of electrical connections of devices with calibrated torque wrench. Use manufacturer's recommended torque values.

G. Clean devices using manufacturer's approved methods and materials.

H. Verify proper fuse types and ratings in fusible devices.

I. Electrical Tests: Perform the following in accordance with manufacturer's instructions:

1. Test controllers with 1000 VDC megger. Follow manufacturer's instructions and remove all control wires and devices as necessary to avoid damage to sensitive components. Test each phase conductor to each phase conductor and ground, record data on test forms. Provide test data, as requested by the Architect, for review by the Architect. Any equipment failing to meet minimum standards as determined by the Architect shall be replaced or repaired at Contractor's expense.
2. Test auxiliary protective features such as but not limited to loss of phase, phase unbalance and undervoltage to verify operation.
3. Check for improper voltages at terminals in controllers that have external control wiring when controller disconnect is opened.
4. Provide written notice of test date/time to owner's representative a minimum of 48 hours prior to the test date or as noted in Section01810.
5. Test data documentation shall be provided to the Commissioning Consultant.

J. Correct deficiencies and retest motor control devices. Verify by the system tests that specified requirements are met.

K. Provide a written statement to the Architect that confirms all field quality control work has been performed and that all installations meet the requirements of the contract documents. Report documentation shall be provided to the Commissioning Consultant.

3.7 CLEANING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials as recommended by manufacturer.

3.8 DEMONSTRATION

A. Training: Engage a factory-authorized service representative to demonstrate solid-state and variable-speed controllers and train Owner's maintenance personnel.

1. Conduct a minimum of 4 hours of training in operation and maintenance as specified in Division 1. Include training relating to equipment operation and maintenance procedures.
2. Schedule training with at least 7 days' advance notice.

B. Refer to Commissioning Specification Section 01810 for training requirements for specific systems and equipment. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Consultant. Commissioning Specification Section 01810 lists the specific systems and equipment. A training agenda shall be prepared by the Contractor and approved by the Commissioning Consultant prior to training performance.

END OF SECTION 262913

SECTION 262923 – VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes solid-state, PWM, VFDs for speed control of three-phase, squirrel-cage induction motors.

B. System commissioning is a part of the construction process. Documentation and testing of systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Consultant. Final Completion is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Commissioning Specification Section 01810 for detailed commissioning requirements.

1.2 DEFINITIONS

A. DDC: Direct digital control

B. IGBT: Integrated gate bipolar transistor.

C. LAN: Local area network.

D. PID: Control action, proportional plus integral plus derivative.

E. PWM: Pulse-width modulated.

F. VFD: Variable frequency drive.

1.3 SUBMITTALS

A. Product Data: For each type of VFD, provide dimensions; mounting arrangements; location for conduit entries; shipping and operating weights; and manufacturer's technical data on features, performance, electrical ratings, characteristics, and finishes.

B. Shop Drawings: For each VFD.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.

C. Wiring Diagrams: Power, signal, and control wiring for VFD. Provide schematic wiring diagram for each type of VFD.

D. Field Test Reports: Written reports specified in Part 3.

E. Operation and Maintenance Data: For VFDs, all installed devices, and components to include in emergency, operation, and maintenance manuals. Include the following:

1. Routine maintenance requirements for VFDs and all installed components.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles (160 km) of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Source Limitations: Obtain VFDs of a single type through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFDs, minimum clearances between VFDs, and adjacent surfaces and other items. Comply with indicated dimensions and clearances.

E. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store VFDs indoors in clean, dry space with uniform temperature to prevent condensation. Protect VFWs from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 COORDINATION

A. Coordinate layout and installation of VFWs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

C. Coordinate features of VFDs installed units, and accessory devices with pilot devices and control circuits to which they connect.

D. Coordinate features, accessories, and functions of each VFD and each installed unit with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spare Fuses: Furnish one set of three of each type and rating.
2. Indicating Lights: Two of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
2. Baldor Electric Company (Graham).
3. Eaton Corp.; Cutler-Hammer Products.
4. General Electrical Distribution & Control.
5. Magnetek Drives and Systems.
6. Siemens Energy and Automation; Industrial Products Division.
7. Graham.
8. Toshiba.
9. Saftronics.

10. Square D

2.2 VARIABLE FREQUENCY CONTROLLERS

A. Description: NEMA ICS 2, IGBT, PWM, VFD; listed and labeled as a complete unit and arranged to provide variable speed of a NEMA MG 1, Design B, 3-phase, premium-efficiency induction motor by adjusting output voltage and frequency.

B. Design and Rating: Match load type, in this case, pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

C. Output Rating: 3-phase; 6 to 60 Hz, with voltage proportional to frequency throughout voltage range.

D. Unit Operating Requirements:

1. Input ac voltage tolerance of 380 to 500 V, plus or minus 10 percent.
2. Input frequency tolerance of 50/60 Hz, plus or minus 6 percent.
3. Capable of driving full load, under the following conditions, without derating:

a. Ambient Temperature: 0 to 40 deg C.
b. Humidity: Less than 90 percent (non-condensing).
c. Altitude: 500 feet.

4. Minimum Efficiency: 96 percent at 60 Hz full load.
5. Minimum Displacement Primary-Side Power Factor: 96 percent.
6. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.
7. Starting Torque: 100 percent of rated torque or as indicated.
8. Speed Regulation: Plus or minus 1 percent.
9. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.

E. Internal Adjustability Capabilities:

1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration: 2 to a minimum of 22 seconds.
4. Deceleration: 2 to a minimum of 22 seconds.
5. Current Limit: 50 to a minimum of 110 percent of maximum rating.

F. Self-Protection and Reliability Features:

1. Input transient protection by means of surge suppressors.
2. Snubber networks to protect against malfunction due to system voltage transients.
3. Under- and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.
4. Motor Overload Relay: Adjustable and capable of NEMA 250 performance.
5. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
6. Instantaneous line-to-line and line-to-ground overcurrent trips.
7. Loss-of-phase protection.
8. Reverse-phase protection.
9. Short-circuit protection.
10. Motor overtemperature fault.

G. Automatic Reset and Restart: To attempt three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bi-directional autospeed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.

H. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped.

I. Torque Boost: Automatically vary starting and continuous torque to at least 1.5 times the minimum torque to insure high-starting torque and increased torque at slow speeds.

J. Motor Temperature Compensation at Slow Speeds: Adjustable current fallback based on output frequency for temperature protection of self-cooled fan-ventilated motors at slow speeds.

K. Input Line Conditioning: AC Line Reactors, 3% minimum impedance as well as a DC link choke.

L. Status Lights: Door-mounted LED indicators shall indicate the following conditions:

1. Power on.
2. Run.
3. Overvoltage.
4. Line fault.
5. Overcurrent.
6. External fault.

M. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and elapsed time meter.

N. Indicating Devices: Meters or digital readout devices and selector switch, mounted flush in controller door and connected to indicate the following controller parameters:

1. Output frequency (Hz).
2. Motor speed (rpm).
3. Motor status (running, stop, and fault).
4. Motor current (amperes).
5. Motor torque (percent).
6. Fault or alarming status (code).
7. PID feedback signal (percent).
8. DC-link voltage (VDC).
9. Set-point frequency (Hz).
10. Output voltage (V).

O. Control Signal Interface: As required for Temperature Control system interface, provide VFDs with the following:

1. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 0/4-20 ma) and 6 programmable digital inputs.
2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BMS or other control systems:

a. 0 to 10-V dc.
b. 0-20 or 4-20 ma.
c. Potentiometer using up/down digital inputs.
d. Fixed frequencies using digital inputs.
e. RS485.

f. Keypad display for local hand operation.

3. Output Signal Interface:

a. A minimum of 1 analog output signal (0/4-20 ma), which can be programmed to any of the following:
Output frequency (Hz).
Output current (load).
DC-link voltage (VDC).
Motor torque (percent).
Motor speed (rpm).
Set-point frequency (Hz).

4. Remote Indication Interface: A minimum of 2 dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:

a. Motor running.
b. Set-point speed reached.
c. Fault and warning indication (overtemperature or overcurrent).
d. PID high or low speed limits reached.

P. Communications: Provide an RS485 interface allowing VFD to be used with an external system within a multi-drop LAN configuration. Interface shall allow all parameter settings of VFD to be programmed via BMS control. Provide capability for VFD to retain these settings within the nonvolatile memory. The serial interface shall be capable of communicating via ModBus and or Johnson Metasys N2 protocols.

Q. Integral Disconnecting Means: NEMA AB 1, instantaneous-trip circuit breaker with lockable handle.

2.3 ENCLOSURES

A. NEMA 1 enclosure with ventilating openings as required.

2.4 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Control Relays: Auxiliary and adjustable time-delay relays.

D. Standard Displays:

1. Output frequency (Hz).
2. Set-point frequency (Hz).
3. Motor current (amperes).
4. DC-link voltage (VDC).
5. Motor torque (percent).
6. Motor speed (rpm).
7. Motor output voltage (V).

E. Historical Logging Information and Displays:

1. Real-time clock with current time and date.
2. Running log of total power versus time.
3. Total run time.

4. Fault log, maintaining last four faults with time and date stamp for each.

F. Current-Sensing, Phase-Failure Relays for Bypass Controller: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage; with adjustable response delay.

G. Isolation process control interface shall enable VFD to follow 4-20 MA or 0-10 volt signal from process device.

H. Line Reactors:

1. Reactors shall be mounted in NEMA 1 enclosures and shall be constructed with Class H insulation.

2.5 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested VFDs before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFDs for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFD installation.

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

3.2 APPLICATIONS

A. Select rating of controllers to suit the motor controlled.

3.3 INSTALLATION

A. Anchor each VFD assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and grout sills flush with VFD mounting surface.

B. Controller Fuses: Install fuses in each fusible switch.

3.4 IDENTIFICATION

A. Identify VFDs, components, and control wiring to match what is used in the building.

B. Operating Instructions: Laminate printed operating instructions for VFDs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFD units.

3.5 CONTROL WIRING INSTALLATION

A. Bundle, train, and support wiring in enclosures.

B. Connect hand-off-automatic switch and other automatic-control devices where available.

1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
2. Connect selector switches with control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of conduit, fittings, and specialties.

B. Ground equipment.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.7 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each VFD element, bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including pretesting and adjusting VFDs.

3.8 STARTUP SERVICE

A. Verify that electrical wiring installation complies with manufacturer's submittal and the NEC.

B. Complete installation and startup checks according to manufacturer's written instructions.

3.9 ADJUSTING

A. Set field-adjustable switches and circuit breaker trip ranges.

3.10 CLEANING

A. Clean VFDs internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain VFDs.

B. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Consultant. A training agenda shall be prepared by the Contractor and approved by the Commissioning Consultant prior to training performance

END OF SECTION 262923

SECTION 265100 - LIGHTING FIXTURES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide lighting fixtures complete with lamps and accessories required for hanging. Contractor shall insure that lamps, reflector lens and trim are clean at time of final inspection. Mount recessed fixtures with trim flush to ceilings, free of gaps or cracks.

B. Coordinate mounting of ceiling mounted lighting fixtures with General Contractor. Where additional fixture supports are required due to lighting fixture location or weight, supports shall be provided by electrical contractor, unless otherwise specified under ceiling specifications.

C. Consult architectural plans for ceiling types and provide surface and recessed lighting fixtures with appropriate mounting components and accessories.

D. Lighting fixtures submitted must meet or exceed specified lighting fixture in performance and construction and appearance.

E. Provide lighting fixtures at each location shown on drawings. Lighting fixtures shall be in accordance with type designation on drawings.

F. Lighting fixture supports shall comply with the latest edition of the NEC Sections 410-15 and 410-16. Provide lighting fixture securing clips as required.

G. See lighting fixture schedule on plans for fixture types.

1.2 INSPECTION

A. Prior to installation of luminaires Electrical Contractor shall inspect luminaire and verify unit meets or exceeds specifications, is new and unused without damage or defect and is suitable for the intended service.

B. See architectural and electrical plans for luminaire locations, coordinate installation with other trades.

C. At the completion of the project all luminaires shall be aligned, level and cleaned to the satisfaction of the A/E.

1.3 MANUFACTURERS

A. Provide luminaires by the following manufacturers:

Downlights: Halo, Lithonia, Marko, Prescolite
Flourescents: Columbia, Lithonia, Metalux, Williams
HID: Holophane, Hubbell, Kim, Lithonia
Track Lighting: Halo, Lithonia, Marko, Prescolite
Emergency Fixtures: Exitronix, Fail-Safe, Hubbell, Lithonia
Security Fixtures: Holcor

END OF SECTION 265100

SECTION 265120 - LAMPS

PART 1 - GENERAL

1.1 LAMPS

A. Luminaire lamps shall be lamp type recommended by fixture manufacturer. Lamp no fixtures above manufacturers recommended maximum wattages.

