SECTION 00 0107
SEALS PAGE

DESIGN PROFESSIONALS OF RECORD

A. CIVIL ENGINEER:

KELSEY LEWIS

KIMLEY HORN

FLORIDA REGISTRATION # 79384

B. LANDSCAPE ARCHITECT:

CHARLIE JOHNSON

KIMLEY HORN

FLORIDA REGISTRATION # LA6667402

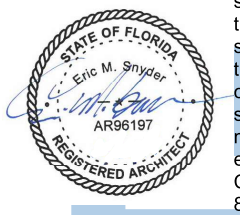
END OF SECTION

B. ARCHITECT:

ERIC SNYDER

GRESHAM SMITH

FLORIDA REGISTRATION #96197



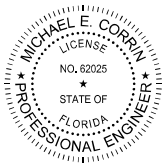
Reason: This item has been digitally signed and sealed by Eric Snyder on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.
Contact Info: 843-364-3494
Date: 2021.12.06 07:38:12-05'00'

C. STRUCTURAL ENGINEER:

MICHAEL E. CORRIN

STANLEY D. LINDSEY & ASSOCIATES, LTD

FLORIDA REGISTRATION #62025



This item has been electronically signed and sealed by
Michael E. Corrin, P.E.
on
12/04/2021
using a Digital Signature.

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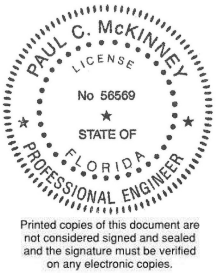
Digitally signed by Michael E. Corrin
DN: E=mcorrin@sdlal.com, CN=Michael E. Corrin, O="Stanley D. Lindsey & Associates, Ltd.", C=US
Reason: I have reviewed this document
Date: 2021.12.04 07:48:47-06'00'

D. ELECTRICAL ENGINEER:

PAUL MCKINNEY

I.C. THOMASSON ASSOCIATES, INC.

FLORIDA REGISTRATION #56569



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Date: 2021.12.06 11:12:41-06'00'

END OF SECTION

SERIES 00 DOCUMENTS – PROCUREMENT AND CONTRACTING REQUIREMENTS

PROCUREMENT REQUIREMENTS

SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

DIVISION 26 - ELECTRICAL

ISSUED	DATE
EARLY RELEASE PACKAGE	**12/06/2021**

END OF SECTION

SECTION 00 2150
HCA PREFERRED VENDORS AND MANUFACTURERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The following list identifies manufacturers and vendors preferred by the Owner, for involvement in its many construction projects. This list may or may not preclude involvement by other companies.

B. HCA has a relationship with HealthTrust Purchasing Group (HPG) and wishes to receive quotes from their contracted vendors. The list includes the latest available information regarding HPG contracts. These contracts should be utilized regarding HPG specific pricing and contract terms, Projects that contain products in specification sections where an HPG contracted vendor is available, the HPG contract vendor must be contacted to provide a quote for the Project. Not all manufacturers and vendors preferred by HCA participate with HPG and their purchasing agreements.

C. Not all manufacturers or distributors identified provide materials intended or expected to be used on this Project and interested individuals must refer to individual technical specification sections of this Project Manual for those elements appropriate to this Project.

D. Manufacturers identified in this list but not specifically identified in the technical specifications, if willing and capable to provide materials meeting the stated criteria, may be presented by the Contractor for considerations as Alternates.

1.2 LIST

A. The HCA Preferred Vendor List begins on the following page.

B. The HPG suppliers and manufacturers with negotiated purchasing agreement numbers are identified in the list.

1.3 DEFINITIONS

A. Sole Source (no substitutions) – This is the only product/manufacturer that can be used. This precludes involvement by other companies to bid and receive awards.

B. Multi-source (no substitutions) – There are multiple products/manufacturers that can be used, which are all identified on the list. This precludes involvement by other companies to bid and receive awards.

C. Preferred Vendor – The manufacturer shall be allowed to provide a bid price for the Project. This does not preclude involvement by other companies to bid and receive awards.

END OF SECTION

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Designation	Description			
Sole Source (**no substitutions**)	This is the only product / manufacturer that can be used. This precludes involvement by other companies to bid and receive awards.			
Multi Source (**no substitutions**)	There are multiple products / manufacturers that can be used, which are all identified on the list. This precludes involvement by other companies to bid and receive awards.			
Preferred vendor	While not a negotiated contract, the manufacturer has preferred status and shall be allowed to provide a bid price for the job. This does not preclude involvement by other companies to bid and receive awards.			
NA	Not applicable to work / scope preformed internally			

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 03 - Concrete				
Gypsum Concrete Underlayment	Ardex			Multi source
	Mapei			Multi source
Division 06 - Wood, Plastics and Composites				
Sheathing	USG			Preferred
	Georgia Pacific			Preferred
Division 07 - Thermal and Moisture Protection				
Exterior Insulation and Finish System (EIFS)	Dryvit			Multi source
	Sto		Mike Gracey (Primary) mgracey@stocorp.com Phone: 404-973-9249 Tim Salerno (StoPanel Division) tsalerno@stocorp.com Phone: 407-466-5371	Multi source
Slab-On-Grade Vapor Retarder	Ardex			Multi source
	Concure			Multi source
	Koester			Multi source
	Stauf			Multi source
	WR Grace			Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
EPDM	Carlisle - Syntec			Multi source
	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	Genflex			Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Thermoplastic Polyolefin (TPO) Roofing	Carlisle - Syntec			Multi source
	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	FiberTite			Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	Genflex			Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Sarnafil	18262	Bill Love love.bill@us.sika.com Phone: 586-201-0431	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Modified Bitumen	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Johns Manville	15419	Eric Smith eric.smith@jm.com 916-230-1536	Multi source
	Siplast			Multi source
	Soprema	12456	Eric Younkin eyounkin@soprema.us 330-334-0066 ext. 2228	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
	WP Hickman			Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Sheet Metal Roofing	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Thermal Insulation	Owens Corning			Preferred
Applied Fireproofing	WR Grace			Multi source
	CAFO			Multi source
	Isolatek			Multi source
Penetrating Firestopping	WR Grace			Multi source
	3M			Multi source
	STI			Multi source
	Hilti			Multi source
	Multiple Manufacturers	148	Mike Harrod WW Grainger, Inc. mike.harrod@grainger.com phone: 502-655-0258	Multi source
Joint Sealants	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
	Koroseal			Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Division 08 - Doors and Windows				
Wood Doors	VT		Buzz Jacoway VT Doors bjacoway@netzero.net 615-400-0236	Preferred
Metal Doors and frames	Steelcraft	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Republic			
Mechanical lock	Schlage	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Door closers	LCN	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Exit Devices	Von Duprin	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Accessories	IVES	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Glenn-Johnson			
	Falcon			
Sliding Glass ICU/CCU Doors Automatic Door Operators	Besam			Multi source
	Stanley			Multi source
Division 09 - Finishes				
Gypsum Board Assemblies	USG			Preferred
	Georgia Pacific			Preferred
Resilient Flooring	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Sole Source
Resinous Flooring				
Carpeting	Shaw	500169	Deborah Smith deborah.smith@shawinc.com 704-249-6758	Multi source
	Tandus	500148	James Bourgeois james.bourgeois@tarkett.com 225-205-4519	Multi source
	Masland	6573	Jeff Taylor jeff.taylor@maslandcontract.com Phone: 404-543-7167	Multi source
	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Multi source
Tile	Crossville Ceramics			Multi source
	Daltile Corporation			Multi source
	Louisville Tile (Crossville Ceramics)			Multi source
	Royal Mosa			Multi source
	Stonepeak Ceramics, Inc.			Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Base	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Sole Source
Paint and coatings	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
Wallcovering	Eykon			Multi source
	DesignTex Inc. (includes J.M. Lynne and Essex)		Available through contract furniture dealers	Multi source
	Koroseal Interior Products			Multi source
	MDC Wallcoverings		Available through contract furniture dealers	Multi source
	National Wallcovering		Available through contract furniture dealers	Multi source
	Maharam		Available through contract furniture dealers	Multi source
	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
Wall Protection	InPro Corporation	44661	Julie Mooney 262-679-9010 ext. 5254 jmooney@inpro.com	Sole Source
Solid Surface	Avonite			Multi source
	Corian			Multi source
	Formica			Multi source
	Wilsonart International, Inc.			Multi source
Acoustic Ceilings	Armstrong World Industries	6924	Anna Justice HCA@armstrong.com Phone: 717-396-4325	Sole source
Plastic Laminate	Formica			Multi source
	Panola Industries - Nevamar			Multi source
	Panola Industries – Pionite			Multi source
	Wilsonart International, Inc.			Multi source
Division 10 - Specialties				
Marker Boards	Claridge		Matt Green Matt@chameleonwhiteboard.com 615.656.3280 ext 1	Multi source
	Eagan Visual		Available through contract furniture dealers	Multi source
	G&T Industries			Multi source
	Staples Advantage	2532	Deb Mailmstrom deb.malmstrom@staples.com Phone: 770-532-8033	Multi source
	Peter Pepper		Available through contract furniture dealers	Multi source
Solid Surface Shower System	InPro Corporation	44661	Mike O'Connell Inpro Corporation moconnell@inprocorp.com Phone: 608-640-8196	Sole Source
Lockers	Quantum Medical	5522	Elizabeth Faller elizabethf@quantumstorage.com 15800 NW 15th Ave Miami, FL 33169	Multi source
	Storage Systems	500166	Bill Kreager bkreager@storagesystems.com Phone: 888-614-0004	Multi source
Division 11 - Equipment				
Food Service Equipment	Inman Foodservices Group	7227	Billy Inman billy.inman@inman-inc.com 3807 Charlotte Ave, Nashville TN 37209 Phone: 615-812-6500	Multi source
Division 12 - Furnishings				
Ice Machines	Follett Corporation	5000041	Gary Gutman ggutman@follettice.com 800-523-9361	Multi source
Audio-Visual Equipment (TVs, Accessories)	Grainger	4077	Todd Dietrich todd.dierich@grainger.com 314-368-8659	Multi source
	Remar	3248	Kevin Kolff kkolff@remarinc.com 615-449-0231	Multi source
	Telehealth	500045	Darrell Leftwich darrell.leftwich@telehealth.com 615-383-7836	Multi source
Division 13 - Special Construction				
Division 14 - Conveying Systems				
Elevators	Schindler	7257	Daniel Winder daniel.winder@schindler.com 972-358-5063	Multi source
	Otis	4229	Ernie Dominguez Ernie.Dominguez@otis.com 512·567-7840	Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
	Kone	6008	Dean Enrico dean.enrico@kone.com 770-527-1163	Multi source
Pneumatic Tube System	Pevco	31267	James Valerino 410-961-3050 jvalerino@pevco.com	Preferred
	Swisslog			Preferred
Division 21 - Fire Suppression & Detection				
Division 22 - Plumbing				
Domestic Water Piping and Valves	Mueller	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Dura-Line			
	Uponor			
	Nibco			
	Milwaukee			
	B-Line			
	FNW			
	Conbraco			
	Anvil			
	Ipsco			
	Victaulic			
Domestic Water Backflow Preventers, Trap Primers, and Shock Absorbers	Zurn/Wilkins	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Proflo			
	PPP			
	Sioux Chief			
	Watts			
Domestic Water Pumps	Taco			Multi source
	Systecon			Multi source
	Bell & Gossett			Multi source
	SyncroFlo			Multi source
	Canariis			Multi source
	Grundfos			Multi source
Domestic Waste Piping and Drains	Charlotte	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Tyler Pipe			
	ABI			
	Ideal			
	Proflo			
	Zurn			
Mechanical Piping	Ipsco	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Aquatherm			
	Weldbend			
	Milwaukee			
	Nordstrom			
	B-Line			
	FNW			
	Nibco			
	Anvil			
General Service Compressed Air Piping and Valves	Beacon Medeas			Multi source
	Allied Health Products			Multi source
	Amico			Multi source
	Powrex			Multi source
Commercial Domestic Water Softeners	Culligan			Multi source
	Anderson Chemical			Multi source
	Bruner			Multi source
	Hydromax			Multi source
	Stay-rite			Multi source
	Marlo			Multi source
	Garratt-Callahan Company	3968	John Reseland ireseland@g-c.com 412-721-5292	Multi source
	Wigan			Multi source
	Nalco	3923	Lawrence Gess lgess@nalco.com 630-305-1658	Multi source
Commercial Storage Electric Domestic Water Heaters	Hesco			Multi source
	Ruud			Multi source
	State			Multi source
	Bradford White			Multi source
	AO Smith			Multi source
	PVI			Multi source
Commercial, Atmospheric, Gas Domestic Water Heaters	Lochinvar			Multi source
	Aerco			Multi source
	Hesco			Multi source
	Bradford White			Multi source
	Patterson Kelly			Multi source
	Teledyne Laars			Multi source
	PVI			Multi source
	AO Smith			Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Commercial, Power-Vent, Gas Domestic Water Heaters	Aerco			Multi source
	Hesco			Multi source
	Patterson Kelly			Multi source
	Armstrong			Multi source
Plumbing Fixtures and Drinking Fountains	Symmons	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Zurn			
	Elkay			
Medical Gas Piping System	Elkhart	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Mueller			
	Nibco			
Deionized Water Piping		5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Enfield			
	Orion			
Division 23 - Heating, Ventilation and Air Conditioning (HVAC)				
Electric Motors	MagneTek			Multi source
	Lincoln			Multi source
	Marathon			Multi source
	Gould			Multi source
	Toshiba			Multi source
	Baldor			Multi source
	Reliance			Multi source
	US Motors			Multi source
	General Electric			Multi source
Vibration Isolation	Mason Industries			Multi source
	kinetics Noise Control			Multi source
	Vibration Eliminator			Multi source
	Korfund			Multi source
	Amber Booth			Multi source
Building Automation System	Johnson Controls	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source
	Schneider Electric		Jeffrey Eggleston jeff.eggleston@schneider-electric.com 469-995-1092	Multi source
Fuel Oil Storage and Handling System	Xerexes			Multi source
	Owens Corning			Multi source
Fuel Oil Leak Detection and Alarm System	Enterprise Brass			Multi source
	Veeder-Root			Multi source
	Pollulert			Multi source
	PetroVend			Multi source
HVAC Pumps	Peerless			Multi source
	Armstrong			Multi source
	Bell & Gossett	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
	Aurora			Multi source
	Paco			Multi source
	Taco			Multi source
	Grundfos			Multi source
	Weinman			Multi source
Steam and Condensate Heating Piping	Ipsco	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Aquatherm			
	B-Line			
	FNW			
	Milwaukee			
	Weiss			
	Sarco			
	Weldbend			
	Nibco			
	Anvil			
Sound Alternators	McGill			Multi source
	IAC			Multi source
	Vibro-Acoustics			Multi source
Variable Air Volume (VAV) units	Johnson Controls	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Air Filters	American Air Filter			Multi source
	CamFil	6688	David Blackwell 806-773-8408 Dave.Blackwell@camfil.com	Multi source
	TriDim	6686	Tabatha Henshaw 540-967-5789 t.henshaw@tridim.com	Multi source
	Kock	No longer contracted	Regina McAnaly reginam@kochfilter.com 502-634-6204	Multi source
	Clarcor	6718	Chuck Lehman clehman@clcair.com 502-810-5764	Multi source
Prefabricated Gas Vent System	American Metal Products			Multi source
	Metal-fab			Multi source
	Selkirk			Multi source
	Metalbestos			Multi source
Fire Tube Boilers	Burnham			Multi source
	Cleaver Brooks			Multi source
	Superior Boiler			Multi source
	Industrial Combustion			Multi source
	Lochinvar			Multi source
	Bryan			Multi source
	Aerco			Multi source
	Hurst			Multi source
	Weil-McLane	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
Deaerator	Cleaver Brooks			Multi source
	Chicago Heater			Multi source
	Crane Cochrane			Multi source
	Industrial Steam			Multi source
Air-Cooled Condensing Units	Carrier	6741		Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source
	McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
Centrifugal Water Chiller	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Air Cooled Chiller	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Air Cooled Chiller for MRI	Filtrine			Multi source
	KKT			Multi source
	Kraus			Multi source
	Neslab			Multi source
Cooling Tower	Baltimore Air Coil			Multi source
	Evapco			Multi source
	Marley			Multi source
Air-Handling Unit - Medium Or Low Pressure	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Rooftop Air Handling Unit	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Rooftop Unit	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Computer Room Air-Conditioning Unit	Liebert			Multi source
	Airedale			Multi source
	HiRoss			Multi source
	DataAire			Multi source
	Compu-Aire			Multi source
	Schneider			Multi source
	Stultz			Multi source
Split System A/C Units	Carrier	6741	Justin Leslie 352-318-5139 Justin.leslie@carrier.com	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Duct Heaters	Carrier	6741	Justin Leslie 352-318-5139 Justin.leslie@carrier.com	Multi source
	McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
Humidifiers	Armstrong			Multi source
	Hermidifier			Multi source
	Dristream			Multi source
	Pure Stream			Multi source
	Nortec			Multi source
Division 26 - Electrical				
Pad-Mounted Transformers	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi source
	Cutler-Hammer / Westinghouse	6448	Consolidated Electrical Distributors (CED) Lance Smith HCA@ced-nashville.com 615-329-2601	Multi source
Generator Synchronizing Switchgear	ASCO	7228	Perry Kaiser 973-966-2131 perry.kaiser@ascopower.com	Multi source
	Cummins Crosspoint	6344	Chris Banet HCA@cummins.com Phone: 615-478-2057	Multi source
Circuit Breaker Distribution Switchboards	Culter Hammer	6448	Consolidated Electrical Distributors (CED) Lance Smith HCA@ced-nashville.com 615-329-2601	Multi source
	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi source
Safety Switches	Culter Hammer			Multi source
	Square D			Multi source
Emergency Standby Engine Generator System	Cummins Crosspoint	6344	Chris Banet HCA@cummins.com Phone: 615-478-2057	Multi source
	Caterpillar	46261	Steve Turner HealthTrust@cat.com Phone: 309-494-5105	Multi source
	Kohler	66551	Keith Kraemer hcasales@nixonpower.com Phone: 615-664-1487	Multi source
	Energy Systems Southeast	3489	Mike Evans HCA@essellc.com Phone: 865-806-9435	Multi source
Surge Protective Devices	Eaton / Cutler Hammer	6448	Consolidated Electrical Distributors (CED) Lance Smith HCA@ced-nashville.com 615-329-2601	Multi source
	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi source
Modular Headwall Units	BLOX		Amanda Moore amoore@bloxbuilt.com 205-424-3242	Multi source
	Neopod		Michael Miller mmiller@neopodsystems.com 512-987-0097	Multi source
Lighting	Acuity	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi Source
	Cooper Lighting	6448	Consolidated Electrical Distributors (CED) Caitlin James HCA@ced-nashville.com Cell - 901-488-0188 Office - 615-329-2601	Multi source
Fire & Life Safety Systems	Johnson Control	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source
	Edwards			Multi source

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: Sept. 2021
Structured Voice and Data Cabling Infrastructure	Accu-Tech	6715	Tim Flannagan 615-430-0813 Tim.Flannagan@accu-tech.com	Multi source
		5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi Source
Division 28 - Electronic Safety and Security				
Security System	ADT			Multi source
	Stanley			Multi source
Access Controls	Lenel Systems International, Inc.		Rick Keebler richard.keebler@lenel.com 513-260-1140	Multi source
	Software House / Tyco International		Keg Giles kgiles@tycoint.com 770-595-4719	Multi source
	aptiQ	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com 615-631-8650	Multi source

Project Manual For:

LAKE CITY MEDICAL CENTER
NORTH FLORIDA REGIONAL HEALTHCARE

Lake City Medical Center

ED Expansion, Pharmacy And Dietary Renovation

340 NW Commerce Drive
Lake City, Florida

Civil and Structural Early Release Package

December 06, 2021

Architect Project # 45057.00
HCA Project # 3793800010, 3793800014
AHCA 23/100156 115

Gresham Smith

Architecture
Gresham Smith
Nashville, Tennessee, 37201
Phone # 615-770-8100
FL Qualifier No. AR0013420
FL Registry No. RY3806
Principal: Rob Hamby
Architect/Interior Designer of Record: Eric Snyder
Project Architect: Eric Snyder
Project Coordinator: Traci Myers
Interior Designer: Morgan Black

HCA Healthcare

Structural Engineering
Stanley D. Lindsey & Associates, Ltd
Nashville, Tennessee, 37027
Phone # 615-320-1735
FL Qualifier No. 39200
FL Registry No. 1329
Project Principal/Engineer: Mark Hilner
Structural Engineer of Record: Michael E. Corrin

M, P & E Engineering
I.C. Thomasson Associates, Inc.
Nashville, Tennessee, 37204
Phone # 615-346-3400
FL Qualifier No. 38970
FL Registry No. 1276
Principal: Josh Cartwright
Project Manager: Paul C. McKinney
Mechanical Engineer of Record: Shawn Sullivan
Plumbing Designer: Donna Seigal
Electrical Engineering: Paul C. McKinney
Telecom: Michael Henry

Civil & Landscape
Kimley-Horn
2615 Centennial Blvd., Suite 102
Tallahassee, Florida 32308
Phone# 850-553-3500
FL Qualifier No.
FL Registry No. 696
Project Manager: Chris Akers
Landscape Architect: Charlie Johnson
Civil Engineer of Record: Kelsey Lewis, P.E.

HCA Vendor Information
Artwork:
Ambiance
Adrienne Graham
615-353-0723
Furniture:
OFS
Candice Manring
800-763-0212
Monitoring/Telemetry:
GE
Tarey Isbell: 901-451-7496
Joseph West: 770-710-2731
Shelving, Bins, Carts:
Storage Systems
Charles Spann: 615-468-1236
Textiles:
Phoenix Textile
Scott Rodgers: 800-325-1440

HCA Design Manager:
Nicole Hoch
Nicole.Hoch@HCAHealthcare.com

HCA Construction Manager:
Ben McAlpin
Ben.McAlpin@HCAHealthcare.com

SECTION 01 1000
SUMMARY OF WORK

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:
1. Contract description.
2. Work by Owner or other Work at the Site.
3. Owner-supplied products.
4. Contractor`s use of Site .
5. Future work.
6. Work sequence.
7. Owner occupancy.
8. Permits.
9. Specification conventions.

B. Related Requirements:
1. Section 01 5000 Temporary Facilities and Controls for limitations and procedures governing temporary use of Owner's facilities.

1.2 CONTRACT DESCRIPTION

A. Work of the Project includes construction of 6,678 square feet of interior build out in existing building shell space.

B. Project Location: Lake City Medical Center, 340 NW Commerce Drive, Lake City, Florida 32055.

C. Perform Work of Contract under HCA Contract with Owner according to Conditions of Contract.

1.3 OWNER CONSULTANTS

A. The Owner has retained certain design professionals who have prepared designated portions of the Contract Documents. Such portions do not have the indicia of the Engineer.

B. The Engineer has no contractual relationship with Owner’s separate design professionals, and specifically disclaims any responsibility for their work and disclaims responsible charge for Contract Documents prepared by them. Engineer’s responsibilities for coordination with such consultants are limited to specific duties stated in its Agreement with the Owner, and do not include authority over these consultants.

C. The Engineer is responsible only for Contract Documents prepared by the Engineer and its consultants and for administration of the contract for construction only for those portions of the Work designed by the Engineer and its consultants.

1.4 OWNER-SUPPLIED PRODUCTS

A. Owner Responsibilities:
1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples to Contractor.
2. Arrange and pay for delivery of owner supplied products to Site.
3. Upon delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers` warranties, inspections, and service.

B. Contractor Responsibilities:
1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload owner supplied products at Site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install, and finish products.
4. Repair or replace items damaged after receipt.

1.5 CONTRACTOR`S USE OF SITE

A. Limit use of Site and premises to allow:
   1. Owner occupancy. Owner staff regular work hours are 7 am to 6 pm, EST..
   2. Do not unreasonably encumber site with equipment, materials, or vehicles.
   3. Parking for construction personnel including the use of Owner's parking lot(s) shall be reviewed with the Owner before construction start.

B. Access to Site: Limited to areas as designated by the Owner.

C. Emergency Building Exits during Construction: Limited to areas designated by the Owner. <>.

D. Construction Operations: Limited to areas indicated on Drawings.
   1. Noisy and Disruptive Operations (such as Blasting, Use of Jack Hammers and Other Noisy Equipment): Not allowed in close proximity to existing building during regular hours of operation. Coordinate and schedule such operations with Owner to minimize disruptions.

E. General: Contractor shall have limited use of premises for construction operations, including use of Project site, during construction period. Contractor`s use of premises is limited only by Owner`s right to perform work or to retain other contractors on portions of the Project.

F. Time Restrictions for Performing Interior Work: As coordinated with the Owner.

G. Utility Outages and Shutdown:
   1. Coordinate and schedule electrical and other utility outages with Owner.
   2. Outages: Allowed only at previously agreed upon times. <>.
   3. At least one week before scheduled outage, submit Outage Request Plan itemizing the dates, times, and duration of each requested outage

H. Construction Plan: Before start of construction, submit three copies of construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.6 WORK SEQUENCE

A. Construct Work in phases in order to accommodate Owner`s occupancy requirements during construction period. Coordinate construction schedule and operations with :

B. Sequencing of Construction Plan: Before start of construction, submit construction plan regarding phasing of demolition, <`> and new Work for acceptance by Owner. After acceptance of plan, construction sequencing shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.7 OWNER OCCUPANCY

A. Schedule and substantially complete designated portions of the Work for occupancy before Substantial Completion of the entire Work.
   1. Owner`s use and occupancy of designated areas before Substantial Completion of the entire Project do not relieve Contractor of responsibility to maintain specified insurance coverages on a 100 percent basis until date of final payment.

B. Owner will occupy Site during entire period of construction. Phasing of construction for installation of underslab plumbing may be required. Coordinate Phasing with Owner.

C. Cooperate with Owner to minimize conflict and to facilitate Owner`s operations.

D. Schedule the Work to accommodate Owner occupancy.

1.8 PERMITS

A. Supply necessary permits for construction of Work including the following:
   1.
   2. Fire Sprinkler permit

1.9 SPECIFICATION CONVENTIONS

A. Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

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

C. Owner Documents: Certain included in the Project Manual documents were prepared by the Owner. These documents were included in the Project Manual without modification by Gresham Smith and are not issued under the seals of the Engineer or its consultants.
   1. No provision in the Owner's documents shall be effective to change the duties and responsibilities of Gresham Smith from those stated in its Agreement with the Owner.

1.10 PROJECT INFORMATION EXCHANGE

A. Project Information Exchange: The Engineer will provide access to relevant Project files through its project information management software Newforma without charge to Contractor and provide instruction on its use. This software includes the ability to exchange large files and large numbers of files.
   1. Contract Documents will be issued using this software.
   2. Contractor shall use this software for transmitting all files for contract administration documents; no other method is acceptable. The Engineer will not download documents from Contractor's FTP site.
   3. Additional requirements for specific types of contract administration documents are specified in other Division-01 Specifications sections.

PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

3.1 SEQUENCE OF WORK

ISSUED	DATE
Early Release Package	**12/06/2021**

END OF SECTION

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements (NOT TO BE USED FOR GRESHAM SMITH PROJECTS, USE 01 3100): Submittal procedures, coordination.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

C. Individual product specification sections may have sepcific requirements

1.3 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.2 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
   1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are

unacceptable.

B. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.

3.3 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect's decision following review of proposed substitution will be noted on the submitted form.

ISSUED:	DATE:
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 2501.01
SUBSTITUTION REQUEST FORM

THIS FORM IS FOR CONTRACTOR'S REQUESTS FOR SUBSTITUTIONS AFTER THE CONTRACT FOR CONSTRUCTION HAS BEEN EXECUTED. NO OTHER FORM IS ACCEPTABLE. REFER TO SECTION 01 2500 FOR REQUIREMENTS GOVERNING SUBMISSION, REVIEW, AND ACCEPTANCE OF REQUESTS FOR SUBSTITUTIONS.

DATE OF CONTRACTOR'S REQUEST:

4.1 WE REQUEST CONSIDERATION TO USE:

_____

(PROPOSED SUBSTITUTION)

INSTEAD OF THE FOLLOWING SPECIFIED ITEM:

SECTION	PAGE	PARAGRAPH	DESCRIPTION

9.1 REASON FOR REQUEST: ATTACH DETAILED EXPLANATIONS FOR ALL REASONS THAT APPLY.

9.2 SPECIFIED PRODUCT IS NOT ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

9.3 SPECIFIED PRODUCT HAS BEEN DISCONTINUED BY MANUFACTURER.

9.4 SPECIFIED PRODUCT CANNOT BE PROVIDED WITHIN CONTRACT TIME BECAUSE OF CIRCUMSTANCES BEYOND CONTROL OF CONTRACTOR.

9.5 PRODUCT SUBSTITUTION OFFERS SUBSTANTIAL BENEFIT TO THE OWNER IN THE FORM OF COST SAVINGS, TIME SAVINGS, ENERGY CONSERVATION, SUSTAINABILITY ADVANTAGES, OR OTHER VALUABLE CONSIDERATIONS, NET OF THE ARCHITECT'S/ENGINEER'S COST TO EVALUATE THE TECHNICAL COMPATIBILITY AND MODIFY THE BUILDING DESIGN, IF REQUIRED.

9.6 ATTACHED ARE THE FOLLOWING SUPPORTING DATA:

□ TEST REPORTS □ SAMPLES □ DRAWINGS □ ICC-ES EVALUATION REPORT

10.1 ATTACH COMPARISON DATA OF THE PROPOSED SUBSTITUTION VERSUS THE SPECIFIED ITEM, AS AN ATTACHMENT TO THE FOLLOWING SUBSTITUTION REQUEST FORM. INCLUDE HIGHLIGHTED PRODUCT DATA AND/OR SPECIFICATIONS TO POINT OUT THE TECHNICAL SIMILARITIES OR DIFFERENCES BETWEEN THE SPECIFIED PRODUCT AND THE PROPOSED SUBSTITUTION PRODUCT. INDICATE NAME, BRAND, CATALOG NUMBERS, MANUFACTURER, AND LIST SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT.

10.2 ATTACH COMPARISON DATA BETWEEN THE PROPOSED SUBSTITUTION AND THE SPECIFIED ITEM FOR NON-TECHNICAL CHARACTERISTICS (E.G. COST BENEFIT, SCHEDULE BENEFIT, FUNCTIONALITY IMPROVEMENT, ENERGY SAVINGS, ETC.)

10.3 PROPOSED CHANGE TO CONTRACT SUM:

10.4 □ DEDUCT: $ □ ADD: $

10.5 CONTRACTOR HAS INVESTIGATED THE PROPOSED SUBSTITUTION AND CERTIFIES THE FOLLOWING:

A. Function, appearance, and quality of proposed substitution is equal or superior to the specified item, except as stated in comparison data.

B. Proposed substitution will have no adverse effects on other installers, construction schedule, or specified warranty requirements.

C. Proposed substitution does not adversely affect dimensions, clearances, or weight for functioning and maintenance.

D. Contractor will modify other parts of the Work as necessary to make all parts of the Work complete and functional without additional costs beyond the proposed change to Contract Sum stated above.

E. Cost data stated herein are complete and Contractor waives any further claims for additional costs incurred by Architect/Engineer's recommendation and Owner's acceptance of substitution.

F. If accepted, Contractor will provide submittals per requirements of Section 01 3300.

POINT BY POINT COMPARATIVE DATA SHEET

LIST ALL PROPERTIES SPECIFIED. (PHYSICAL, TEST, STANDARD, WARRANTY, CODE, PERFORMANCE)	SPECIFIED PRODUCT	PROPOSED PRODUCT	IF THERE IS A DIFFERENCE EXPLAIN WHY THIS SHOULD BE ACCEPTED

A.

EXAMPLE POINT BY POINT COMPARATIVE DATA SHEET (EXAMPLE INFORMATION IN ITALICS)

LIST ALL PROPERTIES SPECIFIED. (PHYSICAL, TEST, STANDARD, WARRANTY, CODE, PERFORMANCE)	SPECIFIED PRODUCT	PROPOSED PRODUCT	IF THERE IS A DIFFERENCE EXPLAIN WHY THIS SHOULD BE ACCEPTED
EX. WARRANTY	**5YR**	**7YR**	**EXCEEDS SPECIFICATION**
EX. ASTM 123	**PASSED**	**EXCEEDS ASTM 123.**	**MEETS ASTM 124 WHICH HAS A LOWER AIR INFILTRATION RATE THAN ASTM 123**

A.

B. CONTRACTOR'S SIGNATURE

Contractor Name:
Name and Title of Person Signing:
Signature:
Date:

ARCHITECT'S RECOMMENDATION

APPROVE SUBSTITUTION: PROVIDE SUBMITTALS PER SPECIFICATION SECTION 01 3300.

APPROVE SUBSTITUTION AS NOTED: PROVIDE SUBMITTALS PER SPECIFICATION SECTIONS 01 3300.

REJECT SUBSTITUTION: PROVIDE ORIGINALLY-SPECIFIED PRODUCTS.

SUBSTITUTION PROPOSAL RECEIVED TOO LATE: PROVIDE ORIGINALLY-SPECIFIED PRODUCTS.

SIGNED BY:	**DATE:**

END OF SECTION

SECTION 01 3100
PROJECT MANAGEMENT AND COORDINATION

PART 1 -GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. Requests for Information/Interpretation (RFIs).
   4. Project meetings.

1.2 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare written summary identifying individuals or firms proposed for each portion of the Work, including those who are to supply products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Sections covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 working days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.3 GENERAL COORDINATION PROCEDURES

A. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor`s construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

1.4 COORDINATION

A. Coordinate scheduling, submittals, and Work of various Specification sections and Drawing notes to ensure efficient and orderly sequence of installation of interdependent construction elements .

B. Coordinate selection of products specified in different Specification sections for compatibility. Compatibility among Contractor`s options is not assured by listed manufacturers or products in the Specifications or Drawings, but must be provided by the Contractor.

C. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities.

D. Coordinate construction operations for efficient and orderly installation of each part of the Work. Coordinate construction operations for Work specified in different Sections that depend on each other for proper installation, connection, and operation. Lay out Work to provide required headroom and width in egress paths.

E. Coordination of installation location and sequence between elements of the Work is a basic Contract requirement. Locations of concealed elements shown on Drawings that connect to exposed elements are intended only as diagrams; final locations are the responsibility of the Contractor within Contract requirements.

F. Locations of access panels shown on Drawings are intended only diagrammatically. Locate access panels to provide convenient and direct location to concealed controls and equipment.

G. Coordinate horizontal and vertical space requirements, support sizes and locations, and installation of Work indicated diagrammatically on Drawings, including concealed spaces. Route concealed pipes, ducts, conduit, and similar items in orderly manner with long dimensions parallel to column grid lines where possible.

H. Coordinate locations of concealed framing, blocking, and other supports with manufacturer requirements for support and anchorage.

I. Utilize spaces efficiently to maximize accessibility for subsequent Work, for maintenance, for repairs, and to permit removal and replacement.

J. Coordinate equipment locations and utility supplies to such locations with manufacturer product information for operational clearances and for maintenance access.

K. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

L. Coordinate enclosure of Work with required inspections and tests to minimize need for uncovering Work for those purposes.

M. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion [and for portions of Work designated for Owner`s partial occupancy].

N. Preparation of coordination drawings for work of different trades is Contractor’s option. Such drawings will not be reviewed by the Architect.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      f. Indicate required installation sequences.

g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor`s sole responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

C. Coordination Digital Data Files: Prepare coordination digital data files.
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
   a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts before submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
3. Architect will supply Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Digital Data Software Program: Drawings are available in .

1.6 REQUESTS FOR INFORMATION OR INTERPRETATION (RFIS)

A. RFIs will be accepted and processed by the Architect only on Contract Documents prepared by the Architect or its consultants that are sealed and have been issued for construction.
1. Requests for information or interpretation of preliminary drawings or specifications shall be made by normal correspondences, not by RFI. Architect’s responses to such requests do not

constitute Contract requirements for the Work.

B. Owner Documents: Requests for information or interpretation of Owner-prepared Contract Documents shall be made by normal correspondence, not by RFI. Owner is responsible for responding to such requests. Provide contemporaneous copies to Architect.

C. Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor`s work or work of subcontractors.

D. Submission of an RFI constitutes representation that the Contractor requires additional information about the Contract Documents after having made careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, and prior project correspondence or documentation.

E. If upon evaluation of the RFI the Architect finds that the requested information is contained in the Contract Documents or by other documents or methods as outlined in paragraph above, the Owner has the option to obtain reimbursement from the Contractor for costs incurred by the Owner for the Architect`s services and expenses made necessary in answering such requests.

F. RFI Submission: RFIs shall be submitted in electronic form using the Architect's InfoExchange internet site. Paper RFIs, e-mail, faxes, and other media are not acceptable and will be returned without action.
   1. At the beginning of the Project, the Architect will set up accounts for Contractor's authorized personnel, including log-in information and passwords. Users will be able to change passwords after logging in for the first time.
   2. Complete the form provided by the InfoExchange software in full. Forms with boxes that are blank will not be processed.
   3. In the box marked "Question", insert the text of the request together with Contractor's suggested resolution and other pertinent information.
   4. Sketches, diagrams, product data sheets, and other supplementary information may be attached to the form as PDF electronic files, but the actual text of the request must be entered into the form. Forms that have "See attached document" or language of similar import in the Question box will be not be processed.
   5. Web Address: http://infox.gspnet.com/userweb/login/login.aspx

G. Content of the RFI: Include detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of Architect.
   6. RFI number, numbered sequentially.
   7. RFI subject.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail references, as appropriate.
   10. Field dimensions and conditions, as appropriate.
   11. Contractor`s suggested resolution. If Contractor`s suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   12. Contractor`s signature.
   13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
       a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

H. Architect`s Action: Architect will review each RFI, determine action required, and respond. Allow at least five working days for Architect`s response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor`s means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect`s actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect`s action may include request for additional information or clarification, in which case Architect`s time for response will date from time of receipt of additional information or clarification from Contractor.
3. Architect`s action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600.
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within working days of receipt of the RFI response.

I. On receipt of Architect`s action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three working days if Contractor disagrees with response.

J. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit copies of log at Owner-Architect-Contractor meetings .
1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect`s response was received.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five working days of the meeting.

B. Preconstruction Conference: Schedule and conduct preconstruction conference before starting construction, at a time convenient to Owner and Architect, but not later than working days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Record and distribute meeting minutes.
4. Agenda: Discuss items of significance that could affect progress.
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Procedures for processing field decisions and Change Orders.
   g. Procedures for RFIs.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.

k. Submittal procedures.
l. Preparation of record documents.
m. Use of the premises.
n. Work restrictions.
o. Working hours.
p. Owner`s occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.
aa. Infection Control Risk Assessment (IRCA).

C. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
a. Contractor`s Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor`s construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
1) Review schedule for next period.
b. Review present and future needs of each entity present, including the following:
1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.
4. Minutes: Record and distribute the meeting minutes to each party present and to parties requiring information.
a. Schedule Updating: Revise Contractor`s construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 3200
EXECUTION

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:
1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Hot work permit.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

C. Hot Work: Work involving welding, brazing, torch cutting, grinding, powder-driven fasteners, torch-applied roofing, or other activities that generate sparks capable of causing combustion. Refer to NFPA 51B and 601.

1.3 INFORMATIONAL SUBMITTALS

A. Prepare submittals per requirements of Section 01 3300 – Submittal Procedures.

B. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
1. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.4 QUALITY ASSURANCE

A. Cutting and Patching:
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.[<>]
a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Mechanical systems piping and ducts.
f. Control systems.
g. Communication systems.
h. Electrical wiring systems.
i. Operating systems of special construction.

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

C. Hot Work Permits: Before starting activities involving hot work, obtain hot work permit from the Owner.

PART 2 -PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

B. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

PART 3 -EXECUTION

3.1 EXAMINATION

A. EXISTING CONDITIONS DISCLAIMER: The Owner and Architect specifically disclaim any warranty as to existence and locations of underground and other concealed utilities and construction indicated on Drawings as existing. The Architect prepared Drawings on the basis of information provided by Owner and did not verify the accuracy of that information. Contractor is therefore advised that actual conditions may differ from those depicted on Drawings or in other Contract Documents.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where appropriate, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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

D. Inspect products immediately before installation. Do not install defective or damaged products.

3.2 PREPARATION

A. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings, including requirements for operation, maintenance access, and other required clearances.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the existing column grid/structure. If discrepancies are discovered, notify Architect promptly.

B. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   1. Inform installers of lines and levels to which they must comply.
   2. Check the location, level and plumb, of every major element as the Work progresses.

3.4 INSTALLATION

A. Project structures have been designed for strength, stability, and safety in completed form. Until completed, provide temporary bracing and supports needed for strength, stability, and safety of construction in progress and for protection of persons and property.

B. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
   4. Maintain minimum headroom clearance of 96 inches in occupied spaces and in unoccupied spaces.

C. Comply with manufacturer instructions and recommendations for installing products.

D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

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

F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachments: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for thermal expansion and contraction, deflection, and normal building movements.
   3. Coordinate installation of anchorages. Supply setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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

J. Isolate products from incompatible materials as needed to prevent deterioration.

K. Coordinate enclosure of the Work with required inspections and tests so as to minimize need for uncovering Work for those purposes.

L. Install products at time and under conditions that will ensure best possible results. Maintain conditions required for product performance until Substantial Completion.

M. Tolerances: Where specific tolerances are not stipulated by Contract Documents or manufacturer recommendations, comply with applicable industry standards.
   1. Tolerances are noncumulative unless otherwise stated.

3.5 HANDICAPPED ACCESSIBILITY REQUIREMENTS

A. ADA Requirements: In addition to Code requirements governing handicapped accessibility, install Work in conformance with US Department of Justice publication 2010 ADA Standards for Accessible Design.
   1. Where ADA compliance is indicated in Contract Documents, comply with this document.
   2. Contractor is cautioned that normal construction industry tolerances may not be acceptable with respect to maximum and minimum dimensions in this document.
   3. Refer questions regarding interpretation of ADA requirements to Owner, with copies of correspondence to Architect.

4. Where Code requirements and ADA requirements are at variance, comply with the more restrictive requirements unless otherwise directed by Owner.

B. The Architect's site observations for compliance with handicapped accessibility requirements are limited in scope and frequency per its contract with the Owner. The Owner will therefore rely on the Contractor's skill, judgment, and expertise for compliance with handicapped accessibility requirements and will look solely to the Contractor for such compliance.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch to restore surfaces to original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Specific cutting and patching requirements applicable to individual units of Work may be specified in other Specification sections.

D. Requirements of this Section apply to all Work of Contract. Refer to Divisions 21 through 33 for additional requirements and limitations on cutting and patching.

E. Temporary Support: Provide temporary support of work to be cut.

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

G. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000.

H. Existing Utility Services and Mechanical/Electrical Systems: Where existing services or systems are required to be removed, relocated, or abandoned, bypass such services or systems before cutting to minimize interruption to occupied areas.

I. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer`s written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

J. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even, plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to weathertight condition and ensures thermal and moisture integrity of building enclosure.

K. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner`s vendor personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner`s vendors.
1. Construction Schedule: Inform Owner of Contractor`s preferred construction schedule for Owner`s portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner`s vendor personnel at preinstallation conferences covering portions of the Work that are to receive Owner`s work. Attend preinstallation conferences conducted by Owner`s construction personnel if portions of the Work depend on Owner`s construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Clean spills, misapplications, and other accidents immediately as they occur.

D. Do not remove or obscure UL labels, third-party certification labels, or other required labeling.
1. Remove liquid spills promptly.

E. Installed Work: Keep installed work clean. Clean installed surfaces according to instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

G. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

H. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section .

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer instructions for temperature and relative humidity.

3.11 DAMAGE CORRECTIONS

A. Provide new conforming Work to replace damaged work that cannot be repaired or refinished in place. Damage includes soiling or staining that cannot be satisfactorily cleaned.
   1. Remove interior gypsum products exposed to water during construction period. Remove entire gypsum board panels; do not cut and patch gypsum board.
   2. Remove insulation, acoustic ceiling components, and other moisture-sensitive products exposed to water during construction period.
   3. Remove metal stud framing components exposed to water during construction period that have visible rust.

B. If there is evidence of water intrusion into partially completed areas, remove portions of gypsum board and other construction at shafts, plenums, and other concealed areas to check for moisture damage and for mold and mildew growth. Examine concealed areas in presence of Architect.
   1. Remove components in entirety that exhibit water damage, mold, or mildew.
   2. Remove gypsum board in whole panels.
   3. Do not install replacement Work until concealed areas are completely dried and causes of water intrusion have been remedied.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Owner`s responsive action.

B. Informational Submittals: Written information that does not require Owner`s approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. General: Electronic copies of base plans of the Contract Drawings for Contractor`s use in preparing submittals will not be provided unless a signed digital data agreement is in place.

B. Submittal Method: The Architect will provide access to Newforma document management software without cost to the Contractor. Contractor shall use the standard transmittal forms provided by the Architect. Using e-mail or other proprietary software for the submittal and processing of submittals is not accepable.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner`s receipt of submittal.
   1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Owner will advise Contractor when a submittal being processed must be delayed for coordination.
   2. If resubmittal is necessary, process it in same manner as initial submittal.
   3. Allow 15 days for processing each resubmittal.
   4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
   5. Submittals out of sequence from agreed upon schedule may result in back charges to the Contractor.

E. Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space on label or beside title block to record Contractor`s review and approval markings.
   3. Include the following information on label for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name and address of Contractor.
      d. Name and address of subcontractor.
      e. Name and address of supplier.
      f. Name of manufacturer.
      g. Number and title of appropriate Specification Section.
      h. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Owner will return submittals, without review, received from sources other than Contractor.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating action taken by Owner in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Submit Product Data before or concurrent with Samples.
   4. Material safety data sheets are not required and should not be included in the product data submittal.
   5. Include the following information, as applicable:
      a. Manufacturer`s written recommendations.
      b. Manufacturer`s product specifications.
      c. Manufacturer`s installation instructions.
      d. Standard color charts.
      e. Manufacturer`s catalog cuts.
      f. Wiring diagrams showing factory-installed wiring.
      g. Printed performance curves.
      h. Operational range diagrams.
      i. Compliance with recognized trade association standards.
      j. Compliance with recognized testing agency standards.
      k. Application of testing agency labels and seals.
      l. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Roughing-in and setting diagrams.
      e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      f. Shopwork manufacturing instructions.
      g. Templates and patterns.
      h. Schedules.
      i. Design calculations.
      j. Compliance with specified standards.
      k. Notation of coordination requirements.
      l. Notation of dimensions established by field measurement.
   2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

D. Samples: Prepare physical units of materials or products, including the following:
   1. Samples for Initial Selection: Submit manufacturer`s color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically

identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Attach label on unexposed side that includes the following:
   a. Generic description of Sample.
   b. Product name or name of manufacturer.
   c. Sample source.
   d. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   2. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer`s letterhead certifying that product complies with requirements.

D. Installer Certificates: Prepare written statements on manufacturer`s letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

E. Manufacturer Certificates: Prepare written statements on manufacturer`s letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

F. Material Certificates: Prepare written statements on manufacturer`s letterhead certifying that material complies with requirements.

G. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency`s standard form, indicating and interpreting test results of material for compliance with requirements.

PART 3 - EXECUTION

3.1 CONTRACTOR`S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Owner.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor`s approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. Submittals not containing the Contractor's stamp will be returned without action.

3.2 ARCHITECT/ENGINEER`S ACTION

A. General: Architect/Engineer will not review submittals that do not bear Contractor`s approval stamp and will return them without action.

1. Review of submittals by Architect/Engineer is only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
2. Review of submittals by Architect/Engineer is not for purpose of determining the accuracy and completeness of dimensions and quantities, or substantiating installation instructions.

B. Re-submittal Review: Submittals marked as "Exceptions Noted – Resubmit" or "Resubmit" will be re-reviewed and stamped with an action stamp. Engineer will mark the stamp appropriately to indicate action taken. If the re-submittal is marked as "Exceptions Noted – Resubmit" or "Resubmit", the Owner will deduct the amount of the Engineer`s compensation for subsequent re-submittal review from the final payment to the Contractor as provided on the Bid Form.

C. Action Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Owner will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. No Exceptions Noted: Where submittal is marked "No Exceptions Noted", the Work covered by the submittal may proceed provided it complies with the Contract Documents.
2. Exceptions Noted: Where submittal is marked "Exceptions Noted", the Work covered by the submittal may proceed provided it complies with both Owner`s notations and corrections on the submittal and the Contract Documents.
3. Exceptions Noted - Resubmit: Where the submittal is marked "Exceptions Noted – Resubmit", do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Owner`s notations and corrections.
4. Resubmit: Where the submittal is marked "Resubmit", do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.
5. Information: Where the submittal is marked "Information", the Architect/Engineer is neither approving nor disapproving the information provided within the submittal. This indication may be placed upon design calculations from Contractor`s Owners, schedules, installation procedures, standards or regulations, etc.

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

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 3324
STRUCTURAL SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural submittals include shop drawings, design calculations, diagrams, illustrations, schedules, performance charts, nomenclature charts, samples, brochures and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, fabricator, or distributor and which illustrate some portion of the Project.

B. Submittals by the Contractor are not a part of the Contract Documents.

1.2 RELATED SECTIONS

A. Section 01 3300 – Submittal Procedures

1.3 SUBMITTAL PROCEDURES

A. Prior to the initial submittal, Contractor shall submit to the Architect/Structural Engineer a completed Submittal Information and Schedules form given in Appendix I.

B. Submittals shall be accompanied by a transmittal letter with the following information:
   1. Project name.
   2. Contractor's name.
   3. Date submitted.
   4. Description of items submitted; identify work and product by Specification Section.
   5. Number of drawings and other pertinent data.

C. Provide blank space on each submittal for the Architect/Structural Engineer's review stamp.

D. The type and number of submittals for each item shall be in accordance with Section 01 3300.

E. Contractor shall direct specific attention on the submittal to any deviation from the Contract Documents.

F. Electronic submittals shall comply with the following standards:
   1. Structural submittals made in electronic format must be in a generally accepted format that can be viewed by Adobe Reader or similar, and capable of receiving comments and notations in Adobe Writer, Blubeam Revu or similar. When creating the file, no permissions should be restricted - All actions should be ALLOWED. Submittals should be issued as a single BOUND set with each page bookmarked with the correct sheet number. Submittals not formatted in this manner will be returned to the contractor for review and resubmittal.
   2. Send electronic files to the following email address and copy the Structural Engineer: shopdrawings@sdlal.com.

1.4 CONTRACTOR RESPONSIBILITY

A. Contractor shall make all submittals in advance of installation or construction to allow the Architect/Structural Engineer sufficient time for review.

B. Contractor shall stamp and sign each sheet of shop drawings and product data, and sign or initial each sample to certify compliance with requirements of Contract Documents. SUBMITTALS RECEIVED

WITHOUT THE CONTRACTOR'S STAMP OF REVIEW WILL BE RETURNED TO THE CONTRACTOR FOR REVIEW AND RESUBMITTAL.

C. Contractor shall understand that the submittal of the required documents does not constitute compliance with the requirements of the Contract Documents; only submittals reviewed by the Architect/Structural Engineer constitute compliance.

D. It is the Contractor's responsibility to furnish equipment, materials, and labor for the Project which meets the requirements of the codes and authorities quoted as well as the Contract Documents. Proprietary items specified herein only establish a minimum functional and aesthetic standard and it is incumbent upon the Contractor to ascertain conformance of these proprietary items or any proposed substitution with the codes and authorities.

E. By reviewing, approving and submitting shop drawings, product data, or samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, member sizes catalog numbers, and similar data and that he has checked and coordinated shop drawings with the requirements of the Project and of the Contract Documents.

F. Work requiring shop drawings, whether called for by the Contract Documents or requested by the Contractor, shall not commence until the submission has been reviewed by the Architect/Structural Engineer. Work may commence if the Contractor verifies the accuracy of the Architect/Structural Engineer's corrections and notations and complies with them without exception and without requesting change in Contract Sum or Contract Time.

1.5 ARCHITECT/STRUCTURAL ENGINEER REVIEW

A. Architect/Structural Engineer will review submittals with reasonable promptness. For scheduling purposes, allow 10 business days in Structural Engineer’s office exclusive of delivery time.

B. Architect/Structural Engineer's review or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the project and with the information given in the Contract Documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions.

C. Architect/Structural Engineer's review shall not relieve the Contractor from responsibility for errors or omissions in the submittals.

D. Architect/Structural Engineer's review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has directed specific attention to the deviation at the time of submission and the Architect/Structural Engineer has given written approval to the specific deviation.

E. Architect/Structural Engineer's review of submittals shall not be construed as authorizing any change in the Contract Sum or Contract Time.

F. Structural Engineer will return a maximum of three reviewed hard copies for submittals that are not submitted electronically.

1.6 SHOP DRAWINGS

A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail of Contract Documents.

B. All shop drawings shall list the Contract Documents used in their production (date, title, revision number, etc.).

C. Reproduction of Structural Drawings for shop drawings is not permitted.

D. Identify field dimensions; show relationship to adjacent or critical features of Work or products.

E. Electronic shop drawings submitted shall meet the requirements of Section 1.03.

F. A copy of the marked structural shop drawings with the Architect/Structural Engineer's review stamp is to be maintained at the job site. If electronic shop drawings are being used, a hard copy with all final markups is to be maintained at the job site.

1.7 PRODUCT DATA

A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.

B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information which is not applicable.

C. Provide manufacturer's preparation, assembly, and installation instructions.

1.8 SAMPLES

A. Submit full range of manufacturer's standard finishes except where more restrictive requirements are specified, indicating colors, textures, and patterns.

B. Submit samples to illustrate functional characteristics of products, including parts and attachments as required by Architect/Structural Engineer.

C. Approved samples which are of proper size may be incorporated in Work.

D. Label each sample with identification.

. Field Finishes: Provide full samples at Project, at location acceptable to Architect/Structural Engineer, as required by individual Specification Section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed work.

1.9 RESUBMITTALS

A. When submittals are returned to the Contractor with the Architect/Structural Engineer's corrections the Contractor shall make the required corrections.

B. Contractor shall direct specific attention on the resubmittal to all revisions including those requested by the Architect/Structural Engineer on previous submission.

1.10 DISTRIBUTION

A. Distribute reproductions of shop drawings, copies of product data, and samples which bear the Architect/Structural Engineer's review stamp to job site file, Record Documents file, subcontractors, suppliers, other affected contractors, and other entities requiring information.

B. Only reviewed shop drawings are considered acceptable for use during construction.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED.

ISSUED	DATE
Early Release Package	12/06/2021

END OF SECTION

APPENDIX I
SUBMITTAL INFORMATION AND SCHEDULES

PROJECT _____

CONTRACTOR _____

CONTRACTOR'S ADDRESS _____

PROJ. MANAGER _____ PHONE (___) _____ FAX (___) _____

SUPERINTENDENT _____ PHONE (___) _____ FAX (___) _____

MOBILIZATION DATE _____

PROJECTED SUBMITTAL DATES

FOUNDATION, CONCRETE & REINFORCING		STRUCTURAL STEEL		MASONRY	
SUBMITTAL	DATE	SUBMITTAL	DATE	SUBMITTAL	DATE
SITE PREPARATION & EQUIPMENT INFORMATION		FABRICATOR / ERECTOR QUALIFICATIONS		GROUT & MORTAR MIX	
CONCRETE MIX DESIGN		ANCHOR ROD & EMBEDDED ITEMS		BLOCK PRISM & COMP. STRENGTH	
FOUNDATION REINFORCING		ERECTION & DETAIL DRAWINGS		REINFORCING	
		DECK		WRITTEN PROCEDURES	

REMARKS:

COMPLETED BY _____ DATE _____

END OF APPENDIX I

SECTION 01 3517
INTERIM LIFE SAFETY MEASURES

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes: Temporary procedures for ensuring continuity of existing life safety protections and systems in Code-compliant condition during renovations and modifications to existing healthcare facilities.

B. Related Sections:
   1. Section 01 3533: Infection control procedures.
   2. Section 01 5000: Temporary facilities and controls.

1.2 INFORMATIONAL SUBMITTALS

A. Submit written plan for implementing Interim Life Safety Measures.

1.3 INTERIM LIFE SAFETY REQUIREMENTS

A. Implement the Interim Life Safety Measures required by applicable laws, ordinances, rules and regulations and the following documents:
   1. The Joint Commission Accreditation Manual for Hospitals, latest edition.
   2. NFPA 241 Safeguarding Construction, Alteration, and Demolition Operations.

B. Prepare written ILSM plan for the following items:
   1. Existing means of egress provide free and unobstructed exiting. Notify Owner if alternative exits must be designated.
   2. Free and unobstructed access is available to emergency fire, security, and other services.
   3. Fire alarm, detection, and suppression systems are maintained in service. Provide temporary equivalent system if permanent fire systems operation is temporarily inoperable. Provide monthly tests and inspections for temporary systems to verify proper functioning and forward copies of inspection reports to Owner.
   4. Construction of temporary partitions to be smoke-tight and built of non-combustible materials.
   5. Additional temporary fire fighting equipment is provided and personnel are trained in use.
   6. Smoking is prohibited in, or adjacent to, all construction areas.
   7. Storage, housekeeping, and debris removal policies and procedures that reduce the flammable and combustible fire load to the lowest level necessary for daily operations and enforcement are documented.
   8. At least two fire drills are conducted per shift per quarter.
   9. Hazard surveillance of buildings, grounds, and equipment is increased with special attention to excavations, construction areas, construction storage, and field offices.
   10. Personnel are trained when structural or compartmentalization features affecting fire safety are compromised.
   11. Organization-wide safety education programs are conducted to ensure awareness of any Life Safety Code deficiencies, construction hazards, and these ILSM.

C. If Contractor observes existing construction or systems that appear to be hazardous to life safety or not conforming to Code requirements, notify Architect and Owner in writing.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 3533
INFECTION CONTROL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Infection control requirements and procedures, including dust barriers, negative air pressure, debris removal, construction personnel traffic, and airflow and filtration requirements.

B. Comply with Owner`s "Infection Control Risk Assessment" (ICRA) for construction activity as prepared by the Owner. Obtain the ICRA directly from the Owner.

C. The purpose of these requirements is to protect patients from acquiring fungal infections associated with inhaling dust. Ceilings and walls in areas adjacent to and within occupied areas shall be secure at all times. If access into the ceiling in occupied areas is required, procedures as described herein shall be followed. Areas to be protected include all areas adjacent or connected by ductwork that are occupied by patients or staff.

D. Related Sections:
1. Section 01 5000: Temporary construction materials and products.
2. Section 02 4119: Selective demolition of existing construction elements.

1.2 DEFINITIONS

A. "Minor" access is defined as visual observation, minor adjustments, or other activity that does not disturb dust.

B. "Major" describes all other access not defined as "minor".

C. All construction separation walls shall be dustproof.

1.3 GENERAL CEILING ACCESS REQUIREMENTS

A. For "Minor" Work In Non-Sterile Areas:
1. Notify Owner`s Representative of areas to be accessed before start.
2. Contact Owner for all ceiling access problems.
3. Re-route traffic with barriers so that no patients or staff travel below work area.
4. Using a HEPA filtered vacuum cleaner, vacuum dust from tops of ceiling panels to be removed and adjacent panels before removing panels.
5. Clean tops of adjacent ceiling panels after work is complete.
6. Clean floor below work area when work is complete.
7. Replace acoustical ceiling panels and close access panels immediately when workers leave the work area.

B. For "Minor" work in sterile areas, see construction separation requirements in Part 3.1(L).

C. For "Major" work, see construction separation requirements in Part 3.1(A-K).

1.4 PROTECTION OF OCCUPIED AREAS BELOW

A. If surface below area where work is occurring, is the top of the acoustical ceiling or if work above an occupied space becomes unavoidable, provide temporary work platforms, and protect the ceiling and the spaces below from falling objects and materials. Take all necessary precautions to protect people and spaces below from injury resulting from Contractor`s operations.

B. Exercise caution when handling fluids, particularly the heating water, in interstitial spaces. When working with fluids, provide watertight barrier beneath the work area to catch and retain all spillage before it reaches the ceiling below.

C. Should a particular operation be deemed by Owner to pose unacceptable risk to people below, alter methods or schedule as acceptable to Owner`s Representative to minimize the hazards.

1.5 QUALITY ASSURANCE

A. Regulatory Standards: Comply with applicable provisions of the following documents.
   1. Facility Guideline Institute Guidelines for Design and Construction of Hospitals and Outpatient Facilities.
   2. CDC "Guidelines for Environmental Infection Control in Health-Care Facilities", Section II Construction, Renovation, Remediation, Repair and Demolition.
   3. NFPA 101 - Life Safety Code
   4. NFPA 701 - Methods of Fire Tests for Flame Propagation of Textiles and Films
   5. ANSI Z9.2 - Fundamentals Governing the Design and Operation of Local Exhaust Systems
   6. ASTM E90 - Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions and Elements
   7. ASTM E413 - Classification for Rating Sound Isolation

B. Train construction staff in infection control procedures as required by the Owner`s ICRA and this section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTIVE ENCLOSURES AND BARRICADES

A. Comply with the requirements of the Owner`s "Infection Control Risk Assessment" (ICRA) document.

B. Install dustproof enclosures for where required to protect areas occupied by the Owner from dust, debris, and damage.
   1. Infection control is critical in all hospital areas, since many patients have high "at-risk" health conditions. Construction shall be conducted behind enclosures that prevent flow of particles and debris into occupied areas.

C. It is Contractor`s responsibility to determine when dustproof enclosures are required to protect occupied areas adjoining work areas. Provide dustproof enclosures where and when directed by Owner.

D. General Barrier Requirements: Provide air-tight barriers that extend from floor to underside of structure above.
   1. Minimize traffic between barricade areas and open areas. Keep doors to such areas closed at all times. Do not transport construction materials, demolished materials, and refuse through patient care areas without prior consent of Owner.
   2. Provide negative pressure in construction areas by blocking supply ventilation in dust-tight manner and either by HEPA filtration of the existing return ventilation ducts or by using a negative air machine. Do not recirculate air from work areas to occupied areas.
   3. Provide adequate forced ventilation of enclosed work areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.

E. Ventilate barricaded construction areas by use of negative air machines exhausted through filters to exterior of building. Negative air machines shall be Micro-Trap 2000 Negative Air Filtration Units by M-TEC Corporation, 1300 W. Steel Road, Unit #2, Morrisville, Pennsylvania 19067, or comparable product.
   1. Do not perform demolition in areas not served by negative air machines.
   2. Provide sufficient number of negative air machines to maintain construction schedule, but not less than two machines.
   3. Provide filters that remove particles to 0.12 micron in size.
   4. Change filters daily during demolition operations.
   5. Maintain airflow of approximately 100 fpm at barricade door openings.
   6. Vent negative air machines to outside by removing existing windows and replacing them with vented sheet metal panels.
   7. Provide constant monitoring to ensure negative air pressure is maintained.

F. Provide barricades, warning signs, and warning lights to protect the building occupants, existing building, storage areas and materials or equipment. Barricades shall be acceptable to Owner.

G. Construction Barriers: Obtain Owner`s approval of exact location of barriers. Materials for barricades and barriers shall be precut in an unoccupied area. Power driven fasteners are not permitted.
   1. Partitions: Minimum 1-hour fire rated gypsum board on metal studs, with 3-1/2 inch R11 insulation batts to reduce noise. Partitions shall extend to bottom of ceiling or to bottom of deck, where there is no ceiling. Seal partition joints and perimeter. Provide polyethylene barriers above ceilings, complying with NFPA 701, overlap and tape full length of joints. Paint partitions on occupied sides.
   2. Construct vestibule airlock at each entrance through partition barrier with minimum 48 inches between doors. Provide carpets or adhesive mats inside vestibule and inside barrier partition at door to vestibule.
      a. Doors: Minimum 3`-0" width, with minimum 20 minute label, solid core wood with metal frame and hardware, including closer, tightly weather-stripped to prevent flow of dust and closers. Swing doors into construction area. Keep barriers locked during non-working hours. Supply three keys for emergency access to the Owner.
   3. Provide construction signs on all doors in temporary partitions stating "DO NOT ENTER - CONSTRUCTION AREA - AUTHORIZED PERSONNEL ONLY".

H. Temporary Enclosures Outside Work Area (including spaces above furred ceilings): Where work is necessary outside of the construction barricades, the space where work is being done, including ladder, shall be contained within a full height polyethylene sheet barrier minimum 4-mil thickness, tightly taped at all edges and along seams. Provide overlapping flap at least 2 feet wide for access.
   1. All work performed outside the construction barricades, including all work in and above corridors and lobbies, shall be performed outside of normal working hours and shall be scheduled in advance with Owner, except when otherwise specified.
   2. At no time shall any construction equipment or material be stored outside construction barricades.
   3. Dust tracked outside of construction areas shall be cleaned immediately. Provide necessary manpower and equipment, (HEPA filtered vacuum cleaner, antiseptic damp mops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all times.
   4. Top surfaces of ceiling panels adjacent to area of work shall be vacuumed with a HEPA filter vacuum cleaner to remove dust before, during, and after completion of work.

I. Where work occurs in occupied areas, provide access openings through existing plaster, gypsum board or acoustical ceilings, and restore ceilings to original condition after work is complete and to ensure dust control within access areas.
   1. Provide temporary fire retardant treated plywood panels anchored to existing steel ceiling support grid for support of workers crawling above ceiling. Panel thickness shall suit spans between existing steel supports.
   2. All work occurring outside the construction barricades, including work in and above corridors and lobbies, shall be performed outside of Owner`s normal working hours as described in Section 01 1000 - Summary.

J. Remodeling work in rooms that serve other rooms shall be coordinated and phased in with phasing of the remodeling so that at no time are both rooms simultaneously inoperative. Interruptions necessitated by remodeling work shall be coordinated with the Owner`s Representative in advance of the shutdown.
   1. Dust: Generation of significant quantities of airborne dust is not permitted. Clean work areas before starting work as necessary to contain dust and debris generated by the work.
   2. Hot Processes: Hot processes, particularly welding and flame cutting, that generate significant quantities of smoke, are of special concern to Owner. These processes have the potential of setting off the building fire alarm system which automatically calls the Fire Department as well as disrupting the Owner`s operations. Therefore, all work involving hot processes shall be scheduled with the Owner`s system deactivated.

K. Debris Removal:
   1. Demolition material and dust and dirt shall be transported through building in tightly sealed, covered, plastic dump carts with rubber tires.
   2. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping.

3. Before leaving area all containers shall be wiped clean to prevent tracking of dust.
4. Place rugs inside barrier entrances; daily clean or change them.

3.2 ACCESS ROUTES

A. Removal of debris and delivery of new materials to site shall be to hospital dock or other area coordinated with Owner. Move debris at times directed by Owner. Provide tightly covered, sealed containers for waste materials.

B. Construction personnel shall enter and leave construction areas only through traffic control route established by Owner for debris removal and material delivery.

3.3 DOCUMENTATION

A. Provide documentation of construction staff training in infection control measures during construction to Owner.

B. Document locations of and construction materials used for temporary construction enclosures and barricades.

C. Monitor and log integrity of temporary construction enclosures and barricades. Use airborne-particle sampling to monitor barrier integrity. Record remedial actions and repairs.

D. Monitor and log air flow at construction area enclosures and barricades.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Contractor's design-related professional design services.

E. Control of installation.

F. Tolerances.

G. Manufacturers' field services.

H. Defect Assessment.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements (NOT TO BE USED FOR GRESHAM SMITH PROJECTS, USE 01 3100): Submittal procedures.

B. Section 01 4216 - Definitions.

C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.3 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

1.4 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
   1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
   1. Sprinkler Layout: Coordinate with ceiling installation, detailed pipe layout, and hydraulic calculations as described in Section 21 1300 - Fire-Suppression Sprinkler Systems.

1.5 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements (NOT TO BE USED FOR GRESHAM SMITH PROJECTS, USE 01 3100), for submittal procedures.

B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
   1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
      a. Full name.
      b. Professional licensure information.

c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

1.6 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.3 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.4 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

ISSUED:	DATE:
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 4100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:

B. 29 CFR 1910 - Occupational Safety and Health Standards current edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

ISSUED:	DATE:
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 01 4113.01
FLORIDA CODES AND STANDARDS

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:
   1. List of codes enforced by Florida Agency for Health Care Administration (AHCA) Office of Plans and Construction (OPC) which have been used in the design and development of this Project.
   2. Abbreviations and acronyms used in Contract Documents to identify such codes.

B. Other applicable codes and regulatory requirements are listed on the Drawings.

1.2 QUALITY ASSURANCE

A. Code requirements are minimums, and Contract Documents may include more stringent requirements. Notify Architect immediately if requirements of the Contract Documents appear to be in conflict with codes listed herein.

B. The date of the code is that as listed in this section. Comply with dated editions of publications included by reference in codes.

1.3 SCHEDULE OF CODES

A. The following is a partial list of the codes enforced by Florida Agency for Health Care Administration (AHCA) Office of Plans and Construction (OPC) which have been used in the design and development of this project. See the Plan Review Data on the Project Information Sheet in the Drawings for additional codes and regulatory requirements that apply to the Project.

B. Federal Codes and Regulations:
   1. 2010 - The Americans with Disibilities Act (ADA) and Accessibility Guidelines for Building and Facilities

C. State Codes:
   1. 2020, 7th Edition Florida Building Code
   2. 2020, 7th Edition Florida Preventation Code
   3. 2018 NFPA 1, Uniform Fire Code, with Florida Amendments
   4. 2018 NFPA 101, Life Safety Code, with Florida Amendments
   5. 2020, 7th Edition Florida Building Code Energy Conservation
   6. 2020, 7th Edition Florida Building Code Plumbing
   7. 2020, 7th Edition Florida Building Code Mechanical
   8. 2020, 7th Edition Florida Accessibility Code
   9. 2020, 7th Edition Florida Building Code Test Protocols for High Velocity Hurricane Zones
   10. 2018 Edition Guidelines for Design and Construction of Hospitals

D. The following State Fire Codes are adopted by the State of Florida Fire Marshall Rule 69A-3.012 F.A.C They are adoped and incorporated by reference as part of the uniform Fire Safety Stands adopted by the State of Florida Fire Marshall and are applicable to those Buildings and structures specified in paragraphs (a) and (b) of subsection (1) of Section 633.022 F.S.:
   1. NFPA 1 – Uniform Fire Code (2018 Florida Edition).
   2. NFPA 10 – 2018, Standard for Portable Fire Extinguishers
   3. NFPA 11 – 2016, Standard for Low-, Medium-, and High- Expansion Foam
   4. NFPA 12 – 2015, Standard on Carbon Dioxide Extinguishing Systems
   5. NFPA 13 – 2013, Standard for the Installation of Sprinkler Systems
   6. NFPA 14 – 2016, Standard for Installation of Standpipe and Hose Systems
   7. NFPA 15 – 2017, Standard for Water Spray Fixed Systems for Fire Protection
   8. NFPA 16 – 2015, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
   9. NFPA 17 – 2017, Standard for Dry Chemical Extinguishing Systems
   10. NFPA 17A – 2017, Standard for Wet Chemical Extinguishing Systems
   11. NFPA 20 – 2016, Standard for the Installation of Stationary Pumps for Fire Protection.

12. NFPA 24 – 2016, Standard for Installation of Private Fire Service Mains and Their Appurtenances
13. NFPA 25 – 2017, Standard for Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, except that quarterly flow tests shall be required for those systems supplied by a municipal water supply.
14. NFPA 30 – 2018, Flammable and Combustible Liquids Code
15. NFPA 33 – 2016, Standard for Spray Application Using Flammable and Combustible Materials
16. NFPA 37 – 2018, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
17. NFPA 51 – 2018, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting and Allied Processes
18. NFPA 51B-2014, Standard for Fire Prevention During Welding, Cutting and Other Hot Work
19. NFPA 54 – 2018, National Fuel Gas Code
20. NFPA 70 – 2017, National Electric Code
21. NFPA 72 – 2016, National Fire Alarm and Signaling Code
22. NFPA 75 – 2017, Standard for the Protection of Information Technology Equipment
23. NFPA 80 – 2016, Standard for Fire Doors and Other Opening Protectives
24. NFPA 90A – 2018, Standard for the Installation of Air Conditioning and Ventilating Systems
25. NFPA 90B – 2018, Standard for the Installation of Warm Air Heating and Air Conditioning Systems
26. NFPA 91 – 2015, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
27. NFPA 92 – 2015, Standard for Smoke Control Systems
28. NFPA 99 – 2018, Health Care Facilities Code
29. NFPA 101 – Life Safety Code (2018 Edition) Adopted by the Federal Government, through the Center for Medicare/Medicaid Services; and enforced by Florida AHCA.
30. NFPA 101 – Life Safety Code (2015 Florida Edition).
31. NFPA 101A – 2016, Guide on Alternative Approaches to Life Safety
32. NFPA 105 – 2016, Standard for Smoke Door Assemblies and Other Opening Protectives
33. NFPA 110 – 2016, Standard for Emergency and Standby Power Systems
34. NFPA 111 – 2013, Standard on Stored Electrical Energy Emergency and Standby Power Systems
35. NFPA 221 – 2018, Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls
36. NFPA 232 – 2017, Standard for the Protection of Records
37. NFPA 241 – 2013, Standard for Safeguarding Construction, Alteration and Demolition Operations
38. NFPA 252 – 2017, Standard Methods of Fire Test of Door Assemblies
39. NFPA 253 – 2015, Standard Methods of Test for Critical Flux of Floor Covering Systems Using a Radiant Heat Energy Source
40. NFPA 257 – 2017, Standard for Fire Tests of Window and Glass Block Assemblies
41. NFPA 259 – 2013, Standard Test Method for Potential Heat of Building Materials
42. NFPA 260 – 2013, Standard Methods of Test and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture
43. NFPA 261 – 2013, Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes
44. NFPA 265 – 2015, Standard Method of Test for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls
45. NFPA 286 – 2015, Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
46. NFPA 601 - 2015; Standard for Security Services in Fire Loss Prevention
47. NFPA 701 – 2015, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
48. NFPA 703 – 2018, Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials
49. NFPA 704 – 2017, Standard System for the Identification of the Hazards of Materials for Emergency Response
50. NFPA 1221 – 2016, Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems
51. NFPA 1963 – 2014, Standards for Fire Hose Connections
52. NFPA 2001 – 2015, Standard on Clean Agent Fire Extinguishing Systems
53. Additional NFPA Standards (in the editions as indicated) as listed in the 2020 FBC Chapter 35 Reference Standards.

54. Additional NFPA Standards (in editions indicated); listed in 2018 Edition of NFPA 101, Life Safety Code.

1.4 FLORIDA PRODUCT APPROVAL (FPA) AND NOTICES OF ACCEPTANCE (NOA'S)

A. Products utilized for this project shall have Florida Product Approvals (FPA) and Notice of Acceptance (NOA's) which represent the basis-of-design products for this project.

B. If a specified equal product is to be installed in lieu of the product identified (if allowed in the Specification), the Contractor must furnish a current FPA or NOA for the substituted product.

PART 2 -PRODUCTS – NOT USED

PART 3 -EXECUTION – NOT USED

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END OF SECTION

SECTION 01 4524
STRUCTURAL TESTING/INSPECTION AGENCY SERVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section summarizes the responsibility of the Contractor and the Structural Testing/Inspection Agency in the performance of the testing/inspection specified in the Contract Documents.

B. Neither the observation of the Architect/Structural Engineer in the administration of the contract, nor tests/inspections by the Testing/Inspection Agency, nor approvals by persons other than the Architect/Structural Engineer shall relieve the Contractor from his obligation to perform the work in accordance with the Contract Documents.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4000 - Quality Requirements.

1.3 REFERENCES

A. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

B. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

C. American Council of Independent Laboratories - Recommended Requirements for Independent Laboratories Qualifications.

1.4 SELECTION AND PAYMENT

A. Owner will employ and pay for the structural testing/inspection services that are required by the Contract Documents.

B. Contractor shall pay for any additional structural testing/inspection required for work or materials not complying with Contract Documents due to negligence or nonconformance.

C. Contractor shall pay for any additional structural testing/inspection required for his convenience.

1.5 STRUCTURAL TESTING/INSPECTION REQUIREMENT SUMMARY

A. Specific structural testing/inspection requirements are given in the following specification sections:
Section 03 2000 - Concrete Reinforcement
Section 03 3000 - Cast-in-Place Concrete
Section 03 6200 - Non-Shrink Grout
Section 04 2200 - Structural Concrete Masonry
Section 05 1200 - Structural Steel
Section 05 3000 - Steel Decking
Section 31 2310 - Excavating, Backfilling, and Compacting for Structures

PART 2 - MATERIALS – NOT USED.

PART 3 - EXECUTION

3.1 STRUCTURAL PRECONSTRUCTION MEETING

A. A structural preconstruction meeting may be conducted at the construction site by the Structural Engineer to discuss quality issues. The parties involved may be the Architect, Contractor, Structural Testing/Inspection Agency, appropriate subcontractors, suppliers, and detailers.

3.2 STRUCTURAL TESTING/INSPECTION AGENCY'S RESPONSIBILITIES

A. Cooperate with the Contractor and provide timely service.

B. Upon arriving at the construction site, sign in and notify the Contractor of presence.

C. Select the representative samples that are to be tested/inspected.

D. Perform tests/inspections as outlined in Contract Documents, the applicable codes, and as directed by the Structural Engineer.

E. Report work and materials not complying with Contract Documents immediately to the Contractor and Structural Engineer.

F. Leave copies of field notes with the Contractor prior to leaving the construction site. Field notes shall include the message given to the Contractor, date, time of message, name of Contractor's representative informed, type and location of work or materials tested/inspected, whether the work or materials complies with Contract Documents and name of the Structural Testing/Inspection Agency's representative.

G. Report and distribute results of tests/inspections promptly in the form of written reports. Copies of the reports for this project will be furnished to the Owner, Contractor, Architect, Structural Engineer, and the Local Building Authorities.

H. Structural Testing/Inspection Agency shall not alter requirements of Contract Documents, approve or reject any portion of the work, or perform duties of the Contractor.

I. If providing special inspections, reports shall include all items as required by the [International Building Code Special Inspection Schedules / Florida Threshold Inspection Plan] provided by the Structural Engineer.

3.3 CONTRACTOR'S RESPONSIBILITIES

A. Provide copy of Contract Documents to the Structural Testing/Inspection Agency.

B. Arrange the preconstruction meeting to discuss quality issues.

C. Notify the Structural Testing/Inspection Agency sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.

D. Cooperate with Structural Testing/Inspection Agency and provide access to work.

E. Provide samples of materials to be tested in required quantities.

F. Furnish copies of mill test reports when requested.

G. Provide storage space for Structural Testing/Inspection Agency's exclusive use, such as for storing and curing concrete testing samples.

H. Provide labor to assist the Structural Testing/Inspection Agency in performing tests/inspections.

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END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Field offices.

1.2 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

1.3 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

1.4 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Internet Connections: Minimum of one; DSL modem or faster.

1.5 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.6 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.7 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.8 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.9 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.10 WASTE REMOVAL

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

ISSUED:	DATE:
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END OF SECTION

SECTION 015639

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 SUMMARY

A. Tree Preservation work includes, but is not limited to:

1. Protection of existing trees and all other items indicated to remain in place.

2. Maintenance of protected areas.

3. Clearing and grubbing activity within protected areas.

4. Damage compensation.

1.03 APPLICABLE REGULATIONS

A. Comply with all applicable local laws and regulations concerning tree preservation as well as the specific requirements stated elsewhere in the Specifications.

PART 2 - PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PROTECTION OF EXISTING TREES TO REMAIN

A. Tagging and Fencing:

1. Trees to remain shall be tagged and protective fencing installed prior to any construction, demolition, or other disturbance.

2. Protective fencing shall be installed at the dripline of the tree to be protected unless otherwise noted on the Plans.

3. The area inside the protective fencing will heretofore be referred to as the protected area.

4. The Contractor shall verify tagged trees and fence locations in field with the Landscape Architect prior to any construction or demolition activity.

3.02 MAINTENANCE OF PROTECTED AREA

A. No construction activity shall occur inside protected areas other than that landscape construction which is required for completion of the project.

1. Construction activity includes, but is not limited to, building material storage, waste stockpiling, topsoil stockpiling, equipment storage or parking, disposal of waste materials of any kind, draining or flushing of tanks, canisters, drums, or other containers, trailer parking or storage, and demolition activity.

B. No traffic, vehicular or pedestrian, shall encroach upon protected areas.

1. This includes, but is not limited to, personal passenger vehicles, construction vehicles, grading machinery, and loading/lifting machinery.

C. No material, machine, vehicle, or part thereof shall encroach above or below the vertical plane of the protective fencing into the protected area.

D. The Contractor shall notify the Landscape Architect of any activity which might infringe or encroach upon the protected area prior to start of said activity.

3.03 ENCROACHMENT UPON PROTECTED AREA

A. If encroachment into the protected area does occur, notify the Landscape Architect immediately.

3.04 ACTIVITY INSIDE PROTECTED AREAS

A. Clearing and Grubbing:

1. Clearing of small trees, shrubs, and herbaceous plants in the protected area shall be performed by hand only.

2. Bulldozers and/or drag chain operations are not permissible inside protected areas.

3. Grubbing of stumps shall be performed in two (2) ways:

a. Stumps under 6" diameter shall be pulled by chain.

i. The vehicle used for pulling shall remain outside the protected area (dripline of the tree to remain) whenever possible.

ii. Under no circumstance shall the pulling vehicle encroach into the protected area by more than 1/3 of the distance from the trunk of tree to remain to the nearest edge of the protected area (dripline).

iii. Any depressions shall be filled with topsoil and leveled to grade by hand.

b. Stumps over 6" diameter shall be ground out to a depth of 4" below grade.

i. Stump grinder shall be trailer mounted and maneuvered by light truck or bobcat.

ii. Wood chips generated by grinding shall be removed and any depressions shall be filled with topsoil and leveled to grade.

iii. These operations shall be performed by hand.

B. Grading:

1. Any grading which may be required inside the protected area shall be performed by hand only.

2. No grading or earthmoving machinery shall be allowed inside the protected area.

3. Provide grade stakes and verify grade elevations with the Landscape Architect prior to commencement of any grading activity.

C. Preparation of soil for seeding and/or sodding within the protected areas shall be done by hand or with a power rake and shall not disturb soil more than 2" deep to prevent damage to feeder root systems.

1. No chemical herbicides shall be used within protected areas unless the Contractor can obtain written manufacturer's guarantee that herbicide will not harm tree health or growth and obtain written approval from the Landscape Architect.

2. Contact the Landscape Architect prior to seed or sod preparation within protected areas to determine exact seed and/or sod limits.

D. Stake locations of all utilities which encroach protected areas.

1. Contact the Landscape Architect prior to clearing or trenching for utilities to verify that staked location is the least obtrusive to protected area.

3.05 REMOVAL OF PROTECTIVE FENCING

A. Protective fencing may be removed to facilitate landscape work in the protected area.

1. All Work in the protected area shall be initiated within 24 hours of fence removal.

2. If landscape work in the protected area is delayed or interrupted for more than 24 hours, then protective fencing shall be reinstalled until such time as work in the protected area is resumed.

3. Protective fencing shall be reinstalled after substantial completion of Work inside protected area and shall remain until substantial completion of the project or approval of the Landscape Architect, whichever is later.

3.06 DAMAGE COMPENSATION

A. Any damage occurring to trees to remain or protected areas or removal of trees to remain in the protected areas caused by neglect, unauthorized encroachment and/or inadequate protection

enforcement as determined by the Landscape Architect shall be the responsibility of the General Contractor.

1. Financial compensation for said damage or removal shall be determined by the Landscape Architect and Owner as per the following guidelines on a per occurrence basis.

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END OF SECTION 015639

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

C. Section 22 0513 - Common Motor Requirements for Plumbing Equipment: Motors for plumbing equipment.

D. Section 23 0513 - Common Motor Requirements for HVAC Equipment: Motors for HVAC equipment.

1.3 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Containing lead, cadmium, or asbestos.

C. Motors: Refer to Section 21 0513 - Common Motor Requirements for Fire Suppression Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.

D. Motors: Refer to Section 22 0513 - Common Motor Requirements for Plumbing Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.

E. Motors: Refer to Section 23 0513 - Common Motor Requirements for HVAC Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.

2.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.2 OWNER-SUPPLIED PRODUCTS

3.3 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

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END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 POLICY

A. HCA's policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. HCA's goal is zero waste, however, we realize that some waste will occur on a project building site that cannot be reduced or recycled. Therefore, contractors shall divert 95% of total project waste from the landfill.

1.2 REFERENCES

A. HCA's policy requires a minimum landfill diversion of 95% of all construction and demolition debris. For additional references to diversion from landfills see www.usgbc.org, Materials and Resources, Credit 2. Contractor should become familiar with LEED reporting requirements in the event that HCA chooses to pursue LEED certification for an individual project.

B. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
   1. ASTM INTERNATIONAL (ASTM)
      a. (2001) Development and Implementation of a Pollution Prevention Program
   2. S. GREEN BUILDING COUNCIL (USGBC)
   3. LEED (2002; R 2005; 2009) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.3 DEFINITIONS

A. **Comingled vs Source Separated C&D Debris:** Comingled debris is material that mixes all types of construction and demolition material in one container. Source separated, keeps several or all materials segregated from each other. Benefits of comingling include reduced labor and no need for education, and space saving. Benefits of source separation are higher value material due to lack of contamination, opportunity to involve labor and ability to use materials such as gypsum, masonry and rock product on site.

B. **Construction and Demolition Debris:** Uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles and other roof coverings, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets ten gallons or less in size and having no more than one inch of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, and pipe and metals that are incidental to any of the above. Solid waste that is not C&D debris (even if resulting from the construction, remodeling, repair and demolition of utilities, structures and roads and land clearing) includes, but is not limited to asbestos waste, garbage, any item containing hazardous materials such as fluorescent light ballasts or transformers, fluorescent lights, tires, drums, containers greater than ten gallons in size, any containers having more than one inch of residue remaining on the bottom and fuel tanks. Specifically excluded from the definition of construction and demolition debris is solid waste (including what otherwise would be construction and demolition debris) resulting from any processing technique that renders individual waste components unrecognizable, such as pulverizing or shredding.

C. **Debris Management Coordinator (DMC):** The contractor must appoint a DMC to oversee the activities relating to managing C&D debris on the site. The DMC will complete and submit the Waste Management Plan (form B) and collect records and data supporting disposal and diversion amounts.

D. **Land Clearing Debris:** Is vegetative matter, soil and rock resulting from activities such as land clearing and grubbing, utility line maintenance or seasonal or storm-related cleanup such as trees, stumps, brush and leaves and including wood chips generated from these materials. Land clearing debris does not include yard waste that has been collected at the curb.

E. **Landfill Diversion:** Means keeping material out of the landfill by reducing the amount of waste produced, reusing material, recycling, composting, incineration, or other mean.

F. **Recycle:** To process materials so that they may be used again. They can be used for their original purpose or another. Recycling is less preferable than reduction or reuse because often the processing takes up to 60% of the energy to transport and remake the new item. Example: pulverizing drywall as a soil amendment.

G. **Reuse:** Using an item again for the same purpose. Example: reusable pallets.

H. **Source Reduction:** The act of decreasing waste or the toxicity of waste. Examples: Waste reduction: Ordering wallboard to the correct height and using cutoffs to fill holes. Reduced toxicity: Paint that contains no VOCs.

I. **Waste Prevention:** Not creating waste through concepts such as source reduction, recycling, composting and reuse.
   1. The following is a partial list of C&D debris materials. The project waste may include but is not limited to these materials.
      a. Asphalt
      b. Bricks
      c. Carpet and carpet pad
      d. Corrugated cardboard
      e. Clean dimensional wood
      f. Wood (Note 1)
      g. Concrete and rock (Note 2)
      h. Concrete masonry units (CMU), slump stone (decorative concrete blocks)
      i. Dirt (Note 2)
      j. Doors
      k. Excavated Dirt & Rock (Note 2)
      l. Ferrous & nonferrous metals such as banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
      m. Fluorescent lamps and ballasts (Note 1)
      n. Gypsum wallboard (drywall)
      o. Land clearing debris & green materials (i.e. tree trimmings) (Note 2)
      p. Paint (Note 1)
      q. Plastic wrap, buckets, PVC
      r. Roofing shingles
      s. Used beverage containers
      t. Note 1: Several common debris materials may be considered toxic, hazardous, or not easily recycled with other C & D debris. In these instances, follow appropriate disposal methods. These materials include but are not limited to:
      u. Magnetic ballasts
      v. Older fluorescent lamps containing polychlorinated biphenyls (PCB's)
      w. All fluorescent lamps that may contain mercury
      x. Treated wood
      y. Painted wood that may contain lead-based paint
      z. Unused paint
      aa.
      bb. Note 2: Excavated materials and land clearing debris should be diverted from landfills. If the project is pursing LEED certification this type of debris must be kept separate and cannot be counted toward LEED diversion rates.

1.4 SUMMARY

A. The following document outlines waste management criteria for all HCA construction and demolition projects. Guidelines established in Section 01 7419 are intended for the use of contractor and contractor's affiliates.

B. Materials subject to the diversion requirements of this contract are the materials that are generated within the construction limits of this project, to include any materials associated with meeting the terms of this contract.

1.5 WASTE DIVERSION GOALS

A. HCA has established that this Project shall generate the least amount of waste possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

B. Acknowledging that Construction and Demolition waste will be generated, HCA requires that the maximum quantity of waste as is economically feasible shall be minimized on the front end and diverted from the landfill. HCA will request an estimate of the project's diversion rate and an explanation for diversion rates that are not 95%.

1.6 MANAGEMENT

A. With regard to these goals, the Contractor shall develop a Waste Management Plan (WMP) for HCA's review. Once this plan undergoes review by HCA, Contractor will be notified of project award or project denial. HCA will base project award on a number of factors included in the "best value evaluation" model. The WMP is a critical component of project award. This plan shall describe and document each of the following diversion and non-diversion activities:
   1. Salvage
   2. Reuse
   3. Source Separation Construction and Demolition Debris Recycling
   4. Co-mingled Construction and Demolition Debris Recycling
   5. Landfill Disposal

B. Develop and implement a waste management plan as specified in this section. Take a proactive, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in program.

C. The Debris Management Coordinator (DMC) shall be responsible for instructing workers and overseeing and documenting the results of the Waste Management Plan (WMP).

D. Construction and demolition waste includes products of demolition and construction, excess of unusable C&D materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work.

E. In the management of waste, consideration shall be given to the availability of viable markets, the condition of the materials, the ability to provide the material in suitable condition, and in a quality acceptable to available markets.

1.7 SUBMITTALS

A. The following submittals are required to be approved by HCA:
   1. Waste Management Plan (WMP Forms A & B) to indicate how waste will be diverted from landfills.
   2. Closeout submittal including weight verification of all construction and demolition material. The percent diversion shall be documented in this submittal. This spreadsheet shall be submitted with the final closeout package submitted to HCA.

PART 1 PRODUCTS

2.1 WASTE MANAGEMENT PLAN (WMP)

A. The complete Waste Management Plan (WMP) consists of two sequential documents: WMP-Form A and WMP-Form B. Contractor must complete WMP-Form A before commencement of debris management activities. Once awarded project, the Debris Management Coordinator (DMC) must assume debris management responsibilities including the submission of WMP- Form B and records and data to support disposal and diversion percentages.
   1. WMP-Form A (Submit with Proposal): WMP-Form A must be submitted with bid documents and is a prerequisite of project award. This document should describe planned C&D debris management activities. HCA may require Contractor to revise and resubmit the plan and does not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement.
   2. WMP-Form B: Once the WMP-Form A is submitted, reviewed, and approved, DMC contractor must submit WMP-Form B on a monthly basis. Form B documents actual diversion percentages. Additionally, Contractor must submit records and data that verify:
      a. Total waste generated
      b. Total waste diverted by recycling, reuse, or salvage
      c. The type of waste generated/diverted
   3. The quantity of waste materials shall be by weight (tons). Landfill records and materials receipts shall be submitted as a formal material submittal.