B. Fluorescent lamp shall be Octron in wattages as scheduled on plans. Lamps shall be tri-phospher with a color temperature of 4100K as scheduled on plans.

C. Metal halide lamps shall be Phillips Lighting Co. “Master Color”. High color rendering type lamps.

D. High pressure sodium lamps in smaller wattages shall be Phillips Lighting Co. “White SON” type lamps with Phillips Lighting Co. “Ceramalux comfort high pressure sodium lamps with CRI of 60.

E. Equivalent lamps by General Electric, Venture, Sylvania.

1.2 INSTALLATION

A. Reference lighting fixture schedule on plans for specific lamp requirements.

END OF SECTION 265120

DIVISION 31: EARTH WORK

SECTION 311000- SITE CLEARING

1. Related Documents
2. Summary
3. Project Conditions
4. Existing Services
5. Site Clearing
6. Disposal of Waste Materials

SECTION 312000- EARTH MOVING

1. Related Documents
2. Standards
3. Description of Work
4. Quality Assurance
5. Submittals
6. Job Conditions
7. Definition of Soil Materials
    a. Satisfactory Soil Materials: Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, SM, SW, and SP. Some CL materials subject to the requirements for "Select Fill" may be acceptable.
    b. Unsatisfactory Soil Materials: Unsatisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GC, ML, MH, CH, OL, OH, and PT. Groups SC and CL are also unsatisfactory unless conforming to requirements specified below.
    c. Fill and Backfill:
        i. Definition: "Fill" is soil material that is used to raise existing grades such as under foundation slabs or above footings, or to replace unsuitable material. Backfill" is soil material that is used to fill an excavation, to fill against the structure, or to fill behind foundation walls.
        ii. Select Fill: "Select fill" material shall be used as noted on the drawings as fill

and/or backfill and shall conform to one of the following:

1. Sandy clay or clayey sand having a plasticity index between 7 and 15 and a liquid limit not exceeding 35. Material shall be free of debris, roots, vegetation, organic matter and all other deleterious substances and free of rock or gravel greater than 2" in any dimension.
2. Satisfactory Soil Material as defined above free of clay, rock, or gravel larger than 2" in any dimension and free of debris, roots, vegetation, waste and all other deleterious materials.

iii. Low Volume Change Material (LVC): Low plasticity cohesive soil - as defined below, granular material – as defined in the Geotechnical Report and as approved by the Geotechnical engineer; or treated soil as defined in the Geotechnical Report and as approved by the Geotechnical engineer.

1. Low Plasticity Cohesive Soil: Low Plasticity Cohesive Soil is that which exhibits a liquid limit of less than 45 percent and a plasticity index between 10 and 25 percent.
2. KDOT AB-3 (or approved equal) may be used as LVC materials.
3. The On-Site moderate to high plasticity clay soils may be stabilized with either hydrated lime or Class "C" Fly Ash. Laboratory tests will be necessary to determine the amount of either material is needed with a typical range being between 5% to 15% (dry weight basis).

iv. Drainage Fill: "Drainage fill" shall be used as noted on the drawings as fill material that is used around a drainage pipe in a wall drainage system or under a foundation slab as part of an underfloor drainage system and shall conform to the following:

1. Uniformly graded mixture of natural or crushed gravel, crushed stone, and natural sand, conforming to the coarse aggregate requirements of ASTM C 33, size 67 with 100% passing a 1" sieve and 0% to 5% passing a No. 8 sieve.
2. Washed evenly graded mixture of crushed stone or crushed or uncrushed gravel, ASTM C33; coarse-aggregate grading Size 56; with 100% passing a 1 1/2" sieve and not more than 5% passing a No. 4 sieve.

v. Drainage Backfill: "Drainage backfill" shall be used as noted on the drawings as backfill material that is used behind a foundation wall as part of a wall drainage system Drainage backfill must be compatible with any drainage fill material to which it comes in contact as part of the complete wall drainage system. Drainage backfill shall conform to the following:

1. A washed free draining river sand graded so that 100% will pass a 3/8" sieve and less than 3% shall pass a No. 200 sieve.
2. Washed evenly graded mixture of crushed stone or crushed or uncrushed gravel, ASTM D448; coarse-aggregate grading Size 57; with 100% passing a 1 1/2" sieve and not more than 5% passing a No. 8 sieve.

vi. Impervious Fill: "Impervious Fill" shall be used as noted on the drawings as backfill material that is used as a cap to seal off surface water from penetrating into backfill below. The material shall be lean clay with a Liquid Limit of between 35 and 50, with a Plasticity Index of between 20 and 30, and capable of compacting to a dense composite.

vii. Granular Base under slab-on-grade: "Granular Base" material shall be used as noted on the drawings as fill material between the moisture retarder and the slab and shall be a clean, well-graded, granular mixture of crushed stone, crushed, recycled concrete, or crushed or uncrushed gravel that is trimmable, compactable, and drains well.

1. Subject to compliance with requirements, the following materials are acceptable
    a. Crushed, recycled concrete with 100% passing the 1 1/2 inch sieve, 45% to 60% passing the 3/8" sieve, 25% to 40% passing the #4 sieve, 20% to 35% passing the #8 sieve, 10% to 30% passing the #100 sieve, and 0% to 5% passing the #200 sieve.

viii. Leveling Sub-base under Moisture Retarder: "Leveling Sub-Base" shall be used as noted on the drawings as a thin smoothing layer over the sub-grade and directly below the moisture retarder. The material shall be a clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D448, size 10, with 100 percent passing a No. 4 sieve and 10 to 30 percent passing a No. 100 sieve; meeting deleterious substance limits of ASTM C33 for fine aggregates.

ix. Cement Stabilized Sand Backfill: "Cement Stabilized Sand" shall be used as noted on the drawings and in these specifications as backfill material and shall be a well mixed composite of the following materials:
    1. Granular soil material conforming to one of the following:
        a. Uniformly graded mixture of natural or crushed gravel, crushed stone, and natural sand, conforming to the fine aggregate (concrete sand) requirements of ASTM C 33, with 100% passing a 3/8" sieve and 2% to 10% passing a No. 100 sieve.
        b. Concrete sand, 3/8" to No. 100, conforming to ASTM C 33.
        c. A washed free draining river sand graded so that 100% will pass a 3/8" sieve and less than 3% shall pass a No. 200 sieve.
    2. Potable Water added in such proportion to make the mixture workable and fully hydrate the cement.
    3. Cement, Type I, ASTM C 150 added in such proportion that the cement to dry sand ratio by weight shall be a minimum of 7%.
    4. The cement stabilized sand shall produce a minimum unconfined compressive strength of 100 PSI in 48 hours and 400 PSI in 7 days where compacted to 95% density according to ASTM D 698 without additional moisture control, cured in accordance with ASTM C 31 Item 9, and tested in accordance with ASTM C 31

x. Use of On-site Materials: On-site materials (i) may be used for fill and backfill only when approved by the Owner's Testing Laboratory. (ii) are not satisfactory for use on this project and shall be hauled off and disposed of in a safe manner.

d. Approval: All soil materials used for the project shall be approved by the Owner's Testing Laboratory prior to hauling or placement. Soil materials used for fill and backfill shall be retested and reapproved each time the source or character of the material changes.

e. Filter Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile: made from polyolefins, polyesters, or polyamides: and with the following minimum properties determined according to ASTM D4759 and referenced standard test methods:
    i. Grab Tensile Strength: 100 lbf: ASTM D4632
    ii. Tear Strength: 40 lbf: ASTM D4533
    iii. Puncture Resistance: 50 lbf; ASTM D4833
    iv. Water Flow Rate; 90 gpm per sq. ft.; ASTM D4491
    v. Apparent Opening Size; No. 50; ASTM D4751

f. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polylolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
    i. Grab Tensile Strength: 200 lbf: ASTM D4632

ii. Tear Strength: 75 lbf: ASTM D4533
iii. Puncture Resistance: 90 lbf; ASTM D4833
iv. Water Flow Rate; 4 gpm per sq. ft.; ASTM D4491
v. Apparent Opening Size; No. 30; ASTM D4751

g. Geocomposite Drainage System: A manufactured system consisting of a geotextile filter fabric specified above that is fusion bonded to a high-impact plastic cuspated core and with the following minimum properties.
i. Flow rate, @3600 psf and hydraulic gradient = 1.0, ASTM D4716: 5 gpm/ft. width
ii. Compressive Strength, ASTM D1621: 15,000 psf
iii. Subject to compliance with requirements, provide one of the following:
1. "MiraDRAIN MD-2000", TC MiraDRI, Inc., Norcross, GA
2. "Sheet Drain HS", Greenstreak, St. Louis, MO
3. "J-DRain 300", JDR Enterprises, Inc., Alpharetta, GA
4. "Hydraway 100", Solutia, Inc., St. Louis, MO
5. "Enkadrain 9010", Akzo Nobel Geosynthetics Company, Enka, NC
iv. Flow rate, @3600 psf and hydraulic gradient = 1.0, ASTM D4716: 15 gpm/ft. width
v. Compressive Strength, ASTM D1621: 18,000 psf
vi. Subject to compliance with requirements, provide one of the following:
1. "MiraDRAIN MD-6000", TC MiraDRI, Inc., Norcross, GA
2. "Sheet Drain", Greenstreak, St. Louis, MO
3. "J-DRain 400", JDR Enterprises, Inc., Alpharetta, GA
4. "Hydraway 300", Solutia, Inc., St. Louis, MO
5. "Enkadrain 9120", Akzo Nobel Geosynthetics Company, Enka, NC

h. Slotted Collector Pipe: Provide Schedule 80 PVC pipe with 0.10 inch slots comprising a minimum of 8% of the total surface area of the pipe but no more than 10%.

8. Clearing and Grubbing

9. Preparation

10. Excavation

11. Placing Fill and Backfill

12. Compaction

13. Building Slab Drainage Course

14. Field Quality Control

15. Maintenance

16. Disposal of Excess Waste Materials

17. Unit Prices

SECTION 312319- DEWATERING

1. Scope
2. Summary
3. Definitions
4. Submittals
5. Quality Assurance
6. Materials
    a. Straw Bale Fence
    b. Anti-erosion Mulch: Clean, dry straw of winter wheat, rye, oats, or barley.
    c. Silt Fence Fabric: Synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yard, containing ultraviolet ray inhibitors and stabilizers providing a minimum of six months usable construction life at a temperature range from 0 to 120 degrees F., and meeting the following requirements:
        i. Sediment retention efficiency: Not less than 85 percent.
        ii. Grab strength at 20 percent maximum elongation:
            1. Standard Strength Fabric: 30 pounds per lineal inch.
            2. Extra Strength Fabric: 50 pounds per lineal inch.
        iii. Flow Rate: Not less than 0.30 gallons per square foot per minute.
    d. Silt Fence Posts: Contractor has option of the following.
        i. 4 inch diameter pine.
        ii. 2 inch diameter oak.
        iii. 1.333 pound per lineal foot steel posts a minimum of 4 feet in length.
            1. Steel posts shall have projections for fastening the fabric.
7. Examination
8. Preparation
9. General
10. Site Stripping and Clearing Operations
11. Installation of Erosion Control Devices
12. Maintenance
13. Inspections
14. Chemical and Sewage Spills
15. Removed Substances

SECTION 313116- TERMITE CONTROL

1. Related Documents

2. Summary
3. Performance Requirements
4. Submittal
5. Quality Assurance
6. Project Conditions
7. Coordination
8. Warranty: Five years
9. Manufacturers
10. Soil Treatment: Provide and EPA-registered termiticide
11. Examination
12. Preparation
13. Application, General
14. Applying Soil Treatment

SECTION 315000- EXCAVATION SUPPORT & PROTECTION (To be Provided at a later date)

SECTION 316000- *GEOPIER* REINFORCED SUBGRADE SYSTEM (Protirerary System)

DIVISION 32: EXTERIOR IMPROVEMENTS

SECTION 321216- ASPHALT PAVING

1. Related Documents
2. Reference Specification
3. Summary
4. Submittals
5. Site Conditions
6. Materials
    a. General: Use locally available materials and gradations that exhibit a satisfactory record of

previous installations.

b. Coarse Aggregate: Sound, angular crushed stone, or crushed gravel.
c. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, gravel, or combinations thereof, complying with ASTM D 1073.
d. Mineral Filler: Rock dust, hydraulic cement, or other inert material complying with ASTM D 242.
e. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
f. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.
g. Tack Coat: Emulsified asphalt; ASTM D 977: Grade SS-1H.
h. Granular Base Course: Type AB-3 complying with Sub-Section 1105 of the Standard Specifications for State Road and Bridge Construction of the Kansas Department of Transportation.
i. Granular Base Course: Type 1 aggregate complying with Section 1006 of the Missouri Standard Specifications for Highway Construction.
j. Granular Base Course: Crushed stone complying with Section 2202 of the Standard Specifications and Design Criteria of the American Public Works Association.
k. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.
    i. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
    ii. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
        1. Ciba-Geigy Corp.
        2. Dow Chemical U.S.A.
        3. E.I. Du Pont de Nemours & Co., Inc.
        4. FMC Corp.
        5. Thompson-Hayward Chemical Co.
        6. U.S. Borax and Chemical Corp.
l. Lane Marking Paint: Alkyd-resin type, ready-mixed complying with AASHTO M 248, Type I
    i. Color: White.
    ii. Color: Yellow.
m. Wheel Stops: 3000 psi compressive strength precast, air-entrained concrete, approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside.