2.2 WMP-FORM A - ESTIMATE OF PERCENT REDUCTION CONTRACTOR WILL ATTAIN DURING PROJECT

A. Contractor will complete and submit the general WMP documents with the Contractor's proposal for HCA review. If approved, this WMP will serve as the basis for the monthly records and data submittals and WMP–Form B. Contractor must submit initial WMP with project proposal to avoid disqualification. This plan should include separate sections for demolition and construction projects. See Appendix A for the WMP forms and corresponding instructions for completing the form. Contractor has the option of completing the WMP forms in Appendix A or creating his own. If he creates his own, the plan must contain the following:
   1. Name of individuals on the Contractor's staff responsible for waste prevention and management.
   2. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
   3. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.
   4. Characterization, including estimated types and quantities, of the waste to be generated.
   5. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.
   6. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by HCA.
   7. Description of the means by which any recyclable materials identified in item (E) above will be protected from contamination.

2.3 WMP-FORM B - ACTUAL PERCENTAGE REDUCTION CONTRACTOR ATTAINS DURING PROJECT

A. WMP-Form B will account for all construction and demolition waste management activity from project commencement to termination. This form must be completed and submitted on a monthly basis. Failure to meet the 95% diversion requirement must be addressed with a written explanation of disparities along with WMP-Form B. Contractor has the option of completing the WMP forms in Appendix A or creating his own. If he creates his own, the plan must contain the following:
   1. Waste Characterization: Document the waste to be generated, including types and quantities by weight.
   2. Diversion Options: List each material to be salvaged, reused, or recycled during the course of the Project, the proposed local market for each material, and the estimated net cost savings/

additional costs from diversion. "Net" means that the following have been subtracted from the cost of separating and recycling: (a) revenue from the sale of recycled or salvaged materials and (b) landfill tipping fees saved due to diversion of materials from the landfill.

3. Waste Reduction Calculations: Calculated end-of-project rates as a percentage of total waste.
4. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals/organizations. Indicate whether organization is tax exempt.
5. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
6. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight, tickets, receipts, and invoices.
7. LEED Submittal (If applicable): LEED letter template for Credit MR 2.1, signed by Contractor, indicating total waste material, quantities diverted and means by which it is diverted and a statement that requirements for the credit have been met.
8. Landfill Options: Include landfill contact information and costs. Provide the name of the landfills, respective tipping fees, and the total projected cost of landfill disposal.
9. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
10. Timeline: Submit a timeline of project commencement and termination in addition to a plan for periodic onsite updates of C&D debris handling.
11. Meetings: Describe the regular meetings to be held to address how to manage waste. At a minimum, discuss waste management goals and issues at pre-construction meetings and regularly scheduled job-site meetings.
12. Handling and Transportation: Describe methods of separation including the use of containers, their location, and labeling system used to identify the different materials. Describe transportation/hauling procedures, which may include but are not limited to contracting a recycling hauler, arranging transportation with the local market to be used and various means of self-transportation.
13. Negotiated approval of the Contractor WMP must be obtained before the commencement of waste management activities. Once notified of WMP approval, Contractor may begin WMP implementation.

PART 1 EXECUTION

3.1 WASTE MANAGEMENT PLAN (WMP) EXECUTION

A. Debris Management Coordinator (DMC): The Contractor shall designate an on site party (or parties) responsible for waste management instruction, oversight and documentation for the entire project.

B. Depending on the size and complexity of the project, Contractor may either designate a full time DMC or assign responsibility to the job supervisor or appropriate personnel.

C. Distribution: The Contractor shall distribute copies of the WMP and other pertinent information to the Job Site Foreman and to each Subcontractor.

D. Instruction: The Contractor shall provide on-site instruction of correct separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

E. Source Separation: The Contractor shall identify and clearly label a specific area to facilitate separation of materials for diversion activities. Recycling and waste bin areas are to be kept neat, clean and clearly marked in order to avoid contamination of materials.

F. If hazardous materials are found at anytime, the contractor shall halt work and inform HCA. The following is a list of appropriate source separation procedures:
   1. Separate recyclable materials from construction and demolition debris to the maximum extent possible. Separate recyclable materials by type.
   2. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.
   3. Stockpile processed materials on-site without mixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   4. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.

5. Store components off the ground and protect from weather.

G. Construction and Demolition Debris Removal:
   1. Buildings and their appetencies are property of the Contractor. Revenues and savings from recycling, salvage, and reuse shall accrue to the Contractor.
   2. Remove construction and demolition debris from project site on a regular basis. Do not allow construction and demolition debris to accumulate on-site.
   3. Transport construction and demolition debris from property and dispose of it legally.
   4. Burning of construction and demolition debris is not permitted.

END OF SECTION

HCA Waste Management Plan - Form A - Estimated Costs (Sheet 3) **EXAMPLE**

Projected Diversion Activities - Construction & Demolition Materials

A	B	C	D	E	F	G	H
Material Type	**Quantity Estimate (tons)**	**Estimated % to be Recycled**	**Destination**	**Transportation**	**Handling/ Transport Costs**	**Projected Revenue or Tip Fee Savings**	**Total Cost or Savings**

Total net cost (+) or savings (-) from diversion activities $_____

Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.

HCA Waste Management Plan - Form A - Instructions

Bidders are required to complete and submit a WMP- Form A. This is the initial job site plan of action and will be used to evaluate project award. It is mandatory for the bidding Contractor to provide all of the following information regarding construction and demolition debris management on the project. This must be completed prior to any material removal from the site.

Follow these procedures to maximize recycling at your job site:

1	Separate and recycle wood, cardboard, metal, drywall, and other recyclable materials.	☐
2	Ensure that all containers and recycling dumpsters are convenient and clearly labeled.	☐
3	Train new personnel on recycling container location and which materials are recyclable.	☐
4	Move mixed C&D debris and recycling containers close to each other making it convenient to recycle.	☐
5	Store materials to prevent loss from damage.	☐
6	Check recycling and mixed C&D containers daily for mis-sorted materials.	☐
7	Provide training to people who are mis-sorting recyclable materials.	☐
8	Identify large quantities of waste that are not being recycled, and have DMC evaluate options for marketing the material.	☐

Action Items:

A	Complete this WMP - Form A and post on-site.	☐
B	Commit subcontractors to recycle in Subcontractor Agreement.	☐
C	Keep subcontractors and workers aware of and informed on the C&D Debris Management Program.	☐
D	Require individuals to properly sort recyclables and hold them responsible for mis-sorted loads.	☐
E	Track and promote diversion results.	☐

Complete the following (3) sheets of the WMP- Form A and submit with proposal.
*** Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.**

HCA Waste Management Plan - Form A - Recyclable Materials (Sheet 1)

Material Type	Condition of Material*	On-site Handling	Hauling Procedures	Final Destination
Example: Asphalt/Concrete	large chunks	stockpile for crushing	haul for on-site use	hospital site for use as backfill
Asphalt/Concrete				
Brick/Masonry/Tile				
Building Materials **				
Carpet & Pad				
Cardboard				
Ceiling Tile				
Concrete				
Drywall				
Field Office Waste				
Paint				
Plastic Film, Sheeting, Wrap				
Scrap Metal				
Aluminum				
Copper				
Steel				
Other Metals				
Unpainted Wood & Pallets				
Window Glass				
Other				

* Check with recycler & hauler for any specifications regarding the required condition/s of material (e.g. size restrictions, packaging, other variables.)
** Doors, windows, fixtures, shingles, lumber, insulation, sheetgoods, etc.

Signed: _____ Date: _____

Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.

HCA Waste Management Plan - Form A - Project Details (Sheet 2)

Project: _____ **Date:** _____

1. Estimated Project Waste

Total Quantity	Total Cost/Ton	Percentage to be Diverted from Landfill*

2. Describe methods for avoiding contamination of recyclables

3. Waste Management Meetings to be held

Pre-Construction _____

Monthly _____

Other _____ Description _____

* Contractor must submit bid for 95% recycling unless bid is accompanied by written documentation regarding reason for lower recylcing rate.

Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.

HCA Waste Management Plan - Form A - Estimated Costs (Sheet 3) **EXAMPLE**

Projected Diversion Activities - Construction & Demolition Materials

A	B	C	D	E	F	G	H
Material Type	**Quantity Estimate (tons)**	**Estimated % to be Recycled**	**Destination**	**Transportation**	**Handling/ Transport Costs**	**Projected Revenue or Tip Fee Savings**	**Total Cost or Savings**
concrete	5000	60%	stockpile on site	20cy truck	=($6+$11-$13)*B6*60%	=$12*B6*60%	=G6-F6
concrete	5000	60%	stockpile on site	20cy truck	$ 18,000	$ 96,000	$ 78,000
					Cost to crush & transport	Savings by not landfilling	Savings by not landfilling, less cost to crush

Cost to landfill = $12/ton
Cost to crush concrete = $6
Cost to transport concrete = $11
Cost of delivered crushed stone = $13
Percentage of crushable concreted = 60%

Total net cost (+) or savings (-) from diversion activities $_____

Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.

HCA Waste Management Plan - Form A - Estimated Costs (Sheet 3) **EXAMPLE**

Projected Diversion Activities - Construction & Demolition Materials

A	B	C	D	E	F	G	H
Material Type	**Quantity Estimate (tons)**	**Estimated % to be Recycled**	**Destination**	**Transportation**	**Handling/ Transport Costs**	**Projected Revenue or Tip Fee Savings**	**Total Cost or Savings**

Total net cost (+) or savings (-) from diversion activities $_____

Note: Failure to submit WMP- Form A in a timely manner may be cause for HCA to render the bid nonresponsive.

HCA Waste Management Plan - Form B

Start Date: _____ **End Date:** _____ **Total # Months:** _____

											Cost for Option 1	**Cost for Option 2**		
A	B	C	D	E	F	G	H	I	J	K	M	O	Q	S
Material	**Generated Debris**		**Recycled Debris (%)**		**Salvage/ Reuse Debris (%)**		**Landfilled Debris (%)**		**Total Diverted Debris**		**Cost to Landfill All C&D Debris**	**Cost to Landfill Non-Diverted Material**	**Cost to Recycle, Salvage or Reuse**	**Total Savings (Cost of Option 1-2)**
	Est	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est (D+F)**	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**
	(tons)		**%**	**%**	**%**	**%**	**%**	**%**	**(tons)**	**(E+G)**	**$/Ton**	**$%**	**$**	**$**
Brick/Masonry/Tile														
Building Materials*														
Carpet & Pad														
Cardboard														
Ceiling Tile														
Concrete														
Drywall														
Field Office Waste														
Paint														
Plastic Film, Sheeting, Wrap														
Scrap Metal														
Aluminum														
Copper														
Steel														
Other Metals														
Unpainted Wood/Pallets														
Window Glass														
Other (describe)														
Other (describe)														
Total									0.00	0.00	$0.00	$0	0	$0

TOTAL PROJECT SAVINGS $ _____

* Doors, windows, fixtures, shingles, lumber, insulation, sheetgoods, etc.

Note: Contractor must transfer WMP Form A estimates to Form B to demonstrate the cumulative amount of waste generated and diverted.

Diversion percentages account for amount and type of materials kept out of the landfill to date.

[illegible] sale.

Contractor Signature: _____ Date: _____ Affidavit: _____

HCA Waste Management Plan - Form B

EXAMPLE

Start Date: _____ **End Date:** _____ **Total # Months:** _____

											Cost for Option 1	**Cost for Option 2**		
A	B	C	D	E	F	G	H	I	J	K	M	O	Q	S
Material	**Generated Debris**		**Recycled Debris (%)**		**Salvage/ Reuse Debris (%)**		**Landfilled Debris (%)**		**Total Diverted Debris**		**Cost to Landfill All C&D Debris**	**Cost to Landfill Non-Diverted Material**	**Cost to Recycle, Salvage or Reuse**	**Total Savings (Cost of Option 1-2)**
	Est	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est (D+F)**	**Actual Tonnage**	**Actual**	**Actual**	**Actual**	**Actual**
	from Form A	**tons**	**from Form A**	**%**	**from Form A**	**%**	**from Form A**	**%**	**from Form A**	**(E+G)**	**$/Ton**	**$%**	**$**	**$**
Example: Asphalt/Concrete	130	159	60%	80%	0%	5%	40%	25%	=(B11*D11)+(B11*F11)	=(C11*E11)+(C11*G11)	=C11*12	=(C11*I11)*32	=(6+11-13)*C11*(E11+G11)	=M11-O11-Q11
Example: Asphalt/Concrete	130	159	60%	80%	0%	5%	40%	25%	78	135	$ 5,088	$ 1,272	$ 676	$ 3,140
Example: Metal	55	69	80%	85%	0%	0%	20%	25%	(B13*D13)+(B13*G13)	=(C13*E13)+(C13*G13)	=C13*12	=(C13*I13)*32	=(12-70)*C13*(E13+G13)	=M13-O13-Q13
Example: Metal	55	69	80%	85%	0%	0%	20%	25%	44	59	$ 2,208	$ 552	$ (3,402)	$ 5,058
Brick/Masonry/Tile														
Building Materials*														
Carpet & Pad														
Cardboard														
Ceiling Tile														
Concrete														
Drywall														
Field Office Waste														
Paint														
Plastic Film, Sheeting, Wrap														
Scrap Metal														
Aluminum														
Copper														
Steel														
Other Metals														
Unpainted Wood/Pallets														
Window Glass														
Other (describe)														
Other (describe)														
Total									0	0.00	$0.00	$0	0	$ 8,198

Cost to landfill = $12/ton
Cost to crush concrete/handle metal = $6
Cost to transport concrete/metal = $11
Cost of delivered gravel = $13
Revenue from sale of metal = $70/ton

Note this is a negative **COST** as the revenue from the sale of the metal exceeds the cost($70/ton>$12/ton), so it represents revenue, not a cost

* Doors, windows, fixtures, shingles, lumber, insulation, sheetgoods, etc.

Note: Contractor must transfer WMP Form A estimates to Form B to demonstrate the cumulative amount of waste generated and diverted.
Diversion percentages account for the amount and type of materials kep out of the landfill to date.
Attach proof of disposal or diversion. For example: haul tickets, landfill records, recycling receipts, bill of sale.

Contractor Signature:

_____ Date: _____ Affidavit: _____

HCA Waste Management Plan - Form B

Start Date: _____ **End Date:** _____ **Total # Months:** _____

											Cost for Option 1	Cost for Option 2		
A	B	C	D	E	F	G	H	I	J	K	M	O	Q	S
Material	**Generated Debris**		**Recycled Debris (%)**		**Salvage/ Reuse Debris (%)**		**Landfilled Debris (%)**		**Total Diverted Debris**		**Cost to Landfill All C&D Debris**	**Cost to Landfill Non-Diverted Material**	**Cost to Recycle, Salvage or Reuse**	**Total Savings (Cost of Option 1-2)**
	Est	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est**	**Actual**	**Est (D+F)**	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**
	(tons)		**%**	**%**	**%**	**%**	**%**	**%**	**(tons)**	**(E+G)**	**$/Ton**	**$%**	**$**	**$**
Brick/Masonry/Tile														
Building Materials*														
Carpet & Pad														
Cardboard														
Ceiling Tile														
Concrete														
Drywall														
Field Office Waste														
Paint														
Plastic Film, Sheeting, Wrap														
Scrap Metal														
Aluminum														
Copper														
Steel														
Other Metals														
Unpainted Wood/Pallets														
Window Glass														
Other (describe)														
Other (describe)														
Total									0.00	0.00	$0.00	$0	0	$0

TOTAL PROJECT SAVINGS $ _____

* Doors, windows, fixtures, shingles, lumber, insulation, sheetgoods, etc.

Note: Contractor must transfer WMP Form A estimates to Form B to demonstrate the cumulative amount of waste generated and diverted.

Diversion percentages account for amount and type of materials kept out of the landfill to date.

Attach proof of disposal or diversion. For example: haul tickets, landfill records, recycling receipts, bill of sale.

Contractor Signature:

_____ Date: _____ Affidavit: _____

SECTION 01 7419.01
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL (LONG FORM)

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:
   1. Contractor shall comply with the requirements and procedures for construction waste management and disposal, including:
      a. Minimizing construction waste and debris and reusing, salvaging, and recycling to specified extent.
      b. Developing and implementing a plan for construction waste management and disposal.
      c. Submitting documentation required for LEED credits.
   2. Extent of required construction waste management and disposal includes:
      a. Construction waste management and disposal within the LEED Site boundary.
      b. Construction waste management and disposal within the Project limits, as shown or indicated.

1.2 SUMMARY

A. Section Includes:
   a. Salvaging non-hazardous <--1--> <--2--> <--3--> waste.
   2. Recycling non-hazardous <--1--> <--2--> <--3--> waste.
   3. Disposing of non-hazardous <--1--> <--2--> <--3--> waste.

B. Coordination:
   1. Each Contractor is responsible for construction waste management and disposal. General Contractor has primary responsibility for construction waste management and disposal on the Project and shall coordinate salvaging, recycling, and disposing of waste of other Contractors. Each Contractor shall cooperate with the General Contractor regarding construction waste management and disposal.
   2. Coordinate salvaging, recycling, and disposing of waste as specified under this and other Sections.

C. Related Sections:
   1. Section <--1-->,
   2. Section 01 35 63, Sustainability Certification Project Requirements.
   3. Section 32 93 00, Plants

D. Performance Requirements: Achieve end-of-Project rates for salvage and recycling (combined) of <--1--> percent by weight of total non-hazardous solid waste generated during the Work. Practice efficient waste management in using materials in the Work. Employ reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of <--2-->:
   1. Demolition Waste:
      a. Bituminous pavement.
      b. Concrete.
      c. Concrete reinforcing steel.
      d. Brick.
      e. Concrete masonry units.
      f. Wood studs.
      g. Wood joists.
      h. Plywood and oriented strand board.
      i. Wood paneling.
      j. Wood trim.
      k. Structural steel and miscellaneous steel.
      l. Rough hardware.
      m. Roofing materials.
      n. Insulation materials.
      o. Doors and frames.
      p. Door hardware.

q. Windows.
r. Glazing material.
s. Metal studs.
t. Gypsum board.
u. Acoustical tile and panels.
v. Carpet.
w. Carpet pad.
x. Demountable partitions.
y. Equipment.
z. Cabinets.
aa. Plumbing fixtures.
bb. Piping.
cc. Supports and hangers
dd. Valves.
ee. Sprinklers.
ff. Mechanical equipment.
gg. Refrigerants.
hh. Electrical conduit.
ii. Copper cabling material.
jj. Lighting fixtures.
kk. Lamps.
ll. Ballasts.
mm. Electrical devices.
nn. Switchgear and panelboards.
oo. Transformers.
pp. <--3-->: <--1--> percent

2. Construction Waste:
   a. Site-clearing waste.
   b. Masonry and CMU.
   c. Lumber.
   d. Wood sheet materials.
   e. Wood trim.
   f. Metals.
   g. Roofing materials.
   h. Insulation materials.
   i. Carpet and pad.
   j. Gypsum board.
   k. Piping.
   l. Electrical conduit.
   m. Packaging: Regardless of salvage/recycle goal specified above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      6) Wood crates.
      7) Plastic pails.
      8) <--4-->

1.3 REFERENCES

A. Standards applicable to this Section are:
   1. S. Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED), Reference Guide, For New Construction and Major Renovation, (LEED-NC).
   2. S. Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED), Reference Guide, For Commercial Interiors, (LEED-CI).

1.4 TERMINOLOGY

A. The following words or terms are not defined but, when used in this Section, have the following meaning:

1. "Waste Management Coordinator" is the person responsible for implementing, monitoring, and reporting the status of the Waste Management Plan. Although available for other assignments, the Waste Management Coordinator shall be present at the Site full time for the duration of the Work.
2. "Construction waste" is building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
3. "Demolition waste" is building and site improvement materials resulting from demolition or selective demolition operations.
4. "Disposal" is removal to an off-Site location of demolition and construction waste and subsequent sale, recycling, reuse, or disposal in a landfill or incinerator conforming to Laws and Regulations and acceptable to authorities having jurisdiction.
5. "Recycle" is recovery of demolition waste or construction waste for subsequent processing in preparation for reuse.
6. "Salvage' is recovery of demolition or construction waste and subsequent sale or reuse in another facility.
7. "Salvage and reuse" is recovery of demolition or construction waste and subsequent incorporation into the Work.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Waste Management Coordinator: Shall be LEED Accredited Professional, accredited by USGBC. <--1--)
   2. Refrigerant Recovery Technician: Shall be certified via a U.S. EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal Laws and Regulations of authorities having jurisdiction.
   1. Review and discuss the preliminary waste management plan, including responsibilities of Waste Management Coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

1.6 SUBMITTALS

A. Action Submittals: Submit the following:
   1. Preliminary Waste Management Plan: Prepare in accordance with Article 1.7 of this Section and submit within 14 days of the date the Contract Times commence running, and before removing waste from the Site.
   2. Final Waste Management Plan: Submit within 14 days of receiving Engineer's comments on the preliminary waste management plan.

B. Informational Submittals
   1. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit monthly Construction and Demolition Waste Reduction Report, using the format included in Attachments G and H to this Section. Provide separate reports for demolition and construction waste. Include the following information:
      a. Material category.
      b. Location where the waste was generated, including building name.
      c. Total quantity of waste in tons.
      d. Quantity of waste salvaged, both estimated and actual, in tons.
      e. Quantity of waste recycled, both estimated and actual, in tons.
      f. Total quantity of waste recovered (salvaged plus recycled), in tons.
      g. Total quantity of waste recovered (salvaged plus recycled) as percentage of the total waste.
   2. Construction and Demolition Waste Reduction Work Plans: Before submitting request for certificate of Substantial Completion, submit calculated end-of-Project rates for salvage,

recycling, and disposal as percentage of the total waste generated during the Work, using formats included as Attachments C and D to this Section.

3. Qualifications Statements:
   a. Waste Management Coordinator.
   b. Refrigerant recovery technician.

C. Closeout Submittals
1. Records of Donations: Submit copy of receipt and acceptance of salvageable waste donated to individuals and organizations. On the submittal indicate whether organization is tax-exempt under federal Law and include the organization's Federal Employer Identification Number (EIN).
2. Records of Sales: Submit copy of receipt and acceptance of salvageable waste sold to individuals and organizations. On the submittal indicate whether organization is tax-exempt under federal Law and include the organization's Federal EIN.
3. Recycling and Processing Facility Records: Submit copy of receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Submit manifests, weight tickets, receipts, and invoices.
4. Landfill and Incinerator Disposal Records: Provide copy of receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Submit manifests, weight tickets, receipts, and invoices.
5. Statement of Refrigerant Recovery: Provide statement of refrigerant recovery signed by refrigerant recovery technician for the Project, stating that all refrigerant that was present was recovered, and that recovery was performed according to U.S. EPA Laws and Regulations. Include name and address of technician and date that refrigerant was recovered.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop preliminary plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. <--1--> Indicate quantities by weight or volume. Use the same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of <--1-->, <--2-->, <--3--> waste generated by the Work. Use the formats included in Attachments A and B to this Section.

C. Waste Reduction Work Plan: List each type of waste and whether waste will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in the Work, describe methods for preparing salvaged materials before incorporating them into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individual and organizations, include list of names, addresses, and telephone numbers of such individuals and organizations.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers. Charitable organizations in the area of the Site that are believed to accept donated salvaged materials include:
   a. <--1-->
4. Recycled Materials: Provide list of local receivers and processors of each type of recycled materials. Include names, addresses, and telephone numbers of each.
5. Disposed Materials: Provide information on how and where materials will be disposed. Include name, address, and telephone number of each landfill and incinerator facility that will be used.
6. Handling and Transportation Procedures: Provide information on the method(s) that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location at the Site where materials separation will be located.

D. Cost/Revenue Analysis: Include in the plan total cost of waste disposal as if there was no waste management plan, and the net additional cost or net savings resulting from implementing the waste management plan. Prepare cost/revenue analysis using the formats included in Attachments E and F to this Section. Include the following:
   a. Total quantity of waste.
   b. Estimated unit cost of disposal. Include hauling and tipping fees and cost of collection containers for each type of waste.
   c. Total cost of disposal without the waste management plan.
   d. Revenue from salvaged materials.

e. Revenue from recycled materials.
f. Savings in hauling and tipping fees by donating materials.
g. Savings in hauling and tipping fees that are avoided.
h. Handling and transportation costs. Include cost of collection containers for each type of waste.
i. Net additional cost or net savings from implementing waste management plan.

E. Forms: Prepare preliminary and final waste management plan documents using the formats included in Attachments A through H to this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Salvage Materials: Provide protective handling and storage as required for all items identified in the Contract Documents for salvage and reuse.

B. Recyclable Waste: On daily basis remove all recyclable materials identified in the waste management plan from the work area in acceptable containers.

C. Provide separate collection containers as required by recycling haulers and to prevent contamination of materials, including protection from the elements as applicable.

D. Replace loaded containers with empty containers as demand requires, at least weekly.

E. Handling: Deposit recyclable materials in containers in clean (no mud, adhesives, solvents, petroleum contamination), debris-free condition.

F. If contamination chemically combines with materials so that materials cannot be cleaned, do not deposit into recycle containers.

G. Environmental Requirements: Transport recyclable waste materials from the work area to recycle containers, and carefully deposit in containers in manner to minimize noise and dust. Close the covers of container immediately after materials are deposited. Do not place recyclable waste materials on the ground adjacent to container.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement the waste management plan approved by Engineer. Provide handling, containers, storage, signage, transportation, and other items required to implement the waste management pan during the Project.

B. Training: Train all installers, SubContractors, and Suppliers as required on proper waste management procedures required for the Work.
1. Distribute the waste management plan as required within three days of Engineer's approval.
2. Distribute the waste management plan to Contractor's personnel, SubContractors, and Suppliers prior to these entities starting the Work. Review with installers, SubContractors, and Suppliers the waste management plan's procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent facilities.
1. Designate and label specific areas of the Site necessary for separating materials to be salvaged, recycled, reused, donated, or sold.
2. Provide temporary controls in accordance with the Contract Documents.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items before reusing.

2. Pack or crate salvaged items after cleaning. Identify contents of containers.
3. Store items in secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make salvaged items functional for use indicated.

B. Salvaged Items for Sale and Donation at the Site: Not allowed at the Site. Sale and donations, if done, must be at location other than the Site.

C. Salvaged Items for Owner's Use:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace the open end of door frames. Except for removing door closers, door hardware shall remain attached to its associated door. Protect materials from exposure to weather.

E. Plumbing Fixtures: Separate by type and size.

F. Lighting Fixtures: Separate lamps by types and protect from breakage.

G. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING <--1--> <--2--> <--3--> WASTE, GENERAL

A. Recycle paper and beverage containers used by Contractor's personnel, SubContractors, and Suppliers.

B. Recycling Receivers and Processors: Available recycling receivers include:
1. <--1-->
2. <--2-->

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials <--1-->.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at the Site to the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until recyclable materials are removed from Site. Provide list of acceptable and unacceptable materials at each container and bin.
2. Inspect containers and bins for contamination and remove contaminated materials if found.
3. Stockpile processed materials at the Site without intermixing with other materials. Place, grade, and shape stockpiles to drain water. Cover to prevent dust and blowing debris.
4. Stockpile materials away from the construction area. Do not store within drip line of trees.
5. Remove recyclable waste from the Site and from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Bituminous Pavement Materials: Grind bituminous pavement into particles of maximum size of <--1--> dimensions.
1. Crush bituminous pavement materials and screen to comply with requirements of applicable Sections of Division 32.
2. Break up and transport pavement to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
1. Crush concrete to maximum dimensions of <--1-->.

2. Crush concrete and screen to comply with requirements in applicable Sections in Division 32 for use in the applications specified for recycled concrete.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
   1. Crush masonry to maximum dimensions of <--1-->.
      a. Crush masonry and screen to comply with requirements in applicable Sections of Division 31 for use as general fill, satisfactory soil for fill, or subbase.
      b. Crush masonry and screen to comply with requirements in Section 32 93 00, Plants, for use as mineral mulch.
   2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, Engineered wood products, panel products, and treated wood materials.

E. Metals:
   1. Separate metals by type.
   2. Structural Steel: Stack steel according to size, type of member, and length.
   3. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, stapes, and accessories.

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

H. Acoustical Ceiling Panels and Tile:
   1. Stack large clean pieces on wood pallets and store in a dry location.
   2. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

I. Carpet <--1-->: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
   1. Store clean, dry carpet and pas in closed container or trailer provided by carpet reclamation agency or carpet recycler.

J. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to the elements.

K. Plumbing Fixtures: Separate by type and size.

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

M. Lighting Fixtures: Separate lamps by type and protect from breakage and damage by the elements.

N. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type and protect from the elements.

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

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store at dry location.
   2. Polystyrene Packaging: Separate polystyrene materials and store in bags.
   3. Pallets: Require that goods delivered on pallets have the pallets removed from Site, to the extent possible. For pallets that remain at the Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
   4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees <--1--> <--2-->.
   1. Comply with requirements in Section 32 93 00, Plants, for use of chipped organic waste as organic mulch.

C. Wood Materials:
   1. Clean Cut-Offs (i.e., wood without fasteners or disease) of Lumber: Grind or chip into small pieces.
   2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
      a. Comply with requirements in Section 32 93 00, Plants, for use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in dry location.
   1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
      a. Comply with Section 32 93 00, Plants, for use of clean ground gypsum board as inorganic soil amendment.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from the Site and properly dispose of waste in facility such as permitted landfill or incinerator or other method acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, remove from the Site all waste and debris from the Work as it accumulates. Upon completion of the Work, remove materials, equipment, waste, and debris and leave the Site clean, neat, and orderly. Comply with the Contract Documents regarding cleaning and removal of trash, debris, and waste.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials at the Site.

C. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.

D. Disposal: Transport waste materials to proper location at site other than Owner's property for disposal in accordance with Laws and Regulations.

3.7 SUPPLEMENTS

A. The forms listed below, following the "End of Section" designation, are part of this Specification Section:
   1. Attachment A – Construction Waste Identification -1.
   2. Attachment B – Demolition Waste Identification -2.
   3. Attachment C – Construction Waste Reduction Work Plan -3.
   4. Attachment D – Demolition Waste Reduction Work Plan – 4.
   5. Attachment E – Cost/Revenue Analysis of Construction Waste Reduction Work Plan – 5.
   6. Attachment F – Cost/Revenue Analysis of Demolition Waste Reduction Work Plan – 6.
   7. Attachment G – Construction Waste Reduction Progress Report – 7.
   8. Attachment H – Demolition Waste Reduction Progress Report – 8 (two pages)

ATTACHMENT A

CONSTRUCTION WASTE IDENTIFICATION – 1							
MATERIAL CATEGORY	**GENERATION POINT**	**EST. QUANTITY OF MATERIALS RECEIVED* (A)**	**EST. WASTE - % (B)**	**TOTAL EST. QUANTITY OF WASTE* (C = A X B)**	**EST. VOLUME CY**	**EST. WEIGHT TONS**	**REMARKS AND ASSUMPTIONS**
PACKAGING: CARDBOARD							
PACKAGING: BOXES							
PACKAGING: PLASTIC							

SHEET OR FILM							
PACKAGING: POLYSTYRENE							
PACKAGING: PALLETS OR SKIDS							
PACKAGING: CRATES							
PACKAGING: PAINT CANS							
PACKAGING: PLASTIC PAILS							
SITE-CLEARING WASTE							
MASONRY OR CMU							
LUMBER: CUT-OFFS							
LUMBER: WARPED PIECES							
PLYWOOD OR OSB (SCRAPS)							
WOOD FORMS							
WOOD WASTE CHUTES							
WOOD TRIM (CUT-OFFS)							
METALS							
INSULATION							
ROOFING							
JOINT SEALANT TUBES							
GYPSUM BOARD (SCRAPS)							
CARPET AND PAD (SCRAPS)							
PIPING							
ELECTRICAL CONDUIT							
OTHER:							

*** INSERT UNITS OF MEASURE.**

ATTACHMENT B

DEMOLITION WASTE IDENTIFICATION - 2				
MATERIAL	EST. QUANTITY	EST. VOLUME	EST. WEIGHT	REMARKS AND

DESCRIPTION		CY	TONS	ASSUMPTIONS
ASPHALTIC CONCRETE PAVING				
CONCRETE				
BRICK				
CMU				
LUMBER				
PLYWOOD AND OSB				
WOOD PANELING				
WOOD TRIM				
MISCELLANEOUS METALS				
STRUCTURAL STEEL				
INSULATION				
ROOFING				
DOORS AND FRAMES				
DOOR HARDWARE				
WINDOWS				
GLAZING				
ACOUSTICAL TILE				
CARPET				
CARPET PAD				
DEMOUNTABLE PARTITIONS				
EQUIPMENT				
CABINETS				
PLUMBING FIXTURES				
PIPING				
PIPING SUPPORTS AND HANGERS				
VALVES				
SPRINKLERS				
MECHANICAL EQUIPMENT				
ELECTRICAL CONDUIT				
COPPER WIRING				
LIGHT FIXTURES				
LAMPS				
LIGHTING BALLASTS				
ELECTRICAL DEVICES				
SWITCHGEAR AND PANELBOARDS				
TRANSFORMERS				

ATTACHMENT C

CONSTRUCTION WASTE REDUCTION WORK PLAN - 3						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTATION PROCEDURES
			EST. AMOUNT SALVAGED	EST. AMOUNT RECYCLED	EST. AMOUNT DISPOSED	

			TONS	TONS	TO LANDFILL TONS	
PACKAGING: CARDBOARD						
PACKAGING: BOXES						
PACKAGING: PLASTIC SHEET OR FILM						
PACKAGING: POLYSTYRENE						
PACKAGING: PALLETS OR SKIDS						
PACKAGING: CRATES						
PACKAGING: PAINT CANS						
PACKAGING: PLASTIC PAILS						
SITE-CLEARING WASTE						
MASONRY OR CMU						
LUMBER: CUT-OFFS						
LUMBER: WARPED PIECES						
PLYWOOD OR OSB (SCRAPS)						
WOOD FORMS						
WOOD WASTE CHUTES						
WOOD TRIM (CUT-OFFS)						
METALS						
INSULATION						
ROOFING						
JOINT SEALANT TUBES						
GYPSUM BOARD (SCRAPS)						
CARPET AND PAD (SCRAPS)						
PIPING						
ELECTRICAL CONDUIT						

OTHER:						

ATTACHMENT D

DEMOLITION WASTE REDUCTION WORK PLAN - 4						
			DISPOSAL METHOD AND QUANTITY			
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	EST. AMOUNT SALVAGED TONS	EST. AMOUNT RECYCLED TONS	EST. AMOUNT DISPOSED TO LANDFILL TONS	HANDLING AND TRANSPORTATION PROCEDURES
ASPHALTIC CONCRETE PAVING						
CONCRETE						
BRICK						
CMU						
LUMBER						
PLYWOOD AND OSB						
WOOD PANELING						
WOOD TRIM						
MISCELLANEOUS METALS						
STRUCTURAL STEEL						
ROUGH HARDWARE						
INSULATION						
ROOFING						
DOORS AND FRAMES						
DOOR HARDWARE						
WINDOWS						
GLAZING						
ACOUSTICAL TILE						
CARPET						
CARPET PAD						
DEMOUNTABLE PARTITIONS						
EQUIPMENT						
CABINETS						
PLUMBING FIXTURES						
PIPING						
SUPPORTS AND HANGERS						
VALVES						
SPRINKLERS						
MECHANICAL						

EQUIPMENT						
ELECTRICAL CONDUIT						
COPPER WIRING						
LIGHT FIXTURES						
LAMPS						
LIGHTING BALLASTS						
ELECTRICAL DEVICES						
SWITCHGEAR AND PANELBOARDS						
TRANSFORMERS						
OTHER:						

ATTACHMENT E

COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN - 5								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A X B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
PACKAGING: CARDBOARD								
PACKAGING: BOXES								
PACKAGING: PLASTIC SHEET OR FILM								
PACKAGING: POLYSTYRENE								
PACKAGING: PALLETS OR SKIDS								
PACKAGING: CRATES								
PACKAGING: PAINT CANS								
PACKAGING: PLASTIC PAILS								
SITE-CLEARING WASTE								
MASONRY								

OR CMU								
LUMBER: CUT-OFFS								
LUMBER: WARPED PIECES								
PLYWOOD OR OSB (SCRAPS)								
WOOD FORMS								
WOOD WASTE CHUTES								
WOOD TRIM (CUT-OFFS)								
METALS								
INSULATION								
ROOFING								
JOINT SEALANT TUBES								
GYPSUM BOARD (SCRAPS)								
CARPET AND PAD (SCRAPS)								
PIPING								
ELECTRICAL CONDUIT								
OTHER:								

ATTACHMENT F

COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN - 6

MATERIALS	**TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)**	**EST. COST OF DISPOSAL (B)**	**TOTAL EST. COST OF DISPOSAL (C = A X B)**	**REVENUE FROM SALVAGED MATERIALS (D)**	**REVENUE FROM RECYCLED MATERIALS (E)**	**LANDFILL TIPPING FEES AVOIDED (F)**	**HANDLING AND TRANSPORTATION COSTS AVOIDED (G)**	**NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)**
ASPHALTIC CONCRETE								
PAVING								
CONCRETE								
BRICK								
CMU								
LUMBER								
PLYWOOD AND								

OSB								
WOOD PANELING								
WOOD TRIM								
MISCELLANEOUS METALS								
STRUCTURAL STEEL								
ROUGH HARDWARE								
INSULATION								
ROOFING								
DOORS AND FRAMES								
DOOR HARDWARE								
WINDOWS								
GLAZING								
ACOUSTICAL TILE								
CARPET								
CARPET PAD								
DEMOUNTABLE PARTITIONS								
EQUIPMENT								
CABINETS								
PLUMBING FIXTURES								
PIPING								
SUPPORTS AND HANGERS								
VALVES								
SPRINKLERS								
MECH. EQUIPMENT								
ELECTRICAL CONDUIT								
COPPER WIRING								
LIGHT FIXTURES								
LAMPS								
LIGHTING BALLASTS								
ELECTRICAL DEVICES								
SWITCHGEAR AND PANELBOARDS								
TRANSFORMERS								

OTHER:								

ATTACHMENT G

CONSTRUCTION WASTE REDUCTION PROGRESS REPORT - 7								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (D = B + C)	TOTAL QUANTITY OF WASTE OF WASTER ECOVERED % (D / A X 100)
			ESTIMATED TONS	ACTUAL TONS (B)	ESTIMATED TONS	ACTUAL TONS (C)		
PACKAGING: CARDBOARD								
PACKAGING: BOXES								
PACKAGING: PLASTIC SHEET OR FILM								
PACKAGING: POLYSTYRENE								
PACKAGING: PALLETS OR SKIDS								
PACKAGING: CRATES								
PACKAGING: PAINT CANS								
PACKAGING: PLASTIC PAILS								
SITE-CLEARING WASTE								
MASONRY OR CMU								
LUMBER: CUT-OFFS								
LUMBER: WARPED PIECES								
PLYWOOD OR OSB (SCRAPS)								
WOOD FORMS								
WOOD WASTE CHUTES								
WOOD TRIM (CUT-OFFS)								
METALS								

INSULATION								
ROOFING								
JOINT SEALANT TUBES								
GYPSUM BOARD (SCRAPS)								
CARPET AND PAD (SCRAPS)								
PIPING								
ELECTRICAL CONDUIT								
OTHER:								

ATTACHMENT H

DEMOLITION WASTE REDUCTION PROGRESS REPORT - 8

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A X 100)
			ESTIMATED TONS	ACTUAL TONS (B)	ESTIMATED TONS	ACTUAL TONS (C)		
ASPHALTIC CONCRETE PAVING								
CONCRETE								
BRICK								
CMU								
LUMBER								
PLYWOOD AND OSB								
WOOD PANELING								
WOOD TRIM								
MISCELLANEOUS METALS								
STRUCTURAL STEEL								
ROUGH HARDWARE								
INSULATION								
ROOFING								
DOORS AND FRAMES								
DOOR HARDWARE								
WINDOWS								
GLAZING								
ACOUSTICAL								

TILE								
CARPET								
CARPET PAD								
DEMOUNTABLE PARTITIONS								
EQUIPMENT								
CABINETS								
PLUMBING FIXTURES								
PIPING								
SUPPORTS AND HANGERS								
VALVES								
SPRINKLERS								
MECHANICAL EQUIPMENT								
ELECTRICAL CONDUIT								
COPPER WIRING								
LIGHT FIXTURES								
LAMPS								
LIGHTING BALLASTS								
ELECTRICAL DEVICES								
SWITCHGEAR AND PANELBOARDS								
TRANSFORMERS								
OTHER:								

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 POLICY

A. HCA's policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. HCA's goal is zero waste, however, we realize that some waste will occur on a project building site that cannot be reduced or recycled. Therefore, contractors shall divert 95% of total project waste from the landfill.

1.2 REFERENCES

A. HCA's policy requires a minimum landfill diversion of 95% of all construction and demolition debris. For additional references to diversion from landfills see www.usgbc.org, Materials and Resources, Credit 2. Contractor should become familiar with LEED reporting requirements in the event that HCA chooses to pursue LEED certification for an individual project.

B. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
   1. ASTM INTERNATIONAL (ASTM)
      a. (2001) Development and Implementation of a Pollution Prevention Program
   2. S. GREEN BUILDING COUNCIL (USGBC)
   3. LEED (2002; R 2005; 2009) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.3 DEFINITIONS

A. **Comingled vs Source Separated C&D Debris:** Comingled debris is material that mixes all types of construction and demolition material in one container. Source separated, keeps several or all materials segregated from each other. Benefits of comingling include reduced labor and no need for education, and space saving. Benefits of source separation are higher value material due to lack of contamination, opportunity to involve labor and ability to use materials such as gypsum, masonry and rock product on site.

B. **Construction and Demolition Debris:** Uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles and other roof coverings, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets ten gallons or less in size and having no more than one inch of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, and pipe and metals that are incidental to any of the above. Solid waste that is not C&D debris (even if resulting from the construction, remodeling, repair and demolition of utilities, structures and roads and land clearing) includes, but is not limited to asbestos waste, garbage, any item containing hazardous materials such as fluorescent light ballasts or transformers, fluorescent lights, tires, drums, containers greater than ten gallons in size, any containers having more than one inch of residue remaining on the bottom and fuel tanks. Specifically excluded from the definition of construction and demolition debris is solid waste (including what otherwise would be construction and demolition debris) resulting from any processing technique that renders individual waste components unrecognizable, such as pulverizing or shredding.

C. **Debris Management Coordinator (DMC):** The contractor must appoint a DMC to oversee the activities relating to managing C&D debris on the site. The DMC will complete and submit the Waste Management Plan (form B) and collect records and data supporting disposal and diversion amounts.

D. **Land Clearing Debris:** Is vegetative matter, soil and rock resulting from activities such as land clearing and grubbing, utility line maintenance or seasonal or storm-related cleanup such as trees, stumps, brush and leaves and including wood chips generated from these materials. Land clearing debris does not include yard waste that has been collected at the curb.

E. **Landfill Diversion:** Means keeping material out of the landfill by reducing the amount of waste produced, reusing material, recycling, composting, incineration, or other mean.

F. **Recycle:** To process materials so that they may be used again. They can be used for their original purpose or another. Recycling is less preferable than reduction or reuse because often the processing takes up to 60% of the energy to transport and remake the new item. Example: pulverizing drywall as a soil amendment.

G. **Reuse:** Using an item again for the same purpose. Example: reusable pallets.

H. **Source Reduction:** The act of decreasing waste or the toxicity of waste. Examples: Waste reduction: Ordering wallboard to the correct height and using cutoffs to fill holes. Reduced toxicity: Paint that contains no VOCs.

I. **Waste Prevention:** Not creating waste through concepts such as source reduction, recycling, composting and reuse.
   1. The following is a partial list of C&D debris materials. The project waste may include but is not limited to these materials.
      a. Asphalt
      b. Bricks
      c. Carpet and carpet pad
      d. Corrugated cardboard
      e. Clean dimensional wood
      f. Wood (Note 1)
      g. Concrete and rock (Note 2)
      h. Concrete masonry units (CMU), slump stone (decorative concrete blocks)
      i. Dirt (Note 2)
      j. Doors
      k. Excavated Dirt & Rock (Note 2)
      l. Ferrous & nonferrous metals such as banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
      m. Fluorescent lamps and ballasts (Note 1)
      n. Gypsum wallboard (drywall)
      o. Land clearing debris & green materials (i.e. tree trimmings) (Note 2)
      p. Paint (Note 1)
      q. Plastic wrap, buckets, PVC
      r. Roofing shingles
      s. Used beverage containers
      t. Note 1: Several common debris materials may be considered toxic, hazardous, or not easily recycled with other C & D debris. In these instances, follow appropriate disposal methods. These materials include but are not limited to:
      u. Magnetic ballasts
      v. Older fluorescent lamps containing polychlorinated biphenyls (PCB's)
      w. All fluorescent lamps that may contain mercury
      x. Treated wood
      y. Painted wood that may contain lead-based paint
      z. Unused paint
      aa.
      bb. Note 2: Excavated materials and land clearing debris should be diverted from landfills. If the project is pursing LEED certification this type of debris must be kept separate and cannot be counted toward LEED diversion rates.

1.4 SUMMARY

A. The following document outlines waste management criteria for all HCA construction and demolition projects. Guidelines established in Section 01 7419 are intended for the use of contractor and contractor's affiliates.

B. Materials subject to the diversion requirements of this contract are the materials that are generated within the construction limits of this project, to include any materials associated with meeting the terms of this contract.

1.5 WASTE DIVERSION GOALS

A. HCA has established that this Project shall generate the least amount of waste possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

B. Acknowledging that Construction and Demolition waste will be generated, HCA requires that the maximum quantity of waste as is economically feasible shall be minimized on the front end and diverted from the landfill. HCA will request an estimate of the project's diversion rate and an explanation for diversion rates that are not 95%.

1.6 MANAGEMENT

A. With regard to these goals, the Contractor shall develop a Waste Management Plan (WMP) for HCA's review. Once this plan undergoes review by HCA, Contractor will be notified of project award or project denial. HCA will base project award on a number of factors included in the "best value evaluation" model. The WMP is a critical component of project award. This plan shall describe and document each of the following diversion and non-diversion activities:
   1. Salvage
   2. Reuse
   3. Source Separation Construction and Demolition Debris Recycling
   4. Co-mingled Construction and Demolition Debris Recycling
   5. Landfill Disposal

B. Develop and implement a waste management plan as specified in this section. Take a proactive, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in program.

C. The Debris Management Coordinator (DMC) shall be responsible for instructing workers and overseeing and documenting the results of the Waste Management Plan (WMP).

D. Construction and demolition waste includes products of demolition and construction, excess of unusable C&D materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work.

E. In the management of waste, consideration shall be given to the availability of viable markets, the condition of the materials, the ability to provide the material in suitable condition, and in a quality acceptable to available markets.

1.7 SUBMITTALS

A. The following submittals are required to be approved by HCA:
   1. Waste Management Plan (WMP Forms A & B) to indicate how waste will be diverted from landfills.
   2. Closeout submittal including weight verification of all construction and demolition material. The percent diversion shall be documented in this submittal. This spreadsheet shall be submitted with the final closeout package submitted to HCA.

PART 1 PRODUCTS

2.1 WASTE MANAGEMENT PLAN (WMP)

A. The complete Waste Management Plan (WMP) consists of two sequential documents: WMP-Form A and WMP-Form B. Contractor must complete WMP-Form A before commencement of debris management activities. Once awarded project, the Debris Management Coordinator (DMC) must assume debris management responsibilities including the submission of WMP- Form B and records and data to support disposal and diversion percentages.
   1. WMP-Form A (Submit with Proposal): WMP-Form A must be submitted with bid documents and is a prerequisite of project award. This document should describe planned C&D debris management activities. HCA may require Contractor to revise and resubmit the plan and does not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement.
   2. WMP-Form B: Once the WMP-Form A is submitted, reviewed, and approved, DMC contractor must submit WMP-Form B on a monthly basis. Form B documents actual diversion percentages. Additionally, Contractor must submit records and data that verify:
      a. Total waste generated
      b. Total waste diverted by recycling, reuse, or salvage
      c. The type of waste generated/diverted
   3. The quantity of waste materials shall be by weight (tons). Landfill records and materials receipts shall be submitted as a formal material submittal.

2.2 WMP-FORM A - ESTIMATE OF PERCENT REDUCTION CONTRACTOR WILL ATTAIN DURING PROJECT

A. Contractor will complete and submit the general WMP documents with the Contractor's proposal for HCA review. If approved, this WMP will serve as the basis for the monthly records and data submittals and WMP–Form B. Contractor must submit initial WMP with project proposal to avoid disqualification. This plan should include separate sections for demolition and construction projects. See Appendix A for the WMP forms and corresponding instructions for completing the form. Contractor has the option of completing the WMP forms in Appendix A or creating his own. If he creates his own, the plan must contain the following:
   1. Name of individuals on the Contractor's staff responsible for waste prevention and management.
   2. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
   3. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.
   4. Characterization, including estimated types and quantities, of the waste to be generated.
   5. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.
   6. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by HCA.
   7. Description of the means by which any recyclable materials identified in item (E) above will be protected from contamination.

2.3 WMP-FORM B - ACTUAL PERCENTAGE REDUCTION CONTRACTOR ATTAINS DURING PROJECT

A. WMP-Form B will account for all construction and demolition waste management activity from project commencement to termination. This form must be completed and submitted on a monthly basis. Failure to meet the 95% diversion requirement must be addressed with a written explanation of disparities along with WMP-Form B. Contractor has the option of completing the WMP forms in Appendix A or creating his own. If he creates his own, the plan must contain the following:
   1. Waste Characterization: Document the waste to be generated, including types and quantities by weight.

2. Diversion Options: List each material to be salvaged, reused, or recycled during the course of the Project, the proposed local market for each material, and the estimated net cost savings/ additional costs from diversion. "Net" means that the following have been subtracted from the cost of separating and recycling: (a) revenue from the sale of recycled or salvaged materials and (b) landfill tipping fees saved due to diversion of materials from the landfill.
3. Waste Reduction Calculations: Calculated end-of-project rates as a percentage of total waste.
4. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals/organizations. Indicate whether organization is tax exempt.
5. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
6. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight, tickets, receipts, and invoices.
7. LEED Submittal (If applicable): LEED letter template for Credit MR 2.1, signed by Contractor, indicating total waste material, quantities diverted and means by which it is diverted and a statement that requirements for the credit have been met.
8. Landfill Options: Include landfill contact information and costs. Provide the name of the landfills, respective tipping fees, and the total projected cost of landfill disposal.
9. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
10. Timeline: Submit a timeline of project commencement and termination in addition to a plan for periodic onsite updates of C&D debris handling.
11. Meetings: Describe the regular meetings to be held to address how to manage waste. At a minimum, discuss waste management goals and issues at pre-construction meetings and regularly scheduled job-site meetings.
12. Handling and Transportation: Describe methods of separation including the use of containers, their location, and labeling system used to identify the different materials. Describe transportation/hauling procedures, which may include but are not limited to contracting a recycling hauler, arranging transportation with the local market to be used and various means of self-transportation.
13. Negotiated approval of the Contractor WMP must be obtained before the commencement of waste management activities. Once notified of WMP approval, Contractor may begin WMP implementation.

PART 1 EXECUTION

3.1 WASTE MANAGEMENT PLAN (WMP) EXECUTION

A. Debris Management Coordinator (DMC): The Contractor shall designate an on site party (or parties) responsible for waste management instruction, oversight and documentation for the entire project.

B. Depending on the size and complexity of the project, Contractor may either designate a full time DMC or assign responsibility to the job supervisor or appropriate personnel.

C. Distribution: The Contractor shall distribute copies of the WMP and other pertinent information to the Job Site Foreman and to each Subcontractor.

D. Instruction: The Contractor shall provide on-site instruction of correct separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

E. Source Separation: The Contractor shall identify and clearly label a specific area to facilitate separation of materials for diversion activities. Recycling and waste bin areas are to be kept neat, clean and clearly marked in order to avoid contamination of materials.

F. If hazardous materials are found at anytime, the contractor shall halt work and inform HCA. The following is a list of appropriate source separation procedures:
   1. Separate recyclable materials from construction and demolition debris to the maximum extent possible. Separate recyclable materials by type.
   2. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.

3. Stockpile processed materials on-site without mixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
4. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
5. Store components off the ground and protect from weather.

G. Construction and Demolition Debris Removal:
1. Buildings and their appetencies are property of the Contractor. Revenues and savings from recycling, salvage, and reuse shall accrue to the Contractor.
2. Remove construction and demolition debris from project site on a regular basis. Do not allow construction and demolition debris to accumulate on-site.
3. Transport construction and demolition debris from property and dispose of it legally.
4. Burning of construction and demolition debris is not permitted.

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END OF SECTION

SECTION 01 7700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.2 ACTION SUBMITTALS

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

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

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor`s List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor`s punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Before Substantial Completion: Complete the following minimum [<>] [<>] working days before requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer`s name and model number where applicable.
5. Submit test/adjust/balance records.

C. Procedures Before Substantial Completion: Complete the following minimum 10 working days before requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner`s personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used before Substantial Completion.
5. Instruct Owner`s personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900.
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mock-ups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

1.6 FINAL COMPLETION PROCEDURES

A. Submittals Before Final Completion: Before requesting final inspection for determining final completion, complete the following:
   1. Certified List of Incomplete Items: Submit certified copy of Architect`s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, TBD.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Submit list of incomplete items in the following format:
      a. PDF electronic file. Architect will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner`s rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 working days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
   1. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer recommendations.

C. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   4. Remove tools, construction equipment, machinery, and surplus material from Project site.
   5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   7. Sweep concrete floors broom clean in unoccupied spaces.
   8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer`s recommendations if visible soil or stains remain.
   9. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   10. Remove labels that are not permanent.
   11. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   12. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   13. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   14. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
      a. Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
   15. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   16. Leave Project clean and ready for occupancy.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section .

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
   1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
   2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
      a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
   3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
   4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

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END OF SECTION

SECTION 01 9113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. Work under this Section is subject to requirements of the Contract Documents including Divisions 00 and 01.

1.2 DESCRIPTION

A. Commissioning is a systematic process of ensuring the HVAC systems perform interactively according to the design intent and Owner's operational needs. Commissioning will encompass and coordinate traditionally separate functions of system documentation, installation checkout, equipment startup, control system calibration and point-to-point checkout, testing and balancing, and functional performance testing. Commissioning is intended to achieve the following specific objectives according to the Contract Documents:
   1. Verify systems are in accordance with the plans and specifications.
   2. Verify and document proper installation and performance of equipment and systems.
   3. Ensure O&M, maintenance training, and commissioning documentation requirements are complete.
   4. Provide Owner with functional buildings and/or systems with minimal operational problems at time of move-in.

B. Commissioning does not take away from or reduce responsibility of system designers or installing contractors to provide a finished and fully functioning product.

C. This section shall in no way diminish the responsibility of the Division 23 Sub-contractors and Suppliers in performing all aspects of work and testing as outlined in the contract documents. Any requirements outlined in this section are in addition to requirements outlined in Division 23 Specifications.

1.3 ABBREVIATIONS

A. The following are common abbreviations used in the Specifications. Definitions are found further in this Section.
   1. A/E - Architect and Design Engineers – The HVAC Engineer
   2. BAS - Building Automation System
   3. CA - Commissioning Agent – An employee or agent of the GC
   4. CM - Construction Manager – HCA Construction Manager
   5. CT - Commissioning Team
   6. Cx - Commissioning
   7. CC - Controls Contractor
   8. DFM - HCA Director of Facility Management
   9. EC - Electrical Contractor
   10. FPT - Functional Performance Test
   11. GC - General Contractor
   12. MC - Mechanical Contractor
   13. OR - Owner's Representative
   14. PC - Pre-functional Checklist
   15. TAB - Test, Adjust and Balance

16. O&M - Operations & Maintenance

17. RFI - Request for Information

1.4 RELATED WORK

A. Specific commissioning requirements are given in the following sections of these specifications.

1.5 COORDINATION

A. Commissioning Team: Members of the Commissioning Team (CT) will consist of:
   1. Commissioning Agent (CA)
   2. Owner's Representative(s) (OR)
   3. Construction Manager (CM)
   4. Architect and Design Engineers (A/E)
   5. Mechanical Contractor (MC)
   6. Electrical Contractor (EC)
   7. Test and Balance Contractor (TAB Contractor)
   8. Controls Contractor (CC)
   9. Equipment Suppliers and Vendors

B. Management: The CA directs and coordinates commissioning activities. All members of the Commissioning Team shall cooperate to fulfill contracted responsibilities and objectives of the Contract Documents.

C. Kick-off Meeting: Within 90 days of commencement of construction, CA will plan, schedule and conduct a commissioning kick-off meeting. Membership and responsibilities of the commissioning team will be clarified at this meeting. CA will distribute meeting minutes to all parties.

D. Scheduling:
   1. CA will work with commissioning team to establish required commissioning activities to incorporate in preliminary commissioning schedule. The CA and GC will integrate commissioning activities into the master construction schedule. Representatives of the commissioning team will address scheduling problems. Necessary notifications are to be made in a timely manner in order to expedite commissioning.
   2. The CA will provide initial schedule of primary commissioning events at commissioning kick-off meeting. As construction progresses, more detailed schedules are developed by the CA.

1.6 DEFINITIONS

A. Acceptance Phase: Phase of construction after startup and initial checkout when Functional Performance Tests, O&M documentation review and training occur.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to the Contract Documents.

C. Architect/Engineer (A/E): Prime consultant (architect) and sub-consultants who comprise the design team, generally HVAC Mechanical Designer/Engineer and Electrical Designer/Engineer.

D. Commissioning Agent (CA): An assigned employee or agent of the GC. CA directs and coordinates day-to-day commissioning activities.

E. Contract Documents: Documents binding on parties involved in construction of this project (drawings, specifications, change orders, amendments, contracts, etc.).

F. Control System: System and components associated with building automation system.

G. Construction Manager (CM): Owner's employee assigned the responsibility of managing the overall project.

H. Deferred Functional Tests: Functional tests performed after substantial completion due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow test from being performed.

I. Deficiency: Condition of a component, piece of equipment or system that is not in compliance with Contract Documents (that is, does not perform properly or is not complying with design intent).

J. Director of Facility Management (DFM): Facility employee responsible for the maintenance of the Physical Plant.

K. Factory Testing: Testing of equipment on-site or at factory, by factory personnel.

L. Functional Performance Test Procedures: Commissioning protocols and detailed test procedures and instructions that fully describe the steps required to determine if the system is performing and functioning properly. These procedures are written by the A/E and shall be used to document Functional Performance Tests. They shall be included in the Project Manual.

M. Functional Performance Test (FPT): A demonstration of the dynamic function and operation of equipment and systems. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, life safety conditions, power failure, etc. Systems are run through all specified sequences of operation. Components are verified to be responding in accordance with contract documents. The test results are both manually recorded on the FPT Procedure and with trending data using the BAS. Functional Performance Tests are executed after pre-functional checklists and startups are complete.

N. General Contractor: Contracted directly to Owner. Sub-contractors report to the General Contractor.

O. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

P. Manual Test: Using hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrary to analyzing monitored data taken over time to make "observation").

Q. Monitoring: Recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or trending capabilities of control systems.

R. Non-Compliance: See Deficiency.

S. Non-Conformance: See Deficiency.

T. Overridden Value: Writing over a sensor value in the control system to see response of a system (e.g., changing outside air temperature value from 50°F to 75°F to verify economizer operation). See also "Simulated Signal".

U. Owner's Representative (OR) – An employee of the Owner or person contracted with the Owner to provide Cx Verification Services. The responsibility of the OR is to assist the Cx Team in understanding the Cx requirements of the project, monitor the Cx progress through site visits and Cx Team Meetings, review the completed Cx Pre-Functional Performance Checklists and Functional Performance Test for completeness, perform Cx verification testing as appropriate to determine that the Cx requirements of the project have been successfully completed.

V. Owner Verification: A repeat of the FPTs in the presence of the OR and A/E. The OR will determine if only selected or all FPTs will be repeated based on his inspection and review of the Cx documentation submitted by the CA prior to this visit. Typically the length of this visit is less than 3 days. On phased projects, phased commissioning may be required.

W. Phased Commissioning: Commissioning completed in phases (by floors, for example) due to size of structure or other scheduling issues.

X. Pre-functional Checklist (PC): 1) A list of static inspections and elementary component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.). 2) Pre-functional Checklists may also include startup tests that prepare equipment and system for functional operation. 3) A summary of specified documentation is presented in checklist format. The A/E shall include the PCs in the Project manual.

Y. Seasonal Performance Tests: Functional Performance Tests or parts thereof that are deferred until system(s) ambient conditions are closer to design conditions in order to verify proper system operation.

Z. Simulated Condition: Condition created for testing component or system (e.g., applying heat to space temperature sensor to monitor response of VAV box).

AA. Simulated Signal: Disconnecting a sensor and using a signal generator or a software value to simulate an input value to the BAS.

BB. Specifications: Construction specifications of Contract Documents.

CC. Startup: The activities where systems or equipment are initially tested and operated. Startup is completed prior to functional testing.

DD. Sub-contractor: Contractors of GC, and their sub-contractors, who provide and install building components and systems.

EE. Test Procedures: Step-by-step processes, which must be executed to fulfill test requirements.

FF. Test Requirements: Requirements specifying what modes and functions, etc. will be tested.

GG. Trending: Recording of parameters (flow, temperature, pressure, status, etc.) during system operation using the BAS.

HH. Vendor: Supplier of equipment.

II. Warranty Period: Warranty period for entire project, including equipment components.

1.7 SUBMITTALS

A. CA shall provide the OR and A/E an “as-built” controls submittal 5 working days prior to the scheduled Owner’s Verification visit. The submittal shall include the full sequences of operation that describe the actual controls programming.

1.8 STARTUP

A. Sub-contractor responsible for purchase, installation and startup of equipment shall perform the manufacturer’s detailed startup and checkout procedures in addition to the PCs.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. Division sub-contractors shall provide all specialized tools, test equipment and instruments required to execute startup, checkout and functional performance testing of equipment under their contract.

B. Test equipment shall be of sufficient quality and accuracy to test and/or measure system performance with tolerances specified. A testing laboratory shall have calibrated test equipment within the previous 12 months. Calibration shall be NIST traceable. Equipment shall be calibrated according to manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING OVERVIEW

A. The following provides a brief overview of typical commissioning tasks during construction and the general order in which they occur:

1. Commissioning during construction begins with a kick-off meeting conducted by CA and OR where membership of commissioning team is established, responsibilities reviewed, and the Cx scope and procedures are reviewed.. A preliminary commissioning schedule is distributed for review.
2. CA schedules subsequent meetings as necessary to plan, coordinate and schedule commissioning activities. Deficiencies and problem resolution will also be discussed at these meetings.
3. CA develops, with cooperation of sub-contractor/vendor, detailed training plan. The CA schedules training activities with the facility's staff.
4. CA assembles the Cx team and for a step by step review of the FPT procedures in advance of the execution of the first FPT. The A/E shall lead this review and immediately update any FPT that requires changes.
5. A/E shall be present to assist in the execution of the first FPT. The CA shall coordinate the schedule for this test to coincide with the A/E's scheduled trip to attend an Owner-Architect-Contractor meeting.
6. CA supervises the execution of the PCs. CA will witness startup of selected equipment.
7. Functional testing is completed after TAB is completed.
8. Functional Performance Tests are executed by sub-contractors, under supervision of and documented by CA.
9. CA is responsible for having the completed FPT procedures, the specified trending data, the final T&B report, and the "as-built" control submittal to the OR and A/E not less than 5 working days prior to the scheduled Owner's Verification visit.
10. All the FPTs must be completed and the Owner's Verification must occur prior to occupancy unless otherwise directed by the CM. (Owner Verification may be waived on some phases of a phased project; however, the FPTs and controls submittal must be submitted to the OR prior to occupancy.)
11. Items of non-compliance in material, installation or setup will be corrected at sub-contractor expense and system shall be retested.

3.2 SYSTEMS TO BE COMMISSIONED

A. Mechanical

1. Air Handling Systems including air handlers, air terminal boxes, energy recovery systems, exhaust fans and ancillary equipment.
2. Chilled Water System including chillers, cooling towers, pumps, and ancillary equipment.

3. Steam System and components serving HVAC system.

4. Heating Hot Water System including boilers, convertors, pumps and ancillary equipment.
5. Building Automation System

B. Plumbing: Domestic Hot Water Recirculation System

C. Electrical: Emergency Generator

3.3 RESPONSIBILITIES

A. Responsibilities of commissioning team members are:
1. Architect/Engineer (A/E):
2. Develop detailed PCs.
3. Develop detailed project specific FPT procedures.
4. Review FPTs in detail with the Cx Team.
5. Witnesses first run of first FPT.
6. Review all Cx documentation, including TAB reports, and provide written comments to the OR and CA within 5 days of receipt.

B. Commissioning Agent (CA):
1. Coordinate and direct commissioning activities in a logical, sequential and efficient manner.
2. Schedule and chair Cx kick-off meeting and issue minutes.
3. Provide progress reports of commissioning status.
4. Periodically update commissioning schedule.
5. Supervise completion of Pre-functional Checklists and supporting documentation to verify systems readiness for Functional Performance Testing.
6. Supervise Functional Performance Tests. Document test results and recommend system for acceptance.
7. Review completed TAB reports.
8. Develop, with cooperation of sub-contractor/vendor and DFM, a detailed training plan.
9. Schedule and oversee training sessions.
10. Prepare final Commissioning Turnover Documentation.
11. Facilitate cooperation of sub-contractors in commissioning work.
12. Incorporate commissioning activities into master construction schedule.
13. Schedule and chair all commissioning team meetings.
14. Forward completed TAB report, as-built controls submittal, FPT procedure, and trend data to OR and A/E and at least 5 working days prior to scheduled Owner Verification visit.
15. Identify, track and coordinate resolution of non-compliance and deficiencies identified by commissioning team. Maintain records of all issues submitted by commissioning team.
16. Coordinate sub-contractor/vendor participation in training sessions. Provide workspace or conference room as needed. Ensure attendance at training is documented.
17. Schedule, coordinate and assist CT in seasonal or deferred testing.

C. Sub-contractors/Vendors:
1. Review PCs and Functional Performance Test procedures.
2. Ensure installation work is complete, is in compliance with Contract Documents and is ready for Functional Performance Testing.
3. Execute Pre-functional Checklists and submit with supporting documentation to CA.
4. Execute Functional Performance Tests developed by CA as described in contract documents.

5. Provide certified and calibrated instrumentation required to take measurements of system and equipment performance during Functional Performance Testing.
6. Assist CA with developing a comprehensive commissioning schedule.
7. Attend commissioning kick-off meeting and other commissioning team meetings.
8. Execute seasonal or deferred Functional Performance Testing.
9. Make necessary amendments to O&M manuals and as-built drawings/submittals for applicable issues identified in the Cx process.
10. Support the testing that occurs during the Owner's Verification visits.

D. Controls Contractor (CC):
1. Completely install and thoroughly inspect startup, test, adjust, calibrate and document systems and equipment under BAS Contract.
2. Provide laptop computer, software and training to accommodate TAB Contractor in system balancing.
3. Maintain database of control parameters submitted by TAB Contractor subsequent to field adjustments and measurements.
4. Provide on-site technician skilled in software programming and hardware operation to exercise sequences of operation and to correct control deficiencies identified during Functional Performance Testing and Owner's Verification.
5. Provide instrumentation, computer, software and communication resources necessary to demonstrate total operation of building systems during Functional Performance Testing and Owner's Verification of control system equipment.
6. Attend commissioning kick-off meeting and other commissioning team meetings.
7. Maintain comprehensive system calibration and checkout records. Submit records to CA upon request.
8. Setup trend logs as requested by CA to substantiate proper systems operation.
9. Prepare the required trending information and submit to the CA.

E. Test, Adjust and Balance (TAB) Contractor:
1. Attend commissioning kick-off meeting and other commissioning team meetings.
2. Complete test and balance procedures prior to Owner's Verification visit.
3. Cooperate with CC with execution of required work.
4. Rebalance deficient areas identified during commissioning.
5. Provide on-site technician, as necessary, skilled in TAB procedures to provide limited system TAB readings during Functional Performance Testing and Owner's Verification.

3.4 COMMISSIONING TEAM MEETINGS

A. Commissioning team meetings will be held periodically as determined by CA with frequency increasing as construction advances and systems become operational. Attendance is mandatory. CA will record minutes and attendance. CA will chair Commissioning Team Meetings.

B. Discussions held in Commissioning Team Meetings shall include, but not be limited to system/equipment startup, progress, scheduling, testing, documentation, deficiencies and problem resolution.

3.5 REPORTING

A. CA will at OAC meetings provide regular status reports to CM and A/E.

B. CA will regularly communicate with members of commissioning team, keeping them apprised of

commissioning progress.

C. CA shall submit non-compliance and deficiency reports to the CM.

3.6 STARTUP AND INITIAL CHECKOUT

A. CA shall schedule equipment startup after the PCs are executed and documented by Sub-contractor. Startup shall not occur until after the CA and sub-contractors have reviewed the completed PCs.

B. OR reserves the right to witness any startup or equipment testing. DFM shall be contacted and invited to witness all equipment startup.

C. CA shall provide OR with signed and data copy of completed startup and pre-functional checklists. Only individuals having direct knowledge that a line item task was actually performed will initial or check that item off.

D. CA shall clearly list outstanding items or initial startup and pre-functional procedures not completed successfully.

E. CA shall review deficiency reports to determine if outstanding items prevent scheduling of Functional Performance Testing.

3.7 FUNCTIONAL PERFORMANCE TESTING

A. Objectives and Scope:
1. The objective of Functional Performance Testing is to demonstrate each system is operating according to documented design intent and Contract Documents. Functional Performance Testing facilitates bringing systems from a state of substantial completion to full dynamic operation. Additionally, during Functional Performance Testing, areas of deficient performance are identified and corrected, improving operation and functioning of systems.
2. Each system shall be operated through all modes of operation where there is a specified system response. Verifying each sequence in the sequences of operation is required.

B. Development of Test Procedures:
1. The purpose of any given specific test is to verify and document compliance with stated criteria of acceptance given on test form. A/E shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Prior to execution, the CA will review the FPT procedures with the A/E and Cx Team (i.e. answering questions about equipment, operation, sequences, etc.). CA shall provide a copy of test procedures to Sub-contractor. Sub-contractor will review tests for feasibility, safety and equipment warranty protection. CA shall also submit tests to Owner, CM and A/E and other commissioning team members for review.
2. Examples of test procedure forms to be developed by the A/E are included herein.

C. Coordination and Scheduling:
1. CA will conduct a step by step table top review of the FPT procedures with the CT weeks in advance of the first FPT.
2. CA shall witness and document functional testing of equipment and systems. Sub-contractor shall execute tests under direction of CA.
3. Functional Performance Testing is conducted after system operation and checkout is satisfactorily completed. Air balancing and water balancing is to be completed and debugged before functional testing of air-related or water-related equipment or systems.
4. CA will schedule Owner's Verification visit with the OR and A/E.
5. CA will transmit the completed FPT procedures, associated trend data, TAB report, and "as-built" control submittal to the OR and A/E on a schedule that will give the them five working days to review

this information prior to the scheduled Owner's Verification visit.

3.8 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation: CA will witness and document the results of the FPTs using specific Functional Performance Test procedures developed for that purpose. CA will include filled out FPTs in Commissioning Turnover Package.

B. Non-Conformance:
   1. CA will record results of functional performance testing. Deficiency or non-conformance issues will be noted and reported to A/E and OR on notes section of the FPT procedure.
   2. Corrections of minor deficiencies identified may be made during tests at discretion of CA. In such cases, deficiency and resolution will be documented on FPT form.
   3. Every effort will be made to expedite testing and minimize unnecessary delays, while not compromising integrity of tests. CA shall not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues unless directed to do so by the OR.
   4. Deficiencies are handled in the following manner:
      a. When there is no dispute on deficiency and Sub-contractor accepts responsibility for remedial action:
         1) CA documents deficiency.
         2) CA reschedules test with Sub-contractor.
      b. When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
         1) CA documents deficiency and the sub-contractor's response and they go on to another test or sequence.
         2) CA facilitates resolution of deficiency. Other parties are brought into discussions as needed. Final interpretive authority is with A/E. Final acceptance authority is with the OR.
         3) CA documents the resolution.

C. Approval: CA notes each satisfactorily demonstrated function on test form. CA, A/E and OR provide formal approval of FPT. CA recommends acceptance of each test to A/E and OR. The OR maintains a Cx Issues Log that documents the issues/problems that arise during Cx Verification. The OR and A/E work together to update the log until all the issues are resolved to the satisfaction of the OR. The OR notifies the CM when the Cx Issues are resolved to the extent that occupancy by the Owner can occur.

3.9 COMMISSIONING DOCUMENTATION

A. Commissioning Turnover Package
   1. CA is responsible to compile and organize commissioning records. CA shall deliver Cx records to the OR in Commissioning Binders. Turnover Package to include the following:
      a. "As-built" controls submittal
      b. Pre-functional Checklists
      c. Completed Functional Performance Test records
      d. Trend data
      e. A list of deficiencies referenced to a specific FPT section
      f. Final TAB Report

3.10 TRAINING OF OWNER PERSONNEL

A. Sub-contractors will provide complete training in startup, operation and maintenance of all equipment under contract.

B. CA will be responsible for overseeing and approving content and adequacy of Facility Staff training.

C. Sub-contractor responsible for training will submit a written training plan to CA for review and approval prior to training. Plan will cover the following elements:
   1. Equipment (included in training)
   2. Intended audience
   3. Location of training
   4. Objectives
   5. Subjects covered
   6. Duration of training on each subject
   7. Instructor for each subject
   8. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
   9. Instructors and qualifications

D. CA coordinates and schedules training with CM, DFM and Sub-contractors. CA develops criteria to determine training satisfactorily completed. CA schedules training sessions with appropriate personnel.

E. CA will provide videotaping of training sessions as required.

3.11 DEFERRED TESTING

A. Deferred Seasonal Testing: During warranty period, seasonal testing (tests delayed until weather conditions are closer to system's design) will be completed as part of this contract. CA will coordinate this activity. Tests will be executed, documented and deficiencies corrected by appropriate contractor(s), with DFM, OR and CA witnessing. CA will incorporate final updates to Commissioning Turnover Package as necessary.

B. Unforeseen Deferred Tests: Any check or test not completed due to building structure, required occupancy condition, or other deficiency, may be delayed upon approval of OR. These tests will be rescheduled as soon as possible.

3.12 PRE-FUNCTIONAL CHECKLISTS

A. The A/E shall include in the specifications Pre-functional Checklists for the major equipment in the systems under going Functional Performance Tests. Included at the end of this section are example Pre-functional Checklists. The design consultant is responsible for including in this section of the Project Manual comprehensive, accurate, and clearly written Pre-functional Checklists for the major equipment called for in the Project.

B. The Mechanical Contractor's field foreman shall inspect each piece of installed HVAC equipment using the appropriate Pre-functional Checklist. He shall initial and date each item when it passes inspection and re-inspect until all items pass.

C. When all items have successfully passed inspection the Mechanical Contractor's superintendent and the General Contractor's project manager shall separately inspect, sign and date the checklists to verify that the installation is complete.

3.13 FUNCTIONAL PERFORMANCE TESTS AND TEST PROCEDURES

A. AHU Functional Performance Test – The AHU FPT is to be conducted after the hydronic water balance and air side T&B for the spaces served by the AHU are complete. Portions of this FPT also require that the

chilled water and heating water systems operate to produce chilled water and heating water at design temperatures. The AHU FPT requires a 24 hour trend at 3 minute intervals of AHU and chilled water system

parameters listed in the FPT procedure. The trending should be scheduled to ensure that fire alarm tests or other activities do not shut down the AHU or hydronic systems during the 24 hour period.

B. In the Function Performance Tests Section (Tab 3) there is an example of AHU FPT (including templates for calculating and displaying the trend data) for the AHU sequence of operation contained in this document (see BAS AHU with and without Preheat Coil Schematic and Sequence of Operation Sections, Tabs 8 and 9). The design consultant is responsible for including in this section of the Project Manual a comprehensive, accurate, and clearly written AHU FPT that is specific to the sequence of operation specified.

C. Air Terminal Unit Functional Performance Tests – Two tests are performed on the Air Terminal Units, a Heating Mode Test and a Cooling Mode Test. Completion of the AHU FPT is a prerequisite to performing these tests. The VAV/CAV Air Terminal Unit Heating and Cooling tests are to be conducted after the hydronic water balance and air side T&B for the terminal units and the AHUs serving these units are completed. These FPTs also require that the chilled water and heating water systems produce design chilled water and heating water temperatures of typically 42°F and 180°F, respectively, continuously throughout the tests. Coordinate with other trades to insure that the chilled water, heating water, and AHUs involved will operate without interference throughout the duration of the tests, approximately 5 hours for each test. An effort should be made to keep all doors separating the terminal boxes' zones closed during these tests. The Air Terminal Unit FPT can be conducted simultaneously for all the terminal units in the project or selected terminal units may be tested separately from others provided the chilled water system, heating hot water system, and the AHU serving the units meet the prerequisites for conducting the test.

D. The Heating Mode test is to be performed prior to the Cooling Mode test. The space thermostats involved in the Heating Mode test are to be set at 72°F at least 5 hours immediately prior to beginning the Heating Mode test. This is done to establish steady state temperature conditions prior to raising the space thermostats to a set point of 76°F.

E. When the building has been given time to stabilize at 72°F begin trending the required parameters. Trend each data point every 3 minutes.

F. Thirty minutes after beginning the trending of parameters globally change the thermostat set point of the boxes being tested to 76°F. Continue trending for another 5 hours. This completes the Heating Mode Test. The information requested on the Heating Mode Test form (see Functional Performance Test Procedures Section, Tab 3) is only supplied for terminal boxes that do not meet the test criteria specified at the bottom of the form.

G. The Cooling Mode Test should immediately follow the Heating Mode Test. Globally set the thermostat set point of the boxes being tested to 69°F and continue trending the same parameters for 4½ hours.

H. If the Cooling Mode Test does not immediately follow the Heating Mode Test, 5 hours prior to starting the Cooling Mode Test adjust the thermostat set point for the terminal units being tested to 74°F. After the 5 hour stabilization period, begin trending the parameters specified in the test form. Thirty minutes after beginning the trending, globally change the thermostat set point of the terminal units being tested to 69°F. Continue trending for another 5 hours.

I. The trend data is to be presented as tabular data in an Excel workbook. The data for each terminal unit is to be contained in separate work sheets using the unique terminal unit designation as the name for each sheet. The columns of each work sheet are to be ordered from left to right as follows:

J. Date and time in ascending order, zone thermostat set point, cooling set point, heating set point, actual zone temperature, terminal unit reheat coil discharge air temperature, reheat valve commanded position, actual cfm, heating cfm set point, cooling cfm set point, commanded damper position, AHU discharge air temperature, and heating hot water supply temperature. Shade data of the Heating Mode Test red and the Cooling Mode Test data blue.

K. The system trend data, AHU discharge air temperature, chilled water valve control position, building chilled water supply temperature, building heating hot water supply temperature, and outside air temperature are to be combined in a separate worksheet for each AHU.

L. Heating Mode and Cooling Mode test forms and templates for calculating and displaying the trend data are included in the Functional Performance Tests Section (Tab 3). These sheets are to be completed for the terminal units that fail the initial FTP or any subsequent FPT.

M. Chilled Water System Functional Performance Test – The Chilled Water System FPT is conducted after chiller startup, hydronic TAB, and the AHU chilled water control valves are under automatic control. This FPT must test or demonstrate: user change of the order in which the chillers are staged; automatic start of the lead chiller; automatic start of the lag chillers in sequence; automatic de-staging of the lag chillers in sequence; automatic staging and control of pumps and pump speeds; the ability of the system to maintain minimum chiller flow; calibration of the chilled water system sensors.

N. In the Function Performance Tests Section (Tab 3) there is an example of a Primary/Secondary Chilled Water System FPT. The design consultant is responsible for including in this section of the Project Manual a comprehensive, accurate, and clearly written Chilled Water System FPT that is specific to the sequence of operation specified.

O. BAS/ESC connectivity Functional Performance Test – Coordinate with HCA corporate FacilitiGroup Energy Service center to verify full BAS communication between the facility and ESC.

P. Pre-Functional Checklists:
1. AHU Pre-Functional Checklist
2. Air Terminal Unit Pre Functional Checklist
3. Blower Coil Unit Pre Functional Checklist
4. General Exhaust Fan Pre-Functional Checklist
5. Isolation Room Exhaust Fan Pre-Functional Checklist
6. Piping and Ductwork Pre Functional Checklist
7. Rooftop Unit Pre-Functional Checklist

Q. Functional Performance Test Procedures:
1. Air Handling Unit Functional Performance Test
2. Air Terminal Unit Heating and Cooling Functional Performance Test
3. BAS Graphics Programmers' Guide
4. General Exhaust Fan Functional Performance Test
5. Heating Hot Water Functional Performance Test
6. Isolation Rooms Functional Performance Test
7. Operating Rooms Functional Performance Test
8. VAV Trend Data

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

[Insert Your Logo Here] [Vendor Logo Here]

Air Handling Unit Pre-Functional Checklist

Facility Name:		**Date:**	
Project Name:			
AHU #:			

1	**Manufacturer:**	
2	**Model #:**	

General		**Y/N/NA; Initials; Date**
3	Unit is installed on housekeeping pad	
4	Unit is installed on floating floor as shown on construction documents	
5	Access doors open freely and seal tightly	
6	Lights are provided and controlled off timer switch	
7	Viewable windows are provided in access doors at filters, fans, and humidifier sections	
8	Casing and duct sealed with proper sealant	
9	Dampers are low leakage and installed with rubber gasket	
10	Casing and duct are properly insulated	
11	Duct smoke detectors are installed in supply and return ductwork with required access doors	
12	Fire/Smoke dampers are installed with access doors where specified	
13	Unit and plenums are clean	

Chilled Water Coil		**Y/N/NA; Initials; Date**
14	Isolation valves are installed on supply and return piping for service	
15	Piping is properly supported and not supported by the coil	
16	Flanges/Unions are provided at coil connections for access	
17	Access is provided for coil pull without obstructions	
18	Clearances have been maintained and piping is installed for service	
19	Coil drain with valve is installed at low point of coil	
20	Manual air vent is installed at high point in coil	
21	Line size dirt leg with shutoff valve is installed in supply and return piping	
22	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
23	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
24	Control valve is installed in the return piping	
25	Common glycerin filled pressure gauge is installed across coil with shutoff valve installed on each line	
26	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
27	Temperature sensor is installed in return piping	
28	Coils are clean and fins are in good condition	
29	Temporary flushing connection is installed with valves to bypass coil during flushing	
30	Coil is piped counterflow (coldest water to coldest air)	
31	Control wells are installed	

Condensate Piping		**Y/N/NA; Initials; Date**
32	Stainless steel drain pan is sloped to drain	
33	Condensate drain is full line size with union	
34	Condensate drain is installed with clean out plug at tee	
35	Open vent is installed after trap	
36	Total trap height between drain pan and condensate after trap is Total Static Pressure + 1"	
37	Total trap height between drain pan and bottom of trap is 2 * (Total Static Pressure + 1")	
38	Condensate drain is piped to nearest floor drain with air gap	

Secondary Cooling Coil		Y/N/NA; Initials; Date
39	Isolation valves are installed on supply and return piping for service	
40	Piping is properly supported and not supported by the coil	
41	Flanges/Unions are provided at coil connections for access	
42	Access is provided for coil pull without obstructions	
43	Clearances have been maintained and piping is installed for service	
44	Coil drain with valve is installed at low point of coil	
45	Manual air vent is installed at high point in coil	
46	Line size dirt leg with shutoff valve is installed in supply and return piping	
47	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
48	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
49	Control valve is installed in the return piping	
50	Common glycerin filled pressure gauge is installed across coil with shutoff valve installed on each line	
51	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
52	Temperature sensor is installed in return piping	
53	Coils are clean and fins are in good condition	
54	Temporary flushing connection is installed with valves to bypass coil during flushing	
55	Coil is piped counterflow (coldest water to coldest air)	
56	Control wells are installed	

Heating Hot Water Coil		Y/N/NA; Initials; Date
57	Isolation valves are installed on supply and return piping for service	
58	Flanges/Unions are provided at coil connections for access	
59	Access is provided for coil pull without obstructions	
60	Piping is properly supported and not supported by the coil	
61	Coil drain with valve is installed at low point of coil	
62	Manual air vent is installed at high point in coil	
63	Line size dirt leg with shutoff valve is installed in supply and return piping	
64	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
65	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
66	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
67	Control valve is installed in the return piping	
68	Isolation valves are installed across recirculation pump	
69	Check valve is installed on discharge of recirculation pump	
70	Glycerin filled pressure gauges are installed across recirculation pump	
71	Recirculation pump is installed with differential pressure switch across pump to indicate status to BAS	

Steam Pre-Heat Coil		Y/N/NA; Initials; Date
72	Isolation valve is installed on supply piping for service	
73	Flanges/Unions are provided at coil connections for access	
74	Access is provided for coil pull without obstructions	
75	Piping is properly supported and not supported by the coil	
76	Dirt leg is installed with condensate trap on steam piping to coil	
77	Control valve is installed not to allow the buildup of condensate and is accessible	
78	Parallel traps are installed	
79	Condensate trap is installed with shutoff valves and unions for service	
80	Condensate piping slopes down from coil and does not lift	
81	Vacuum breaker is installed in coil	

Humidifier		Y/N/NA; Initials; Date
82	Isolation valve is installed on supply piping for service	
83	Flanges/Unions are provided at coil connections for access	
84	Access is provided for tube removal without obstructions	
85	Piping is properly supported and not supported by the humidifier	
86	Control valve is installed not to allow the buildup of condensate and is accessible	
87	Humidifier is located a minimum 15 feet upstream of final filters or downstream of final filters and smoke detectors	
88	Viewable window and light is provided to observe operation	
89	Controlling high limit humidity sensor is installed downstream of humidifier	
90	High limit humidity switch is installed adjacent to the controlling high limit humidity sensor	
91	Condensate trap is installed with shutoff valves and unions for service	
92	Condensate piping slopes down from coil and does not lift	

Supply Fan		Y/N/NA; Initials; Date
93	Fan is installed on 2" static deflection spring isolators and not bottomed out	
94	Torque springs are properly installed on fan	
95	Shipping bolts have been removed from spring isolators	
96	Piezometer ring properly installed for air flow measuring station with proper transducer	
97	Fan guard is properly installed	
98	High static pressure safety switch is installed in proper location and manual reset is accessible	
99	Flexible connection is provided at fan and duct connections	
100	Starter/VFD is installed and permanently labeled	
101	Bearings lubricated on fans and shaft. Grease Zerks are readily accessible	

Return Fan		Y/N/NA; Initials; Date
102	Fan is installed on 2" static deflection spring isolators and not bottomed out	
103	Torque springs are properly installed on fan	
104	Shipping bolts have been removed from spring isolators	
105	Piezometer ring properly installed for air flow measuring station with proper transducer	
106	Fan guard is properly installed	
107	High static pressure safety switch is installed in proper location and manual reset is accessible	
108	Flexible connection is provided at fan and duct connections	
109	Starter/VFD is installed and permanently labeled	
110	Bearings lubricated on fans and shaft. Grease Zerks are readily accessible	

Filter Sections		Y/N/NA; Initials; Date
111	Filter racks are front loading	
112	Manometers are installed and have clean and dirty markings on gauge	
113	Pre and final filters are installed prior to equipment startup	

[Insert Your Logo Here] [Vendor Logo Here]

Air Handling Unit Pre-Functional Checklist

Electrical / Controls		Y / N / NA; Initials; Date
114	Power is connected to unit	
115	Control and electrical panel clearances are provided and piping is not installed above panels	
116	Return temperature sensor is installed in return ductwork	
117	Return humidity sensor is installed in return ductwork	
118	Mixed Air temperature sensor is installed 1 linear foot for each square foot of coil area	
119	Freezestat sensors are installed 1 linear foot for each square foot of coil area	
120	Adequate space between coil and temperature sensor is allowed for coil cleaning without removing capillary tube	
121	Pre-Heat coil temperature sensor is installed downstream of pre-heat coil	
122	Duct static pressure sensor is installed in proper location	
123	Discharge air temperature sensor is installed downstream of coils	
124	Air Flow Measuring Station display is in accessible location	
125	All dampers and actuators are installed per construction documents	
126	Filter switch is installed across pre and final filter bank	
127	Controls wiring and sensors are installed and complete	

Insulation & Labeling		Y / N / NA; Initials; Date
128	Piping insulation is complete and undamaged	
129	Duct insulation is complete and undamaged	
130	Condensate drain line insulation is complete and undamaged	
131	Engraved label for unit is installed and clearly visible	
132	Piping is painted and labeled with contents and flow direction	
133	Valves are tagged with permanent engraved labels	

Start-Up		Y / N / NA; Initials; Date
134	Flushing of piping is complete and flushing connection lines are removed, capped, and valve handles removed prior to start-up	
135	Unit and all ductwork are protected prior to being used for temporary conditioning of space	
136	Factory representative start-up completed and documents provided	

Notes		Date
1		
2		
3		
4		
5		
6		
7		

Approvals

Mechanical Contractor / Signature **Company:**

General Contractor / Signature **Company:**

[Insert Your Logo Here] [Vendor Logo Here]

AIR TERMINAL UNIT PRE-FUNCTIONAL CHECKLIST

Facility Name:		**Date:**	
Project Name:			
Served by AHU #:			
VAV #:			

General		**Y/N/NA; Initials; Date**
1	Box is hung from structure with 4 support wires supplied by manufacturer.	
2	Transition to box inlet allows for minimum 2 duct diameters of straight, hard duct entering box, no flex allowed.	
3	Duct run out matches duct size on drawings.	
4	Duct run out from main line greater than 15 feet is 1 size larger than inlet of VAV.	
5	Piping package is installed and accessible with isolation valves and union for service.	
6	Hot water return and air bleed are installed at top of coil.	
7	Hot water piping is not installed above air bleed valve.	
8	Piping is properly supported within 3 feet of box.	
9	Power is connected to unit.	
10	Required access is provided for control box for service.	
11	Discharge air temperature sensor is installed downstream of unit.	
12	Controls wiring and sensors are installed and complete.	
13	Piping insulation is complete and undamaged.	
14	Duct insulation is complete and undamaged.	
15	Units concealed above lay-in ceilings are marked by a marker clipped to the grid.	
16	Unit is labeled.	