7. Asphalt-Aggregate Mixture
    a. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with mix designations and combined aggregate mixtures of reference specifications as noted on the Drawings.

8. Surface Preparation

9. Placing Mix

10. Rolling

11. Traffic and Lane Markings

12. Wheel Stops

13. Field Quality Control

SECTION 321313- CONCRETE PAVING

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Project Conditions
6. Forms
    a. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
        i. Use flexible or curved forms for curves of a 100-foot or less radius.
    b. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
7. Reinforcing Materials
    a. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.
    b. Epoxy-Coated Reinforcing Bars: ASTM A 775 with ASTM A 615, Grade 60 deformed steel bars.
    c. Plain, Cold-Drawn Steel Wire: ASTM A 82.
    d. Welded Steel Wire Fabric: ASTM A 185.
        i. Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.
    e. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
    f. Epoxy-Coated Joint Dowel Bars: ASTM A 775 with ASTM A 615, Grade 60 plain steel bars.
    g. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
        i. Use supports with sand plates or horizontal runners where base material will not support chair legs.
8. Concrete Materials
    a. Portland Cement: ASTM C 150, Type I
        i. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
    b. Fly Ash: ASTM C 618, Type C. Limit use of fly ash such that it does not exceed 15 percent of cement content by weight.
    c. Normal-Weight Aggregates: ASTM C 33, and as follows. Provide aggregates from a single source.
        i. Maximum Aggregate Size: 1-1/2 inches.
        ii. Do not use fine or coarse aggregates that contain substances that cause spalling.

iii. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

d. Water: Potable.

e. Fiber Reinforcement: Synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III.

9. Admixtures

a. Provide concrete admixtures that contain no chloride ions.

b. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

c. Water-Reducing Admixture: ASTM C 494, Type A.

d. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

e. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

f. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

g. Products: Subject to compliance with requirements, provide one of the following:

i. Air-Entraining Admixture:

1. Air-Tite or Amex 210; Cormix Construction Chemicals.
2. Air-Mix or Perma-Air; Euclid Chemical Co
3. Darex AEA or Daravair; W.R. Grace & Co.
4. MB-VR or Micro-Air; Master Builders, Inc.
5. Sealtight AEA; W.R. Meadows, Inc.
6. Sika AER; Sika Corp.

ii. Water-Reducing Admixture:

1. Chemtard; ChemMasters Corp.
2. Type A Series; Cormix Construction Chemicals
3. Eucon WR-75; Euclid Chemical Co.
4. WRDA; W.R. Grace & Co
5. Pozzolith Normal or Polyheed; Master Builders, Inc.
6. Metco W.R.; Metalcrete Industries.
7. Plastocrete 161; Sika Corp.

iii. High-Range Water-Reducing Admixture

1. Super P; Anti-Hydro Co., Inc.
2. Cormix 2000, PSI Super, or Melmet; Cormix Construction Chemicals.
3. Eucon 37; Euclid Chemical Co.
4. WRDA 19 or Daracem; W.R. Grace & Co.
5. Rheobuild or Polyheed; Master Builders, Inc.
6. Superslump; Metalcrete Industries
7. Sikament 300; Sika Corp.

iv. Water-Reducing and Accelerating Admixture:

1. Q-Set; Conspec Marketing & Manufacturing Co.
2. Gilco Accelerator or Lub NCA; Cormix Construction Chemicals.
3. Accelguard 80; Euclid Chemical Co.
4. Daraset; W.R. Grace & Co.
5. Pozzutec 20; Master Builders, Inc.
6. Accel-Set; Metalcrete Industries.

v. Water-Reducing and Retarding Admixture:

1. Type D Series; Cormix Construction Chemicals.
2. Eucon Retarder 75; Euclid Chemical Co.
3. Daratard-17; W.R. Grace & Co.
4. Pozzolith R; Master Builders, Inc

5. Plastiment; Sika Corporation.

10. Curing Materials
    a. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
    b. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
        i. Waterproof paper.
        ii. Polyethylene film.
        iii. White burlap-polyethylene sheet.
    c. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A or B, wax free.
    d. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.
        i. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.
    e. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
    f. Products: Subject to compliance with requirements, provide one of the following:
        i. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound:
            1. Clear Cure; Anti-Hydro Co., Inc.
            2. Spartan-Cote; The Burke Co.
            3. All Resin; Conspec Marketing & Mfg. Co.
            4. Sealco 309; Cormix Construction Chemicals.
            5. Day-Chem Cure and Seal; Dayton Superior Corp
            6. Diamond Clear; Euclid Chemical Co.
            7. #64 Resin Cure-Clear; Lambert Corp
            8. L&M Cure R; L&M Construction Chemicals, Inc.
            9. Masterkure; Master Builders, Inc.
            10. 3100 Series; W.R. Meadows, Inc.
            11. Seal N Kure; Metalcrete Industries.
            12. Kure-N-Seal; Sonneborn-Chemrex
            13. Horn Clear Seal; Tamms/A.C. Horn.
        ii. Clear Waterborne Membrane-Forming Curing Compound:
            1. Clear Cure Water Base; Anti-Hydro Co., Inc.
            2. Spartan Cote WB; The Burke Co.
            3. W.B. Resin Cure; Conspec Marketing and Mfg. Co.
            4. Sealco VOC; Cormix Construction Chemicals.
            5. Safe Cure and Seal (J-18); Dayton Superior Corp.
            6. Diamond Clear VOX; Euclid Chemical Co.
            7. Aqua Kure-Clear; Lambert Corp.
            8. Dress & Seal #22 WB; L&M Construction Chemicals, Inc.
            9. Masterkure 100W; Master Builders, Inc.
            10. 1100 Clear Series; W.R. Meadows, Inc.
            11. Metcure; Metalcrete Industries.
            12. Kure-N-Seal WB; Sonneborn-Chemrex.
            13. Horncure 100; Tamms/A.C. Horn.
        iii. Evaporation Control:
            1. Aquafilm; Conspec Marketing and Mfg. Co.
            2. Eucobar; Euclid Chemical Co.
            3. E-Con; L&M Construction Chemicals, Inc.
            4. Confilm; Master Builders, Inc.
            5. Waterhold; Metalcrete Industries.

11. Related Materials
    a. Boiled Linseed Oil Mixture: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.
    b. Traffic Paint: Alkyd-resin ready-mixed, complying with AASHTO M 248, Type S.
        i. Color: White.
        ii. Color: Yellow.
    c. Nonslip Aggregate Finish: Fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, nonglazing, and unaffected by freezing, moisture, and cleaning materials.
    d. Dry-Shake Color Hardener: Packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless indicated otherwise.
    e. Bonding Agent: Acrylic or styrene butadiene.
    f. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.
    g. Products: Subject to compliance with requirements, provide one of the following:
        i. Dry-Shake Color Hardener:
            1. Conshake 600 Colortone; Conspec Marketing & Mfg. Co.
            2. Floorcron; Cormix Construction Chemicals.
            3. Quartz Tuff; Dayton-Superior.
            4. Surflex; Euclid Chemical Co.
            5. Quartz Plate; L&M Construction Chemicals, Inc.
            6. Colorcron; Master Builders, Inc.
            7. Floor Quartz; Metalcrete Industries.
            8. Lithochrome Color Hardener; L.M. Scofield Co
            9. Harcol Redi-Mix; Sonneborn-Chemrex.
            10. Hard Top; Symons Corp.
            11. Colorundum; Tamms/A.C. Horn, Inc.
        ii. Bonding Agent:
            1. Acrylic Bondcrete; The Burke Co.
            2. Strongbond; Conspec Marketing and Mfg. Co.
            3. Day-Chem Ad Bond (J-40); Dayton Superior Corp.
            4. SBR Latex; Euclid Chemical Co.
            5. Daraweld C; W.R. Grace & Co.
            6. Everbond; L&M Construction Chemicals, Inc.
            7. Acryl-Set; Master Builders Inc
            8. Intralok; W.R. Meadows, Inc.
            9. Acrylpave; Metalcrete Industries.
            10. Sonocrete; Sonneborn-Chemrex.
            11. Stonlock LB2; Stonhard, Inc.
            12. Strong Bond; Symons Corp.
        iii. Epoxy Adhesive:
            1. Burke Epoxy M.V.; The Burke Co.
            2. Spec-Bond 100; Conspec Marketing and Mfg. Co.
            3. Resi-Bond (J-58); Dayton Superior
            4. Euco Epoxy System #452 or #620; Euclid Chemical Co

5. Concresive Standard Liquid; Master Builders, Inc.
6. Rezi-Weld 1000; W.R. Meadows, Inc.
7. Metco Hi-Mod Epoxy; Metalcrete Industries.
8. Sikadur 32 Hi-Mod; Sika Corp.
9. R-600 Series; Symons Corp.
10. Epoxtite Binder 2390; Tamms/A.C. Horn, Inc.

12. Concrete Mix
    a. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
        i. Do not use the Owner's field quality-control testing agency as the independent testing agency.
    b. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
        i. Compressive Strength (28-Day): 4000 psi.
        ii. Compressive Strength (28-Day): 3500 psi.
        iii. Compressive Strength (28-Day): 3000 psi.
        iv. Maximum Water-Cement Ratio at Point of Placement: 0.45.
        v. Maximum Water-Cement Ratio at Point of Placement: 0.50.
        vi. Slump Limit at Point of Placement: 3 inches.
            1. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
    c. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1 percent:
        i. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
        ii. Air Content: 6.0 percent for 1-inch maximum aggregate.
        iii. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
        iv. Air Content: 7.0 percent for 1/2-inch maximum aggregate.
    d. Fiber Reinforcement: Add to mix at rate of 1.5 lb per cu. yd., unless manufacturer recommends otherwise.
    e. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

13. Surface Preparations
    a. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
        i. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

14. Edge Forms and Screed Construction

15. Placing Reinforcement

16. Joints

17. Concrete Placement

18. Concrete Finishing
19. Special Finishes
20. Concrete Protection and Curing
21. Traffic Paint
22. Field Quality Control Testing
23. Repairs and Protection

SECTION 321373- PAVEMENT JOINT SEALANTS

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Delivery, Storage & Handling
6. Project Conditions
7. Materials, General
    a. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.
    b. Colors of Exposed Joint Sealants: Match Architect's samples.
    c. Colors of Exposed Joint Sealants: As indicated by referencing manufacturer's designations.
    d. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.
8. Cold-Applied Joint Sealants
    a. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
        i. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
        ii. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
        iii. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
    b. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

c. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
d. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
e. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.
f. Available Products: Subject to compliance with requirements, cold-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:
g. Products: Subject to compliance with requirements, provide one of the following:
    i. Multicomponent Jet-Fuel-Resistant Sealant for Concrete:
        1. Vulkem 202; Mameco International.
        2. SEALTIGHT GARDOX; W.R. Meadows, Inc.
        3. Urexpan NR-300; Pecora Corporation.
        4. Sonomeric 2; Sonneborn Building Products Div., ChemRex, Inc.
    ii. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete:
        1. Vulkem 200; Mameco International.
        2. Sonomeric 1; Sonneborn Building Products Div., ChemRex, Inc.
    iii. Type NS Silicone Sealant for Concrete:
        1. Roadsaver Silicone-SL; Crafco Inc.
        2. 888; Dow Corning.
    iv. Type SL Silicone Sealant for Concrete and Asphalt:
        1. 890-SL; Dow Corning.
    v. Multicomponent Low-Modulus Sealant for Concrete and Asphalt:
        1. SOF-SEAL; W.R. Meadows, Inc.

9. Hot-Applied Joint Sealants
    a. Jet-Fuel-Resistant Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3569.
    b. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.
    c. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.
    d. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.
    e. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:
    f. Products: Subject to compliance with requirements, provide one of the following:
        i. Jet-Fuel-Resistant Elastomeric Sealant for Concrete:
            1. Superseal 444/777; Crafco, Inc.
            2. POLY-JET 3569; W.R. Meadows, Inc.
        ii. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete:
            1. SUPERSEAL 1614A; Crafco Inc.
            2. POLY-JET 1614; W.R. Meadows, Inc.
            3. POLY-JET 3406; W.R. Meadows, Inc.
            4. POLY-JET 3569, W.R. Meadows, Inc.
        iii. Elastomeric Sealant for Concrete:
            1. Superseal 444/777; Crafco, Inc.
            2. POLY-JET 3406; W.R. Meadows, Inc.
        iv. Sealant for Concrete and Asphalt:
            1. ROADSAVER 221; Crafco Inc.

2. Product #9005; Koch Materials Company.
3. Product #9030; Koch Materials Company.
4. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

10. Joint-Sealant Backer Materials
    a. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.
    b. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.
    c. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
    d. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

11. Examination

12. Preparation

13. Installation of Joint Sealants

14. Cleaning

15. Protection

SECTION 321400- UNIT PAVING

SECTION 329200- TURF AND GRASSES

DIVISION 33: UTILITIES

SECTION 330500- WATER SYSTEMS

1. Related Documents

2. Summary

3. System Performance Requirements

4. Submittals

5. Quality Assurance

6. Deliver, Storage & Handling

7. Project Conditions

8. Sequencing and Scheduling

9. Manufacturers
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Drilling Machine Corporation Stops:
            1. Ford Meter Box Co., Inc.
            2. Hays Div., Romac Industries.
            3. Mueller Co., Grinnell Corp.
        ii. Bronze Corporation Stops and Valves:
            1. Ford Meter Box Co., Inc.
            2. Hays Div., Romac Industries.
            3. A.Y. McDonald Mfg. Co.
            4. Mueller Co., Grinnell Corp.
        iii. Tapping Valves:
            1. Clow Valve Co. Div., McWane, Inc.
            2. East Jordan Iron Works, Inc.
            3. Kennedy Valve Div., McWane, Inc.
            4. Mueller Co., Grinnell Corp.
            5. U.S. Pipe & Foundry Co.
        iv. Gate Valves:
            1. American Darling Valve Div., American Cast Iron Pipe Co.
            2. Clow Valve Co. Div., McWane, Inc.
            3. East Jordan Iron Works, Inc.
            4. Gem Sprinkler Co. Div., Grinnell Corp.
            5. Hammond Valve Corp
            6. Kennedy Valve Div., McWane, Inc.
            7. Milwaukee Valve Co., Inc.
            8. Mueller Co., Grinnell Corp.
            9. Nibco, Inc.
            10. Stockham Valves & Fittings, Inc.
            11. U.S. Pipe & Foundry Co.
            12. Waterous Co.
        v. Indicator Posts and Indicator Gate Valves:
            1. American Darling Valve Div., American Cast Iron Pipe Co.
            2. Clow Valve Co. Div., McWane, Inc.
            3. Kennedy Valve Div., McWane, Inc.
            4. Mueller Co., Grinnell Corp.
            5. Nibco, Inc.
            6. Stockham Valves & Fittings, Inc.
            7. U.S. Pipe & Foundry Co.
            8. Waterous Co.
        vi. Dry-Barrel Fire Hydrants:
            1. American Darling Valve Div., American Cast Iron Pipe Co
            2. Clow Valve Co. Div., McWane, Inc.
            3. East Jordan Iron Works, Inc.
            4. Kennedy Valve Div., McWane, Inc.
            5. Mueller Co., Grinnell Corp.
            6. U.S. Pipe & Foundry Co.
            7. Waterous Co.

vii. Wet-Barrel Fire Hydrants:
1. Clow Valve Co. Div., of McWane, Inc.
2. Mueller Co., Grinnell Corp.

viii. Water Meters:
1. Badger Meter, Inc.
2. Carlon Meter Co., Inc.
3. Hays Div., Romac Industries.
4. Hersey Products, Inc., Grinnell Corp.
5. Kent Meters, Inc.
6. Neptune Water Div., Schlumberger Industries, Inc.
7. Sensus Technologies, Inc., BTR Co.
8. Water Specialties Corp.

ix. Detector-Type Water Meters:
1. Badger Meter, Inc.
2. Hersey Products, Inc., Grinnell Corp.
3. Neptune Water Div., Schlumberger Industries, Inc.
4. Sensus Technologies, Inc.

x. Drains:
1. Ancon, Inc.
2. Jones Manufacturing Co., Inc.
3. Josam Co.
4. Jay R. Smith Mfg. Co. Div., Smith Industries, Inc
5. Wade Div., Tyler Pipe Subsid., Tyler Corp.
6. Zurn Hydromechanics Div., Zurn Industries, Inc.

xi. Detector Check Valves
1. Ames Co., Inc.
2. Hersey Products, Inc., Grinnell Corp.
3. Kennedy Valve Div., McWane, Inc.
4. Viking Corp.
5. Watts Regulator Co.

xii. Backflow Preventers:
1. Ames Co., Inc.
2. Cla-Val Co. Div., Griswold Industries.
3. Conbraco Industries, Inc.
4. Febco.
5. Hersey Products, Inc., Grinnell Corp.
6. Watts Regulator Co.
7. Wilkins Regulator Div., Zurn Industries, Inc.

xiii. Sanitary-Type Yard Hydrants:
1. Murdock, Inc.

xiv. Post-Type Yard Hydrants:
1. Ancon, Inc.
2. Jones Manufacturing Co., Inc.
3. Josam Co.
4. Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
5. Wade Div., Tyler Pipe Subsid., Tyler Corp.
6. Woodford Mfg. Co. Div., WCM Industries, Inc.
7. Zurn Hydromechanics Div., Zurn Industries, Inc.

xv. Fire Department Connections:
1. Badger-Powhatan, Figgie International Co.
2. Croker Div., Fire-End and Croker Corp.

3. Elkhart Brass Mfg. Co., Inc.
4. Firematic Sprinkler Devices, Inc.
5. Gem Sprinkler Co. Div., Grinnell Corp.
6. Guardian Fire Equipment, Inc.
7. Potter-Roemer Div., Smith Industries, Inc.
8. Reliable Automatic Sprinkler Co., Inc
9. Sierra Fire Equipment Co.

10. Pipes and Tubes
    a. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube materials specified below are used.
    b. Ductile-Iron Pipe: AWWA C151, Classes 150, 200, and 250.
        i. Lining: AWWA C104, cement mortar, seal coated.
        ii. Gaskets, Glands, and Bolts and Nuts: AWWA C111.
        iii. Push-On-Joint-Type Pipe: AWWA C111, rubber gaskets.
        iv. Mechanical-Joint-Type Pipe: AWWA C111, rubber gaskets, ductile- or cast-iron glands, and steel bolts and nuts.
        v. Encasement: AWWA C105, polyethylene film tube.
    c. Copper Tube: ASTM B 88, Types K and L, seamless water tube, annealed temper.

11. Pipe and Tube Fittings
    a. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube fitting materials specified below are used.
    b. Ductile-Iron and Cast-Iron Pipe Fittings: AWWA C110, ductile-iron or cast-iron, 250-psig minimum pressure rating; or AWWA C153, ductile-iron compact fittings, 350-psig pressure rating.
        i. Lining: AWWA C104, cement mortar.
        ii. Gaskets: AWWA C111, rubber.
    c. Ductile-Iron and Gray-Iron Flanged Fittings: AWWA C110, 250-psig minimum pressure rating, with AWWA C104 cement-mortar lining.
    d. Ductile-Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends conforming to AWWA C110 or AWWA C153. Units have 2 gasketed ball-joint sections and 1 or more gasketed sleeve sections, rated for 250-psig minimum working pressure and with FDA-approved epoxy interior coating, for offset and expansion indicated.
    e. Ductile-Iron Deflection Fittings: Compound coupling fitting with sleeve and flexing sections, gaskets, and restrained-joint ends conforming to AWWA C110 or AWWA C153. Units rated for 250-psig minimum working pressure, and with cement lining or FDA-approved epoxy interior coating, for up to 20 degrees (0.34 rad) deflection.
    f. Ductile-Iron Expansion Joints: 3-piece assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron bell-and-spigot end sections conforming to AWWA C110 or AWWA C153. Units rated for 250-psig minimum working pressure, and with cement lining or FDA-approved epoxy interior coating, for expansion indicated.
    g. Polyethylene Encasement: AWWA C105, 8-mils minimum thickness, tube or sheet.
    h. Copper Tube Fittings: ASME B16.22, wrought-copper, solder-joint pressure type.

12. Joining Materials
    a. Refer to Part 3 Article "Piping Applications" for identification of systems where joining materials specified below are used.
    b. Ductile-Iron Pipe and Ductile-Iron or Cast-Iron Fittings: The following materials apply:
        i. Push-On Joints: AWWA C111 rubber gaskets and lubricant.

ii. Mechanical Joints: AWWA C111 ductile-iron or gray-iron glands, high-strength steel bolts and nuts, and rubber gaskets.
iii. Flanged Joints: AWWA C115 ductile-iron or gray-iron pipe flanges, rubber gaskets, and high-strength steel bolts and nuts.
1. Gaskets: Rubber, flat face, 1/8 inch thick except where other thickness is indicated; and full-face or ring type except where other type is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

c. Brazing Filler Metals: AWS A5.8, BCuP (copper-phosphorus) Series.
d. Solder Filler Metal: ASTM B 32, Alloy Sn95; tin (approximately 95 percent), silver (approximately 4.5 percent), with 0.10 percent maximum lead content.
e. Solder Filler Metal: ASTM B 32, Alloy Sn95, Alloy Sn94, or Alloy E; tin (approximately 95 percent), silver or copper (approximately 5 percent), with 0.10 percent maximum lead content.
f. Pipe Couplings: Iron-body sleeve assembly, fabricated to match outside diameters of pipes to be joined.
i. Sleeve: ASTM A 126, Class B, gray iron.
ii. Followers: ASTM A 47, Grade 32510, or ASTM A 536 ductile iron.
iii. Gaskets: Rubber.
iv. Bolts and Nuts: AWWA C111.
v. Finish: Enamel paint.
vi. Encasement: AWWA C105, polyethylene film tube or sheet.

13. Piping Specialties
a. Flexible Pipe Connectors for Non-Ferrous Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends; brazed to hose.
b. Flexible Pipe Connectors for Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1 threaded steel pipe nipples or ASME B16.5 steel pipe flanges; welded to hose.
c. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and corrosion.
i. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
ii. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material isolating dissimilar metals and ends with inside threads according to ASME B1.20.1.
iii. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150-psig or 300-psig minimum pressure to suit system pressures.
iv. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
1. Provide separate companion flanges and steel bolts and nuts for 150-psig or 300-psig minimum working pressure to suit system pressures.
v. Dielectric Couplings: Galvanized-steel couplings having inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F.
vi. Dielectric Nipples: Electroplated steel nipples having inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig working pressure at 225 deg F.