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Blower Coil Unit Pre-Functional Checklist

Facility Name:		**Date:**	
Project Name:			
FCU #:			

1	**Manufacturer:**	
2	**Model #:**	

	General	**Y/N/NA; Initials; Date**
3	Unit is properly mounted with spring isolators	
4	Unit is installed with access for service of fan and electrical panel	
5	Filter access is provided for maintenance	
13	Unit is clean	

	Chilled Water Coil	**Y/N/NA; Initials; Date**
14	Isolation valves are installed on supply and return piping for service	
15	Piping is properly supported and not supported by the coil	
16	Unions are provided at coil connections for access	
18	Clearances have been maintained and piping is installed for service	
19	Coil drain with valve is installed at low point of coil	
20	Manual air vent is installed at high point in coil	
22	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
23	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
24	Control valve is installed in the return piping	
27	Temperature sensor is installed in return piping	
29	Temporary flushing connection is installed with valves to bypass coil during flushing	
30	Coil is piped counterflow (coldest water to coldest air)	
31	Control wells are installed	

	Condensate Piping	**Y/N/NA; Initials; Date**
33	Condensate drain is full line size with union	
34	Condensate drain is installed with clean out plug at tee	
35	Open vent is installed after trap	

	Heating Hot Water Coil	**Y/N/NA; Initials; Date**
57	Isolation valves are installed on supply and return piping for service	
58	Unions are provided at coil connections for access	
60	Piping is properly supported and not supported by the coil	
61	Coil drain with valve is installed at low point of coil	
62	Manual air vent is installed at high point in coil	
64	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
66	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
67	Control valve is installed in the return piping	

	Electrical/Controls	**Y/N/NA; Initials; Date**
114	Power is connected to unit	
127	Controls wiring and sensors are installed and complete	

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Blower Coil Unit Pre-Functional Checklist

Insulation & Labeling		Y/N/NA; Initials; Date
128	Piping insulation is complete and undamaged	
129	Duct insulation is complete and undamaged	
130	Condensate drain line insulation is complete and undamaged	
131	Engraved label for unit is installed and clearly visible	
132	Piping is painted and labeled with contents and flow direction	
133	Valves are tagged with permanent engraved labels	

Start-Up		Y/N/NA; Initials; Date
134	Flushing of piping is complete and flushing connection lines are removed, capped, and valve handles removed prior to start-up	
135	Unit and all ductwork are protected prior to being used for temporary conditioning of space	
136	Start-up is complete and documents provided	

Notes		Date
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General Exhaust Fan Pre-Functional Checklist

Facility Name:		**Date:**	
Project Name:			
EF #:			

1	**Manufacturer:**	
2	**Model #:**	

General		**Y/N/NA; Initials; Date**
3	Unit is securely mounted on roof curb	
4	Access is provided to service the fan	
5	Birdscreen is installed	
6	Fan is installed to avoid re-entrainment of exhaust air back into facility	
7	Unit is permanently labeled	
8	Unit is clean	

Electrical/Controls		**Y/N/NA; Initials; Date**
9	Power is connected to unit	
10	Disconnect is installed and located within sight of fan	
11	Controls wiring and sensors are installed and complete	

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Isolation Room Exhaust Fan Pre-Functional Checklist

Facility Name:		**Date:**	
Project Name:			
EF #:			

1	**Manufacturer:**	
2	**Model #:**	

General		**Y/N/NA; Initials; Date**
3	Unit is installed on channel iron supports a minimum of 18" above roof	
4	Access is provided to service the fan	
5	Fan is installed on spring isolators	
6	Weatherproof motor and drive housing is provided for unit	
	Exterior mounted zerk fittings	
7	Duct is connected to fan with flexible connections	
8	Inlet duct to fan provided with minimum 4 fan wheel diameters	
9	3/4" drain is installed in bottom of fan scroll and piped to nearest roof drain with 9" trap	
10	Fan discharge is installed 10 feet above finished roof	
11	1/4" hardware screen is installed at flue outlet	
12	12"x12" weatherproof warning sign is white with red lettering and is installed 5 feet above roof mounted on each side of duct or fan housing	
13	Flue is supported with 3 guy wires equally spaced bolted to roof	
14	Duct penetration through roof is installed with 18" curb and counter flashing	
15	Fan is installed to avoid re-entrainment of exhaust air back into facility	
16	Unit is permanently labeled	
17	Unit is clean	

Electrical/Controls		**Y/N/NA; Initials; Date**
18	Power is connected to unit	
19	Disconnect is installed and located within sight of fan	
20	Controls wiring and sensors are installed and complete	

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Piping and Ductwork Pre-Functional Checklist

Facility Name:		**Date:**	
Project Name:			

1	**Manufacturer:**	
2	**Model #:**	

Chilled Water Piping		**Y/N/NA; Initials; Date**
	Piping in mechanical rooms are painted and labeled identifying contents and flow direction	
	Piping is labeled in 20 foot intervals and at least once in each separate space	
	Pipe is supported properly per the contract documents	
	Sleeves are installed on piping passing through masonry walls and floors	
	Air separator and expansion tank are installed and piped	
	Expansion tank has been properly charged	
	Air vents are provided at high points throughout the system	
	Drain valves are provided at low points throughout the system	
	Shutoff valves are installed at main branches on each floor or major wings or sections	
	CHW piping is insulated with closed-cell type and undamaged	
	System has been cleaned and flushed	

Heating Hot Water Piping		**Y/N/NA; Initials; Date**
	Piping in mechanical rooms are painted and labeled identifying contents and flow direction	
	Piping is labeled in 20 foot intervals and at least once in each separate space	
	Pipe is supported properly per the contract documents	
	Sleeves are installed on piping passing through masonry walls and floors	
	Air separator and expansion tank are installed and piped	
	Expansion tank has been properly charged	
	Air vents are provided at high points throughout the system	
	Drain valves are provided at low points throughout the system	
	Shutoff valves are installed at main branches on each floor or major wings or sections	
	HW piping is insulated with molded fiberglass and undamaged	
	Piping 2" and larger are supported with high density insulation inserts and not wood blocks	
	System has been cleaned and flushed	

Steam Piping		**Y/N/NA; Initials; Date**
	Piping in mechanical rooms are painted and labeled identifying contents, flow direction, and working pressure	
	Piping is labeled in 20 foot intervals and at least once in each separate space	
	Pipe is supported properly per the contract documents	
	Sleeves are installed on piping passing through masonry walls and floors	
	Shutoff valves are installed at main branches on each floor or major wings or sections	
	Steam piping is insulated with molded fiberglass and undamaged	
	Piping 2" and larger are supported with high density insulation inserts and not wood blocks	

Condensate Piping		**Y/N/NA; Initials; Date**
	Piping in mechanical rooms are painted and labeled identifying contents and flow direction	
	Piping is labeled in 20 foot intervals and at least once in each separate space	
	Pipe is supported properly per the contract documents	
	Sleeves are installed on piping passing through masonry walls and floors	
	Condensate piping is insulated with molded fiberglass and undamaged	
	Piping 2" and larger are supported with high density insulation inserts and not wood blocks	

Ductwork		**Y/N/NA; Initials; Date**
	Duct is properly supported per the contract documents	
	Mechanical room duct floor penetrations and plenum floor penetrations are installed with 2" curb	
	Duct insulation is complete and undamaged	

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Piping and Ductwork Pre-Functional Checklist

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Rooftop Unit Pre-Functional Checklist

	Facility Name:		**Date:**
	Project Name:		
	RTU #:		

1	**Manufacturer:**	
2	**Model #:**	

General		**Y/N/NA; Initials; Date**
3	Unit is installed on spring vibration isolation roof curb	
5	Access doors open freely and seal tightly	
6	Lights are provided and controlled off timer switch	
7	Viewable windows are provided in access doors at filters, fans, and humidifier sections	
8	Outside air intake is minimum 36" above roof	
	Outside air intake is minimum 25 feet from sanitary vent or exhaust	
	Lightning protection installed and terminated	
9	Dampers are low leakage and installed with rubber gasket	
10	Duct smoke detectors are installed in supply and return ductwork with required access doors	
	All pipe penetrations through roof are sealed	
11	Fire/Smoke dampers are installed with access doors where specified	
12	Unit is clean	

Chilled Water Coil		**Y/N/NA; Initials; Date**
	Piping valves and accessories are installed at unit	
13	Isolation valves are installed on supply and return piping for service	
14	Piping is properly supported and not supported by the coil	
15	Flanges/Unions are provided at coil connections for access	
16	Access is provided for coil pull without obstructions	
17	Clearances have been maintained and piping is installed for service	
18	Coil drain with valve is installed at low point of coil	
19	Manual air vent is installed at high point in coil	
21	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
22	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
23	Control valve is installed in the return piping	
24	Common glycerin filled pressure gauge is installed across coil with shutoff valve installed on each line	
25	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
26	Temperature sensor is installed in return piping	
27	Coils are clean and fins are in good condition	
28	Temporary flushing connection is installed with valves to bypass coil during flushing	
29	Coil is piped counterflow (coldest water to coldest air)	
30	Control wells are installed	

Condensate Piping		**Y/N/NA; Initials; Date**
31	Stainless steel drain pan is sloped to drain	
32	Condensate drain is full line size with union	
33	Condensate drain is installed with clean out plug at tee	
34	Open vent is installed after trap	
35	Total trap height between drain pan and condensate after trap is Total Static Pressure + 1"	
36	Total trap height between drain pan and bottom of trap is 2 * (Total Static Pressure + 1")	
37	Condensate drain is piped to nearest roof drain with air gap	

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Rooftop Unit Pre-Functional Checklist

Secondary Cooling Coil		Y/N/NA; Initials; Date
	Piping valves and accessories are installed at unit	
38	Isolation valves are installed on supply and return piping for service	
39	Piping is properly supported and not supported by the coil	
40	Flanges/Unions are provided at coil connections for access	
41	Access is provided for coil pull without obstructions	
42	Clearances have been maintained and piping is installed for service	
43	Coil drain with valve is installed at low point of coil	
44	Manual air vent is installed at high point in coil	
46	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
47	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
48	Control valve is installed in the return piping	
49	Common glycerin filled pressure gauge is installed across coil with shutoff valve installed on each line	
50	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
51	Temperature sensor is installed in return piping	
52	Coils are clean and fins are in good condition	
53	Temporary flushing connection is installed with valves to bypass coil during flushing	
54	Coil is piped counterflow (coldest water to coldest air)	
55	Control wells are installed	

Heating Hot Water Coil		Y/N/NA; Initials; Date
	Piping valves and accessories are installed at unit	
56	Isolation valves are installed on supply and return piping for service	
57	Flanges/Unions are provided at coil connections for access	
58	Access is provided for coil pull without obstructions	
59	Piping is properly supported and not supported by the coil	
60	Coil drain with valve is installed at low point of coil	
61	Manual air vent is installed at high point in coil	
63	PT Ports are installed on supply and return piping directly at coil connection and at all temperature sensors	
64	Weiss solar digital thermometers are installed in common supply and return piping to/from coils and viewable from floor	
65	Balancing valve is installed in return piping with recommended straight length upstream and downstream of valve	
66	Control valve is installed in the return piping	
67	Isolation valves are installed across recirculation pump	
68	Check valve is installed on discharge of recirculation pump	
69	Glycerin filled pressure gauges are installed across recirculation pump	
70	Recirculation pump is installed with differential pressure switch across pump to indicate status to BAS	

Steam Pre-Heat Coil		Y/N/NA; Initials; Date
71	Isolation valve is installed on supply piping for service	
72	Flanges/Unions are provided at coil connections for access	
73	Access is provided for coil pull without obstructions	
74	Piping is properly supported and not supported by the coil	
75	Dirt leg is installed with condensate trap on steam piping to coil	
76	Control valve is installed not to allow the buildup of condensate and is accessible	
77	Condensate trap is installed with shutoff valves and unions for service	
78	Condensate piping slopes down from coil and does not lift	
79	Vacuum breaker is installed in coil	

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Rooftop Unit Pre-Functional Checklist

Humidifier		Y/N/NA; Initials; Date
80	Isolation valve is installed on supply piping for service	
81	Flanges/Unions are provided at coil connections for access	
82	Access is provided for tube removal without obstructions	
83	Piping is properly supported and not supported by the humidifier	
84	Control valve is installed not to allow the buildup of condensate and is accessible	
85	Humidifier is located a minimum 15 feet upstream of final filters or downstream of final filters and smoke detectors	
86	Viewable window and light is provided to observe operation	
87	Controlling high limit humidity sensor is installed downstream of humidifier	
88	High limit humidity switch is installed adjacent to the controlling high limit humidity sensor	
89	Condensate trap is installed with shutoff valves and unions for service	
90	Condensate piping slopes down from coil and does not lift	

Supply Fan		Y/N/NA; Initials; Date
	Fan is installed on 2" static deflection spring isolators and not bottomed out	
	Torque springs are properly installed on fan	
	Shipping bolts have been removed from spring isolators	
	Piezometer ring properly installed for air flow measuring station with proper transducer	
	Fan guard is properly installed	
	High static pressure safety switch is installed in proper location and manual reset is accessible	
	Flexible connection is provided at fan and duct connections	
	Starter/VFD is installed and permanently labeled	
	Bearings lubricated on fans and shaft. Grease Zerks are readily accessible	

Return Fan		Y/N/NA; Initials; Date
	Fan is installed on 2" static deflection spring isolators and not bottomed out	
	Torque springs are properly installed on fan	
	Shipping bolts have been removed from spring isolators	
	Piezometer ring properly installed for air flow measuring station with proper transducer	
	Fan guard is properly installed	
	High static pressure safety switch is installed in proper location and manual reset is accessible	
	Flexible connection is provided at fan and duct connections	
	Starter/VFD is installed and permanently labeled	
	Bearings lubricated on fans and shaft. Grease Zerks are readily accessible	

Filter Sections		Y/N/NA; Initials; Date
	Filter racks are front loading	
	Manometers are installed and have clean and dirty markings on gauge	
	Pre and final filters are installed prior to equipment startup	

Electrical/Controls		Y/N/NA; Initials; Date
	Power is connected to unit	
	Control and electrical panel clearances are provided	
	Return temperature sensor is installed in return ductwork	
	Return humidity sensor is installed in return ductwork	
	Mixed Air temperature sensor is installed 1 linear foot for each square foot of coil area	
	Freezestat sensors are installed 1 linear foot for each square foot of coil area	
	Adequate space between coil and temperature sensor is allowed for coil cleaning without removing capillary tube	
	Pre-Heat coil temperature sensor is installed downstream of pre-heat coil	
	Duct static pressure sensor is installed in proper location	
	Discharge air temperature sensor is installed downstream of coils	
	Air Flow Measuring Station display is in accessible location	
	All dampers and actuators are installed per construction documents	
	Filter switch is installed across pre and final filter bank	
	Controls wiring and sensors are installed and complete	

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Rooftop Unit Pre-Functional Checklist

Insulation & Labeling		Y/N/NA; Initials; Date
	Piping insulation is complete and undamaged	
	Duct insulation is complete and undamaged	
	Outdoor piping is insulated and heat traced	
	Engraved label for unit is installed and clearly visible	
	Piping is labeled with contents and flow direction	
	Valves are tagged with permanent engraved labels	

Start-Up		Y/N/NA; Initials; Date
	Flushing of piping is complete and flushing connection lines are removed, capped, and valve handles removed prior to start-up	
	Unit and all ductwork are protected prior to being used for temporary conditioning of space	
	Factory representative start-up completed and documents provided	

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Air Handling Unit Functional Performance Test

Reference		Date		AHU #	

Unit Configuration and Basic Design Information

Instructions:
- Answer Yes or No for each component that is present for this unit.
- Use Plan CFMs and VAV Totals for the following information.

Component	Y	N	Plan CFMs/VAV Totals	
Economizer Package			Unit Design CFM when all VAV terminals are at full cooling.	
Air Blender				
Return Fan			Unit Design CFM when all VAV terminals are at minimum.	
Pre-Heat Coil				
Humidifier			Design Outside Air CFM.	
CHW Coil				
Glycol Coil				
Supply Fan				

Notes:

1 Start of Test Readings

Instructions: BAS contractor to record the following controls system point readings to document status of unit at the beginning of test.

Sensor/Input Readings			Actuator/Output Positions		
Outside Air Temperature		° F	Minimum OA Damper Position		%
Outside Air Humidity		%RH	Economizer OA Damper Position		%
Return Air Temperature		° F	Return Air Damper Position		%
Return Air Humidity Setpoint		%RH	Relief Air Damper Position		%
Return Air Humidity		%RH	Pre-heat Valve Position		%
Mixed Air Temperature		° F	Humidifier Valve Position		%
Preheat Discharge Air Temperature Setpoint		° F	Chilled Water Valve Position		%
Preheat Discharge Air Temperature		° F	Supply Fan Speed		%
Discharge Air Temperature Setpoint		° F	Return Fan Speed	10	%
Discharge Air Temperature		° F	**Sensor/Input Readings Continued**		
Duct Static Pressure Setpoint		In.W.G.	Plant CHW Supply Temp		° F
Duct Static Pressure		In.W.G.	Plant HW Supply Temp		° F
Supply CFM		CFM			
Return CFM		CFM			
Outside Air CFM Setpoint		CFM			
Outside Air CFM Actual		CFM			

Notes:

2 Control Valve Test

2a. Chilled Water Valve (s)

Verify Chilled water system is operating and under control. ____ Y/N

Test Procedure: Command CHW Valve closed (0%)

Using Micro manometer, Measure Coil Water differential pressure. ____ In. W.G.

CHW Valve is closed with no water flow. ____ Y/N

Test Procedure: Command CHW Valve open to 5%

Using Micro manometer, Measure Coil Water differential pressure. ____ In. W.G.

Does coil ΔP indicate coil flow is present? ____ Y/N

Test Procedure: If no, Command CHW Valve open in 2% increments until water flow

Using Micro manometer, Measure Coil Water differential pressure. ____ In. W.G.

Record BAS command when water flow starts. ____ %

Value less than 15%? ____ Y/N

Test Procedure: Command CHW Valve to 90%

		Verify valve motion to 90%.	Y/N
	Test Procedure: Command CHW Valve to 100% open		
		Verify valve fully opens.	Y/N
	Notes:		

2b.	**Hot Water Valve**		
		Verify hot water system is operating and under control.	Y/N
	Test Procedure: Command HW Valve closed (0%)		
		Using Micro manometer, Measure Coil Water differential pressure	In. W.G.
		HW Valve is closed with no water flow.	Y/N
	Test Procedure: Command HW Valve open to 5%		
		Using Micro manometer, Measure Coil Water differential pressure	In. W.G.
		Does coil ΔP indicate coil flow is present?	Y/N
	Test Procedures: If no, Command HW Valve open in 2% increments until water flow		
		Using Micro manometer, Measure Coil Water differential pressure	In. W.G.
		Record BAS command when water flow starts.	%
		Is value less than 15%?	Y/N
	Test Procedure: Command HW Valve to 90% & verify valve motion		
		Verify valve motion to 90%.	Y/N
	Test Procedure: Command HW Valve to 100% open & verify valve fully open		
		Verify valve fully opens.	Y/N
	Notes:		

2c.	**Recirculation Pump**		
	Test Procedure: Simulate OAT to 40°F		
		Recirculation pump energizes.	Y/N
		BAS pump status shows on.	Y/N
		Measure Preheat Coil ΔP	In W.G.
	Test Procedure: Simulate OAT > 42°F		
		Recirculation pump stops.	Y/N
		BAS pump status shows off.	Y/N
	Notes:		

2d.	**Humidifier Valve**		
		Verify Steam system is operating and under control.	Y/N
		Record Steam Pressure	PSI
	Test Procedure: Command valve closed (0%)		
		Verify valve closed.	Y/N
	Test Procedure: Command valve 5% open		
		Verify stem starts to open.	Y/N
	Test Procedures: If No, open valve in 2% increments		
		Record when valve starts to move.	%
		Value was less than 15%?	Y/N
	Test Procedure: Command valve to 90% open		
		Verify valve opens.	Y/N
	Test Procedure: Command valve to 100% open		
		Verify valve opens 100%.	Y/N
		Release all valve overrides.	Y/N
	Notes:		

3	**Damper Binding Test**		
	Test Procedure: Command VAV terminals served by this AHU to 100% design cooling CFM		
3a.	**Minimum Outside Air Damper**		
	Test Procedure: Command minimum OA damper closed		
	Verify damper closed tightly.		Y/N
	Test Procedure: Command minimum OA damper open		
	Verify actuator and blades of damper open fully.		Y/N
	Notes:		
3b.	**Economizer Dampers**		
	Test Procedure: Command economizer OA damper to 50% open		
	Verify actuator and blades of ***OA damper*** are approximately 50% open.		Y/N
	Verify actuator and blades of ***relief damper*** are approximately 50% open.		Y/N
	Verify actuator and blades of ***return damper*** are approximately 50% open.		Y/N
	Test Procedure: Command economizer OA damper to 90% open		
	Verify actuator and blades of ***OA damper*** are approximately 90% open.		Y/N
	Verify actuator and blades of ***relief damper*** are approximately 90% open.		Y/N
	Verify actuator and blades of ***return damper*** is approximately 90% closed.		Y/N
	Test Procedure: Command economizer OA damper to 100% open		
	Verify actuator and blades of ***OA damper*** are 100% open.		Y/N
	Verify actuator and blades of ***relief damper*** are 100% open.		Y/N
	Verify actuator and blades of ***return damper*** are 100% closed and closed tightly.		Y/N
	Release all damper overrides.		Y/N
	Notes:		

4	**Static Pressure Controller**		
4a.	**Record location of static pressure sensor:**		
	Is pressure being sensed in area being served by the AHU?		Y/N
4b.	**Record TAB recommended set point necessary to satisfy worse case air terminal.**		In. W.G.
	List in notes below box(es) that determine set point.		
4c.	**Test Procedure: Set static SP to recommended value. Command VAVs to Design Full Cooling CFM.**		
	Verify calibration of sensor by comparison to TAB contractors test instrument measuring pressure between same locations as sensor.		Y/N
	Record **BAS** static pressure reading.		In. W.G.
	Record **TAB** static pressure reading.		In. W.G.
	Readings are within specified tolerance.		Y/N
4d.	**Test Procedure: Adjust setpoint down 0.4" below current setpoint.**		
	Verify supply fan modulates down to meet new SP.		Y/N
	Record New Set Point.		In. W.G.
	Set static SP to TAB recommended value .		Y/N
	Notes:		

5	**AFMS - Fan Inlet Probes Type**		
5a.	**Fan Information**		
	Supply Fan Information		
	Supply Fan: Record fan inlet cone area.		ft^2
	Supply Fan: Record less fan shaft where applicable.		ft^2
	Supply Fan: Record flow area.		ft^2
	Return Fan Information		
	Return Fan: Record fan inlet cone area.		ft^2
	Return Fan: Record less fan shaft where applicable.		ft^2
	Return Fan: Record flow area.		ft^2
5b.	**Verify Pargon transmitter air temperature settings**		
	Verify Paragon transmitter air temperature setting for return air is 73°F.		Y/N

	Verify Paragon transmitter air temperature setting for supply air is 55°F.		Y/N
5c.	**Test Procedure: Command VAV terminals served by this AHU to 100% design cooling CFM. Manually control speed of supply fan until its AFMS reads approximately design CFM. Traverse supply and return ducts.**		
	Record supply fan BAS reading.		CFM
	Record supply fan traverse reading.		CFM
	Record return fan BAS reading.		CFM
	Record return fan traverse reading.		CFM
	Record the total air terminals supply air CFM from BAS.		CFM
	Notes:		

6	**Sensor Calibration**		
6a.	**Test Procedure: Close minimum OA, economizer OA, and relief dampers and open return damper 100%. Shut off pre-heat, CHW, and humidifier valves. Set OA CFM SP to 0 CFM. Command VAV boxes to full design CFM.**		
6b.	**Test Procedure: Slowly ramp up supply fan speed until return fan is almost unable to maintain a steady 0 CFM SP.**		
	Verify no air is leaking through the closed OA & relief dampers.		Y/N
6c.	**Test Procedure: Compare sensor readings against TAB contractor test instrument measuring temperature or humidity at same location as sensor (Tolerance - +/- 0.5°F & +/- 5% RH)**	**BAS Readings**	**TAB Reading**
	Return Air Temperature	°F	°F
	Sensor within tolerance?		Y/N
	Mixed Air Temperature	°F	°F
	Sensor within tolerance?		Y/N
	Pre-Heat Air Temperature	°F	°F
	Sensor within tolerance?		Y/N
	Discharge Air Temperature	°F	°F
	Sensor within tolerance?		Y/N
	Return Air Humidity	°F	°F
	Sensor within tolerance?		Y/N
	Supply Air High Limit Humidity	°F	°F
	Sensor within tolerance?		Y/N
	Outside Air Temperature	°F	°F
	Sensor within tolerance?		Y/N
	Outside Air Humidity	% RH	% RH
	Sensor within tolerance?		Y/N
	Notes:		

7	**SF and RF Airflow Measuring Device Synchronization and Calibration**		
7a.	**Test Procedure: With unit still in zero outside air mode (as above) and VAV boxes in full cooling, Command RF speed until micrometer readings of the mixed air plenum pressure stay within +/- 0.009" w.c. range.**		
	Record BAS box total.		CFM
	Record BAS supply fan CFM.		CFM
	Record BAS return fan CFM.		CFM
	Record Supply Fan CFM - Return Fan CFM (difference).		CFM
	Is difference greater than 5% of total airflow?		Y/N
7b.	**If yes, recalibrate one AFMS to equal other AFMS. Use AFMS that more closely matches box total as standard or more accurate traverse.**		
	After calibration: Record supply fan CFM.		CFM
	After calibration: Record return fan CFM.		CFM
	Record Supply Fan CFM - Return Fan CFM (Difference).		CFM
	Record which AFMS was recalibrated.		SF/RF
	Record Supply AFMS calibration factor.		
	Record Return AFMS calibration factor.		
7c.	**Return AHU to normal operation and release all overrides.**		
Notes:			

8	**Return Fan Minimum Outside Air CFM**		
8a.	**Test Procedure: Command unit to Minimum OA Mode and VAV boxes to Design Full Cooling CFM.**		
	Supply fan modulates to maintain duct static pressure SP.		Y/N
	Return fan modulates to maintain CFM offset SP.		
	Set OA CFM offset to correct SP and record SP.		CFM
	Return fan modulates to maintain CFM offset SP.		Y/N
	Record supply duct static pressure reading.		in. W.G.
	Record supply fan speed and hertz.		%/Hz
	Record supply CFM per AFMS.		CFM
	Record return fan speed and hertz.		%/Hz
	Record return CFM per AFMS.		CFM
	Record Outside Air CFM (SF-RF).		CFM
8b.	**Test Procedure: Command AHU to 100% economizer mode.**		
	Return fan modulates to maintain CFM offset SP.		Y/N
	Record supply duct static pressure reading.		In. W.G.
	Record supply fan speed and hertz.		%/Hz
	Record supply CFM per AFMS.		CFM
	Record Outside Air CFM (SF-RF).		CFM
8c.	**Test Procedure: Command all VAV boxes served by this AHU to minimum CFM setting.**		
	Return fan modulates to maintain CFM offset SP.		Y/N
	Record supply duct static pressure reading.		In. W.G.
	Record supply fan speed and hertz.		%/Hz
	Record supply CFM per AFMS.		CFM
	Record return fan speed and hertz.		%/Hz
	Record return CFM per AFMS.		CFM
	Record Outside Air CFM (SF-RF).		CFM
8d.	**Test Procedure: Command AHU to minimum OA Mode at minimum CFM.**		
	Return fan modulates to maintain CFM offset SP.		Y/N
	Record supply duct static pressure reading.		In. W.G.
	Record supply fan speed and hertz.		%/Hz
	Record supply CFM per AFMS.		CFM
	Record return fan speed and hertz.		%/Hz
	Record return CFM per AFMS.		CFM
	Record Outside Air CFM (SF-RF).		CFM
8e.	**Test Procedure: Turn off supply and return fan.**		
	Supply fan CFM < 50 CFM		Y/N
	Return fan CFM < 50 CFM		Y/N
8f.	**Return AHU to normal operation and release all overrides.**		
Notes:			

9	**Manual Reset Freeze Stat / Low Temp Detection**		
9a.	**Verify Freezestat is set at 36°F.**		Y/N
9b.	**Test Procedure: Use ice bag to activate low temperature/freezestat.**		
	Verify supply fan shuts down.		Y/N
	Verify return fan shuts down.		Y/N
	Verify associated exhaust fans shut down.		Y/N
	Verify low temperature alarm is initiated at BAS.		Y/N
	Verify economizer OA damper is closed.		Y/N
	Verify minimum OA damper is closed.		Y/N
	Verify relief OA damper is closed.		Y/N
	Verify return OA damper is open.		Y/N
	Verify CHW valve opens.		Y/N
	Verify pre-heat recirculation pump energizes.		Y/N
	Verify secondary CHW pump is energized at plant.		Y/N
9c.	**Test Procedure: If Pre-heat coil; Simulate pre-heat leaving air temperature to 41°F and outside air temperature to 40°F.**		

	Verify pre-heat valve opens.		Y/N
	Verify pre-heat recirculation pump energizes.		Y/N
9d.	**Return AHU to normal operation and release all overrides.**		
Notes:			

10	**High Static Safety Switch and Dirty Final Filter Alarm**		
10a.	**Record high static safety switch setting approved by Design Consultant.**		in. W.G.
10b.	**Test Procedure: With fan running, trip high static safety switch with squeeze bulb and magnahelic gauge. Adjust setting as required to trip at recorded setting above.**		
	Record high static safety switch setting after adjustment.		In. W.G
	Verify AHU supply fan, return fan, and associated Efs shut down.		Y/N
	Verify AHU economizer, minimum OA, and relief dampers modulate closed.		Y/N
	Verify return damper modulates fully open.		Y/N
	Verify CHW valve and humidifier valve close.		Y/N
	Verify pre-heat valve is active to maintain pre-heat temperature setpoint.		Y/N
	Record actual switch setpoint adjacent to switch on AHU casing with black permanent marker.		Y/N
	Record dirty pressure drop setpoint for final filter (consult submittal and filter schedule).		In. W.G
10c.	**Test Procedure: With fan running, trip dirty filter switch with squeeze bulb and magnahelic gauge. Adjust setting as required to trip at recorded setting above.**		
	Record dirty pressure drop setpoint after adjustment.		In. W.G
	Verify dirty final filter alarm was generated at BAS.		Y/N
10d.	**Test Procedure: Reset dirty filter alarm.**		
	Verify alarm clears on BAS.		Y/N
	Verify dirty filter setpoint is marked on pressure gauge.		Y/N
Notes:			

11	**LOW Static Safety Switch and Dirty Pre-Filter Alarm**		
11a.	**Record low static safety switch setting approved by Design Consultant.**		in. W.G.
11b.	**Test Procedure: With fan running, trip low static safety switch with squeeze bulb and magnahelic gauge. Adjust setting as required to trip at recorded setting above.**		
	Record low static safety switch setting after adjustment.		In. W.G
	Verify AHU supply fan, return fan, and associated Efs shut down.		Y/N
	Verify AHU economizer, minimum OA, and relief dampers modulate closed.		Y/N
	Verify return damper modulates fully open.		Y/N
	Verify CHW valve and humidifier valve close.		Y/N
	Verify pre-heat valve is active to maintain pre-heat temperature setpoint.		Y/N
	Record actual switch setpoint adjacent to switch on AHU casing with black permanent marker.		Y/N
	Record dirty pressure drop setpoint for final filter (consult submittal and filter schedule).		In. W.G
11c.	**Test Procedure: With fan running, trip dirty filter switch with squeeze bulb and magnahelic gauge. Adjust setting as required to trip at recorded setting above.**		
	Record dirty pressure drop setpoint after adjustment.		In. W.G
	Verify dirty final filter alarm was generated at BAS.		Y/N
11d.	**Test Procedure: Reset dirty filter alarm.**		
	Verify alarm clears on BAS.		Y/N
	Verify dirty filter setpoint is marked on pressure gauge.		Y/N
Notes:			

12	**Economizer Mode Operation**	
	Caution: This portion of the functional Performance Test (FPT) need only be performed on a single AHU provided a copy of its program is copied and used for the other AHUs that use the identical sequence of operation This test should be performed when the OAT is above 58°F. If the test cannot be delayed until those conditions, utilize pre-heat coil to heat 100% OA to 58°F pre-heat coil leaving temperature.	

12a.	**Preliminary Set Up**		
	Test Procedure: Release VAV/CAV boxes to auto.		
	Test Procedure: Set DAT SP to 55°F.		
	Record actual BAS OAT.		°F
	Record MAT.		°F
	Record PHT.		°F
	Record DAT.		°F
	Record economizer dampers command.		%
	Record humidifier control valve command.		%
	Record pre-heat control valve command.		%
	Record program's time delay prior to going from State #1 to State #2 (TD 1/2).		Minute
	Record program's time delay prior to going from State #2 to State #1 (TD 2/1).		Minute
	Record program's time delay prior to going from State #2 to State #3 (TD 2/3).		Minute
	Record program's time delay prior to going from State #3 to State #2 (TD 3/2).		Minute
	Record program's time delay prior to going from State #3 to State #4 (TD 3/4).		Minute
	Record program's time delay prior to going from State #3 to State #3 (TD 4/3).		Minute
	Test Procedure: Set all above time delays to 5 minutes.		
	Record program's OAT transition temperature setpoint from State #1 to State #2 (TSP 1/2).		°F
	Record program's OAT transition temperature setpoint from State #2 to State #1 (TSP 2/1).		°F
12b.	**State #1: Mechanical Cooling**		
	Record State the AHU is currently indexed to.		#
	Test Procedure: Simulate OAT equal to TSP 1/2 + 2°F.		
	Record the simulated OAT.		°F
	If unit was in State #2, verify the TDI 2/1 times out in 5 minutes.		Y/N or N/A
	If unit was in State #3, verify unit immediately goes to State #1.		Y/N or N/A
	Verify AHU is operating in State #1.		Y/N
	Verify economizer dampers are closed.		Y/N
	Test Procedure: Wait until MAT and DAT stabilize.		
	Record MAT.		°F
	Record pre-heat coil leaving air temperature.		°F
	Record DAT.		°F
	Record DAT SP.		°F
	Record PH coil control valve command.		%
	Record CHW control valve command.		%
	Record CHW CEP supply temperature.		°F
12c.	**State #2: Full economizer w/ cooling coil**		
	Test Procedure: Simulate OAT equal to TSP 1/2 - 0.1°F.		
	Record simulated OAT.		°F
	Record initial CHW control valve command.		%
	Verify after 5 minutes, unit goes to State #2.		Y/N
	Verify Economizer dampers go from fully closed to fully open and remain open.		Y/N
	Test Procedure: Wait until MAT and DAT stabilize.		
	Record MAT.		°F
	Record pre-heat coil leaving air temperature.		°F
	Record DAT.		°F
	Record DAT SP.		°F
	Record PH Coil control valve command.		%
	Record CHW control valve command.		%
	Test Procedure: Simulate an OAT equal to TSP 2/1 + 0.1°F.		
	Record simulated OAT.		°F
	Record initial CHW control valve command.		%
	Verify after 5 minutes, unit goes to State #1.		Y/N
	Verify Economizer dampers go from fully open to fully closed.		Y/N
	Record adjusted CHW control valve command.		%

	Test Procedure: Simulate OAT equal to TSP 1/2 - 0.1°F.		
	Record simulated OAT.		°F
	Record initial CHW control valve command.		Y/N
	Verify after 5 minutes, unit goes to State #2.		Y/N
	Verify Economizer dampers go from fully closed to fully open and remain open.		Y/N
12d.	**State #3: Free Cooling**		
	Verify AHU is in State #2 and OAT of TSP 1/2 -0.1°F is simulated.		Y/N
	Record MAT.		%
	Record DAT.		°F
	Record DAT SP.		°F
	Record pre-heat leaving temperature.		°F
	Record pre-heat coil control valve command.		%
	Record CHW control valve command.		%
	Record BAS OAT.		°F
	Test Procedure: Simulate MAT of 90°F to avoid MAT Low Limit from activating.		
	Test Procedure: Reset DAT SP to 90°F.		
	Verify CHW control valve goes to 0% open and stays closed.		Y/N
	Verify unit goes to State #3 after CHW valve has been closed for 5 minutes.		Y/N
	Verify economizer OA damper command goes to 0% open.		Y/N
	Test Procedure: Adjust DAT SP to actual DAT - 5°F.		
	Verify Economizer damper command is > 0%.		Y/N
	Test Procedure: Set DAT SP to 45°F.		
	Verify economizer dampers are commanded to 100% open and remain open.		Y/N
	Verify unit goes to State #2 when economizer dampers have been at 100% for 5 minutes.		Y/N
	Test Procedure: Reset DAT SP to 90°F.		
	Verify CHW control valve goes to 0% open and stays closed.		Y/N
	Verify unit goes to State #3 after CHW valve has been closed for 5 minutes.		Y/N
	VI Economizer dampers are 0% open.		Y/N
	Record DAT.		°F
12e.	**MAT Low Limit Alarm (If no Pre-Heat Section)**		
	Test Procedure: Simulate MAT of 44°F.		
	Verify MAT low limit alarm is issued to operator.		Y/N
	Verify AHU goes immediately to MAT Low Limit with no time delay.		Y/N
	Verify CHW valve goes to 100% open and stays open.		Y/N
	Verify minimum OA damper is open.		Y/N
	Verify relief dampers are fully closed.		Y/N
	Verify return dampers are fully open.		Y/N
	Verify none of the change of State timers activated.		Y/N
	Verify facility CHW pumps receive command to start if not already in operation.		Y/N
	Test Procedure: Wait more than 5 minutes, then set DAT SP to 45°F.		
	Verify relief dampers remain fully closed.		Y/N
	Verify return dampers are fully open.		Y/N
	Verify OAT remains simulated at TSP 1/2 - 0.1°F.		E/D
	Test Procedure: Reset MAT low limit alarm at front end and wait 7 minutes.		
	Verify facility CHW pumps were not commanded off.		Y/N
	Verify MAT low limit alarm did not reset.		Y/N
	Verify AHU remained in MAT low limit alarm.		Y/N
	Test Procedure: Simulate MAT of 46°F.		
	Test Procedure: Reset MAT low limit alarm at front end.		
	Verify facility CHW pumps override on command immediately terminated.		Y/N
	Verify that 5 minutes after resetting MAT low limit alarm the AHU indexes to State #3.		Y/N
	Test Procedure: Remove all simulations and reset all set points to initial values. Proceed to Section 13.		
12f.	**State #4: Pre-Heat**		
	Verify AHU is in State #3 and OAT simulation remains at OAT of TSP 1/2 - 0.1°F.		Y/N
	Verify DAT SP remains at 90°F.		°F
	Verify economizer dampers are commanded 0% open and stay closed.		Y/N
	Verify pre-heat valve remains closed in State #3.		Y/N
	Verify unit goes to State #4 after economizer dampers are closed to 5 minutes.		Y/N
	Record pre-heat valve command.		%

	Record DAT.		°F
	Test Procedure: Reset pre-heat low limit temperature SP to 42°F.		
	Test Procedure: Set DAT SP to 45°F.		
	Verify pre-heat valve is commanded 0% open and remains closed.		Y/N
	Verify unit goes to State #3 when pre-heat valve has been closed for 5 minutes.		Y/N
	Record economizer damper's command.		%
	Record DAT.		°F
	Test Procedure: Simulate pre-heat coil leaving temperature of 40°F.		
	Verify pre-heat valve opens.		E/D
	Verify pre-heat low limit alarm is sent to BAS.		Y/N
	Test Procedure: Simulate pre-heat coil leaving temperature of 37°F.		
	Verify AHU shuts down.		Y/N
	Verify pre-heat temperature shutdown alarm is sent to BAS.		Y/N
	Test Procedure: Reset pre-heat temperature shutdown alarm at BAS.		
	Verify AHU restarts.		Y/N
12g.	**Reset to Normal**		
	Test Procedure: Return all timers set points and temperature setpoints to their initial values. Remove all analog input simulated temperatures.		
	Record MAT.		°F
	Record OAT.		°F
	Record DAT.		°F
	Record DAT SP.		°F
	Record pre-heat leaving temperature.		°F
	Record CHW control valve command.		%
	Record economizer dampers command.		%
	Record pre-heat valve command.		%
	Record operating State #.		#
Notes:			

13	**Humidifier Operation**		
13a.	Record setpoints of the space or return duct humidistat controlling the humidifier.		% RH
	Record actual space or return duct humidity.		% RH
	Verify controlling limit SP of the RH sensor located downstream of humidifier is 80% RH.		Y/N
	Verify high limit alarm SP of the RH sensor located downstream of humidifier is 95% RH.		Y/N
13b.	**Test Procedure: Override humidity SP of humidistat controlling humidifier to 90%**		
	Verify BAS commands humidifier steam valve open.		Y/N
	Verify humidifier steam valve opens and steam enters airstream.		Y/N
13c.	**Test Procedure: Override controlling limit SP to current supply RH - 10%.**		
	Record current supply humidity.		%RH
	Record new controlling limit SP (Current RH-10%).		%RH
	Verify humidifier steam valve starts to close.		Y/N
	Verify humidifier valve is controlling to new controlling limit SP.		Y/N
	Record duct humidity when steam valve position stabilizes.		%RH
	Record BAS command to steam valve when steam valve position stabilizes.		%
13d.	**Test Procedure: Reset controlling limit SP to 80% and override high limit alarm setpoint down in 5% increments.**		
	Verify high limit alarm activates.		Y/N
	Verify humidifier steam valve closes.		Y/N
	Verify humidifier is disabled.		Y/N
13e.	**Test Procedure: Manually reset humidifier alarm.**		
13f.	**Test Procedure: Reset controlling limit SP of the RH sensor located downstream of humidifier to 80% RH.**		
13g.	**Test Procedure: Reset high limit alarm SP of the RH sensor located downstream of humidifier to 95% RH.**		
13h.	**Test Procedure: Reset humidistat SP to original value.**		
	Verify humidifier is reset and under normal control.		Y/N

Notes:

14	Fire Alarm		
14a.	**Test Procedure: Initiate fire alarm signal to BAS (Can open/close fire alarm interface contact).**		
	Verify supply fan shuts down.		Y/N
	Verify return fan shuts down.		Y/N
	Verify associated exhaust fans shut down.		Y/N
	Verify FS/D's associated with AHU close after 10 second delay.		Y/N
	Verify economizer dampers close.		Y/N
14b.	**Test Procedure: Simulate OAT to 40°F.**		
	Verify pre-heat recirculation pump energizes.		Y/N
14c.	**Test Procedure: Initiate fire alarm reset signal to BAS (Can open/close fire alarm interface contact).**		
	Verify FS/D's associated with AHU open.		Y/N
	Verify after 10 second delay, supply fan starts.		Y/N
	Verify return fan starts.		Y/N
	Verify associated exhaust fans start.		Y/N

Notes:

15	Final Set Points:					
	Test Procedure: Record the following setpoints.					
	DAT SP		° F	**Duct static pressure SP**		In. W. G.
	Pre-heat recirculating pump enable SP		° F	**SF/RF CFM Differential SP**		CFM
	Pre-heat coil low limit SP		° F	**State #1 enable temperature**		° F
	Pre-heat discharge temperature SP		° F	**State #2 enable temperature**		° F
	Controlling limit/high limit humidistat SP		%			
	Notes:					

16	Final Readings					
	Test Procedure: Record the following parameters.					
	OAT		° F	**Minimum OA Damper Position**		%
	OA Humidity		%RH	**Economizer OA Damper**		%
	RAT		° F	**Return Air Damper Position**		%
	RA Humidity		%RH	**Relief Air Damper Position**		%
	MAT		° F	**Preheat Valve Position**		%
	Pre-heat discharge temperature		° F	**Humidifier Valve Position**		%
	Humidifier High Limit Reading		%RH	**Chilled Water Valve Position**		%
	DAT		° F	**SF VFD Speed**		%
	Duct Static Pressure		In.W.G.	**RF VFD Speed**		%
	Supply Fan CFM		CFM	**AHU Operating Finite State**		#
	Return CFM		CFM	**Plant CHW Supply Temperature**		° F
	Outside Air CFM		CFM	**Plant HW Supply Temperature**		° F

17	24-Hour Unit Trends					
17a.	Test Procedure: Set up trend log to record the following required points once every 1 minute preferred or a minimum of once every 3 minutes for 24 hours. Data shall be in electronic tabulated form in excel and transmitted to engineer for review. Obtain HCA data formatting template from design engineer and present data in that format in excel spreadsheet.					
	OAT		° F	Return Air Damper Position		%
	MAT		° F	Relief Air Damper Position		%
	Pre-heat discharge temperature		° F	CHW Valve Position		%
	DAT		° F	Pre-Heat Valve Position		%
	DAT SP		° F	Humidifier Valve Position		%
	RAT		° F	Supply CFM		CFM
	HHW Supply Temperature		° F	Return CFM		CFM
	CHW Supply Temperature		° F	OA CFM		CFM
	OA Humidity		%RH	Supply Fan Speed		%
	Return Air Humidity		%RH	Return Fan Speed		%
	Return Air Humidity SP		%RH	Duct Static SP		in. W.G.
	Any monitored space humidity		%RH	Duct Static		in. W.G.
	Duct sensors used for controlling limit and high limit %RH		%RH	Operating State of AHU		#
	Minimum OA Damper Position		%	Record Trend Start Date and Time		
	Economizer OA Damper		%	Record Trend End Date and Time		
Notes:						

[Insert Your Logo Here] [Vendor Logo Here]

Air Terminal Unit Heating and Cooling Test Report

Instructions:

Follow the test procedures below. Complete the forms for only boxes noted to have problems during cooling or heating tests. Retain the completed forms from every test.

HEATING MODE TEST

Initialization: Confirm with design consultant that the AHU is operating at the appropriate DAT set point and that the heating water system is operating at the correct supply water set point (usually 180°F). Run this test prior to the Cooling Mode Test. The supply and return fan shall run continuously. Doors to spaces should be closed for this test. Immediately preceding Step One below, operate for a 3 hour continuous period with the thermostat setpoint of all boxes being tested set to 72°F. This is the Initialization Period.

STEP ONE - HEATING PERFORMANCE TEST

PROCEDURE: At the end of the initialization Period above, begin trending all the BAS points listed. After 1 hour of trending, adjust thermostat set point on all the system boxes to 76°F & continue trending for an additional 4.5 hours. The dead band between heating and cooling mode shall be 1°F .

TRENDING REQUIREMENTS

Trend the points listed in this paragraph at 3 minute intervals. Present the trended data in an Excel worksheet for each terminal unit. Graph the data per the templates provided by the Design Consultant. The columns in each worksheet shall be ordered (L to R) as follows: **Date & Time** in ascending order, **Zone Temperature Set Point, Actual Zone Temperature, Terminal Unit Discharge Air Temperature, Reheat Valve Command, CFM Set Point, Actual CFM, Damper Commanded Position**. Also trend the **AHU DAT, AHU CHW valve % open, Plant CHW & HHW Supply Temperatures and OAT**. The 5.5 hour terminal trend data for the Heating Mode Test is to be shaded red. The blank entries below in this form need only to be completed for the terminal boxes that do not satisfy the three test conditions listed below. Transmit forms & trends for all boxes that pass to the Design Consultant.

PASS/FAIL CRITERIA

To pass the test, a box must meet all three of the conditions described at the bottom of this page. Transmit the trends for all boxes that pass the test to the Design Consultant. If a box fails to meet all three conditions, complete the information below, inspect, repair the box and conduct the heating test again on this box. When a failed box subsequently passes the test, transmit this form and only the successful trend data to the Design Consultant.

Value	Measured	Set Point	Difference
AHU Discharge Air Temp	°F	°F	°F
AHU CHW Valve Command	% open		
Supply Chilled Water Sys Temp	°F	°F	°F
Heating Hot Water Supply Temp.	°F	°F	°F
Outside Air Temp.	°F		

Information	Response		Information	Response
BAS Box Identification			Space - Name/No.	
Manufacturer			Inlet Size	
Model No.			Respective AHU	

Value	Measured	Design	Difference
Box Damper Position	% open		
BAS Airflow	cfm	cfm	% difference
Box Discharge Air Temp	°F		°F difference [T(Box) - T(AHU)]
Reheat Valve Position	% open		
Thermostat Setpoint	°F		
Space Temperature	°F		°F difference [T(setpoint) - T(space)]

[Insert Your Logo Here] [Vendor Logo Here]

Air Terminal Unit Heating and Cooling Test Report

1. If space temperature cannot be maintained within +/- 1°F of set point; record investigative findings and corrective measures taken.
2. If box cannot control airflow to within +/- 10% of design heating air flow, record investigative findings and corrective measures taken.
3. If box reheat valve is commanded 100% open & discharge air temperature is not equal to or greater than coil DAT in approved submittal then record investigative findings and corrective action taken. If reheat valve is commanded to less than 100% open, raise T-stat set point 5°F above current space temp, verify reheat valve is commanded 100% open & box discharge temp is not equal to or greater than coil DAT in approved submittal.

WITNESSED:	
General Contractor	***BAS Controls Contractor***
Mechanical Contractor	***Test and Balance Contractor***

[Insert Your Logo Here] [Vendor Logo Here]

Air Terminal Unit Heating and Cooling Test Report

COOLING MODE TEST

The Cooling Mode Test begins at the end of the Heating Mode Test. In other words, the beginning of this test requires that the spaces have already been conditioned to 76°F. This test also requires that the AHU is operating at the appropriate DAT set point and that the heating water system is operating at the design maximum water supply water temperature (usually 180°F) . Run this test without any supply fan or return fan shutdowns. Doors to the space should continue to be closed for this test.

COOLING PERFORMANCE TEST

PROCEDURE: Continue trending the points listed in the Heating Mode Test. These points are also listed below. Adjust the thermostat set point of all system boxes to 68°F & continue trending for an additional 4.5

TRENDING REQUIREMENTS

Trend the points listed in this paragraph at 3 minute intervals. Present the trended data in an Excel worksheet for each terminal unit. Graph the data per the templates provided by the Design Consultant. The columns in each worksheet shall be ordered (L to R) as follows: **Date & Time** in ascending order, **Zone Temperature Set Point, Actual Zone Temperature, Terminal Unit Discharge Air Temperature, Reheat Valve Command, CFM Set Point, Actual CFM, Damper Commanded Position**. Also trend the **AHU DAT, AHU CHW valve % open, Plant CHW & HHW Supply Temperatures and OAT**. The blank entries below in this form need only to be completed for the terminal boxes that do not satisfy the three test conditions listed below during the initial test. Transmit forms & trends for all boxes that pass to the Design Consultant.

PASS/FAIL CRITERIA

To pass the test, a box must meet all three of the conditions described at the bottom of this page. Transmit the trends for all boxes that pass the test to the Design Consultant. If a box fails to meet all three conditions, complete the information below, inspect, repair the box and conduct the cooling test again on this box. When a failed box subsequently passes the test, transmit this form and only the successful trend data to the Design Consultant.

Information	Response		Information	Response
BAS Box Identification			Space - Name/No.	
Manufacturer			Inlet Size	
Model No.			Respective AHU	

Value	Measured	Design	Difference
Box Damper Position	% open		
BAS Airflow	cfm	cfm	% difference
Box Discharge Air Temp	°F		°F difference [T(Box) - T(AHU)]
Reheat Valve Position	% open		
Thermostat Setpoint	°F		
Space Temperature	°F		°F difference [T(setpoint) - T(space)]

1. If box damper position is 100% and space temperature cannot be maintained within +/- 1°F of set point; record investigation and corrective measures taken.

2. If box measured air flow is not within +/- 10% of design cooling air flow, record the investigation and corrective actions taken.

3. If reheat valve is commanded to 0% open & box discharge air temperature is not within + 2°F of AHU DAT, record the investigative findings and corrective actions taken. If reheat valve is commanded to greater than 0% open, lower t-stat set point 10°F below space temperature and repeat test and record results.

WITNESSED:

[Insert Your Logo Here] [Vendor Logo Here]

Air Terminal Unit Heating and Cooling Test Report

General Contractor	***BAS Controls Contractor***
Mechanical Contractor	***Test and Balance Contractor***

Appendix B-8: BAS Graphics Programmers' Guide

HCA | FACILITIGROUP Infrastructure Solutions SM

Preface

The Programmers Guide is intended to be a more detailed explanation of the features of the user interface. It demonstrates the functionality of navigation buttons and hidden data links.

Not all graphic panels will be shown in the Programmer's Guide. All features mentioned in this guide should be carried through the entire user interface, even though they may only be displayed once.

The graphic panels present here may not necessarily be of the latest revision, but the intended navigation and operation remains the same.

???? ????
???? ????

FACILITIGROUP
Infrastructure Solutions

TriStar Skyline MEDICAL CENTER

Johnson Controls

Chilled Water System	CH-1	CH-2
Supply Temp	???? ????	???? ????
% RLA	???? ????	???? ????
kW / Ton	???? ????	???? ????

??
??
??
??

Condenser Water System	CT-1	CT-2
Speed	???? ????	???? ????
delta T	???? ????	???? ????
Tons	???? ????	???? ????

??
??
??
??

Chilled Water System	CH-3	CH-4
Supply Temp	???? ????	???? ????
% RLA	???? ????	???? ????
kW / Ton	???? ????	???? ????

??
??
??
??

extra box to be deleted if not used

Air Handlers	Sa Temp	Sa Static
AHU 01 - Area Served	???? ????	???? ????
AHU 02 - Area Served	???? ????	???? ????
AHU 03 - Area Served	???? ????	???? ????
AHU 04 - Area Served	???? ????	???? ????
AHU 05 - Area Served	???? ????	???? ????
AHU 06 - Area Served	???? ????	???? ????
AHU 07 - Area Served	???? ????	???? ????
AHU 08 - Area Served	???? ????	???? ????
AHU 09 - Area Served	???? ????	???? ????
AHU 10 - Area Served	???? ????	???? ????
AHU 11 - Area Served	???? ????	???? ????
AHU 12 - Area Served	???? ????	???? ????
AHU 13 - Area Served	???? ????	???? ????
AHU 14 - Area Served	???? ????	???? ????
AHU 15 - Area Served	???? ????	???? ????
AHU 16 - Area Served	???? ????	???? ????
AHU 17 - Area Served	???? ????	???? ????
AHU 18 - Area Served	???? ????	???? ????

Steam System	BLR-1	BLR-2
% Firing Range	???? ????	???? ????
Steam Flow	???? ????	???? ????
Efficiency	???? ????	???? ????

??
??
??
??

Hot Water System	HX-1	HX-2
HW Sup Temp	???? ????	???? ????
HW Ret Temp	???? ????	???? ????
Pump Status	???? ????	???? ????

??
??
??
??

Hot Water System	HWBLR-1	HWBLR-2
% Firing Range	???? ????	???? ????
Supply Temp	???? ????	???? ????
Efficiency	???? ????	???? ????

??
??
??
??

extra box to be deleted if not used

Outside Air Temperature ???? ????
Outside Air Relative Humidity ???? ????
Typical of ALL panels

Links to facility's Energy portal on HCAFI.com

FACILITIGROUP Infrastructure Solutions

TriStar Skyline MEDICAL CENTER

Links to Facility Public Website

Johnson Controls

Links to Contact Panel for JCI Rep, Energy Service Center, Utility providers

Links to individual equipment detail panel

Links to AHU Summary

Links to individual air handling units

Chilled Water System	CH-1	CH-2
Supply Temp	???? ????	???? ????
% RLA	???? ????	???? ????
kW / Ton	???? ????	???? ????

Condenser Water System	CT-1	CT-2
Speed	???? ????	???? ????
delta T	???? ????	???? ????
Tons	???? ????	???? ????

Chilled Water System	CH-3	CH-4
Supply Temp	???? ????	???? ????
% RLA	???? ????	???? ????
kW / Ton	???? ????	???? ????

Links to individual System Panel

extra box to be deleted if not used

The facility logo on the footer will now become the HOME button and will link to the Dashboard. Typical of ALL panels

Air Handlers	Sa Temp	Sa Static
AHU 01 - Area Served	???? ????	???? ????
AHU 02 - Area Served	???? ????	???? ????
AHU 03 - Area Served	???? ????	???? ????
AHU 04 - Area Served	???? ????	???? ????
AHU 05 - Area Served	???? ????	???? ????
AHU 06 - Area Served	???? ????	???? ????
AHU 07 - Area Served	???? ????	???? ????
AHU 08 - Area Served	???? ????	???? ????
AHU 09 - Area Served	???? ????	???? ????
AHU 10 - Area Served	???? ????	???? ????
AHU 11 - Area Served	???? ????	???? ????
AHU 12 - Area Served	???? ????	???? ????
AHU 13 - Area Served	???? ????	???? ????
AHU 14 - Area Served	???? ????	???? ????
AHU 15 - Area Served	???? ????	???? ????
AHU 16 - Area Served	???? ????	???? ????
AHU 17 - Area Served	???? ????	???? ????
AHU 18 - Area Served	???? ????	???? ????

Steam System	BLR-1	BLR-2
% Firing Range	???? ????	???? ????
Steam Flow	???? ????	???? ????
Efficiency	???? ????	???? ????

Hot Water System	HX-1	HX-2
HW Sup Temp	???? ????	???? ????
HW Ret Temp	???? ????	???? ????
Pump Status	???? ????	???? ????

Hot Water System	HWBLR-1	HWBLR-2
% Firing Range	???? ????	???? ????
Supply Temp	???? ????	???? ????
Efficiency	???? ????	???? ????

Summarizes all alarms for the system.

extra box to be deleted if not used

Links to the facility's EnergyScript portal on HCAFI.com. Typical of ALL panels

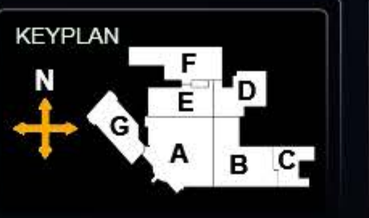
Facility Name - Floor Plan

???? ????
???? ????

First Floor

Section A - AHU-02,03,04

Second Floor



Section B - OR's
Section C - AHU-05

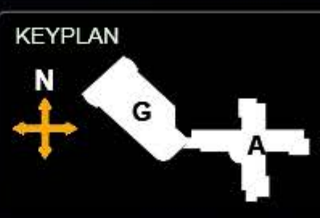
Second Floor-Zone B
?? ?? ??
??

Third Floor

Section A - AHU-06,07,08,09,10,11
Section A - C-Section

Third Floor-Zone A
?? ?? ??
??

Fourth Floor



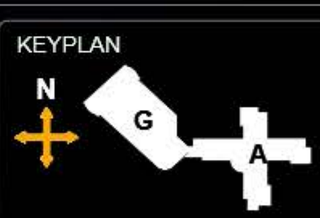
Fifth Floor

Sixth Floor

Seventh Floor

Eighth Floor

Ninth Floor



Section A - AHU-12,13

Roof

Floor Descriptions, Equipment labels, Critical Areas, and Plant Operations should be listed and linked where applicable

First Floor

Section A - AHU-02,03,04

Second Floor

Section B - OR's
Section C - AHU-05

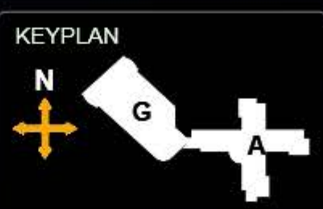
Second Floor-Zone B
?? ?? ??
??

Third Floor

Section A - AHU-06,07,08,09,10,11
Section A - C-Section

Third Floor-Zone A
?? ?? ??
??

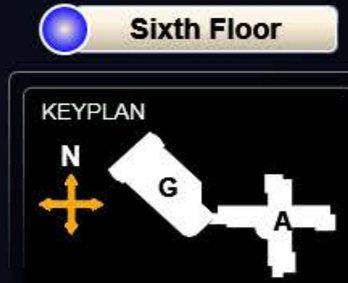
Fourth Floor



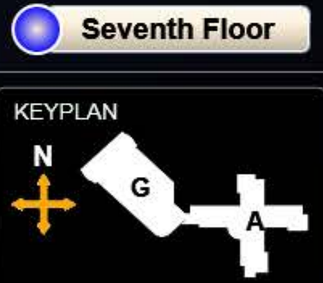
Fifth Floor

Alarm Modules are present for ORs and critical areas on this panel

Sixth Floor

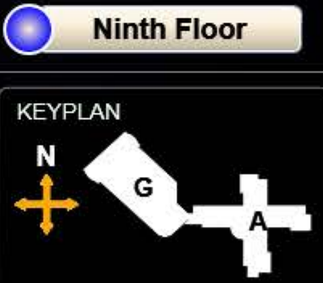


Seventh Floor



Eighth Floor

Ninth Floor



Section A - AHU-12,13

Roof

Once the user clicks on this icon and the panel is loaded, the icon will change color to indicate. This is typical of every button on the Footer.

Facility Name - First Floor

???? ????
???? ????

Room Control Module

????
????

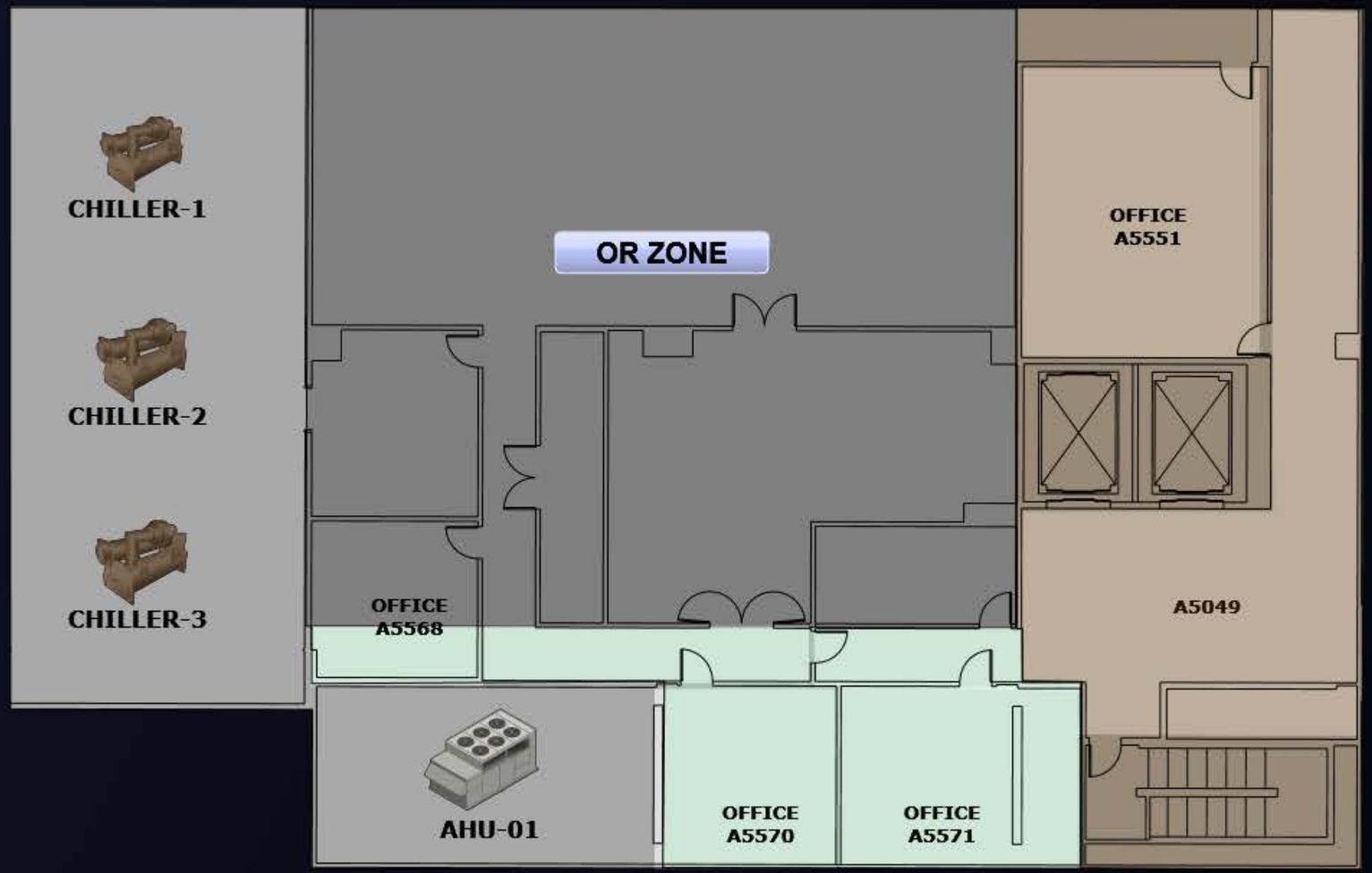
Zone Setpoint
???? ????

System Mode
???? ????

Unit Enable Mode
???? ????

Discharge Temp
???? ????

Heating Output
???? ????



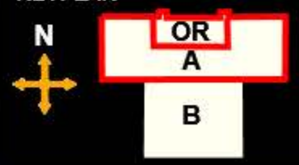
AHU 01

AHU 02

First Floor
?? ?? ??
??

Offline | Low Alarm | Low Warning | Below Setpoint | Normal | Above Setpoint | High Warning | High Alarm | Overridden

KEYPLAN



TriStar Skyline MEDICAL CENTER

FLOOR CHW HW STEAM AHU ENERGY EPSS ALARMS AUX LEGEND

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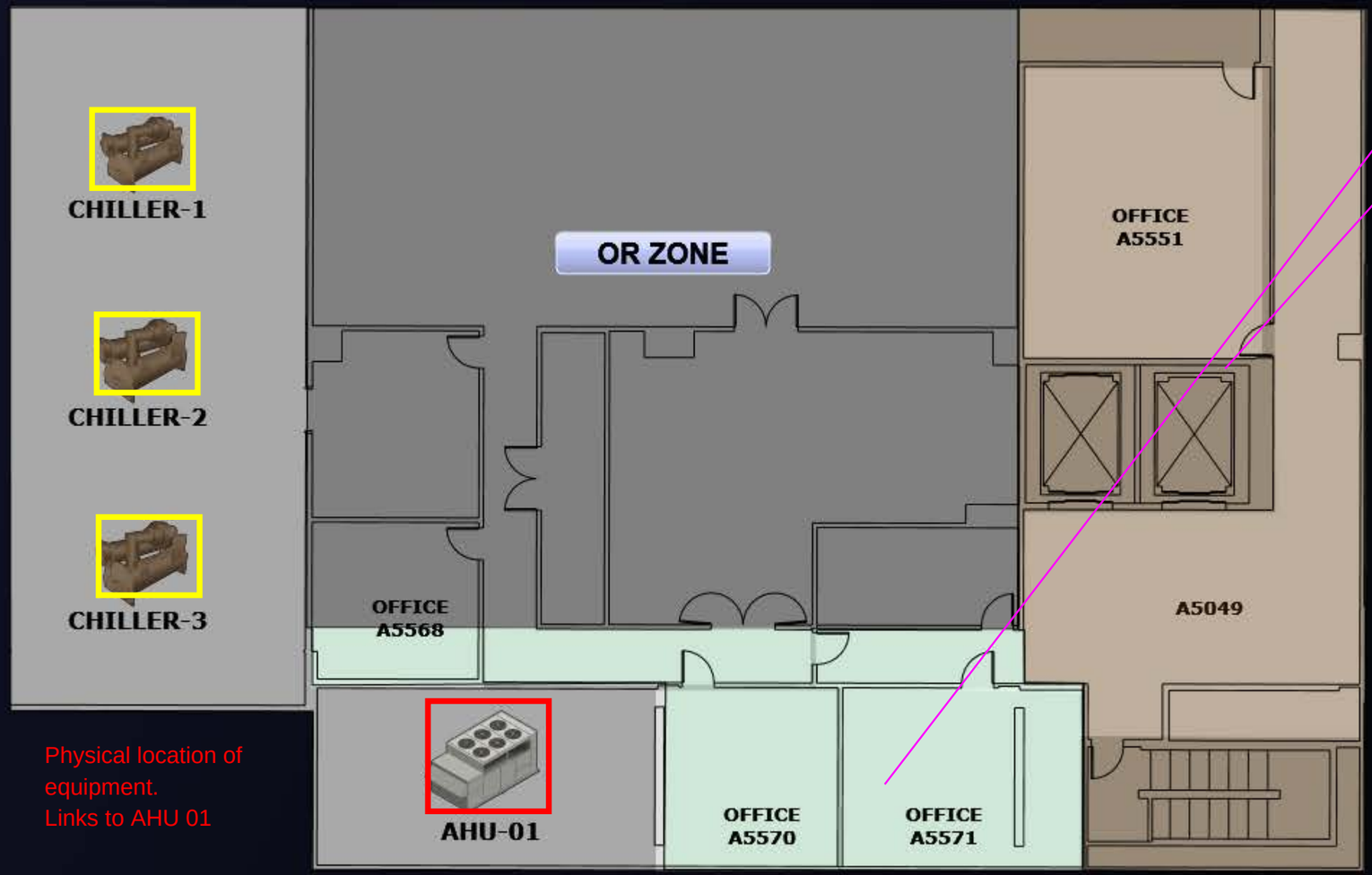
Infrastructure Solutions

Facility Name - First Floor

???? ????
???? ????

Physical locations of equipment.
Links to individual Chiller Detail Panels



Physical location of equipment.
Links to AHU 01

AHU 01

AHU 02

Floor Plan shaded to show different serving AHU. Button colors correspond to floor plan colors

This alarm module shows only the alarms relevant to this graphic panel

Offline | Low Alarm | Low Warning | Below Setpoint | Normal | Above Setpoint | High Warning | High Alarm | Overridden

TriStar Skyline MEDICAL CENTER

FLOOR CHW HW STEAM AHU ENERGY EPSS ALARMS AUX LEGEND

FACILITIGROUP Infrastructure Solutions

???? ????
???? ????

Room Control Module

????
????

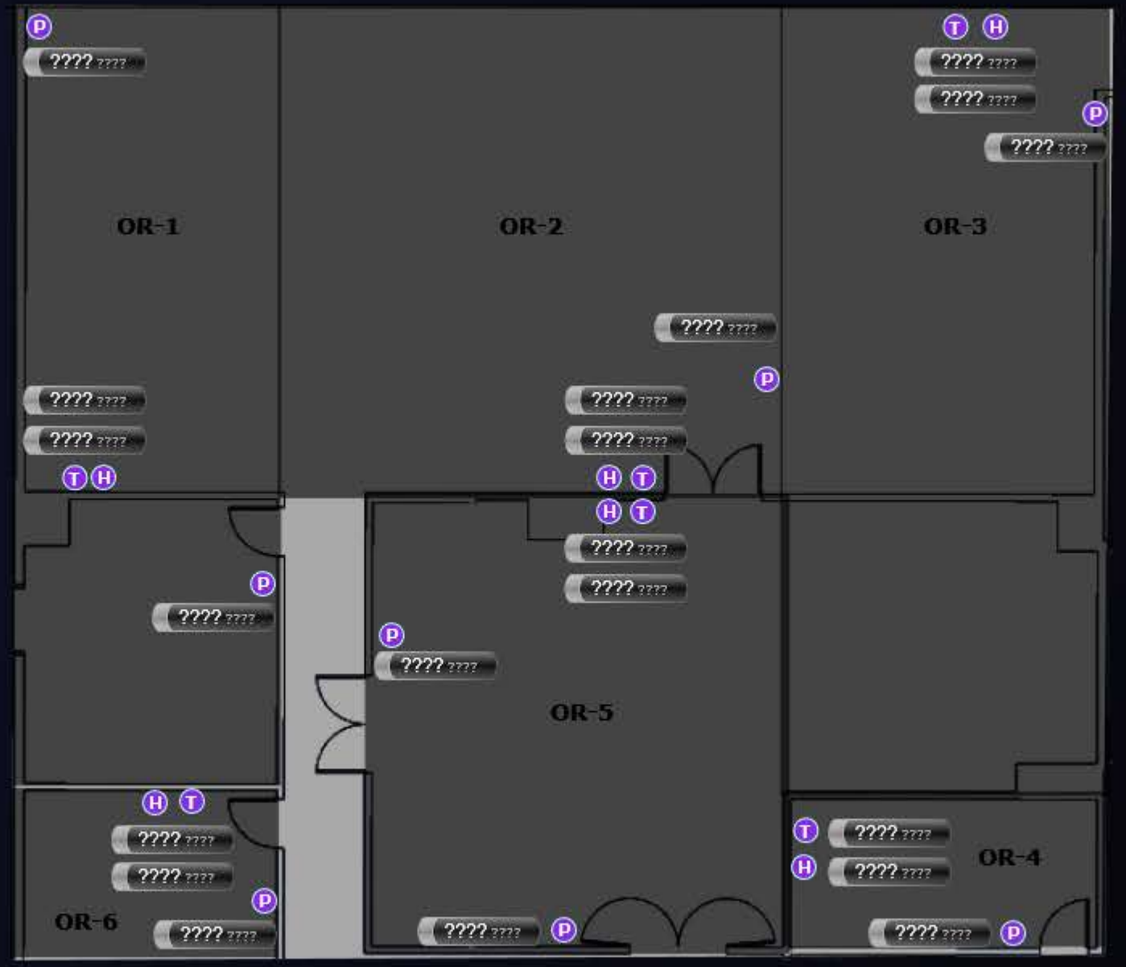
Zone Setpoint
???? ????

System Mode
???? ????

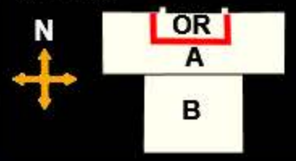
Unit Enable Mode
???? ????

Discharge Temp
???? ????

Heating Output
???? ????



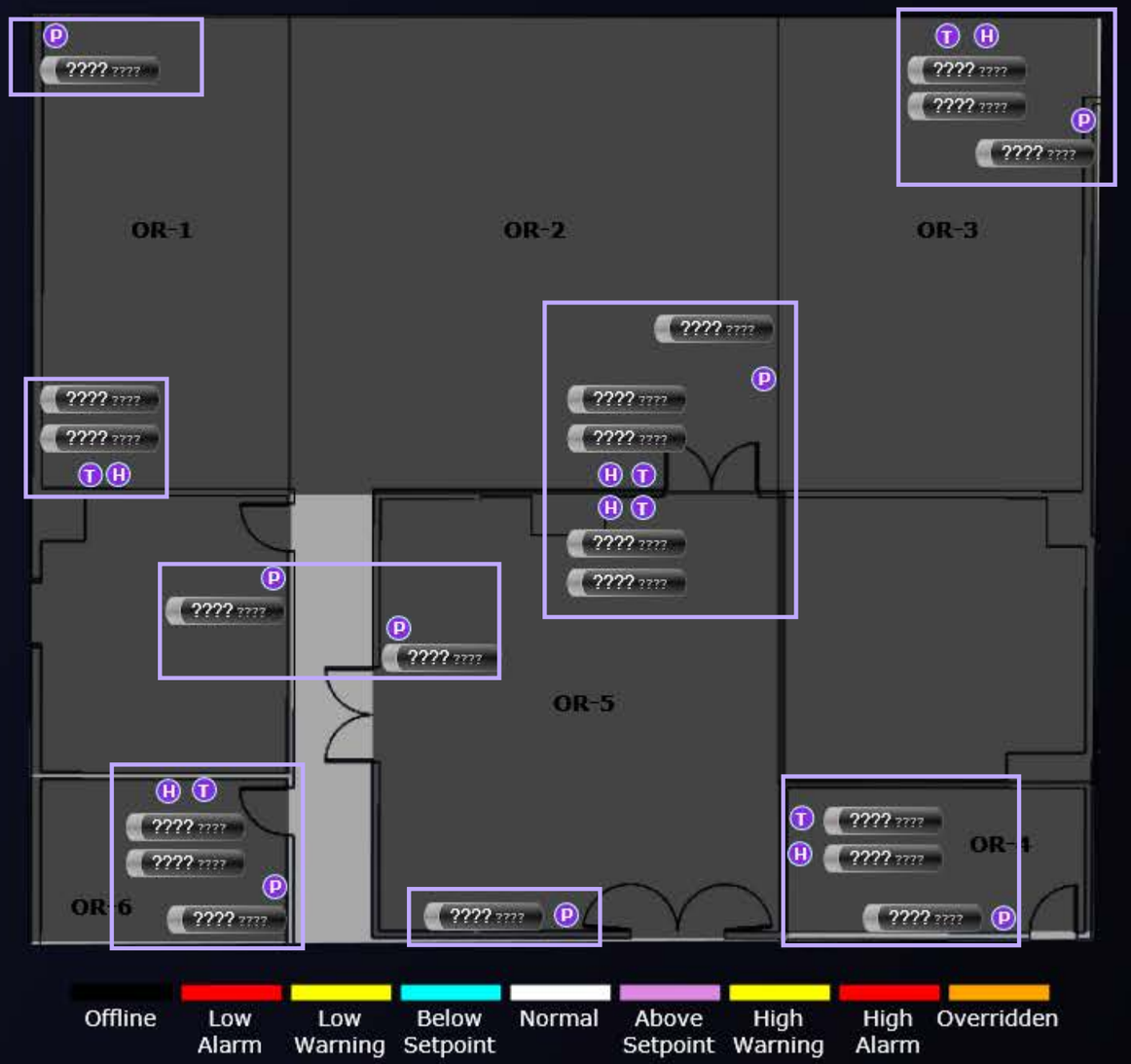
KEYPLAN



Offline | Low Alarm | Low Warning | Below Setpoint | Normal | Above Setpoint | High Warning | High Alarm | Overridden

???? ????
???? ????

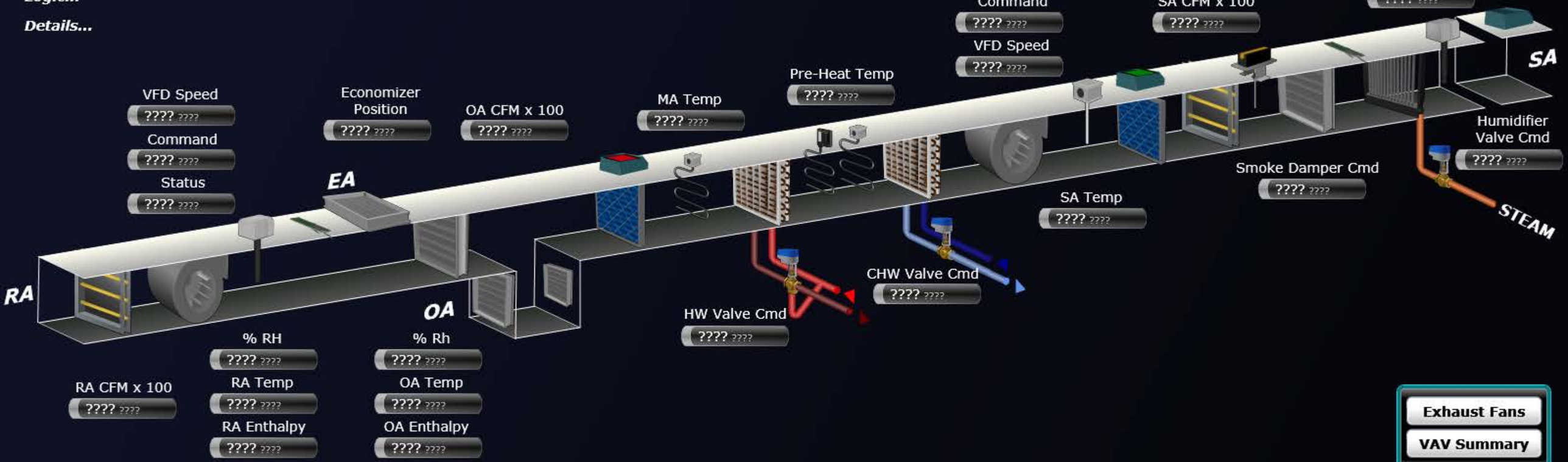
Temperature, Humidity, and Pressure sensors for the OR Zone should be located on this floor plan in the same location as the facility.



Facility Name - Air Handling Unit - 01

???? ????
???? ????

AhuEna
EconEna
Sequence...
Logic...
Details...



Exhaust Fans
VAV Summary

System Parameters

		SETPOINT
SA Temp	???? ????	???? ????
MA Temp	???? ????	???? ????
Pre-Heat Temp	???? ????	???? ????
Humidifier	???? ????	???? ????
SA Static Press	???? ????	???? ????

Alarms

Freeze Stat	????
Pre-Filter	????
Final Filter	????
High SA Static	????
Fire Alarm	????

Facility Name - Air Handling Unit - 01

???? ????
???? ????

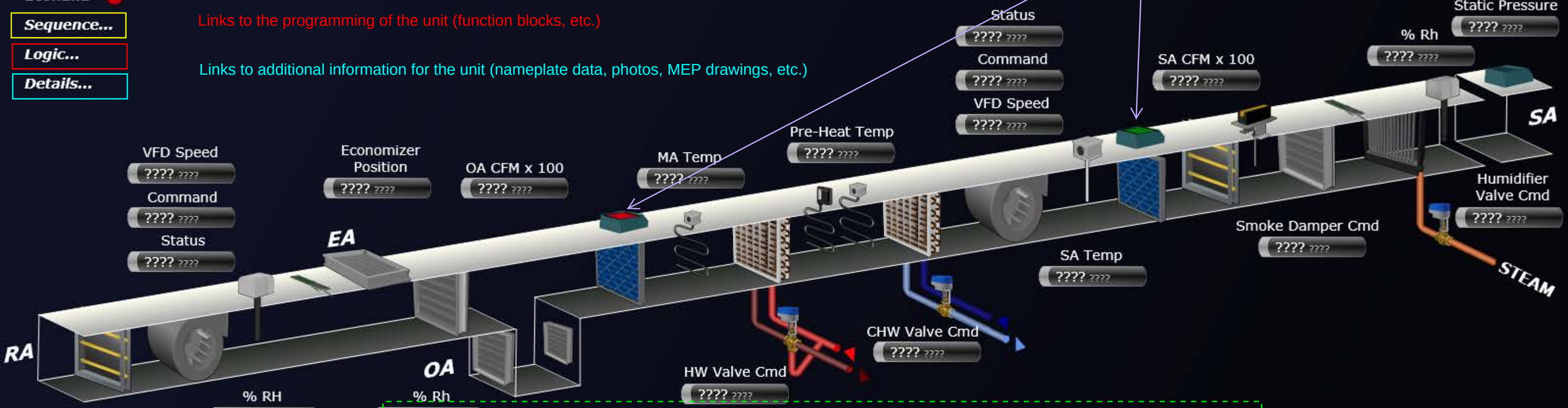
AhuEna
EconEna
Sequence...
Logic...
Details...

Links to the SOO Graphic panel, and PDF of the control drawings/sequence

Links to the programming of the unit (function blocks, etc.)

Links to additional information for the unit (nameplate data, photos, MEP drawings, etc.)

State squares to indicate the status of the filters. Green=Clean, Red=Dirty (alarm)



Upon a right-click > View Trend, the trend viewer window will pop up here for any point that is trended

Exhaust Fans
VAV Summary

System Parameters		SETPOINT
SA Temp	???? ????	???? ????
MA Temp	???? ????	???? ????
Pre-Heat Temp	???? ????	???? ????
Humidifier	???? ????	???? ????
SA Static Press	???? ????	???? ????

Alarms	
Freeze Stat	????
Pre-Filter	????
Final Filter	????
High SA Static	????
Fire Alarm	????

Facility Name - AHU Summary

???? ????
???? ????

Chiller Summary			
Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Boiler Summary			
Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

Equipment	Mode	EconState	SaTmp deg F	SaTmpSpt deg F	SaStp in wc	SaStPSpt in wc	ChwVlv % Open	MaTmp deg F	PrHtVlv % Open	PrHtTmp deg F	PrHtTmpSpt deg F	RaTmp deg F	RaRh % RH	BoxTotCFM
AHU 01 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 02 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 03 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 04 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 05 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 06 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 07 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 08 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 09 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 10 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 11 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 12 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 13 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 14 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 15 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????

OR Summary | AHU Details | Next >

Facility Name - AHU Summary

???? ????
???? ????

Chiller Summary

Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Links to individual equipment detail panels

Boiler Summary

Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

Links to individual air handling units

Equipment	Mode	EconState	SaTmp deg F	SaTmpSpt deg F	SaStp in wc	SaStPSpt in wc	ChwVlv % Open	MaTmp deg F	PrHtVlv % Open	PrHtTmp deg F	PrHtTmpSpt deg F	RaTmp deg F	RaRh % RH	BoxTotCFM
AHU 01 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 02 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 03 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 04 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 05 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 06 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 07 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 08 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 09 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 10 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 11 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 12 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 13 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 14 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????
AHU 15 - Area Served	????	????	????	????	????	????	????	????	????	????	????	????	????	????

OR Summary

Links to Operating Room Summary

AHU Details

Links to Tailored Summary with all other AHU points

Next >

Links to 2nd panel for additional AHUs. Delete if unused

Facility Name - OR Summary

???? ????
???? ????

AHU 01 Summary			
Econ State	????	ChwVlvPos	????
SaTmp	????	HwVlvPos	????
RaTmp	????	BoxTotCFM	????
RaRh	????	Total Load	????

Chiller Summary			
Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Boiler Summary			
Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

Equipment	Mode	ZnTmp deg F	ZnTmpSpt deg F	ZnRh % RH	ZnRhSpt % RH	ReHtVlv % Open	DaCFM CFM	DaCFMSpt CFM	DmprPos % Open	Door Sensor	ZnPress in wc			
OR 01 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 02 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 03 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 04 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 05 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 06 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 07 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 08 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 09 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 10 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 11 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 12 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 13 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 14 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 15 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????

< Previous

Next >

Facility Name - OR Summary

???? ????
???? ????

Links to AHU 01 graphic panel

AHU 01 Summary			
Econ State	????	ChwVlvPos	????
SaTmp	????	HwVlvPos	????
RaTmp	????	BoxTotCFM	????
RaRh	????	Total Load	????

Chiller Summary			
Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Boiler Summary			
Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

Links to individual VAV units

Links to individual equipment detail panels

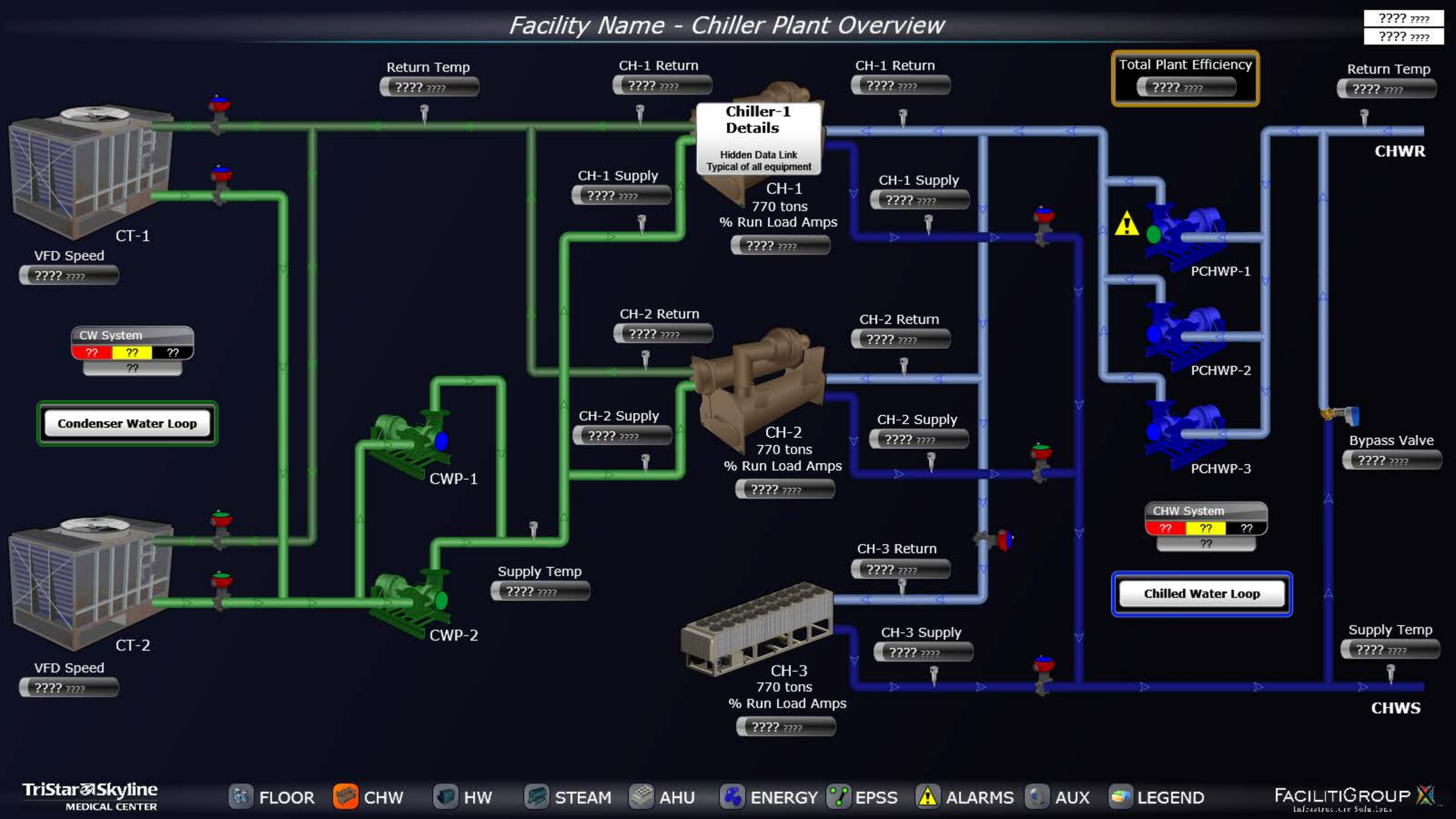
Remove unused columns

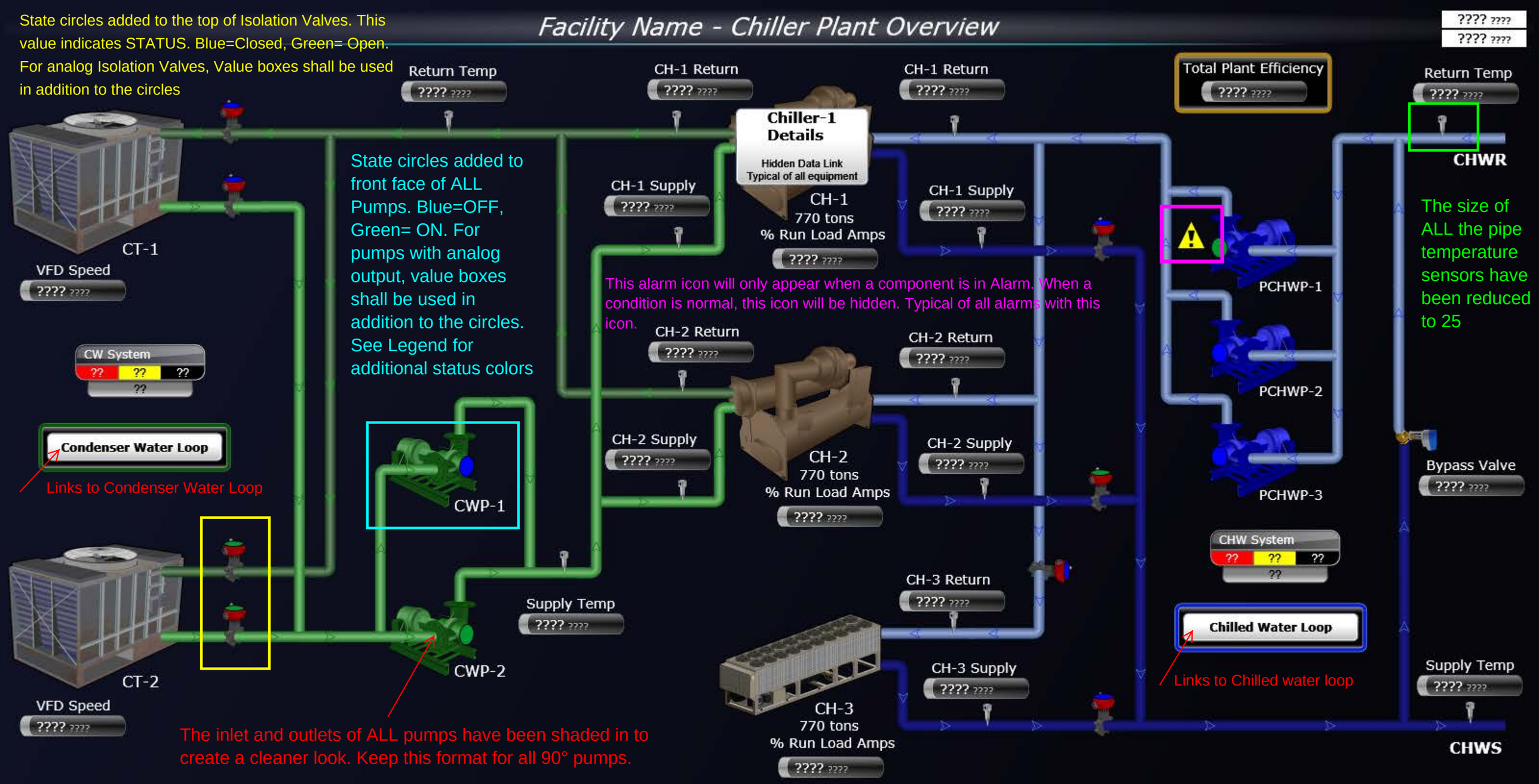
Equipment	Mode	ZnTmp deg F	ZnTmpSpt deg F	ZnRh % RH	ZnRhSpt % RH	ReHtVlv % Open	DaCFM CFM	DaCFMSpt CFM	DmprPos % Open	Door Sensor	ZnPress in wc			
OR 01 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 02 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 03 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 04 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 05 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 06 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 07 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 08 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 09 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 10 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 11 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 12 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 13 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 14 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????
OR 15 - VV 01-101	????	????	????	????	????	????	????	????	????	????	????	????	????	????