14. Valves
    a. Nonrising Stem Gate Valves 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psig working pressure, mechanical joint ends.
    b. Nonrising Stem Gate Valves 3 Inches and Larger: AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psig working pressure, mechanical joint ends.
    c. Nonrising Stem Gate Valves 4 Inches and Larger: UL 262, FM approved, iron body and bonnet with flange for indicator post, bronze seating material, inside screw, 175-psig working pressure, mechanical joint ends. Provide with flanged ends for pit installation.
    d. Rising Stem Gate Valves, 3 Inches and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings, cast-iron or ductile-iron body and bonnet, OS&Y, bronze stem, 200-psig working pressure, flanged ends.
    e. Rising Stem Gate Valves, 3 Inches and Larger: AWWA C509, resilient seated; cast-iron or ductile-iron body and bonnet, OS&Y, bronze stem, 200-psig working pressure, flanged ends.
    f. Nonrising Stem Gate Valves, 2 Inches and Smaller: MSS SP-80; body and screw bonnet of ASTM B 62 cast bronze; with Class 125 threaded ends, solid wedge, nonrising copper-silicon alloy stem, brass packing gland, polytetrafluoroethylene (PTFE)-impregnated packing, and malleable-iron handwheel.
    g. Valve Boxes: Cast-iron box having top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
        i. Provide a steel tee-handle operating wrench with each valve box. Wrench shall have tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.
    h. Indicator Posts: UL 789, FM-approved, vertical type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.
    i. Curb Stops: Bronze body, ground key plug or ball, and wide tee head, with inlet and outlet to match service piping material.
    j. Service Boxes for Curb Stops: Cast-iron box with telescoping top section of length required for depth of bury of valve. Include cover having lettering "WATER," and bottom section with base of size to fit over curb stop and barrel approximately 3 inches in diameter.
        i. Provide steel tee-handle shutoff rod with each service box. Shutoff rod shall have tee handle with 1 pointed end, stem of length to operate curb stop, and slotted end fitting curb stop head.
    k. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. Use sleeve and valve compatible with tapping machine.
        i. Tapping Sleeve: Cast-iron or ductile-iron 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical joint ends with rubber gaskets or sealing rings in sleeve body. Use sleeve that mates with size and type pipe material being tapped. Outlet flange shall be size required for branch connection.
    l. Service Clamps and Corporation Stops: Complete assembly, including service clamp, corporation stop, and bolts and nuts. Use service clamp and stop compatible with drilling machine.
        i. Service Clamp: Cast iron or ductile iron with gasket and AWWA C800 threaded outlet for corporation stop, and threaded end straps.

ii. Corporation Stops: Bronze body and ground key plug, with AWWA C800 threaded inlet and outlet matching service piping material.
iii. Manifold: Copper with 2 to 4 inlets as required, with ends matching corporation stops and outlet matching service piping.

15. Pits
    a. Concrete: Portland cement mix, 3000 psi.
        i. Cement: ASTM C 150, Type I.
        ii. Fine Aggregate: ASTM C 33, sand.
        iii. Coarse Aggregate: ASTM C 33, crushed gravel.
        iv. Water: Potable.
    b. Reinforcement: Steel conforming to the following:
        i. Fabric: ASTM A 185, welded wire fabric, plain.
        ii. Reinforcement Bars: ASTM A 615, Grade 60, deformed.
    c. Steps: Polyethylene-encased steel steps.
    d. Manhole: ASTM A 48, Class 35, gray-iron, 24-inch minimum diameter traffic frame and cover, of size and weight indicated.
    e. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron, 24-inch minimum diameter traffic frame and cover, of size and weight indicated.
    f. Drain: ASME A112.21.1M, cast-iron area drain, of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

16. Fire Hydrants
    a. General: Cast-iron body, compression-type valve, opening against pressure and closing with pressure, 6-inch mechanical joint inlet, 150-psig working pressure.
    b. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
    c. Operating and Cap Nuts: Pentagon 1-1/2 inch point to flat.
    d. Direction of Opening: Open hydrant valve by turning operating nut to the left, or counterclockwise.
    e. Finish: Red exterior alkyd gloss enamel paint.
    f. Dry-Barrel Fire Hydrants: UL 246, FM-approved, two 2-1/2-inch and one 4-1/2-inch outlets, 5-1/4-inch main valve, drain valve, and 6-inch mechanical joint inlet.
    g. Dry-Barrel Fire Hydrants: AWWA C502, two 2-1/2-inch and one 4-1/2-inch outlets, 5-1/4-inch main valve, drain valve, and 6-inch mechanical joint inlet.
    h. Wet-Barrel Fire Hydrants: UL 246, FM-approved, two 2-1/2-inch and one 4-1/2-inch outlets, 6-inch threaded or flanged inlet, and base section with 6-inch mechanical joint inlet.
    i. Wet-Barrel Fire Hydrants: AWWA C503, two 2-1/2-inch and one 4-1/2-inch outlets, 6-inch threaded or flanged inlet, and base section with 6-inch mechanical joint inlet.

17. Fire Department Connections
    a. Exposed, Sidewalk Fire Department Connections: UL 405, cast-brass body, with thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded NPS bottom outlet. Include lugged cap, gasket, and chain; lugged swivel connection and drop clapper for each hose connection inlet; 18-inch-high brass sleeve; and round sidewalk escutcheon plate.
        i. Connections: Two 2-1/2-inch inlets and 4-inch outlet.
        ii. Connections: Two 2-1/2-inch inlets and 6-inch outlet.
        iii. Connections: Three 2-1/2-inch inlets and 6-inch outlet.

iv. Connections: Four 2-1/2-inch inlets and 6-inch outlet.
v. Connections: Six 2-1/2-inch inlets and 6-inch outlet.
vi. Connections: Six 2-1/2-inch inlets and 8-inch outlet.
vii. Inlet Alignment: In line, horizontal
viii. Inlet Alignment: Square.
ix. Finish Including Sleeve: Polished chrome plated.
x. Finish Including Sleeve: Rough chrome plated.
xi. Finish Including Sleeve: Polished brass.
xii. Escutcheon Plate Marking: "AUTO SPKR & STANDPIPE."
xiii. Escutcheon Plate Marking: "AUTO SPKR."
xiv. Escutcheon Plate Marking: "STANDPIPE."

18. Detector Check Valves
    a. Detector Check Valves: UL 213, galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends; designed for 175 psig working pressure. Include 1-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in the inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
        i. Water Meter: AWWA C700, disc type, of size not less than one-fourth the size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
    b. Detector Check Valve: UL 312, FM-approved detector check, iron body, corrosion-resistant clapper ring and seat ring material, 175 psig working pressure, flanged ends, with connections for (but not including) a bypass and installation of a water meter.

19. Backflow Preventers
    a. General: ASSE Standard backflow preventers, of size indicated for maximum flow rate and maximum pressure loss indicated.
        i. Working Pressure: 150 psig minimum except where indicated otherwise.
        ii. 2 Inches and Smaller: Bronze body with threaded ends.
        iii. 2-1/2 Inches and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends
            1. Interior Lining: FDA-approved epoxy coating for backflow preventers having cast-iron or steel body.
        iv. Interior Components: Corrosion-resistant materials.
        v. Exterior Finish: Polished chrome plate when used in chrome-plated piping system.
        vi. Strainer on inlet where strainer is indicated.
    b. Reduced-Pressure-Principle Backflow Preventer: ASSE 1013, with OS&Y gate valves on inlet and outlet, and strainer on inlet. Include test cocks and pressure-differential relief valve having ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves for continuous-pressure application.
        i. Pressure Loss: 12 psig maximum through middle third of flow range.
    c. Double-Check Backflow Prevention Assemblies: ASSE 1015, with valves on inlet and outlet and strainer on inlet. Include test cocks with 2 positive-seating check valves for continuous-pressure application.
        i. Pressure Loss: 5 psig maximum through middle third of flow range.
    d. Double Check Valve Assembly: UL 312, FM-approved. Assembly has 2 UL 312, FM-approved, iron-body, 175-psig working pressure, flanged-end check valves, with 2 UL 262, FM-approved, iron-body, OS&Y, flanged, 175-psig working pressure gate valves.
        i. Pressure Loss: 5 psig maximum through middle third of flow range.

e. Antisiphon, Pressure-Type Vacuum Breakers: ASSE 1020, with valves, spring-loaded check valve, and spring-loaded floating disc. Include test cocks and atmospheric vent for continuous-pressure application.
    i. Pressure Loss: 5 psig maximum through middle third of flow range.
f. Reduced-Pressure Detector Assembly Backflow Preventers: ASSE 1047, FM-approved or UL-listed, with OS&Y gate valves on inlet and outlet, and strainer on inlet. Include pressure-differential relief valve having ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves, test cocks, and bypass with displacement-type water meter, valves, and reduced-pressure backflow preventer, for continuous-pressure application.
    i. Pressure Loss: 12 psig maximum through middle third of flow range.
g. Double-Check Detector Assembly Backflow Preventers: ASSE 1048, FM-approved or UL-listed, with OS&Y gate valves on inlet and outlet, and strainer on inlet. Include 2 positive-seating check valves and test cocks, and bypass with displacement-type water meter, valves, and double-check backflow preventer, for continuous-pressure application.
    i. Pressure Loss: 5 psig maximum through middle third of flow range.

20. Yard Hydrants
    a. Yard Hydrants, Sanitary Type: Nonfreeze, post type, with nondraining chamber for storing water trapped downstream of inlet valve. Hydrants have 1-inch inlet, integral or field-installed vacuum breaker with outlet conforming to ASME B1.20.7, 3/4-11.5NH threads for garden hose, brass or bronze casing, and other parts in contact with water, and are handle or key operated. Body of hydrant is of length required for installation of storage chamber below frost line. Furnish 2 keys for each key-operated hydrant.
    b. Yard Hydrants, Post Type: Nonfreeze, post-type, 3/4-inch inlet, integral or field-installed vacuum breaker with outlet conforming to ASME B1.20.7, 3/4-11.5NH threads for garden hose. Include bronze casing, cast-iron or cast-aluminum casing guard, tapped drain port in valve housing, and key operation. Hydrant is of length required for installation of inlet valve below frost line. Furnish 2 keys for each hydrant.

21. Anchorages
    a. Clamps, Straps, and Washers: ASTM A 506, steel.
    b. Rods: ASTM A 575, steel
    c. Rod Couplings: ASTM A 197, malleable iron.
    d. Bolts: ASTM A 307, steel.
    e. Cast-Iron Washers: ASTM A 126, gray iron.
    f. Concrete Reaction Backing: Portland cement concrete mix, 3000 psi.
        i. Cement: ASTM C 150, Type I.
        ii. Fine Aggregate: ASTM C 33, sand.
        iii. Coarse Aggregate: ASTM C 33, crushed gravel.
        iv. Water: Potable.

22. Indentification
    a. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."
    b. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."
    c. Nonmetallic Piping Label: Engraved plastic-laminate label, for installation on main electrical meter panel; not less than 1 inch by 3 inches, with caption "CAUTION - THIS STRUCTURE HAS A NONMETALLIC WATER SERVICE."

23. Earthwork
24. Service Entrance Piping
25. Piping Applications
26. Valve Applications
27. Joint Construction
28. Piping Systems- Common Requirements
29. Piping Installation
30. Anchorage Installation
31. Valve Installation
32. Fire Hydrant Installation
33. Roughing-in for Water Meters
34. Pit Construction Installation
35. Detector Check Valve Installation
36. Backflow Preventer Installation
37. Yard Hydrant Installation
38. Fire Department Connection Installation
39. Security
40. Identification Installation
41. Field Quality Control
42. Cleaning

SECTION 334100- STORM UTILITY DRAINAGE PIPING

1. Related Documents
2. Summary
3. Definitions
4. Submittals

5. Quality Assurance

6. Deliver, Storage & Handling

7. Project Conditions

8. Sequencing and Scheduling

9. Manufacturers
    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        i. Cleanouts and Drains
            1. Ancon, Inc.
            2. Jones Manufacturing Co., Inc.
            3. Josam Co.
            4. Rockford Sanitary Systems, Inc.
            5. Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
            6. Wade Div., Tyler Corp.
            7. Zurn Industries, Inc., Hydromechanics Div.

10. Pipes and Fittings
    a. Corrugated-Steel Pipe: ASTM A 760, Type I, made from ASTM A 444, zinc-coated steel sheet for banded joints.
        i. Fittings: Fabricated to types indicated and according to same standards as pipe.
        ii. Connecting Bands: Standard couplings made for corrugated-steel pipe to form soiltight joints.
    b. Corrugated-Aluminum Pipe: ASTM B 745, Type I, made from ASTM B 744, aluminum-alloy sheet for banded joints.
        i. Fittings: Fabricated to types indicated and according to same standards as pipe.
        ii. Connecting Bands: Standard couplings made for corrugated-aluminum pipe to form soiltight joints.
    c. Corrugated, Polyethylene (PE) Drainage Tubing and Fittings: AASHTO M 252 Interim, Type S, with smooth waterway for coupling joints
        i. Soiltight Couplings: AASHTO M 252 Interim, corrugated, matching tube and fittings to form soiltight joints.
        ii. Silttight Couplings: Polyethylene (PE) sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material, that mates with tube and fittings to form silttight joints.
    d. Corrugated, Polyethylene (PE) Drainage Tubing: AASHTO M 252 Interim, Type S, with smooth waterway for gasketed joints.
        i. Fittings: ASTM D 3034, polyvinyl chloride (PVC) with socket ends, for gasketed joints.
        ii. Gaskets: ASTM F 477, elastomeric seals, that mates with tube and fittings to form watertight joints.
    e. Corrugated, Polyethylene (PE) Plastic Pipe and Fittings: AASHTO M 294 Interim, Type S, with smooth waterway for coupling joints.
        i. Soiltight Couplings: AASHTO M 294 Interim, corrugated, matching pipe and

fittings to form soiltight joints.
ii. Silttight Couplings: Polyethylene (PE) sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material, that mates with pipe and fittings to form silttight joints.

f. Corrugated, Polyethylene (PE) Plastic Pipe: AASHTO M 294 Interim, Type S, with smooth waterway for gasketed joints.
i. Fittings 12 and 15 Inches: ASTM D 3034, polyvinyl chloride (PVC) with socket ends, for gasketed joints.
ii. Fittings 18 to 24 Inches: ASTM F 1336, polyvinyl chloride (PVC) with socket ends, for gasketed joints.
iii. Gaskets: ASTM F 477, elastomeric seals, that mates with pipe and fittings to form watertight joints.

g. Corrugated, Polyethylene (PE) Plastic Pipe and Fittings: AASHTO M 294 Interim, Type S, with smooth waterway for coupling joints.
i. Couplings: Polyethylene (PE) sleeve with ASTM F 477, elastomeric seals, that mates with pipe and fittings to form watertight joints.

h. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints.
i. Primer: ASTM F 656.
ii. Solvent Cement: ASTM D 2564.
iii. Gaskets: ASTM F 477, elastomeric seal.

i. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM F 679, T-1 wall thickness, bell and spigot for gasketed joints.
i. Gaskets: ASTM F 477, elastomeric seal.

j. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, for mastic joints.