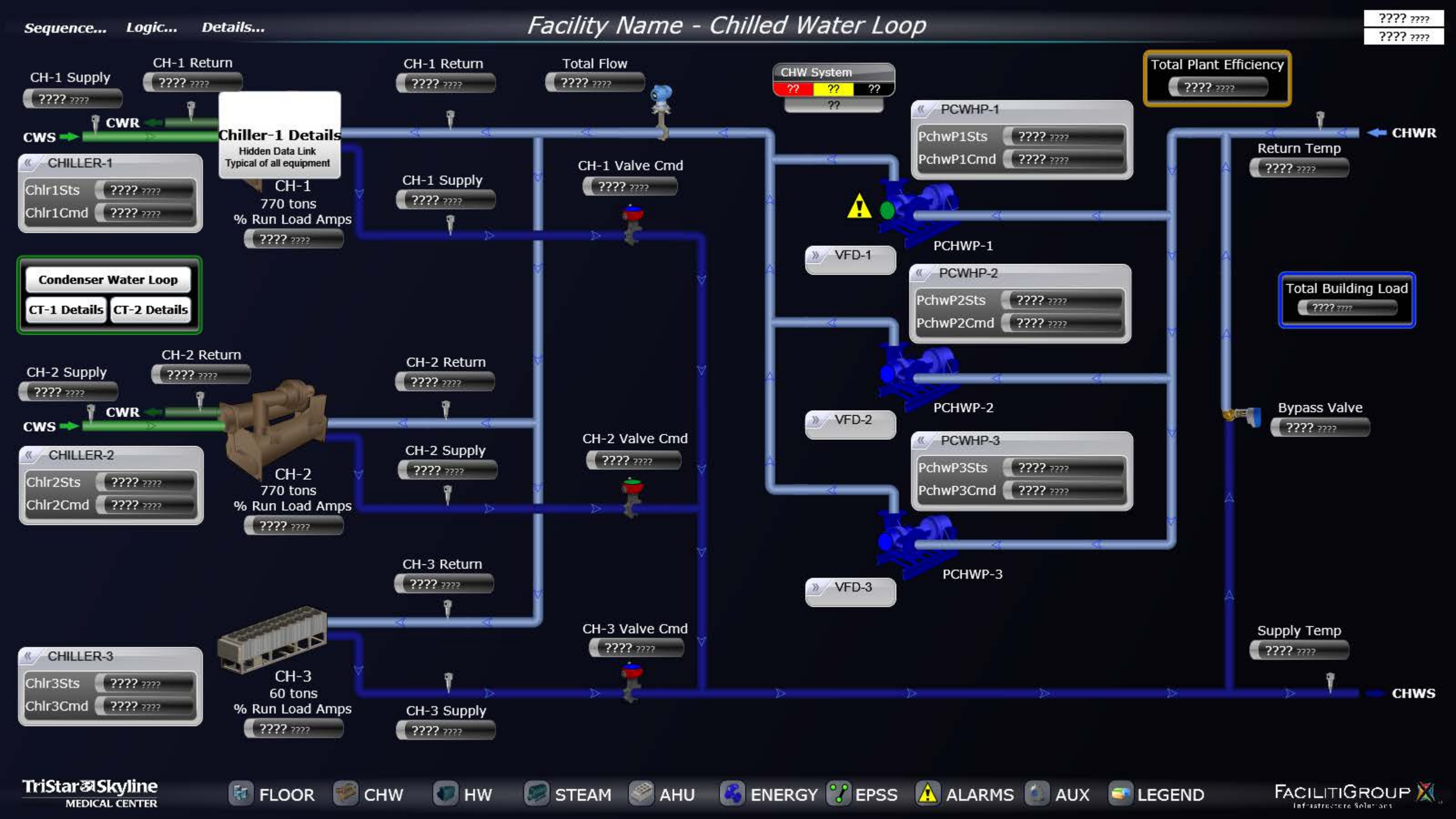
< Previous

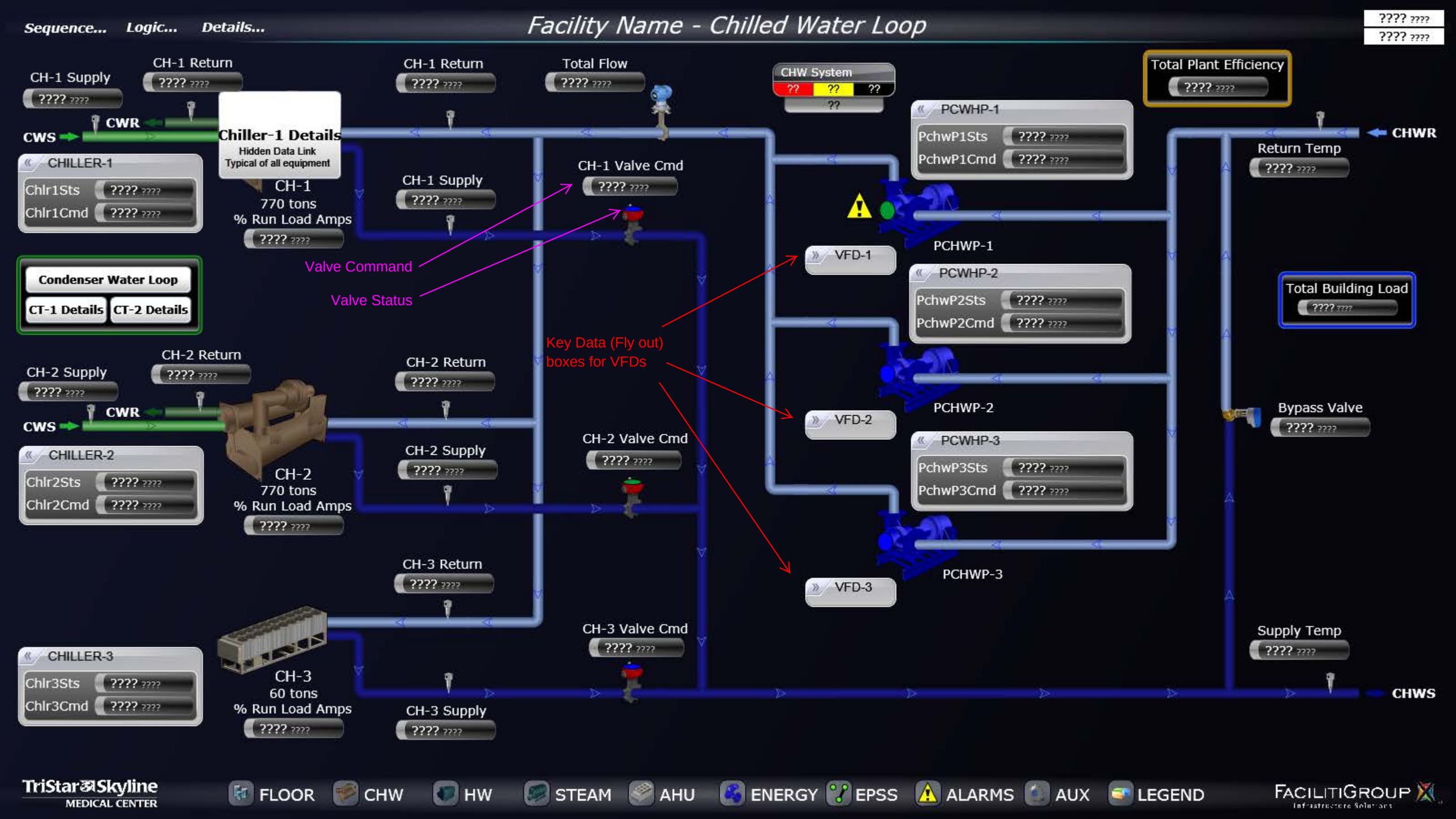
Links to 2nd panel for additional ORs

Next >


Facility Name - Chiller Plant Overview
???? ????
???? ????
Return Temp
???? ????
CH-1 Return
???? ????
CH-1 Return
???? ????
Total Plant Efficiency
???? ????
Return Temp
???? ????
CHWR
Chiller-1 Details
Hidden Data Link
Typical of all equipment
CH-1
770 tons
% Run Load Amps
???? ????
CH-1 Supply
???? ????
CH-1 Supply
???? ????
CT-1
VFD Speed
???? ????
PCHWP-1
CW System
?? ?? ??
??
CH-2 Return
???? ????
CH-2 Return
???? ????
PCHWP-2
Condenser Water Loop
CH-2
770 tons
% Run Load Amps
???? ????
CH-2 Supply
???? ????
CH-2 Supply
???? ????
PCHWP-3
Bypass Valve
???? ????
CWP-1
CHW System
?? ?? ??
??
CH-3 Return
???? ????
Chilled Water Loop
Supply Temp
???? ????
CT-2
VFD Speed
???? ????
CWP-2
CH-3 Supply
???? ????
CH-3
770 tons
% Run Load Amps
???? ????
Supply Temp
???? ????
CHWS
TriStar Skyline
MEDICAL CENTER
FLOOR
CHW
HW
STEAM
AHU
ENERGY
EPSS
ALARMS
AUX
LEGEND
FACILITIGROUP
Infrastructure Solutions


State circles added to the top of Isolation Valves. This value indicates STATUS. Blue=Closed, Green= Open. For analog Isolation Valves, Value boxes shall be used in addition to the circles
Facility Name - Chiller Plant Overview
???? ????
???? ????
Return Temp
???? ????
CH-1 Return
???? ????
CH-1 Return
???? ????
Total Plant Efficiency
???? ????
Return Temp
???? ????
CHWR
Chiller-1 Details
Hidden Data Link
Typical of all equipment
CH-1
770 tons
% Run Load Amps
???? ????
CH-1 Supply
???? ????
CH-1 Supply
???? ????
CT-1
VFD Speed
???? ????
State circles added to front face of ALL Pumps. Blue=OFF, Green= ON. For pumps with analog output, value boxes shall be used in addition to the circles. See Legend for additional status colors
This alarm icon will only appear when a component is in Alarm. When a condition is normal, this icon will be hidden. Typical of all alarms with this icon.
PCHWP-1
PCHWP-2
PCHWP-3
The size of ALL the pipe temperature sensors have been reduced to 25
CW System
?? ?? ??
??
CH-2 Return
???? ????
CH-2 Return
???? ????
CH-2
770 tons
% Run Load Amps
???? ????
CH-2 Supply
???? ????
CH-2 Supply
???? ????
Condenser Water Loop
Links to Condenser Water Loop
CWP-1
Bypass Valve
???? ????
CHW System
?? ?? ??
??
CH-3 Return
???? ????
Chilled Water Loop
Supply Temp
???? ????
CT-2
VFD Speed
???? ????
CWP-2
CH-3 Supply
???? ????
Links to Chilled water loop
CH-3
770 tons
% Run Load Amps
???? ????
Supply Temp
???? ????
CHWS
The inlet and outlets of ALL pumps have been shaded in to create a cleaner look. Keep this format for all 90° pumps.
TriStar Skyline MEDICAL CENTER
FLOOR
CHW
HW
STEAM
AHU
ENERGY
EPSS
ALARMS
AUX
LEGEND
FACILITIGROUP
Infrastructure Solutions


Sequence...
Logic...
Details...
Facility Name - Chilled Water Loop
???? ????
???? ????
CH-1 Supply
???? ????
CH-1 Return
???? ????
CWR
CWS
Chiller-1 Details
Hidden Data Link
Typical of all equipment
CHILLER-1
Chlr1Sts
???? ????
Chlr1Cmd
???? ????
CH-1
770 tons
% Run Load Amps
???? ????
CH-1 Return
???? ????
Total Flow
???? ????
CH-1 Supply
???? ????
CH-1 Valve Cmd
???? ????
CHW System
?? ?? ??
??
Total Plant Efficiency
???? ????
PCWHP-1
PchwP1Sts
???? ????
PchwP1Cmd
???? ????
PCHWP-1
VFD-1
CHWR
Return Temp
???? ????
Condenser Water Loop
CT-1 Details
CT-2 Details
PCWHP-2
PchwP2Sts
???? ????
PchwP2Cmd
???? ????
Total Building Load
???? ????
CH-2 Supply
???? ????
CH-2 Return
???? ????
CWR
CWS
CHILLER-2
Chlr2Sts
???? ????
Chlr2Cmd
???? ????
CH-2
770 tons
% Run Load Amps
???? ????
CH-2 Return
???? ????
CH-2 Supply
???? ????
CH-2 Valve Cmd
???? ????
PCHWP-2
VFD-2
Bypass Valve
???? ????
PCWHP-3
PchwP3Sts
???? ????
PchwP3Cmd
???? ????
PCHWP-3
VFD-3
CH-3 Return
???? ????
CHILLER-3
Chlr3Sts
???? ????
Chlr3Cmd
???? ????
CH-3
60 tons
% Run Load Amps
???? ????
CH-3 Valve Cmd
???? ????
CH-3 Supply
???? ????
Supply Temp
???? ????
CHWS
TriStar Skyline
MEDICAL CENTER
FLOOR
CHW
HW
STEAM
AHU
ENERGY
EPSS
ALARMS
AUX
LEGEND
FACILITIGROUP


Sequence...
Logic...
Details...
Facility Name - Chilled Water Loop
???? ????
???? ????
CH-1 Supply
???? ????
CH-1 Return
???? ????
CWR
CWS
Chiller-1 Details
Hidden Data Link
Typical of all equipment
CHILLER-1
Chlr1Sts
???? ????
Chlr1Cmd
???? ????
CH-1
770 tons
% Run Load Amps
???? ????
CH-1 Return
???? ????
Total Flow
???? ????
CH-1 Supply
???? ????
CH-1 Valve Cmd
???? ????
Valve Command
Valve Status
Condenser Water Loop
CT-1 Details
CT-2 Details
CH-2 Supply
???? ????
CH-2 Return
???? ????
CWR
CWS
CHILLER-2
Chlr2Sts
???? ????
Chlr2Cmd
???? ????
CH-2
770 tons
% Run Load Amps
???? ????
CH-2 Return
???? ????
CH-2 Supply
???? ????
CH-2 Valve Cmd
???? ????
CH-3 Return
???? ????
CHILLER-3
Chlr3Sts
???? ????
Chlr3Cmd
???? ????
CH-3
60 tons
% Run Load Amps
???? ????
CH-3 Supply
???? ????
CH-3 Valve Cmd
???? ????
CHW System
??
??
??
??
Key Data (Fly out)
boxes for VFDs
VFD-1
VFD-2
VFD-3
PCWHP-1
PchwP1Sts
???? ????
PchwP1Cmd
???? ????
PCHWP-1
PCWHP-2
PchwP2Sts
???? ????
PchwP2Cmd
???? ????
PCHWP-2
PCWHP-3
PchwP3Sts
???? ????
PchwP3Cmd
???? ????
PCHWP-3
Total Plant Efficiency
???? ????
CHWR
Return Temp
???? ????
Total Building Load
???? ????
Bypass Valve
???? ????
Supply Temp
???? ????
CHWS
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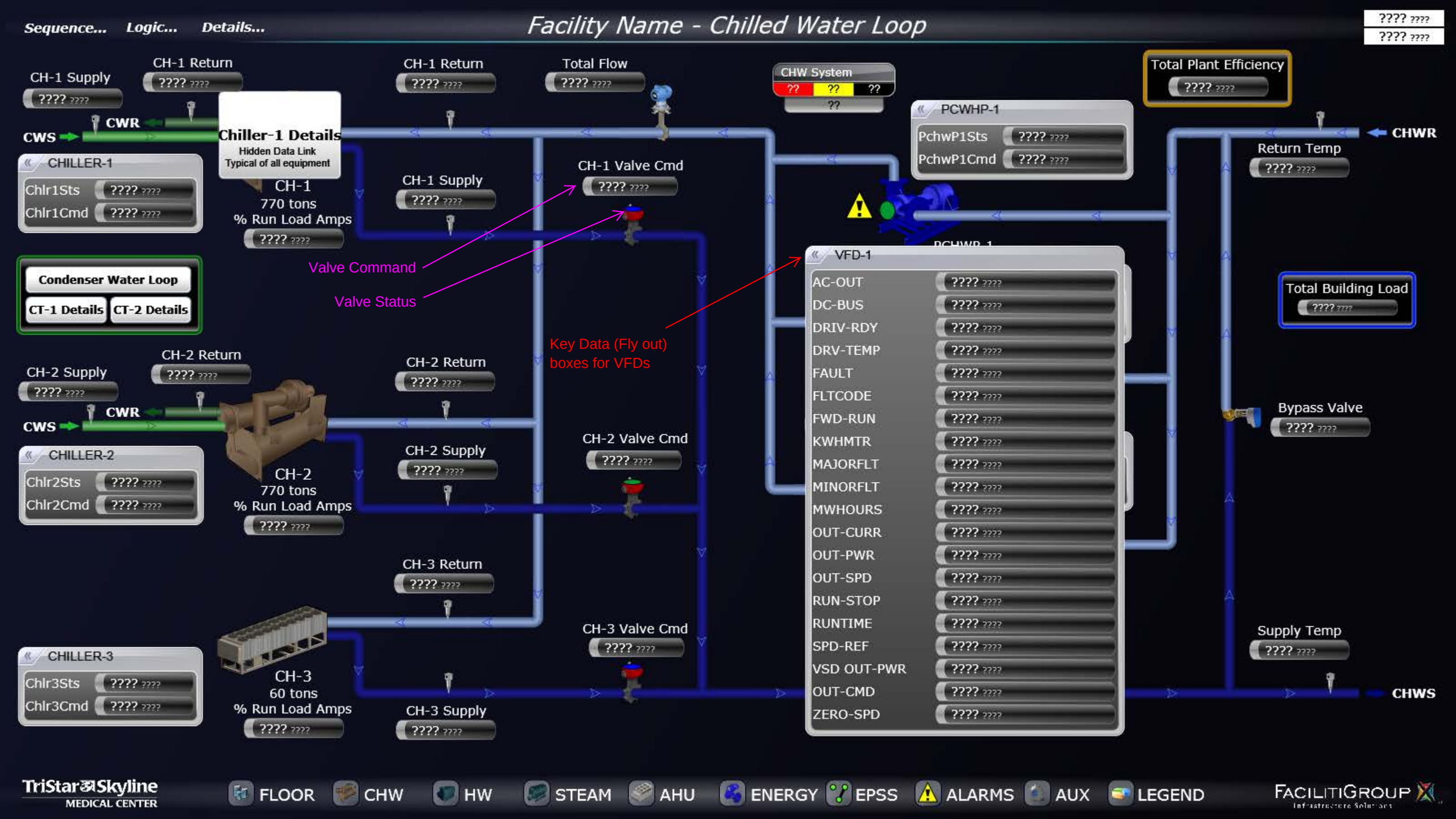
FLOOR
CHW
HW
STEAM
AHU
ENERGY
EPSS
ALARMS
AUX
LEGEND
FACILITIGROUP


Sequence...
Logic...
Details...
Facility Name - Chilled Water Loop
???? ????
???? ????
CH-1 Supply
???? ????
CH-1 Return
???? ????
CWR
CWS
Chiller-1 Details
Hidden Data Link
Typical of all equipment
CH-1 Return
???? ????
Total Flow
???? ????
CHW System
?? ?? ??
??
Total Plant Efficiency
???? ????
PCWHP-1
PchwP1Sts
???? ????
PchwP1Cmd
???? ????
CHWR
Return Temp
???? ????
CHILLER-1
Chlr1Sts
???? ????
Chlr1Cmd
???? ????
CH-1
770 tons
% Run Load Amps
???? ????
CH-1 Supply
???? ????
CH-1 Valve Cmd
???? ????
Valve Command
Valve Status
Condenser Water Loop
CT-1 Details
CT-2 Details
VFD-1
AC-OUT ???? ????
DC-BUS ???? ????
DRIV-RDY ???? ????
DRV-TEMP ???? ????
FAULT ???? ????
FLTCODE ???? ????
FWD-RUN ???? ????
KWHMTR ???? ????
MAJORFLT ???? ????
MINORFLT ???? ????
MWHOURS ???? ????
OUT-CURR ???? ????
OUT-PWR ???? ????
OUT-SPD ???? ????
RUN-STOP ???? ????
RUNTIME ???? ????
SPD-REF ???? ????
VSD OUT-PWR ???? ????
OUT-CMD ???? ????
ZERO-SPD ???? ????
Key Data (Fly out)
boxes for VFDs
Total Building Load
???? ????
Bypass Valve
???? ????
CH-2 Return
???? ????
CH-2 Supply
???? ????
CWR
CWS
CHILLER-2
Chlr2Sts
???? ????
Chlr2Cmd
???? ????
CH-2
770 tons
% Run Load Amps
???? ????
CH-2 Return
???? ????
CH-2 Supply
???? ????
CH-2 Valve Cmd
???? ????
CH-3 Return
???? ????
CHILLER-3
Chlr3Sts
???? ????
Chlr3Cmd
???? ????
CH-3
60 tons
% Run Load Amps
???? ????
CH-3 Supply
???? ????
CH-3 Valve Cmd
???? ????
Supply Temp
???? ????
CHWS
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STEAM
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Facility Name - Chiller 1 Details

???? ????
???? ????

Chiller 1 - Nameplate

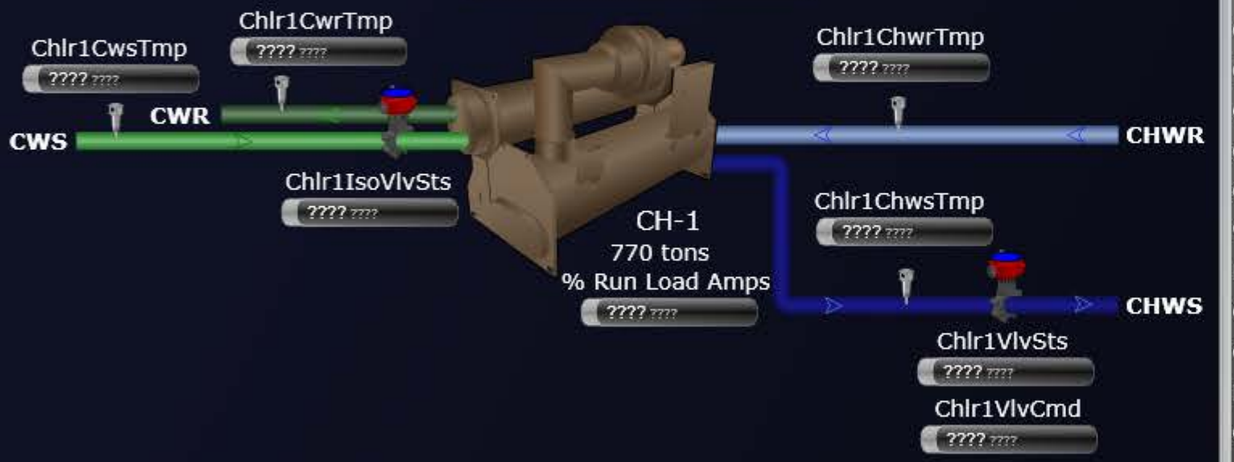
Serial Number -
Model Number -
Installation Date -

Chiller 1 Efficiency ???? ????

Total Plant Efficiency ???? ????

CHILLER-1

Chlr1Sts	???? ????
Chlr1Cmd	???? ????



CHILLER-1 Parameters

Manufacturer	???? ????
Command	???? ????
Status	???? ????
Efficiency	???? ????
Oil Temp	???? ????
Oil Press Diff	???? ????
CHW Lvg Temp	???? ????
CHW Ent Temp	???? ????
CW Lvg Temp	???? ????
CW Ent Temp	???? ????
% Full Load Amps	???? ????
Evap Refrig Press	???? ????
Cond Refrig Press	???? ????
Comp Dis Refrig Temp	???? ????
Evap Refrig Temp	???? ????
Cond Refrig Temp	???? ????
CHW Setpoint	???? ????
Cond Water Flow	???? ????
CHW Flow	???? ????
Capacity	???? ????

CHILLER-1 Parameters

System Reset	???? ????
System Eanble	???? ????
Runtime Rotate	???? ????
Rot SCHW Pumps	???? ????
Pump Down Time	???? ????
Pump Runtime Reset	???? ????
Lead Chiller Fail	???? ????
Rot Chillers	???? ????
CH Runtime Reset	???? ????
PCHWP-1A in Hand	???? ????
PCHWP-1A Runtime	???? ????
CH-1 Alm CH Panel	???? ????
CH-1 Runtime Exd	???? ????

Condenser Water Loop
CT-1 Details | CT-2 Details

Chilled Water Loop
CH-1 Details | CH-2 Details

Facility Name - Chiller 1 Details

???? ????
???? ????

Chiller 1 - Nameplate

Serial Number -
Model Number -
Installation Date -

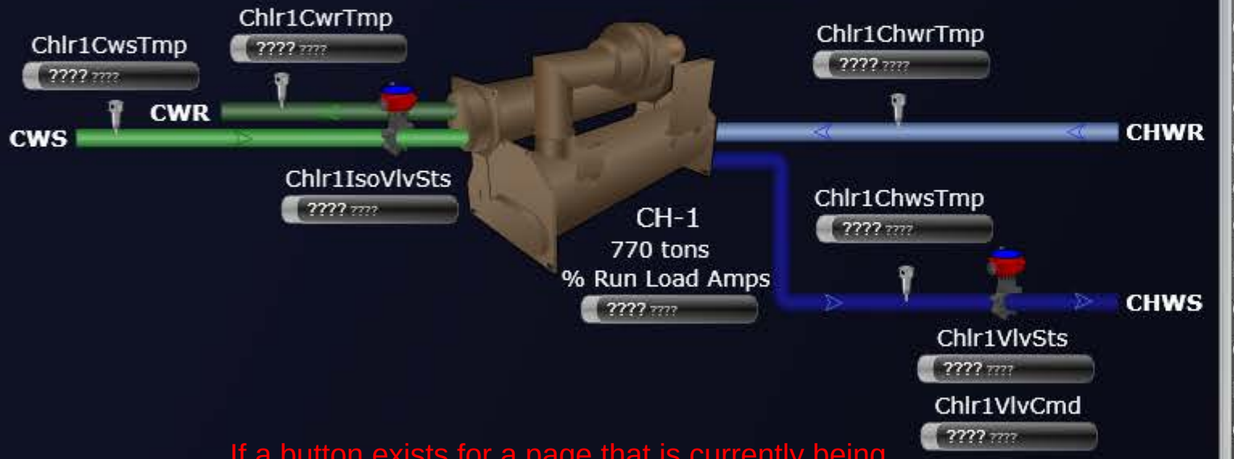
On a detail page, any and all information regarding that piece of equipment shall be accessed on this panel, either by listing it (as shown) or linking to it.

Chiller 1 Efficiency ???? ????

Total Plant Efficiency ???? ????

CHILLER-1

Chlr1Sts	???? ????
Chlr1Cmd	???? ????



If a button exists for a page that is currently being viewed, shade the Fill of the button Orange Red

Condenser Water Loop
CT-1 Details | CT-2 Details

Chilled Water Loop
CH-1 Details | CH-2 Details

CHILLER-1 Parameters

Manufacturer	???? ????
Command	???? ????
Status	???? ????
Efficiency	???? ????
Oil Temp	???? ????
Oil Press Diff	???? ????
CHW Lvg Temp	???? ????
CHW Ent Temp	???? ????
CW Lvg Temp	???? ????
CW Ent Temp	???? ????
% Full Load Amps	???? ????
Evap Refrig Press	???? ????
Cond Refrig Press	???? ????
Comp Dis Refrig Temp	???? ????
Evap Refrig Temp	???? ????
Cond Refrig Temp	???? ????
CHW Setpoint	???? ????
Cond Water Flow	???? ????
CHW Flow	???? ????
Capacity	???? ????

CHILLER-1 Parameters

System Reset	???? ????
System Eanble	???? ????
Runtime Rotate	???? ????
Rot SCHW Pumps	???? ????
Pump Down Time	???? ????
Pump Runtime Reset	???? ????
Lead Chiller Fail	???? ????
Rot Chillers	???? ????
CH Runtime Reset	???? ????
PCHWP-1A in Hand	???? ????
PCHWP-1A Runtime	???? ????
CH-1 Alm CH Panel	???? ????
CH-1 Runtime Exd	???? ????

Facility Name - Chiller 5-Low Temp Details

???? ????
???? ????

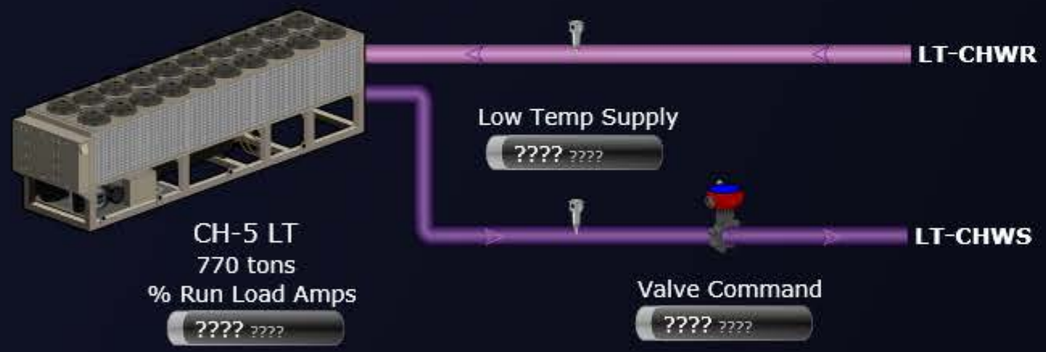
Chiller 5 - Name Plate

Serial Number -
Model Number -
Installation Date -

Chiller 5 Efficiency
???? ????

Chiller 5 - Low Temperature

Chlr05-LTSts	???? ????
Chlr05-LTCmd	???? ????



AHU Served

Chiller 5-LT Parameters

Manufacturer	???? ????
Capacity	???? ????
Command	???? ????
Status	???? ????
Efficiency	???? ????
Oil Temp	???? ????
Oil Press Diff	???? ????
CHW Lvg Temp	???? ????
CHW Ent Temp	???? ????
CW Lvg Temp	???? ????
CW Ent Temp	???? ????
% Full Load Amps	???? ????
Evap Refrig Press	???? ????
Cond Refrig Press	???? ????
Comp Dis Refrig Temp	???? ????
Evap Refrig Temp	???? ????
Cond Refrig Temp	???? ????
CHW Setpoint	???? ????
Cond Water Flow	???? ????
CHW Flow	???? ????

Chiller 5-LT Parameters

System Reset	???? ????
System Eanble	???? ????
Runtime Rotate	???? ????
Rot SCHW Pumps	???? ????
Pump Down Time	???? ????
Pump Runtime Reset	???? ????
Lead Chiller Fail	???? ????
Rot Chillers	???? ????
CH Runtime Reset	???? ????
PCHWP-5A in Hand	???? ????
PCHWP-5A Runtime	???? ????
CH-5 Alm CH Panel	???? ????
CH-5 Runtime Exd	???? ????

Facility Name - Chiller 5-Low Temp Details

???? ????
???? ????

Chiller 5 - Name Plate

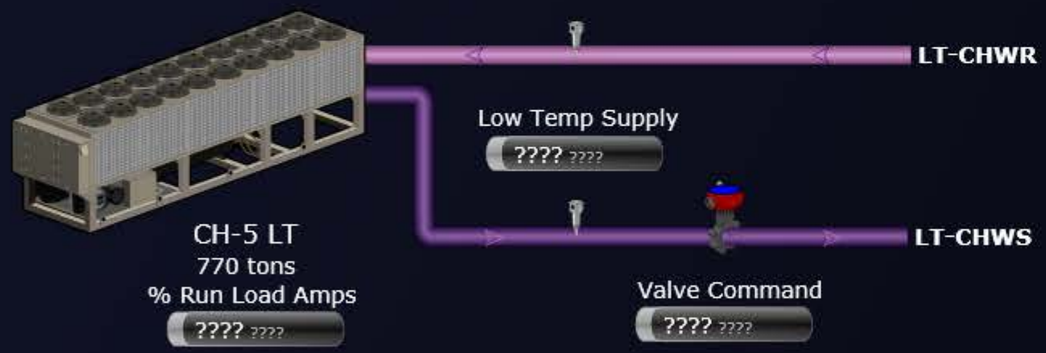
Serial Number -
Model Number -
Installation Date -

Refrigeration Machines that sub-cool will now be generally known as "Low Temperature, Low Temp, or LT" to cover the various types of equipment possibilities.

Chiller 5 Efficiency
???? ????

Chiller 5 - Low Temperature

Chlr05-LTSts	???? ????
Chlr05-LTCmd	???? ????



AHU Served

Chiller 5-LT Parameters

Manufacturer	???? ????
Capacity	???? ????
Command	???? ????
Status	???? ????
Efficiency	???? ????
Oil Temp	???? ????
Oil Press Diff	???? ????
CHW Lvg Temp	???? ????
CHW Ent Temp	???? ????
CW Lvg Temp	???? ????
CW Ent Temp	???? ????
% Full Load Amps	???? ????
Evap Refrig Press	???? ????
Cond Refrig Press	???? ????
Comp Dis Refrig Temp	???? ????
Evap Refrig Temp	???? ????
Cond Refrig Temp	???? ????
CHW Setpoint	???? ????
Cond Water Flow	???? ????
CHW Flow	???? ????

Chiller 5-LT Parameters

System Reset	???? ????
System Eanble	???? ????
Runtime Rotate	???? ????
Rot SCHW Pumps	???? ????
Pump Down Time	???? ????
Pump Runtime Reset	???? ????
Lead Chiller Fail	???? ????
Rot Chillers	???? ????
CH Runtime Reset	???? ????
PCHWP-5A in Hand	???? ????
PCHWP-5A Runtime	???? ????
CH-5 Alm CH Panel	???? ????
CH-5 Runtime Exd	???? ????

Facility Name - Hot Water Plant Overview

???? ????
???? ????

HW Plant Efficiency
???? ????

BLR-1 Supply
???? ????

BLR-1 Return
???? ????

Boiler 1 Detail
Hidden Data Link
Typical of all equipment

Boiler 01
12000 MBH
% Firing Range
???? ????

HWP-1

HWP-1
Sts ???? ????
Cmd ???? ????

Mixing Valve
???? ????

HW Supply
???? ????

SHWP-1
Sts ???? ????
Cmd ???? ????

HWS

VFD-1

SHWP-1

BLR-2 Supply
???? ????

HW-Diff Press
???? ????

BLR-2 Return
???? ????

VFD-2

SHWP-2

HWP-2

HWP-2
Sts ???? ????
Cmd ???? ????

SHWP-2
Sts ???? ????
Cmd ???? ????

Boiler 02
12000 MBH
% Firing Range
???? ????

HW Return
???? ????

HWR

TriStar Skyline MEDICAL CENTER

FLOOR | CHW | HW | STEAM | AHU | ENERGY | EPSS | ALARMS | AUX | LEGEND

FACILITIGROUP Infrastructure Solutions

Facility Name - Hot Water Plant Overview

???? ????
???? ????

HW Boiler capacity should always be written in MBH (1000 BTU/hr)

HW Plant Efficiency
???? ????

BLR-1 Supply
???? ????

BLR-1 Return
???? ????

Boiler 1 Detail
Hidden Data Link
Typical of all equipment

Boiler 01
12000 MBH
% Firing Range
???? ????

HWP-1
Sts ???? ????
Cmd ???? ????

Mixing Valve
???? ????

HW Supply
???? ????

SHWP-1
Sts ???? ????
Cmd ???? ????

HWS

VFD-1

SHWP-1

BLR-2 Supply
???? ????

HW-Diff Press
???? ????

BLR-2 Return
???? ????

VFD-2

SHWP-2

HWP-2
Sts ???? ????
Cmd ???? ????

SHWP-2
Sts ???? ????
Cmd ???? ????

Boiler 02
12000 MBH
% Firing Range
???? ????

HW Return
???? ????

HWR

TriStar Skyline MEDICAL CENTER

FLOOR | CHW | HW | STEAM | AHU | ENERGY | EPSS | ALARMS | AUX | LEGEND

FACILITIGROUP Infrastructure Solutions

Facility Name - Steam Boiler Plant Overview

???? ????
???? ????

Boiler 1 Detail
Hidden Data Link
Typical of all equipment

Steam Flow ???? ????

Pressure ???? ????

Steam Plant Efficiency ???? ????

Natural Gas ???? ????

BLR-1
400 BHP
% Firing Range ???? ????

Feed Water ???? ????

BLR-1
400 BHP
% Firing Range ???? ????

Feed Water ???? ????

Make Up Water ???? ????

FWP1
FWP2
FWP3

DA Tank

From Condensate Return Unit

FW Pump-1
Sts ???? ????
Cmd ???? ????

FW Pump-2
Sts ???? ????
Cmd ???? ????

FW Pump-3
Sts ???? ????
Cmd ???? ????

1/3 Vlv Output ???? ????

2/3 Vlv Output ???? ????

HX Detail

HX-1

To Consensate Return Unit

HWP - 1
HWP - 2

HWR

HWS

PFHX-1 Parameters
HwsTmp ???? ????
HwrTmp ???? ????
Hw GPM ???? ????
Load ???? ????

1/3 Vlv Output ???? ????

2/3 Vlv Output ???? ????

HX-2

To Consensate Return Unit

HWP - 3
HWP - 4

HWR

HWS

PFHX-2 Parameters
HwsTmp ???? ????
HwrTmp ???? ????
Hw GPM ???? ????
Load ???? ????

STM

HX Details

TriStar Skyline MEDICAL CENTER

FLOOR | CHW | HW | STEAM | AHU | ENERGY | EPSS | ALARMS | AUX | LEGEND

FACILITIGROUP Infrastructure Solutions

Facility Name - Steam Boiler Plant Overview

Steam boiler capacity should always be written in units of BHP (Boiler Horsepower)

State Square added on inline pumps. Green=ON, Blue = OFF. Pumps with analog output values shall have a value box in addition to the state square.

Boiler 1 Detail
Hidden Data Link
Typical of all equipment

Steam Flow
Pressure
Steam Plant Efficiency
Natural Gas
Feed Water
BLR-1
400 BHP
% Firing Range
Make Up Water
DA Tank
From Condensate Return Unit
FWP1
FWP2
FWP3
FW Pump-1
FW Pump-2
FW Pump-3
Sts
Cmd
1/3 Vlv Output
2/3 Vlv Output
HX Detail
HX-1
HX-2
To Consensate Return Unit
HWP - 1
HWP - 2
HWP - 3
HWP - 4
HWR
HWS
STM
PFHX-1 Parameters
PFHX-2 Parameters
HwsTmp
HwrTmp
Hw GPM
Load
HX Details

This is the preferred way to show the continuation of a pipe

TriStar Skyline MEDICAL CENTER

FLOOR | CHW | HW | STEAM | AHU | ENERGY | EPSS | ALARMS | AUX | LEGEND

FACILITIGROUP Infrastructure Solutions

Facility Name - Electrical System

???? ????
???? ????

Feed 1
???? ????
???? ????
???? ????
???? ????

Feed 2
???? ????
???? ????
???? ????
???? ????

???? A
???? A
???? A
???? A

Generator
???? ????
???? ????
???? ????
???? ????

Fuel Oil Tank

Fuel Oil Tank
Capacity ???? ????
Remaining ???? ????

Total kW
???? ????

Generator
Manufacturer ???? ????
Capacity ???? ????
Command ???? ????
Status ???? ????

ATS 01
???? A
Life Safety
???? ????
???? ????
???? ????
???? ????
???? ????

ATS 02
???? A
Equipment
???? ????
???? ????
???? ????
???? ????
???? ????

???? A
???? A
???? A
???? A
???? A
???? A
???? A
???? A

Chiller 1
???? ????
???? ????
???? ????
???? ????

Chiller 2
???? ????
???? ????
???? ????
???? ????

Floors 1-2

MRI
???? ????
???? ????
???? ????
???? ????

CAT
???? ????
???? ????
???? ????
???? ????

Floors 3-5

MRI
???? ????
???? ????
???? ????
???? ????

CAT
???? ????
???? ????
???? ????
???? ????

TriStar Skyline MEDICAL CENTER

FLOOR CHW HW STEAM AHU ENERGY EPSS ALARMS AUX LEGEND

FACILITIGROUP Infrastructure Solutions

Facility Name - Electrical System

???? ????
???? ????

Feed 1
???? ????
???? ????
???? ????
???? ????

Feed 2
???? ????
???? ????
???? ????
???? ????

V - Voltage
A - Amperage
kW - kilowatts
PF - Power Factor

???? A
???? A
???? A
???? A

Generator
???? ????
???? ????
???? ????
???? ????

Fuel Oil Tank

Fuel Oil Tank
Capacity ???? ????
Remaining ???? ????

Total kW
???? ????

Generator
Manufacturer ???? ????
Capacity ???? ????
Command ???? ????
Status ???? ????

State Squares. Green=Normal Power,
Red=Emergency Power

ATS Capacity, in Amps (A), static value

ATS 01
???? A
Life Safety
???? ????
???? ????
???? ????
???? ????
???? ????

ATS 02
???? A
Equipment
???? ????
???? ????
???? ????
???? ????
???? ????

Vs1
Vs2
Hzs1
Hzs2

Vs1
Vs2
Hzs1
Hzs2

Additional Info

???? A
Chiller 1
???? ????
???? ????
???? ????
???? ????

???? A
Chiller 2
???? ????
???? ????
???? ????
???? ????

???? A
Floors 1-2

???? A
MRI
???? ????
???? ????
???? ????
???? ????

???? A
CAT
???? ????
???? ????
???? ????
???? ????

???? A
Floors 3-5

???? A
MRI
???? ????
???? ????
???? ????
???? ????

???? A
CAT
???? ????
???? ????
???? ????
???? ????

Facility Name - VAV Summary

???? ????
???? ????

Equipment	Mode	ZnTmp deg F	ZnTmpSpt deg F	ReHtVlv % Open	DaCFM CFM	DaCFMSpt CFM	DmprPos % Open
VV 01-101 - Area Served	????	????	????	????	????	????	????
VV 01-102 - Area Served	????	????	????	????	????	????	????
VV 01-103 - Area Served	????	????	????	????	????	????	????
VV 01-104 - Area Served	????	????	????	????	????	????	????
VV 01-105 - Area Served	????	????	????	????	????	????	????
VV 01-106 - Area Served	????	????	????	????	????	????	????
VV 01-107 - Area Served	????	????	????	????	????	????	????
VV 01-108 - Area Served	????	????	????	????	????	????	????
VV 01-109 - Area Served	????	????	????	????	????	????	????
VV 01-110 - Area Served	????	????	????	????	????	????	????
VV 01-111 - Area Served	????	????	????	????	????	????	????
VV 01-112 - Area Served	????	????	????	????	????	????	????
VV 01-113 - Area Served	????	????	????	????	????	????	????
VV 01-114 - Area Served	????	????	????	????	????	????	????
VV 01-115 - Area Served	????	????	????	????	????	????	????
VV 01-116 - Area Served	????	????	????	????	????	????	????
VV 01-117 - Area Served	????	????	????	????	????	????	????
VV 01-118 - Area Served	????	????	????	????	????	????	????
VV 01-119 - Area Served	????	????	????	????	????	????	????
VV 01-120 - Area Served	????	????	????	????	????	????	????
VV 01-121 - Area Served	????	????	????	????	????	????	????
VV 01-122 - Area Served	????	????	????	????	????	????	????
VV 01-123 - Area Served	????	????	????	????	????	????	????
VV 01-124 - Area Served	????	????	????	????	????	????	????

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AHU 01 Summary			
Econ State	????	ChwVlvPos	????
SaTmp	????	HwVlvPos	????
RaTmp	????	BoxTotCFM	????
RaRh	????	Total Load	????

Chiller Summary			
Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Boiler Summary			
Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

Links to individual VAV graphic

Facility Name - VAV Summary

???? ????
???? ????