11. Special Pipe Couplings and Fittings
a. Sleeve-Type Pipe Couplings: Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined, for nonpressure joints.
i. Sleeves for Plastic Pipe: ASTM F 477, elastomeric seal.
ii. Sleeves for Dissimilar Pipes: Compatible with pipe materials being joined.
iii. Bands: Stainless steel, at least one at each pipe insert.

b. Gasket-Type Pipe Couplings: Rubber or elastomeric compression gasket, made to match outside diameter of smaller pipe and inside diameter or hub of adjoining larger pipe, for nonpressure joints.
i. Gaskets for Plastic Pipe: ASTM F 477, elastomeric seal.
ii. Gaskets for Dissimilar Pipes: Compatible with pipe materials being joined.

12. Manholes
a. Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated.
i. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
ii. Riser Sections: 4-inch minimum thickness, 48-inch minimum diameter, and lengths to provide depth indicated.
iii. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
iv. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match a 24-inch-diameter frame and cover.
v. Steps: Plastic coated, steel core, individual steps. Include a width that allows a

worker to place both feet on one step and is designed to prevent lateral slippage off the step. Cast steps into base, riser, and top section sidewalls at 16-inch intervals.

b. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron. Include 24-inch inside diameter by 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover.

13. Inlets
    a. Curb Inlets: Vertical, curb-opening type, of materials and dimensions indicated.
    b. Area Inlets: Vertical opening type, of materials and dimensions indicated.
    c. Grate Inlets: Horizontal opening type, of materials and dimensions indicated. Include heavy-duty frames and grates.
    d. Frames and Grates: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron, frames and flat grates, of dimensions indicated.

14. Concrete
    a. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
        i. Cement: ASTM C 150, Type II.
        ii. Fine Aggregate: ASTM C 33, sand.
        iii. Coarse Aggregate: ASTM C 33, crushed gravel.
        iv. Water: Potable.
    b. Structures: Portland-cement design mix, 4000 psi minimum, with 0.45 maximum water-cement ratio.
        i. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
        ii. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.
    c. Structure Inverts: Field-formed from concrete. Portland-cement design mix, 4000 psi minimum, with 0.45 maximum water-cement ratio.
        i. Cast inverts in all structures.
            1. Inverts: Concrete invert, formed to same width as connected piping, with height of the vertical sides to 1/2 of the pipe diameter. Form curved channels with smooth, uniform radius and slope.

15. Cleanouts
    a. Description: ASME A112.36.2M, round, cast-iron housing with clamping device and round, secured, scoriated, cast-iron cover. Include cast-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
        i. Light Duty: In earth or grass, foot-traffic areas.
        ii. Medium Duty: In paved, foot-traffic areas.
        iii. Heavy Duty: In vehicle-traffic service areas.
        iv. Extra Heavy Duty: In roads.
    b. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, service class, cast-iron soil pipe and fittings.

16. Drains
    a. Area Drains: ASME A112.21.1M, round, cast-iron body with anchor flange and round, secured, cast-iron grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated. Use units with top-loading classifications according to the following applications:
        i. Medium Duty: In paved, foot-traffic areas.
        ii. Heavy Duty: In vehicle-traffic service areas.

17. Headwall Structures
    a. Construct headwall, apron, and tapered sides of cast-in-place, reinforced concrete.
    b. Riprap: Broken stone, irregular size and shape, weighing 15 to 50 pounds each.
    c. Energy Dissipators: Construction as indicated, from materials indicated.
18. Earthwork
19. Identification
20. Special Pipe Coupling and Fitting Application
21. Installation, General
22. Pipe Joint Construction and Installation
23. Manhole Installation
24. Inlet Installation
25. Headwall Structure Construction
26. Concrete Placement
27. Cleanout Installation
28. Drain Installation
29. Drain Installation
30. Tap Connections
31. Closing Abandoned Systems
32. Field Quality Control

SECTION 334600- SUBDRAINAGE

1. Related Documents
2. Summary
3. Submittals
4. Quality Assurance
5. Coordination
6. Manufacturers
    a. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

b. Products: Subject to compliance with requirements, provide one of the following:
   i. Drainage Conduits:
      1. AvanEDGE; Advanced Drainage Systems, Inc.
      2. Form-A-Drain; CertainTeed Corp.; Pipe & Plastics Group.
   ii. Molded-Sheet Drainage Panels:
      1. Amerdrain 500; American Wick Drain Corp.
      2. In-Drain; Eljen Corp.
      3. Battle Drain II; Exxon Chemical Co.
      4. Hydroduct; Grace: W.R. Grace & Co.; Construction Products Div.
      5. Sheet Drain; GREENSTREAK Plastic Products Co., Inc.
      6. Hydraway 100; Monsanto Co.
      7. Miradrain MD-6000; Nicolon Corp.; Mirafi Div.
   iii. Molded-Sheet Drainage Panels with Film Backing:
      1. Amerdrain 520; American Wick Drain Corp.
      2. Battle Drain Plus, with film backing; Exxon Chemical Co.
      3. Hydroduct 2; Grace: W.R. Grace & Co.; Construction Products Div.
      4. Sheet Drain, with film backing; GREENSTREAK Plastic Products Co., Inc.
      5. Hydraway 300; Monsanto Co.
      6. Miradrain MD-6200; Nicolon Corp.; Mirafi Div.
   iv. Fabric Drainage Panels
      1. Plastinet 6261; AET/Maynard Plastics.
      2. Enkadrain 9120; Akzo Industrial Systems Co.
      3. Gundnet; Gundle Lining Systems, Inc.
      4. JDRain-100; JDR Enterprises, Inc.
      5. STRATADRAIN 50-1; Strata Systems, Inc.
   v. Thermadry Type 1750; Dow Chemical Co.
   vi. GEOTECH; GeoTech Systems Corp.

7. Pipes and Fittings
   a. General: Include pipes, fittings, couplings, and joint materials
   b. Cast-Iron Soil Pipe and Fittings: ASTM A 74, Service and Extra-Heavy classes, hub-and-spigot ends, gray, cast iron, for gasketed joints
      i. Gaskets: ASTM C 564, rubber, of thickness matching class of pipe.
   c. Polyethylene (PE) Drainage Tubing and Fittings: AASHTO M 252 Interim, Type S, corrugated, with smooth waterway, for coupled joints.
      i. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.
   d. Polyethylene (PE) Pipe and Fittings: AASHTO M 294 Interim, Type S, corrugated, with smooth waterway, for coupled joints.
      i. Couplings: AASHTO M 294, corrugated, band type, matching tubing and fittings.
   e. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.
      i. Gaskets: ASTM F 477, elastomeric seal.
   f. Perforated, Polyethylene (PE) Pipe and Fittings: ASTM F 405, corrugated, for coupled joints.
      i. Couplings: Manufacturer's standard, band type.
   g. Perforated, Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.
   h. Perforated, Clay Pipe and Fittings: ASTM C 700, Standard-Strength and Extra-Strength

classes, unglazed, socket-and-spigot ends, for closed joints.
    i. Gaskets: ASTM C 425, rubber.
i. Perforated, Concrete Pipe: ASTM C 444 (ASTM C 444M), Type 1, and applicable requirements of ASTM C 14 (ASTM C 14M), Class 2, socket-and-spigot ends, for closed joints.
    i. Fittings: ASTM C 14 (ASTM C 14M), Class 2.
    ii. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
j. Porous, Concrete Pipe and Fittings: ASTM C 654 (ASTM C 654M), Standard-Strength and Extra-Strength classes, for slip joints.
k. Clay Drain Tile: ASTM C 4, Standard, Extra-Quality, and Heavy-Duty classes, for open joints.
l. Concrete Drain Tile: ASTM C 412 (ASTM C 412M); Standard-Quality; Extra-Quality; and Heavy-Duty, Extra-Quality classes, for open joints.
m. Joint Screening: 1 of the following coverings for each open joint:
    i. ASTM D 226, Type I, asphalt-saturated; or ASTM D 227, coal-tar-saturated, roofing felt.
    ii. Copper mesh screening.
    iii. Corrosion-resistant metal clips made for this application.
    iv. Woven geotextile filter fabric, in 1 or more layers, for minimum total weight of 3 oz./sq. yd. (0.10 kg/sq. m). Include fabric covering for entire length of tile installation

8. Special Pipe Couplings
    a. Description: Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined. Include the following specific sleeve materials, where available:
        i. Cast-Iron Soil Pipe: ASTM C 564, rubber.
        ii. Concrete Pipe: ASTM C 443 (ASTM C 443M), rubber.
        iii. Clay Pipe: ASTM C 425, rubber.
        iv. Plastic Pipe: ASTM F 477, elastomeric seal.
        v. Dissimilar Pipes: Compatible with pipe materials being joined.
        vi. Bands: Stainless steel, at least 1 at each pipe insert.

9. Cleanouts
    a. Description: ASME A112.36.2M, with round-flanged, cast-iron housing, and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

10. Sleeves
    a. Steel Pipe Sleeves: ASTM A 53; Type F or Type E, Grade A; Schedule 40; galvanized.
    b. Cast-Iron Sleeves: Cast or fabricated wall pipe with integral water stop, made for this application.
    c. Cast-Iron Pipe Sleeves: ASTM A 74, Service class, cast-iron soil pipe.
    d. Cast-Iron Pipe Sleeves: ASTM A 74, Extra-Heavy class, cast-iron soil pipe.
    e. Mechanical Sleeve Seals: Modular and watertight. Include interlocking rubber links shaped to fill annular space between pipe and sleeve and connecting bolts and pressure plates.

11. Drainage Conduits
    a. Description: Corrugated, high-density, polyethylene (PE) conduit system, with fittings and filter-fabric jacket. Conduit system is equivalent to ASTM F 405 piping.

i. Conduit: Molded from ASTM D 3350, PE material with perforations. Special fittings with outlet include a combination 4- and 6-inch (DN 100 and DN 150) outlet connection.
1. Minimum Flow Rate: 30 gpm/foot (6.2 L/s/1000 mm) at 3600 psf (172 kPa) normal pressure when tested according to ASTM D 4716.
2. Size: 12 inches (305 mm) high by approximately 3/4 inch (19 mm) thick.
3. Size: 18 inches (457 mm) high by approximately 3/4 inch (19 mm) thick.
ii. Couplings: Corrugated PE band.
iii. Filter Fabric: Manufacturer's standard woven PE sleeve.

b. Description: Smooth, rigid, perforated, polyvinyl chloride (PVC) conduit system, with fittings. Conduit system is equivalent to ASTM D 2729 PVC piping.
i. Conduit: Extruded from ASTM D 4216, PVC compound material. Special fittings with outlet include 4-inch (DN 100) outlet connection.
1. Minimum Flow Rate: Equal to or greater than 4-inch (DN 100) pipe.
2. Size: 6 inches (152 mm) high by approximately 2-1/4 inches (57 mm) wide.
3. Size: 8 inches (203 mm) high by approximately 2-1/4 inches (57 mm) wide.
ii. Couplings: PVC fitting.

12. Molded Sheet Drainage Panels
a. Description: Prefabricated, composite drainage panels, made with drainage core and filter fabric, for use as part of foundation drainage system.
b. Drainage Core: 3-dimensional, nonbiodegradable, molded-plastic-sheet material designed to effectively conduct water to foundation drainage system under maximum soil pressures.
i. Minimum Flow Rate: 15 gpm/foot (3.1 L/s/1000 mm) at 1 hydraulic gradient and 3600 psf (172 kPa) normal pressure when tested according to ASTM D 4716.
ii. Film Backing: Plastic, protective-film, backing sheet attached to surface facing building wall.
c. Filter Fabric: Nonwoven geotextile fabric of polypropylene (PP) or polyester fibers, or combination of both.

13. Fabric Drainage Panels
a. Description: Prefabricated, composite drainage panels, made with drainage core and filter fabric, for use as part of foundation drainage system.
b. Drainage Core: Open-construction, resilient, 0.8-inch- (20-mm-) thick, nylon-filament mesh.
i. Minimum Flow Rate: 2.4 gpm/foot (0.49 L/s/1000 mm) at 1 hydraulic gradient and 3600 psf (172 kPa) normal pressure when tested according to ASTM D 4716.
c. Drainage Core: 3-dimensional, polyethylene (PE) strand, 0.25-inch- (6.3-mm-) thick, nonwoven net.
i. Minimum Flow Rate: 5 gpm/foot (1.0 L/s/1000 mm) at 1 hydraulic gradient and 3600 psf (172 kPa) normal pressure when tested according to ASTM D 4716.
d. Filter Fabric: Nonwoven geotextile fabric of polypropylene (PP) or polyester fibers, or combination of both.

14. Insulated Drainage Panels
a. Description: Composite drainage panels, made with insulating drainage core and filter fabric, for use as part of foundation drainage system.

b. Drainage Core: Board made of expanded polystyrene beads bonded with waterproof adhesive, 4 inches (102 mm) thick, and approximately 2-lb/cu. ft. (32-kg/cu. m) density.
    i. Thermal Resistance: R equals 14 deg F times hour times sq. ft./Btu at 75 deg F (RSI equals 2.46 K times sq. m/W at 24 deg C), when dry.
    ii. Minimum Flow Rate: 10 gpm/foot (2 L/s/1000 mm) at 1 hydraulic gradient and 750 psf (36 kPa) normal pressure when tested according to ASTM D 4716.
c. Drainage Core: ASTM C 578 extruded-polystyrene foam board, 2.25 inches (57 mm) thick, with vertical and horizontal drainage channels, and approximately 1.6-lb/cu. ft. (26-kg/cu. m) density.
    i. Thermal Resistance: R equals 10.6 deg F times hour times sq. ft./Btu at 75 deg F (RSI equals 0.88 K times sq. m/W at 24 deg C).
    ii. Minimum Flow Rate: 10 gpm/foot (2 L/s/1000 mm) at 1 hydraulic gradient and 1500 psf (72 kPa) normal pressure when tested according to ASTM D 4716.
d. Filter Fabric: Manufacturer's standard on soil side of core.
e. Include manufacturer's adhesive for attachment to substrate.

15. Soil Materials
    a. Impervious Fill: Clayey gravel and sand mixture capable of compacting to dense state.
    b. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate, Size No. 57, with 100 percent passing 1-1/2-inch (37.5-mm) sieve and not more than 5 percent passing No. 8 (2.36-mm) sieve.
    c. Filtering Material: Evenly graded mixture of natural or crushed gravel or crushed stone and natural sand, with 100 percent passing 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing No. 50 (0.3-mm) sieve.
    d. Flowable Fill: Low-strength, flowable slurry, with 115- to 145-lb/cu. ft. (1840- to 2325-kg/cu. m) density. Include the following:
        i. Mixture: ASTM C 150, Type I, portland cement; ASTM C 33 fine aggregates; ASTM C 618 fly-ash mineral admixture; and ASTM C 94 mixing water.
        ii. Mixture: ASTM C 150, Type I, portland cement; ASTM C 33 natural sand and fine aggregates, natural or crushed gravel or crushed stone; and ASTM C 94 mixing water.
        iii. Strength: Approximately 100 psi (690 kPa) at 28 days.
        iv. Strength: 100 to 200 psi (690 to 1380 kPa) at 28 days.
    e. Roofing Felts: ASTM D 226, Type I, asphalt-saturated; or ASTM D 227, coal-tar-saturated, organic felt.
    f. Matting: Geotextile filter fabric, in 1 or more layers, for minimum total weight of 6 oz./sq. yd. (0.20 kg/sq. m).

16. Examination

17. Foundation Drainage System Application

18. Underslab Drainage System Application

19. Underslab Drainage System Header Application

20. Special Pipe Coupling Applications

21. Piping Installation

22. Pipe Joint Consturction and Installation

23. Cleanout Installation
24. Sleeve Installation
25. Drainage Conduit Installation
26. Drainage Panel Installation
27. Soil Material Installation
28. Field Quality Control

DIVISION 32: EXTERIOR IMPROVEMENTS

SECTION 321216- ASPHALT PAVING

14. Related Documents
15. Reference Specification
16. Summary
17. Submittals
18. Site Conditions
19. Materials
    a. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
    b. Coarse Aggregate: Sound, angular crushed stone, or crushed gravel.
    c. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, gravel, or combinations thereof, complying with ASTM D 1073.
    d. Mineral Filler: Rock dust, hydraulic cement, or other inert material complying with ASTM D 242.
    e. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
    f. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.
    g. Tack Coat: Emulsified asphalt; ASTM D 977: Grade SS-1H.
    h. Granular Base Course: Type AB-3 complying with Sub-Section 1105 of the Standard Specifications for State Road and Bridge Construction of the Kansas Department of Transportation.
    i. Granular Base Course: Type 1 aggregate complying with Section 1006 of the Missouri Standard Specifications for Highway Construction.
    j. Granular Base Course: Crushed stone complying with Section 2202 of the Standard Specifications and Design Criteria of the American Public Works Association.
    k. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.

i. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
ii. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
1. Ciba-Geigy Corp.
2. Dow Chemical U.S.A.
3. E.I. Du Pont de Nemours & Co., Inc.
4. FMC Corp.
5. Thompson-Hayward Chemical Co.
6. U.S. Borax and Chemical Corp.

l. Lane Marking Paint: Alkyd-resin type, ready-mixed complying with AASHTO M 248, Type I
i. Color: White.
ii. Color: Yellow.

m. Wheel Stops: 3000 psi compressive strength precast, air-entrained concrete, approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside.

20. Asphalt-Aggregate Mixture
a. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with mix designations and combined aggregate mixtures of reference specifications as noted on the Drawings.

21. Surface Preparation

22. Placing Mix

23. Rolling

24. Traffic and Lane Markings

25. Wheel Stops

26. Field Quality Control

SECTION 321313- CONCRETE PAVING

24. Related Documents

25. Summary

26. Submittals

27. Quality Assurance

28. Project Conditions

29. Forms
a. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

i. Use flexible or curved forms for curves of a 100-foot or less radius.

b. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

30. Reinforcing Materials
    a. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.
    b. Epoxy-Coated Reinforcing Bars: ASTM A 775 with ASTM A 615, Grade 60 deformed steel bars.
    c. Plain, Cold-Drawn Steel Wire: ASTM A 82.
    d. Welded Steel Wire Fabric: ASTM A 185.
        i. Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.
    e. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
    f. Epoxy-Coated Joint Dowel Bars: ASTM A 775 with ASTM A 615, Grade 60 plain steel bars.
    g. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
        i. Use supports with sand plates or horizontal runners where base material will not support chair legs.

31. Concrete Materials
    a. Portland Cement: ASTM C 150, Type I
        i. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
    b. Fly Ash: ASTM C 618, Type C. Limit use of fly ash such that it does not exceed 15 percent of cement content by weight.
    c. Normal-Weight Aggregates: ASTM C 33, and as follows. Provide aggregates from a single source.
        i. Maximum Aggregate Size: 1-1/2 inches.
        ii. Do not use fine or coarse aggregates that contain substances that cause spalling.
        iii. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
    d. Water: Potable.
    e. Fiber Reinforcement: Synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III.

32. Admixtures
    a. Provide concrete admixtures that contain no chloride ions.
    b. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
    c. Water-Reducing Admixture: ASTM C 494, Type A.
    d. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
    e. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
    f. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
    g. Products: Subject to compliance with requirements, provide one of the following:
        i. Air-Entraining Admixture:
            1. Air-Tite or Amex 210; Cormix Construction Chemicals.
            2. Air-Mix or Perma-Air; Euclid Chemical Co

3. Darex AEA or Daravair; W.R. Grace & Co.
4. MB-VR or Micro-Air; Master Builders, Inc.
5. Sealtight AEA; W.R. Meadows, Inc.
6. Sika AER; Sika Corp.

ii. Water-Reducing Admixture:
1. Chemtard; ChemMasters Corp.
2. Type A Series; Cormix Construction Chemicals
3. Eucon WR-75; Euclid Chemical Co.
4. WRDA; W.R. Grace & Co
5. Pozzolith Normal or Polyheed; Master Builders, Inc.
6. Metco W.R.; Metalcrete Industries.
7. Plastocrete 161; Sika Corp.

iii. High-Range Water-Reducing Admixture
1. Super P; Anti-Hydro Co., Inc.
2. Cormix 2000, PSI Super, or Melmet; Cormix Construction Chemicals.
3. Eucon 37; Euclid Chemical Co.
4. WRDA 19 or Daracem; W.R. Grace & Co.
5. Rheobuild or Polyheed; Master Builders, Inc.
6. Superslump; Metalcrete Industries
7. Sikament 300; Sika Corp.

iv. Water-Reducing and Accelerating Admixture:
1. Q-Set; Conspec Marketing & Manufacturing Co.
2. Gilco Accelerator or Lub NCA; Cormix Construction Chemicals.
3. Accelguard 80; Euclid Chemical Co.
4. Daraset; W.R. Grace & Co.
5. Pozzutec 20; Master Builders, Inc.
6. Accel-Set; Metalcrete Industries.

v. Water-Reducing and Retarding Admixture:
1. Type D Series; Cormix Construction Chemicals.
2. Eucon Retarder 75; Euclid Chemical Co.
3. Daratard-17; W.R. Grace & Co.
4. Pozzolith R; Master Builders, Inc
5. Plastiment; Sika Corporation.

33. Curing Materials
a. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
b. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
i. Waterproof paper.
ii. Polyethylene film.
iii. White burlap-polyethylene sheet.
c. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A or B, wax free.
d. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.
i. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.
e. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
f. Products: Subject to compliance with requirements, provide one of the following:
i. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound:
1. Clear Cure; Anti-Hydro Co., Inc.

2. Spartan-Cote; The Burke Co.
3. All Resin; Conspec Marketing & Mfg. Co.
4. Sealco 309; Cormix Construction Chemicals.
5. Day-Chem Cure and Seal; Dayton Superior Corp
6. Diamond Clear; Euclid Chemical Co.
7. #64 Resin Cure-Clear; Lambert Corp
8. L&M Cure R; L&M Construction Chemicals, Inc.
9. Masterkure; Master Builders, Inc.
10. 3100 Series; W.R. Meadows, Inc.
11. Seal N Kure; Metalcrete Industries.
12. Kure-N-Seal; Sonneborn-Chemrex
13. Horn Clear Seal; Tamms/A.C. Horn.

ii. Clear Waterborne Membrane-Forming Curing Compound:
1. Clear Cure Water Base; Anti-Hydro Co., Inc.
2. Spartan Cote WB; The Burke Co.
3. W.B. Resin Cure; Conspec Marketing and Mfg. Co.
4. Sealco VOC; Cormix Construction Chemicals.
5. Safe Cure and Seal (J-18); Dayton Superior Corp.
6. Diamond Clear VOX; Euclid Chemical Co.
7. Aqua Kure-Clear; Lambert Corp.
8. Dress & Seal #22 WB; L&M Construction Chemicals, Inc.
9. Masterkure 100W; Master Builders, Inc.
10. 1100 Clear Series; W.R. Meadows, Inc.
11. Metcure; Metalcrete Industries.
12. Kure-N-Seal WB; Sonneborn-Chemrex.
13. Horncure 100; Tamms/A.C. Horn.

iii. Evaporation Control:
1. Aquafilm; Conspec Marketing and Mfg. Co.
2. Eucobar; Euclid Chemical Co.
3. E-Con; L&M Construction Chemicals, Inc.
4. Confilm; Master Builders, Inc.
5. Waterhold; Metalcrete Industries.

34. Related Materials
a. Boiled Linseed Oil Mixture: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.
b. Traffic Paint: Alkyd-resin ready-mixed, complying with AASHTO M 248, Type S.
i. Color: White.
ii. Color: Yellow.
c. Nonslip Aggregate Finish: Fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, nonglazing, and unaffected by freezing, moisture, and cleaning materials.
d. Dry-Shake Color Hardener: Packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless indicated otherwise.
e. Bonding Agent: Acrylic or styrene butadiene.
f. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp

surfaces. Provide material type, grade, and class to suit requirements.

g. Products: Subject to compliance with requirements, provide one of the following:
   i. Dry-Shake Color Hardener:
      1. Conshake 600 Colortone; Conspec Marketing & Mfg. Co.
      2. Floorcron; Cormix Construction Chemicals.
      3. Quartz Tuff; Dayton-Superior.
      4. Surflex; Euclid Chemical Co.
      5. Quartz Plate; L&M Construction Chemicals, Inc.
      6. Colorcron; Master Builders, Inc.
      7. Floor Quartz; Metalcrete Industries.
      8. Lithochrome Color Hardener; L.M. Scofield Co
      9. Harcol Redi-Mix; Sonneborn-Chemrex.
      10. Hard Top; Symons Corp.
      11. Colorundum; Tamms/A.C. Horn, Inc.
   ii. Bonding Agent:
      1. Acrylic Bondcrete; The Burke Co.
      2. Strongbond; Conspec Marketing and Mfg. Co.
      3. Day-Chem Ad Bond (J-40); Dayton Superior Corp.
      4. SBR Latex; Euclid Chemical Co.
      5. Daraweld C; W.R. Grace & Co.
      6. Everbond; L&M Construction Chemicals, Inc.
      7. Acryl-Set; Master Builders Inc
      8. Intralok; W.R. Meadows, Inc.
      9. Acrylpave; Metalcrete Industries.
      10. Sonocrete; Sonneborn-Chemrex.
      11. Stonlock LB2; Stonhard, Inc.
      12. Strong Bond; Symons Corp.
   iii. Epoxy Adhesive:
      1. Burke Epoxy M.V.; The Burke Co.
      2. Spec-Bond 100; Conspec Marketing and Mfg. Co.
      3. Resi-Bond (J-58); Dayton Superior
      4. Euco Epoxy System #452 or #620; Euclid Chemical Co
      5. Concresive Standard Liquid; Master Builders, Inc.
      6. Rezi-Weld 1000; W.R. Meadows, Inc.
      7. Metco Hi-Mod Epoxy; Metalcrete Industries.
      8. Sikadur 32 Hi-Mod; Sika Corp.
      9. R-600 Series; Symons Corp.
      10. Epoxtite Binder 2390; Tamms/A.C. Horn, Inc.

35. Concrete Mix
   a. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
      i. Do not use the Owner's field quality-control testing agency as the independent testing agency.
   b. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
      i. Compressive Strength (28-Day): 4000 psi.
      ii. Compressive Strength (28-Day): 3500 psi.
      iii. Compressive Strength (28-Day): 3000 psi.

iv. Maximum Water-Cement Ratio at Point of Placement: 0.45.
v. Maximum Water-Cement Ratio at Point of Placement: 0.50.
vi. Slump Limit at Point of Placement: 3 inches.
1. Slump limit for concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.

c. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1 percent:
i. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
ii. Air Content: 6.0 percent for 1-inch maximum aggregate.
iii. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
iv. Air Content: 7.0 percent for 1/2-inch maximum aggregate.

d. Fiber Reinforcement: Add to mix at rate of 1.5 lb per cu. yd., unless manufacturer recommends otherwise.

e. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

36. Surface Preparations
a. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
i. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

37. Edge Forms and Screed Construction

38. Placing Reinforcement

39. Joints

40. Concrete Placement

41. Concrete Finishing

42. Special Finishes

43. Concrete Protection and Curing

44. Traffic Paint

45. Field Quality Control Testing

46. Repairs and Protection

SECTION 321373- PAVEMENT JOINT SEALANTS

16. Related Documents

17. Summary

18. Submittals

19. Quality Assurance

20. Delivery, Storage & Handling

21. Project Conditions

22. Materials, General
    a. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.
    b. Colors of Exposed Joint Sealants: Match Architect's samples.
    c. Colors of Exposed Joint Sealants: As indicated by referencing manufacturer's designations.
    d. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

23. Cold-Applied Joint Sealants
    a. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
        i. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
        ii. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
        iii. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
    b. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
    c. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
    d. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
    e. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.
    f. Available Products: Subject to compliance with requirements, cold-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:
    g. Products: Subject to compliance with requirements, provide one of the following:
        i. Multicomponent Jet-Fuel-Resistant Sealant for Concrete:
            1. Vulkem 202; Mameco International.
            2. SEALTIGHT GARDOX; W.R. Meadows, Inc.
            3. Urexpan NR-300; Pecora Corporation.
            4. Sonomeric 2; Sonneborn Building Products Div., ChemRex, Inc.
        ii. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete:
            1. Vulkem 200; Mameco International.
            2. Sonomeric 1; Sonneborn Building Products Div., ChemRex, Inc.
        iii. Type NS Silicone Sealant for Concrete:

1. Roadsaver Silicone-SL; Crafco Inc.
2. 888; Dow Corning.

iv. Type SL Silicone Sealant for Concrete and Asphalt:
1. 890-SL; Dow Corning.

v. Multicomponent Low-Modulus Sealant for Concrete and Asphalt:
1. SOF-SEAL; W.R. Meadows, Inc.

24. Hot-Applied Joint Sealants
a. Jet-Fuel-Resistant Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3569.
b. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.
c. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.
d. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.
e. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:
f. Products: Subject to compliance with requirements, provide one of the following:
i. Jet-Fuel-Resistant Elastomeric Sealant for Concrete:
1. Superseal 444/777; Crafco, Inc.
2. POLY-JET 3569; W.R. Meadows, Inc.

ii. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete:
1. SUPERSEAL 1614A; Crafco Inc.
2. POLY-JET 1614; W.R. Meadows, Inc.
3. POLY-JET 3406; W.R. Meadows, Inc.
4. POLY-JET 3569, W.R. Meadows, Inc.

iii. Elastomeric Sealant for Concrete:
1. Superseal 444/777; Crafco, Inc.
2. POLY-JET 3406; W.R. Meadows, Inc.

iv. Sealant for Concrete and Asphalt:
1. ROADSAVER 221; Crafco Inc.
2. Product #9005; Koch Materials Company.
3. Product #9030; Koch Materials Company.
4. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

25. Joint-Sealant Backer Materials
a. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.
b. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.
c. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
d. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

26. Examination

27. Preparation
28. Installation of Joint Sealants
29. Cleaning
30. Protection

SECTION 323113- CHAIN-LINK FENCES AND GATES

1. Related Documents
2. Summary
3. Definitions
4. Submittals
5. Quality Assurance
6. Project Conditions
7. Chain-Link Fence Fabric
    a. Steel Chain-Link Fence Fabric: Provide fabric fabricated in one-piece widths for fencing in height of 6 feet. Comply with CLFMI's "Product Manual" and with requirements indicated below
        i. Mesh and Wire Size: 1-3/4-inch (44-mm) mesh, 0.148-inch (3.65-mm) diameter.
        ii. Zinc Coated Fabric: ASTM A 392, with zinc coating applied to steel wire mesh fabric after weaving with the following minimum coating weight:
            1. Class 1: Not less then 1.2 oz./ sq. ft. (366 g/ sq. m) of uncoated wire surface.
8. Industrial Fence Framing
    a. Round Steel Pipe: Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less then 1.8-oz./ sq. ft. (0.55-kg/ sq. m.) zinc; and the following strength and stiffness requirement:
        i. Line, End, Corner & Pull Posts and Intermediate Rails (at corners and gates only): Per requirements for Heavy Industrial Fence
9. Tension Wire
    a. General: Provide horizontal tension wire at the following locations:
        i. Location: Extended along top and bottom of fence fabric.
    b. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 824 and the following:
        i. Coating: Type II, zinc coated (galvanized) by the hot-dip process, with the following minimum coating weight:
            1. Matching chain-link fabric coating weight.
10. Industrial Swing Gates
    a. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1083 and ASTM F 1043

for materials and protective coatings.

b. Frames and Bracing: Fabricate members from round galvanized steel tubing with outside dimension and weight according to ASTM F 900 for the following gate fabric height:
   i. Gate Fabric Height: 6 feet (1.83 m) or less.
c. Frame Corner Construction: As follows:
   i. Assembled with corner fittings and 5/16-inch- (7.9-mm-) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.
d. Gate Posts: Fabricate members from round galvanized steel pipe with outside dimension and weight according to ASTM F 900 for the following gate fabric heights and leaf widths:
   i. Gate Fabric Height by Leaf Width: 6 feet (1.83 m) or less by 4 feet (1.22 m) or less.
   ii. Gate Fabric Height by Leaf Width: 6 feet (1.83 m) or less by over 4 feet (1.22 m) but not over 10 feet (3.05 m).
   iii. Gate Fabric Height by Leaf Width: 6 feet (1.83 m) or less by over 10 feet (3.05 m) but not over 18 feet (5.49 m).
e. Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and, for each gate leaf more than 5 feet (1.5 m) wide, keepers. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

11. Fittings

12. Barbed Wire
    a. Zinc-Coated Steel Barbed Wire: Comply with ASTM A 121, Standard Chain-Link Fence grade for the following two-strand barbed wire:
       i. Standard Size and Construction: 0.099-inch- (2.51-mm-) diameter line wire with 0.080-inch- (2.03-mm-) diameter, 4-point round barbs spaced not more than 4 inches (102mm) o.c.

13. Grout and Anchoring Cement
    a. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

14. Examination

15. Preparation

16. Installation, General

17. Chain-Link Fence Installation

18. Gate Installation

19. Adjusting

20. Demonstration

SECTION 329200- TURF AND GRASSES

1. Summary

2. Submittals

3. Delivery and Storage

4. Turf Installation Seasons

5. Turf Establishment Period

6. Plant and Turf Guarantee

7. Applicable Publications
    a. U. S. Department of Agriculture Federal Seed Act of August 9, 1939: 53 Stat. 1275 Rules and Regulations.

8. Topsoil
    a. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 1 inch in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 5.0 nor more than 7.5.
    b. Obtain material from stockpiles established under Section 02315 - Excavation and Fill, Article 3.2 subparagraph, Stripping Topsoil, that meet the general requirements as stated above.
    c. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Owner of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above.

9. Turf Fertilizer
    a. Time Released: Provide time released starter turf fertilizer that is commercial grade, free flowing, uniform in composition, and conforms to applicable state and federal regulations. Granular fertilizer shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 18% nitrogen (of which 50 percent shall be organic), 24% available phosphoric acid, and 12% potash (18-24-12).

10. Seed
    a. General: Seed shall be state-certified seed of the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Seed shall be labeled in conformance with U. S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable. Onsite seed mixing shall be done only in the presence of the Owner. Seed mixture shall meet the following requirements:
        i. K-31 Fescue, 98% Pure with 85% germination.

11. Sod
    a. General: Sod shall be nursery grown approved sod as classified in the TPI Guideline Specifications to Turfgrass Sodding. The composition of the grass species in the sod shall be of a fescue blend. Quality shall conform to ASPA Guideline Specifications for Sodding.

12. Herbicides
    a. General: All herbicides shall be properly labeled and registered with the U.S. Department of Agriculture. Keep all herbicides in the original labeled containers indicating the analysis and method of use.

13. Erosion Control
    a. Fiber Mat: Erosion control material shall be a mat made from aspen wood fiber constructed from curled wood excelsior of which 80% is 6" or longer in length. It has a uniform green dyed color with consistent thickness and the fibers are evenly distributed over the entire blanket. Top side of blanket shall be covered with a photo degradable plastic mesh. The blanket is smolder resistant without the use of chemical additives. Anchorage shall be achieved through the use of 6" wire staples.
        i. Manufacturer: American Excelsior Company – "Quick Grass"

14. Water
    a. Sources: As will be available sources of water located at the work site, Contractor shall be responsible for connecting to secured sources, with no additional cost to the Owner. Rate of moisture application whether by natural rainfall or Contractor irrigation shall be maintained by Contractor at no less than 1" per week for 6 weeks.

15. Examination

16. Tillage

17. Finish Grading

18. Application of Fertilizer for Turf Area

19. Seeding

20. Watering

21. Protection of Turf Areas

22. Erosion Control Material

23. Final Clean-Up

GEOTECHNICAL REPORT

Note: The Design Team has received from the owner and reviewed the geotechnical report prepared by GeoSource for this project. We acknowledge that rock is present that could conflict with subgrade excavations. We also acknowledge the presence of rubble within fill beneath the building site.