Equipment	Mode	ZnTmp deg F	ZnTmpSpt deg F	ReHtVlv % Open	DaCFM CFM	DaCFMSpt CFM	DmprPos % Open
VV 01-101 - Area Served	????	????	????	????	????	????	????
VV 01-102 - Area Served	????	????	????	????	????	????	????
VV 01-103 - Area Served	????	????	????	????	????	????	????
VV 01-104 - Area Served	????	????	????	????	????	????	????
VV 01-105 - Area Served	????	????	????	????	????	????	????
VV 01-106 - Area Served	????	????	????	????	????	????	????
VV 01-107 - Area Served	????	????	????	????	????	????	????
VV 01-108 - Area Served	????	????	????	????	????	????	????
VV 01-109 - Area Served	????	????	????	????	????	????	????
VV 01-110 - Area Served	????	????	????	????	????	????	????
VV 01-111 - Area Served	????	????	????	????	????	????	????
VV 01-112 - Area Served	????	????	????	????	????	????	????
VV 01-113 - Area Served	????	????	????	????	????	????	????
VV 01-114 - Area Served	????	????	????	????	????	????	????
VV 01-115 - Area Served	????	????	????	????	????	????	????
VV 01-116 - Area Served	????	????	????	????	????	????	????
VV 01-117 - Area Served	????	????	????	????	????	????	????
VV 01-118 - Area Served	????	????	????	????	????	????	????
VV 01-119 - Area Served	????	????	????	????	????	????	????
VV 01-120 - Area Served	????	????	????	????	????	????	????
VV 01-121 - Area Served	????	????	????	????	????	????	????
VV 01-122 - Area Served	????	????	????	????	????	????	????
VV 01-123 - Area Served	????	????	????	????	????	????	????
VV 01-124 - Area Served	????	????	????	????	????	????	????

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Links to individual equipment detail pages.

AHU 01 Summary			
Econ State	????	ChwVlvPos	????
SaTmp	????	HwVlvPos	????
RaTmp	????	BoxTotCFM	????
RaRh	????	Total Load	????

Chiller Summary			
Chiller 01	????	ChwsTmp	????
Chiller 02	????	ChwrTmp	????
Chiller 03	????	SChwGPM	????
Chiller 04	????	Total Load	????

Boiler Summary			
Boiler 01	????	HwsTmp	????
Boiler 02	????	HwrTmp	????
		HwGPM	????
		Total Load	????

[Insert Your Logo Here] [Vendor Logo Here]

General Exhaust Fan Functional Performance Test

Reference		Date	

Description	Attribute	
Test Procedure: Command fan on.		
Expected Response: Fan is on.		Y/N
Test Procedure: Command fan off.		
Expected Response: Fan is off.		Y/N
Test Procedure: With fan commanded on, fail fan.		
Expected Response: Fan turns off.		Y/N
Expected Response: Alarm is sent to BAS.		Y/N
Test Procedure: Simulate belt failure while fan is commanded on.		
Expected Response: Alarm is sent to BAS.		Y/N

[Insert your/vendor logo here]

Heating Hot Water Functional Performance Test

Date		Equipment	

Location	

1	System Configuration	Response	
	Number of Heat Recovery Chillers		#
	Number of HW Boilers		#
	Number of HW Pumps		#
	Flow Meter Installed		Y/N
	Parameters	**Value**	
	Outside Air Temperature		°F
	Outside Air Humidity		%RH
	Hot Water Supply Temperature Setpoint		°F
	Hot Water Supply Temperature		°F
	Hot Water Return Temperature		°F
	Heat Recovery Chiller Status		%
	Lead Boiler Status		%
	Differential Pressure Setpoint		psi
	Differential Pressure		psi
	Lead Pump Status		%
	HW System Flow		GPM
	HW System Load		BTU

2	System Disabled	Response	
	Test Procedure: Disable HW system at BAS.		
	Expected Response: All HOA switches are in auto.		Y/N
	Expected Response: HW Pumps are off.		Y/N
	Expected Response: Heat Recovery Chiller is off.		Y/N
	Expected Response: HW boilers are off.		Y/N
	Expected Response: BAS updates to each condition.		Y/N

3	System Enabled	Response	
	Test Procedure: Enable HW system from BAS.		
	Expected Response: Heat recovery chiller HW and CHW isolation valves open.		Y/N
	Expected Response: Lead HW pump energizes and modulates to maintain DP SP.		Y/N
	Expected Response: Heat recovery pumps energize.		Y/N
	Expected Response: Heat recovery chiller modulates to maintain HW supply temperature setpoint.		Y/N
	Expected Response: BAS updates to each condition.		Y/N

4	HW Pump Control	Response	
4a.	Record DP setpoint.		psi
	Record DP.		psi
	Record pump VFD%.		%
4b.	**Test Procedure: Vary DP setpoint.**		
	Expected Response: Pump modulates to maintain new DP SP.		Y/N
4c.	**Test Procedure: Fail lead pump.**		
	Expected Response: Lag pump energizes.		Y/N
	Expected Response: Alarm is sent to BAS.		Y/N
4d.	**Test Procedure: Fail lag pump.**		
	Expected Response: Standby pump energizes.		Y/N
	Expected Response: Alarm is sent to BAS.		Y/N
4e.	**Test Procedure: Simulate DP too high.**		
	Expected Response: High DP alarm is initiated at BAS.		Y/N
4f.	**Test Procedure: Simulate DP too low.**		
	Expected Response: Low DP alarm is initiated at BAS.		Y/N

[Insert your/vendor logo here]

Heating Hot Water Functional Performance Test

5	HW Temperature Control	Response	
5a.	Record HW supply temperature setpoint.		°F
	Record HW supply temperature.		°F
	Record heat pump status.		%
	Record lead boiler status.		%
5b.	**Test Procedure: Raise HW supply temperature setpoint.**		
	Expected Response: Heat recovery chiller modulates to maintain new SP.		Y/N
	Expected Response: Once heat recovery chiller is 100%, lead boiler pump and boiler energize and boiler modulates to maintain HW supply temperature SP.		Y/N
5c.	**Test Procedure: Further raise HWS temperature.**		
	Expected Response: As capacity requires, lag boilers energize with boiler pump and modulate with lead boiler and heat recovery chiller to maintain HW supply temperature SP.		Y/N
5d.	**Test Procedure: Lower HWS temperature SP.**		
	Expected Response: Boilers stage down as load requires while heat recovery chiller stays in operation.		Y/N
5e.	**Test Procedure: Fail lead boiler while in operation.**		
	Expected Response: Lag boiler pump and boiler energize and modulate to maintain HW supply temperature.		Y/N
	Expected Response: BAS updates to each condition.		Y/N

6	Hot Water Temperature Reset Schedule	Response	
6a.	Record outside air temperature reset schedule.		
6b.	**Test Procedure: Simulate OAT greater than high limit of reset scheduled.**		
	Expected Response: HW supply temperature setpoint resets to low end of reset schedule.		Y/N
6c.	**Test Procedure: Simulate OAT is in middle of reset schedule.**		
	Expected Response: HW supply temperature setpoint resets to middle of reset schedule.		Y/N
6d.	**Test Procedure: Simulate OAT less than low limit of reset scheduled.**		
	Expected Response: HW supply temperature setpoint resets to high end of reset schedule.		Y/N
	Expected Response: BAS updates to each condition.		Y/N

7	Differential Pressure Reset Control	Response	
7a.	Record differential pressure reset range.		PSI
	Record most open critical zone valve position target.		%
	Record most open critical zone valve position.		%
7b.	**Test Procedure: Simulate most open critical valve above target position.**		
	Expected Response: DP setpoint is raised in increments to high limit until valve position is at the target.		Y/N
	Expected Response: HW pump modulates to maintain DP SP.		Y/N
	Expected Response: Non-critical valve positions are ignored for HW DP reset.		Y/N
7c.	**Test Procedure: Simulate most open critical valve below target position.**		
	Expected Response: DP setpoint is lowered in increments to low limit until valve position is at the target.		Y/N
	Expected Response: HW pump modulates to maintain DP SP.		Y/N
	Expected Response: BAS updates to each condition.		Y/N

[Insert Your Logo Here] [Vendor Logo Here]

ISOLATION ROOM FUNCTIONAL PERFORMANCE TEST

Isolation Room #		Date	

1	Parameters	Response	
	Space Temperature Setpoint		°F
	Space Temperature		°F
	Supply Airflow Setpoint		CFM
	Supply Airflow		CFM
	Exhaust Airflow		CFM
	CFM Offset Setpoint		CFM
	CFM Offset		CFM
	Space Differential Pressure		inches
	Supply Damper Position		%
	Exhaust Damper Position		%
	AHU Discharge Air Temperature		°F
	Terminal Discharge Air Temperature		°F

2	Normal Operation	Response	
2a.	**Test Procedure: Isolation room is under normal operation.**		
	Expected Response: Exhaust damper modulates to maintain CFM setpoint.		Y/N
	Expected Response: Supply damper modulates to maintain CFM offset.		Y/N
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
	Expected Response: Isolation fan modulates to maintain static pressure setpoint.		Y/N
2b.	**Test Procedure: Raise space temperature setpoint.**		
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
	Expected Response: Supply and exhaust dampers modulate to maintain CFM setpoint and CFM offset.		Y/N
2c.	**Test Procedure: Lower space temperature setpoint.**		
	Expected Response: HW valve closes.		Y/N
	Expected Response: Supply and exhaust dampers modulate to maintain CFM setpoint and CFM offset.		Y/N
	Expected Response: Space differential pressure is below -0.01".		Y/N
	Record: Space differential pressure.		inches
	Expected Response: Space pressure monitor can be seen from BAS.		Y/N
2d.	**Test Procedure: Simulate space pressure is above -0.01" by opening door.**		
	Expected Response: Alarm is sent to nurse station.		Y/N
	Expected Response: Alarm is sent to BAS.		Y/N
2e.	**Test Procedure: Fail isolation exhaust fan.**		
	Expected Response: Alarm is sent to BAS.		Y/N
2f	**Test Procedure: Simulate broken belt while fan is running.**		
	Expected Response: Alarm is sent to BAS stating belt is broken.		Y/N

[Insert Your Logo Here] [Vendor Logo Here]

OPERATING ROOM FUNCTIONAL PERFORMANCE TEST

Date		OR #	

1	Parameters	Response	
	Space Temperature Setpoint		°F
	Space Temperature		°F
	Space Humidity Setpoint		%
	Space Humidity		%
	Occupied Supply Airflow Setpoint		CFM
	Supply Airflow		CFM
	Unoccupied Supply Airflow Setpoint		CFM
	Return Airflow		CFM
	CFM Offset Setpoint		CFM
	CFM Offset		CFM
	Space Differential Pressure		inches
	Supply Damper Position		%
	Return Damper Position		%
	AHU Discharge Air Temperature		°F
	Terminal Discharge Air Temperature		°F

2	Occupied Mode	Response	
2a.	**Test Procedure: Schedule OR in occupied mode from BAS.**		
	Expected Response: Supply damper modulates to maintain occupied supply CFM setpoint.		Y/N
	Expected Response: Return damper modulates to maintain CFM offset.		Y/N
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
2b.	**Test Procedure: Raise space temperature setpoint.**		
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
	Expected Response: Supply and return dampers modulate to maintain occupied CFM setpoints and CFM offset.		Y/N
2c.	**Test Procedure: Lower space temperature setpoint.**		
	Expected Response: HW valve closes.		Y/N
	Expected Response: Supply and return dampers modulate to maintain occupied CFM setpoints and CFM offset.		Y/N
	Expected Response: Space differential pressure is greater than +0.01".		Y/N
	Record space differential pressure.		inches
	Expected Response: Space pressure monitor can be seen from BAS.		Y/N
2d.	**Test Procedure: Simulate space temperature above high temperature alarm setpoint.**		
	Expected Response: Alarm is sent to BAS.		Y/N
2e.	**Test Procedure: Simulate space humidity above high humidity alarm setpoint.**		
	Expected Response: Alarm is sent to BAS.		Y/N
2f.	**Test Procedure: Simulate space pressure is below +0.01" by opening door.**		
	Expected Response: Alarm is sent to BAS.		Y/N

3	Unoccupied Mode	Response	
3a.	**Test Procedure: Schedule OR in unoccupied mode from BAS.**		
	Expected Response: Supply damper modulates to maintain unoccupied supply CFM offset.		Y/N
	Expected Response: Return damper modulates to maintain space pressure above +0.01".		Y/N
	Expected Response: During transition from occupied to unoccupied, OR space pressure never drops to negative pressure.		Y/N
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
	Record space differential pressure.		inches
	Expected Response: OR space temperature SP resets to 68°F.		Y/N

3b.	**Test Procedure: Press 3-hour override switch at Nurse's Station or Pressure Monitor.**		
	Expected Response: OR goes into occupied mode.		Y/N
	Expected Response: Supply damper modulates to occupied supply CFM setpoint.		Y/N
	Expected Response: Return damper modulates to maintain CFM offset.		Y/N
	Expected Response: Space temperature setpoint is controlled off OR thermostat.		Y/N
	Expected Response: HW valve modulates to maintain space temperature setpoint.		Y/N
	Expected Response: Once timer has ended, OR reverts back to schedule.		Y/N

4	**Fire Alarm**	**Response**	
4a.	**Test Procedure: Simulate smoke detector trips in OR.**		
	Expected Response: Alarm is sent to BAS.		Y/N
	Expected Response: OR stays in normal operation.		Y/N
	Expected Response: If separate smoke exhaust damper is installed, return damper closes and smoke exhaust damper opens.		Y/N
	Expected Response: AHU serving OR stays in normal operation until return smoke detector is tripped.		Y/N
	Expected Response: Once AHU senses smoke, unit goes into smoke purge mode.		Y/N

[Insert Your Logo Here] [Vendor Logo Here]

VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
1													
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VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
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VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
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[Insert Your Logo Here] [Vendor Logo Here]

VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
88													
89													
90													
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116													

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VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
117													
118													
119													
120													
121													
122													
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VAV Trend Data

Date:	
Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
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VAV Trend Data

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Facility Name:	
Project:	
AHU:	

VAV Box I.D.	
Design Heating CFM:	
Design Cooling CFM:	

Line No.	Date / Time	Zone T-Stat Set Pt	Cooling Set Pt	Heating Set Pt	Actual Zone Temp	Air Terminal Box DAT	Reheat Valve Cmd Pos	Actual CFM	Heating CFM Set Pt	Cooling CFM Set Pt	Box Damper Cmd Pos	AHU DAT	Heating HW Temp
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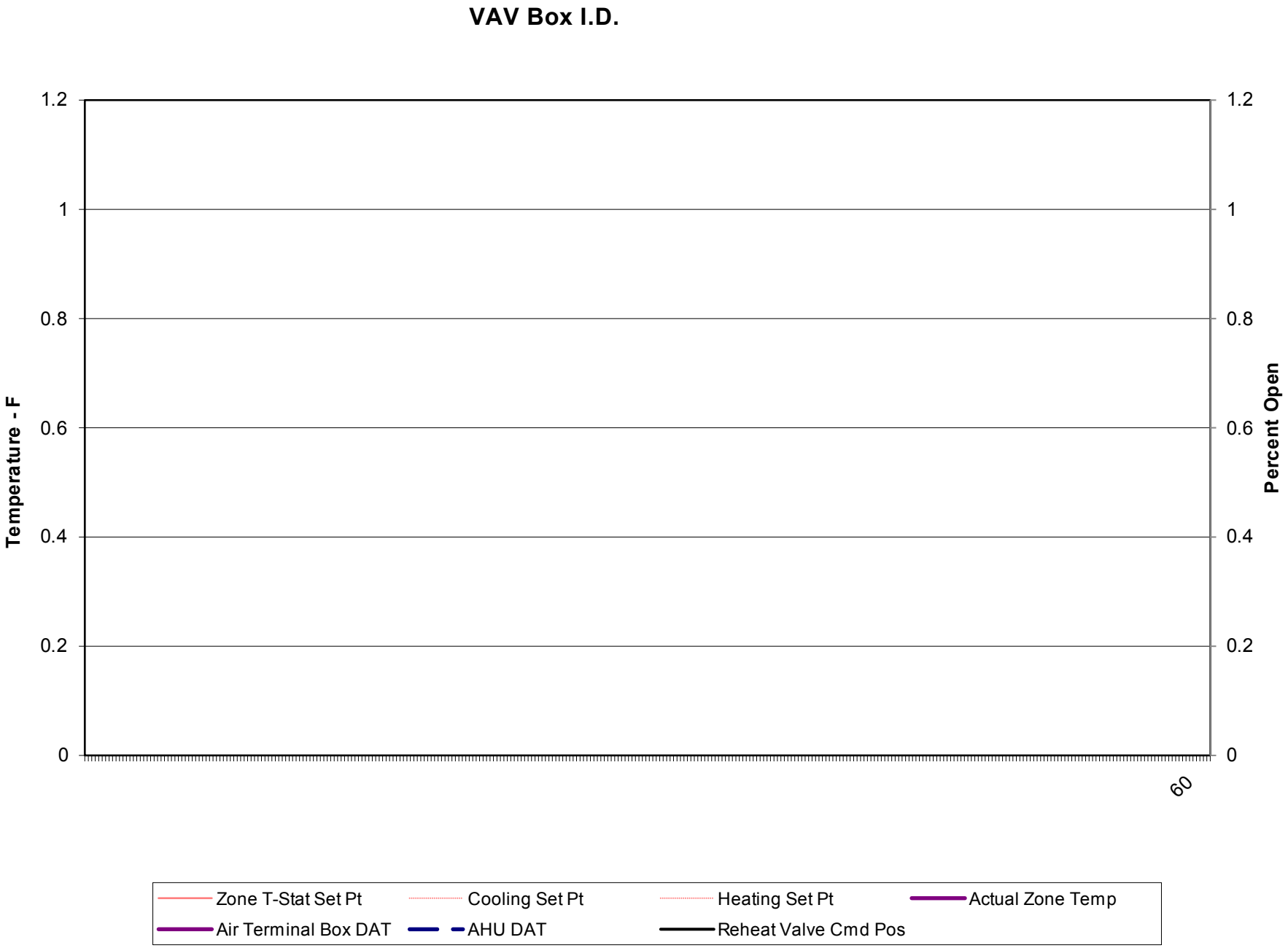
VAV Box I.D.
Temperature - F
Percent Open
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Zone T-Stat Set Pt
Cooling Set Pt
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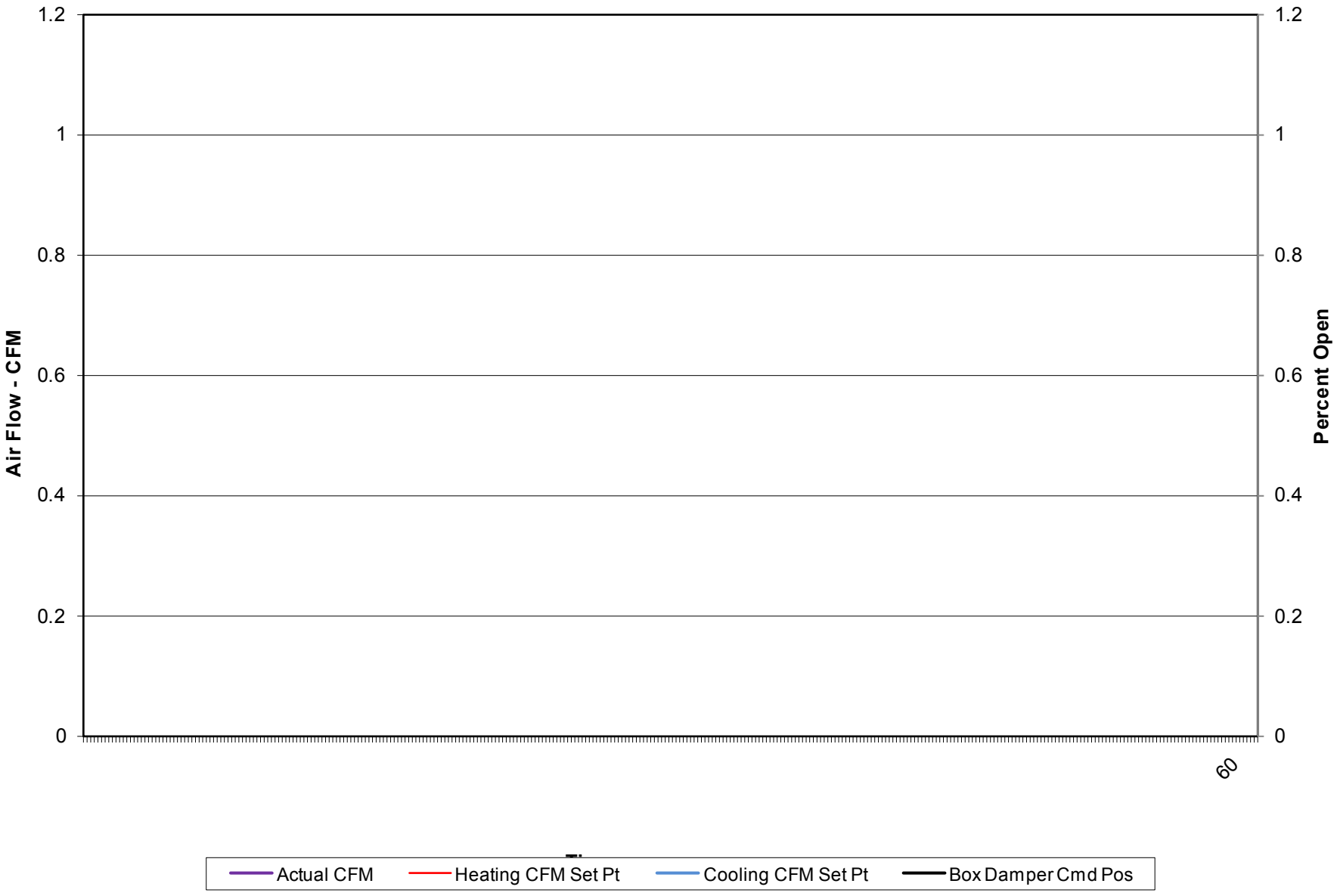
AHU DAT
Reheat Valve Cmd Pos


VAV Box I.D.
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Air Flow - CFM
Percent Open
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Actual CFM
Heating CFM Set Pt
Cooling CFM Set Pt
Box Damper Cmd Pos

SECTION 024119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 “Summary” for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 015639 “Temporary Tree and Plant Protection” for temporary protection of existing trees and plants that are affected by selective demolition.
3. Section 017300 “Execution” for cutting and patching procedures.
4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements
5. Section 017419 “Construction and Demolition Waste Management.”

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing condition, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at the Project Site.

1. Inspect and discuss condition of construction to be selectively demolished.

2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

5. Review areas where existing construction is to remain and requires protection.

6. Review Section 017419 “Construction and Demolition Waste Management” for actions required prior to demolition.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure on-site operations to existing buildings are uninterrupted.

2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.

4. Use of elevator and stairs.

5. Coordination of Owner's continuing occupancy of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Pre-demolition Photographs or Video: Submit before Work begins.

F. Statement of Refrigerant Recover: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 Quality Assurance

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

1.9 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner’s operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect/Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.

2. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.

2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

3. Retain subparagraph below if hazardous materials are known to be present. Delete if Owner does not have, or will not provide, material safety data sheets for these materials.

4. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

G. Storage or sale of removed items or materials on-site is not permitted.

H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with all local, state, and federal regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform survey as the Work progresses to detect hazards resulting from selective demolition activities.

2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or preconstruction videotapes, and/or field-located surveys and provide information to Owner.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.

2. Arrange to shut off indicated utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

c. Equipment to Be Removed: Disconnect and cap services and remove requirement.

d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment and deliver to Owner.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 “Temporary Facilities and Controls.”

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.

5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 “Temporary Facilities and Controls.”

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations.

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction and Demolition Waste Management."

B. Work in Historic Areas: Selective demolition may be performed only in areas of the Project that are not designated as historic. In historic spaces, areas, and rooms or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling".

C. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

D. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, cleaned, and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings. Do not use methods requiring solvent-based adhesive strippers.

F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Coordinate first subparagraph below with use of elevators, stairs, or building entries permitted by building manager.

4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

5. Comply with requirements specified in Section 017419 "Construction and Demolition Waste Management."

B. Burning: Do not burn demolished materials.

C. Burning: Burning of demolished materials will be permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Transport demolished materials and dispose of at designated spoil areas on Owner's property

E. Disposal: Transport demolished materials off Owner’s property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Existing Items to Be Removed: See construction drawings.

B. Existing Items to Be Removed and Salvaged: See construction drawings.

C. Existing Items to Be Removed and Reinstalled: See construction drawings.

D. "Existing Items to Remain" Paragraph below may be used to inform Contractor of items that are to remain, such as those that occur in, or are adjacent to, construction being demolished, but are not being removed and reinstalled. Retain paragraph if required.

E. Existing Items to Remain: See construction drawings.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 024119

SECTION 03 1000
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes the design and erection of formwork, shoring and reshoring for cast-in-place concrete and accessories.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 03 2000 - Concrete Reinforcement.

C. Section 03 3000 - Cast-in-Place Concrete.

1.3 REFERENCES

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

B. ACI 301 - Standard Specifications for Structural Concrete.

C. ACI 318 - Building Code Requirements for Structural Concrete.

D. ACI 347 - Recommended Practice for Concrete Formwork.

E. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

F. ASTM E1643-09 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact With Earth or Granular Fill Under Concrete Slabs.

G. ASTM E1745-09 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.4 SUBMITTALS

A. Submit locations of construction joints for approval.

B. Submit manufacturer's data for waterstops.

1.5 DESIGN OF FORMWORK

A. Design of formwork, shoring, and reshoring and its removal is the sole responsibility of the Contractor.

B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.

C. Design formwork in a manner such that existing or new construction is not overloaded.

D. The formwork engineer shall verify adequate structural stability exists for intermediate pours on a given floor when developing a re-shoring plan. Any unstable areas must remain fully shored until the total elevated floor area has been completed and achieved required concrete strength (tendons fully stressed as well if PT slab/beam system).

E. Do not remove shores earlier than recommended by ACI 301 and ACI 347.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Construct forms with wood, plywood, metal, fiberglass or a combination of these.

B. Form materials shall have sufficient strength to prevent distortion.

2.2 FORMWORK ACCESSORIES

A. Formwork accessories that are embedded in concrete, including ties and hangers, shall be commercially manufactured products. Do not use nonfabricated wire form ties.

2.3 FORM RELEASE AGENT

A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

2.4 WATERSTOPS

A. Waterstops at construction joints and control joints indicated by the Drawings shall be sized to suit the joints.

B. Waterstops shall be preformed plastic adhesive waterstops as manufactured by SYNKO-FLEX Products or approved equal.

2.5 VAPOR RETARDER

A. Vapor retarder shall consist of a material having a permeance rating of 0.100 perm or less, when tested in accordance with ASTM E1745, and not less than ten mils thick.

2.6 PREFORMED EXPANSION JOINT FILLER

A. Asphalt impregnated premolded fiberboard expansion joint filler shall conform with ASTM D1751 and be 1/2-inch thick by full thickness of slab or joint, unless indicated otherwise on the Drawings.

2.7 CONSTRUCTION JOINTS

A. Provide key type steel forms by Vulcan screed joints, Burke Keyed Kold joint form or approved equal.

2.8 STAY IN PLACE FORMWORK

A. Stay in place formwork shall be one of the following approved products:
   1. Dayton Superior Metal Rib as manufactrured by Dayton Superior
   2. Stay-Form as manufactured by Amico

PART 3 - EXECUTION

3.1 GENERAL

A. Erect formwork in accordance with ACI 301, ACI 318, and ACI 347.

B. Maintain formwork and shoring to support loads until such loads can be supported by concrete structure.

3.2 TOLERANCES

A. Finished work shall comply with ACI 117 tolerances.

3.3 SURFACE PREPARATION

A. For concrete exposed to view, seal form joints to prevent leakage.

B. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

3.4 CHAMFERS

A. Provide 3/4-inch chamfer at all formed corners.

B. Chamfers are not required for concrete tie-beams and tie-columns embedded in CMU walls.

3.5 FOUNDATION ELEMENTS

A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.

B. Sides of foundation walls and turned-down slabs shall be formed.

C. Maintain minimum coverage of reinforcing steel as indicated on Structural Drawings.

3.6 INSERTS

A. Install and secure in position required inserts, hangers, sleeves, anchors, and nailers.

B. Locate anchor bolts by using templates with two nuts to secure in position.

3.7 EMBEDS

A. Set and secure embedded plates, bearing plates, and anchor bolts in accordance with approved setting drawings and in such a manner to prevent displacement during placement of concrete.

3.8 VAPOR RETARDER

A. Install Vapor Retarder to resist the transmission of water vapor through the exterior envelope.

B. Where indicated on Drawings, place vapor retarder over sewer and piping, but below conduits and ducts, and behind insulation and expansion joints at sidewalls.

C. Place, protect and repair vapor retarder in accordance with ASTM E1643. Lap vapor retarder six inches minimum at splices, sealing joints as required by the manufacturer with adhesive or pressure sensitive tape or both.

D. Do not puncture vapor retarder.

E. Vapor Retarder shall be installed above granular sub-base.

3.9 FORM REMOVAL

A. Remove forms carefully in such manner and at such time as to ensure complete safety of structure. Do not remove forms shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.

3.10 PROVISIONS FOR OTHER TRADES

A. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades providing such items.

B. Accurately place and securely support items built into forms. Obtain approval for openings not shown on Drawings.

3.11 CLEANING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

3.12 FORM SURFACES

A. Coat contact surfaces of forms with a formcoating compound before reinforcement is placed. Apply in accordance with manufacturer's recommendations. Rust-stained steel formwork is not acceptable.

3.13 CONSTRUCTION JOINTS

A. Provide construction joints in accordance with ACI 318.

B. Obtain Architect/Structural Engineer's prior approval for use and location of joints.

C. Unless noted otherwise on the structural drawings, provide 1-1/2 inch deep key type construction joints at end of each placement for slabs, beams, walls, and footings. Bevel forms for easy removal.

D. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

ISSUED	DATE
Early Release Package	12/06/2021

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

C. Section 03 1000 - Concrete Formwork.

D. Section 03 3000 - Cast-in-Place Concrete.

1.2 REFERENCES

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

B. ACI 301 - Standard Specifications for Structural Concrete.

C. ACI 315 - Details and Detailing of Concrete Reinforcement.

D. ACI 318 - Building Code Requirements for Structural Concrete.

E. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

F. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

G. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

H. AWS D12.1 - Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.

I. AWS D1.4 - Structural Weld Code - Reinforcing Steel.

J. CRSI - Manual of Practice, and Documents 63 and 65.

1.3 SUBMITTALS

A. Submit shop drawings as follows:
   1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.
   2. Indicate size, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.
   3. Plans, details, and manufacturer data for splicers, headed shear stud reinforcement, and plate dowels as applicable to the project. Submit dowel adhesive unless already approved in the structural documents.
   4. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.
   5. Reproduction of Structural Drawings for shop drawings is not permitted.

B. Submit, for information only, a certification from each manufacturer or supplier stating that materials meet the requirements of the ASTM and ACI standards referenced.

C. Submit, for information only, mill test reports.

D. Submit manufacturer's data for tensile and compressive splicers.

1.4 QUALITY ASSURANCE

A. Coordinate and schedule in a timely manner with the Structural Testing/Inspection Agency the following quality related items:
   1. Verify reinforcing steel for quantity, size, location, and support.
   2. Verify proper reinforcing steel concrete coverage.

1.5 STORAGE AND PROTECTING

A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings which might impair bond.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Deformed reinforcing steel shall conform to ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).

B. Welded steel wire fabric shall conform to ASTM A1064.

2.2 ACCESSORY MATERIALS

A. Annealed steel tie wire shall be 16-1/2 gage minimum.

B. Bar supports shall be plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

2.3 SPLICERS

A. Tensile splicers shall be capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

B. Compression splicers shall be the mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

PART 3 - EXECUTION

3.1 FABRICATION

A. Fabricate steel in accordance with ACI 318 and CRSI standards.

B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved by Structural Engineer and checked by Testing and Inspection Agency for cracks.

C. Weld only as indicated. Perform welding in accordance with AWS D12.1 and or AWS D1.4.

D. Tag reinforcing steel for easy identification.

3.2 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles and coatings.

B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.

C. Place concrete beam reinforcement support parallel to main reinforcement.

D. Locate welded wire fabric in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.

E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.

F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

3.3 SPLICES

A. Do not splice reinforcement except as indicated on Structural Drawings.

B. Tension couplers may be used and installed in accordance with manufacturer's specifications.

3.4 DOWELS IN EXISTING CONCRETE

A. Install dowels and dowel adhesive in accordance with manufacturer’s recommendations.

B. Minimum embedment length shall be 12 bar diameters, unless noted otherwise.

ISSUED	DATE
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END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes cast-in-place concrete work indicated in the Contract Documents or otherwise required for proper completion of the work.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

C. Section 03 1000 - Concrete Formwork.

D. Section 03 2000 - Concrete Reinforcement.

E. Section 03 6200 - Non-Shrink Grout.

F. Section 05 1200 - Structural Steel.

G. Division 9 - Flooring and Finishes.

1.3 REFERENCES

A. ACI 214 - Recommended Practice for Evaluation of Strength Test Results of Concrete.

B. ACI 224.3R - Joints in Concrete Construction.

C. ACI 233R - Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete.

D. ACI 301 - Specifications for Structural Concrete for Buildings.

E. ACI 302.1 - Guide for Concrete Floor and Slab Construction.

F. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.

G. ACI 305 - Hot Weather Concreting.

H. ACI 306 - Cold Weather Concreting.

I. ACI 308 - Standard Practice for Curing Concrete.

J. ACI 309 - Guide for Consolidation of Concrete.

K. ACI 318 - Building Code Requirements for Structural Concrete.

L. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

M. ASTM C33 - Standard Specification for Concrete Aggregates.

N. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

O. ASTM C78 - 08 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

P. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

Q. ASTM C138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

R. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

S. ASTM C150 - Standard Specification for Portland Cement.

T. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.

U. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

V. ASTM C230 - Standard Specification for Flow Table or Use in Tests of Hydraulic Cement.

W. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

X. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

Y. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.

Z. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

AA. ASTM C495 - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

BB. ASTM C567 - Standard Test Method for Unit Weight of Structural Lightweight Concrete.

CC. ASTM C618 - Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

DD. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars

EE. ASTM E1155 - Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

FF. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures

GG. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

1.4 NOTICE

A. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency not less than 48 hours prior to placing concrete.

1.5 QUALITY ASSURANCE

A. Structural Testing/Inspection Agency shall perform the following quality related items:
   1. Examine concrete in truck to verify that concrete appears properly mixed.
   2. Perform a slump test as deemed necessary for each concrete load. Record if water or admixtures are added to the concrete at the job site. Perform additional slump tests after job site adjustments.
   3. Casting and curing of test specimens shall be in accordance with ASTM C31.
   4. Mold specimen sets for compressive strength testing in accordance with below table. Mold one set for each 75 cubic yards of each mix design placed in any one day. At a minimum, one set of

specimens must be taken every day and one set for every 5,000 square feet of surface area for slabs or walls. For each set molded, record:

a. Slump
b. Air content
c. Unit weight
d. Temperature, ambient and concrete
e. Location of placement
f. Any pertinent information, such as addition of water, addition of admixtures, etc.

Perform cylinder breaks in accordance with below table. The spare cylinders are to be broken as directed by the Structural Engineer if compressive strength does not appear adequate. The average of the concrete cylinders broken at 28 days shall be used to verify that the concrete has obtained the specified strength.

The strength level shall be considered satisfactory for a class of concrete if both of the following are met: Every average of any three consecutive tests equals or exceeds f'c AND no strength test falls below f'c by more than 500 psi (or by more than 0.10 f'c when f'c is more than 5,000 psi). Tests shall be as defined in Chapter 26 of ACI318-14.

Cylinder Size	No. Cylinders & Test Age
6x12	1@ 7 Days, 2 @ 28 Days, 1 Spare
4x8	1@ 7 Days, 3 @ 28 Days, 2 Spare

5. Monitor placement of structural lightweight concrete placed by pumping.
6. Report in writing, as directed by the Architect/Structural Engineer, on the same day that tests are performed. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing agency, concrete design compressive strength, location of concrete placement in structure, concrete mix proportions and materials, compressive breaking strength and type of break.
7. Test concrete slabs for specified flatness and levelness in accordance with ASTM E1155.

B. The ready-mixed concrete plant shall be certified for conformance with the requirements of the State Department of Transportation or the National Ready Mix Concrete Association.

1.6 EXPOSURE CATEGORIES AND CLASSES

A. Concrete elements are classified by exposure in accordance with Table 19.3.1.1 of ACI 318-14. Refer to drawings for classes and strengths of concrete required.

1.7 CONCRETE MIX DESIGN

A. Establish concrete mix design proportions in accordance with ACI 318-14, Chapter 19 and 26.

B. Submit concrete mix designs. Include the following:
1. Type and quantities of materials.
2. Slump.
3. Air content.
4. Fresh unit weight.
5. Aggregates sieve analysis.
6. Design compressive strength.
7. Location of placement in structure.
8. Method of placement.
9. Method of curing.
10. Expected minimum strengths of the concrete at the specified testing frequencies (7, and 28 days) noted in section 1.05 A 4.
11. Waterproofing Admixture

C. Concrete supplier shall submit certifications that the materials used meet applicable ASTM Specifications. Mix designs not conforming to the above will be rejected.

D. Submit verification from the concrete admixture supplier that the concrete mix conforms to their requirements for the waterproofing admixture. Concrete supplier shall coordinate the mix design with the waterproofing admixture supplier prior to the concrete mix submittal.

1.8 STRUCTURAL LIGHTWEIGHT CONCRETE

A. Design structural lightweight concrete mixes suitable for pumping.

1.9 SLUMP

A. Design concrete with a maximum slump of five inches.

B. If a slump greater than five inches is desired, it shall be achieved with a high-range water reducer. The maximum slump after high-range water reducers are added shall be eight inches.

1.10 FRESH UNIT WEIGHT

A. Normal weight concrete shall have a fresh unit weight of 140 to 152 pcf.

B. Structural lightweight concrete shall have a fresh unit weight of 110 to 120 pcf, and an air-dried unit weight of 107-116 pcf.

1.11 AIR CONTENT

A. Tolerance
   1. Air content includes both entrained and entrapped air and shall be within +/- 1.5% of the values indicated below.

B. Normal Weight Concrete
   1. Normal weight concrete does not require any air content unless the concrete is in Exposure Class F1, F2, or F3.

C. Light Weight Concrete
   1. Light weight concrete not used in a UL Fire Rated Structural Assembly does not require any air content.
   2. Light weight concrete used in a UL Fire Rated Structural Assembly shall have air content of 5.5%.

1.12 WATER/CEMENT RATIO

A. Concrete elements are classified by exposure in accordance with Table 19.3.1.1 of ACI 318-14. See Structural Notes for specific classifications and associated Water/Cement Ratios for the subject project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer. Instructions and specifications, published by the manufacturer of such materials are included in and are a part of these specifications. Upon request, provide certification from manufacturer or supplier that materials designated by reference to ASTM and ACI standards meet the requirements of these standards.

2.2 CONCRETE STRENGTH

A. Provide concrete strengths indicated on the Structural Drawings.

2.3 CEMENT

A. Portland cement shall conform to ASTM C150. Use one brand only.

B. For concrete in Exposure Class S0, use Type I, unless noted otherwise.

C. For concrete in Exposure Class S1, use Type II with moderate sulfate resistance, unless noted otherwise.

D. For concrete in Exposure Class S2, use Type V, unless noted otherwise.

E. For concrete in Exposure Class S3, use Type V combined with either pozzolan or slag, unless noted otherwise.

2.4 AGGREGATE

A. Fine aggregate shall conform to ASTM C33.

B. Coarse aggregate of gravel or crushed stone shall conform to ASTM C33. Size coarse aggregate in accordance with ACI 318 and within the limitations set forth in the Structural Drawings.

C. Lightweight coarse aggregate shall conform to ASTM C330. Do not blend lightweight coarse aggregates with normal weight coarse aggregates for structural lightweight concrete.

D. See Structural Drawings for specific classifications and associated maximum aggregate size.

2.5 WATER

A. Water shall be potable and free of deleterious substances in accordance with ACI 318.

2.6 AIR ENTRAINING AGENT

A. Air entraining agent shall conform to ASTM C260.

2.7 WATER REDUCER

A. Water reducing agent shall conform to ASTM C494.

2.8 HIGH-RANGE WATER REDUCER

A. High-range water reducers (superplasticizers) shall conform to ASTM C494.

2.9 CURING COMPOUND

A. An acrylic, water based, “odorless” cure compound may be used at the Contractor's option in accordance with ASTM C309 or ASTM C1315, and in compliance with these specifications.

2.10 FLY ASH

A. Fly ash shall be Class F fly ash with a loss on ignition of less than five percent or Class C fly ash with a loss on ignition of less than one percent in accordance with ASTM C618.

B. Maximum fly ash content shall be limited to 20% of the total cementitious material weight.

2.11 GROUND GRANULATED BLAST-FURNACE SLAG (GGBFS).

A. Ground Granulated Blast-Furnace Slag (GGBFS) shall conform to ASTM C989 and ACI 233.

B. Maximum GGBFS content shall be limited to 50% of the total cementitious material weight. Maximum total combined GGBFS plus Fly ash shall be limited to 50% of the total cementitious material weight.

2.12 SILICA FUME

A. Silica Fume shall conform to ASTM C1240.

B. Maximum Silica Fume content shall be limited to 10% of the total cementitious material weight. Maximum total combined Silica Fume, GGBFS, and Fly ash shall be limited to 50% of the total cementitious material weight.

2.13 ACCELERATORS

A. Non-chloride accelerators shall conform to ASTM C494.

2.14 RETARDERS

A. Retarders shall conform to ASTM C494.

2.15 WATERPROOFING ADMIXTURE

A. Admixture shall be Concure Waterproofing Admixture or approved equal.

B. Admixture must be compatible with pumpability and concrete finishing requirements, in addition to the finished flooring.

2.16 CONTRACTION JOINT SEALANT

A. Semi-rigid, epoxy joint filler. Sealer must be compatible with Division 9 flooring installation preparation.

2.17 CALCIUM CHLORIDE AND CHLORIDE ION CONTENT

A. Calcium chloride or admixtures containing more than 0.5% chloride ions by weight of the admixture are not permitted.

B. 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 Table 19.3.2.1 of ACI 318-14. Water-soluble chloride ion tests shall conform to ASTM C 1218. One test shall be run for each class of concrete before the mix design submittal and each time a change is made to the mix design (such as change in aggregate type or source).

C. The Concrete Supplier shall certify on the Mix Design Submittal Form that the chloride ion content in all concrete mix designs used on the project does not exceed the limits stated above.

PART 3 - EXECUTION

3.1 HIGH-RANGE WATER REDUCERS

A. High-range water reducers are to be added at dosage recommended by the manufacturer. The slump of the concrete shall be one to four inches at the time the high-range water reducers are added. Do not permit fresh concrete containing superplasticizers to come in contact with fresh concrete not containing superplasticizers.

3.2 COARSE LIGHTWEIGHT AGGREGATE

A. Presoak coarse lightweight aggregate prior to batching. Maintain the moisture content indicated by the five day saturated weight.

3.3 ADDITION OF WATER AT JOB SITE

A. Water may be added to the batch only if neither the maximum permissible water/cement ratio nor the maximum slump is exceeded.

B. The superintendent or his designated representative may only add water to the concrete batch if the batching plant has noted on the trip ticket the maximum amount of water that may be added on site.

3.4 TEST SLAB

A. Provide a minimum 400 square foot test slab when pumping of concrete is proposed to demonstrate pumpability and finishing of concrete.

B. Test slab shall be moist cured.

C. Use the same concrete mix, placement and finishing equipment as to be used for the regular placements.

3.5 PLACEMENT OF CONCRETE

A. Deposit concrete as near as practical to final position. Maximum free fall shall be six feet.

B. Do no flowing of concrete with vibrators.

C. Place floors and slabs in accordance with ACI 302.

D. Place thickened slabs for partitions integral with floor slabs.

E. Prepare place of deposit, mix, convey, place, and cure concrete in accordance with ACI 301, ACI 304, and ACI 318. Wet forms before placing concrete.

3.6 TIME LIMIT

A. Deposit concrete within one and one-half hours after batching.

3.7 VIBRATION

A. Consolidate concrete in accordance with ACI 301 and ACI 309.

3.8 CURING

A. Begin curing procedures immediately following the commencement of the finishing operation.

B. Cure concrete in accordance with ACI 308. Keep the concrete surface moist. Moist cure slabs with a clear, polyethylene vapor barrier to maintain a moist surface. Do not over wet concrete surface. For vertical surfaces, elevated slabs, and slabs on grade that do not receive a finished floor an acrylic curing compound is used, apply in accordance with manufacturer's recommendations to surfaces of concrete not protected for five days by formwork. Do not use curing compounds in areas to receive material that does not adhere to concrete cured with a curing compound unless the curing compound is water soluble.

3.9 SLAB ON GRADE

A. Concrete used in slabs on grade shall exhibit ultimate shrinkage strain no more than 0.05 percent. If tests were required to meet this criteria, concrete shrinkage tests shall be performed in accordance with ASTM C 157 on specimens moist-cured for one day. Tests shall be performed by an ACI certified technician in an ACI certified laboratory.

3.10 ENVIRONMENTAL PROVISIONS

A. Perform cold weather concreting in accordance with ACI 306.

B. Perform hot weather concreting in accordance with ACI 305.

C. Protect concrete from drying and excessive temperature for the first seven days.

D. Protect fresh concrete from wind.

3.11 CONTRACTION JOINTS

A. Obtain Architect/Structural Engineer's approval for location of contraction joints.

B. Do not place contraction joints in framed floors or composite slabs.

C. Place contraction joints in slabs-on-grade as indicated on the Drawings.

D. Provide contraction joints in concrete walls at approximately 20-foot centers; coordinate location with Architect and Engineer. Contraction joints shall be formed as a V-groove on both faces of the wall, 3/4-inch minimum depth.

E. Remove dirt and debris from joints. Joints shall be dry and free from all substances that inhibit bond. Install sealant to prevent three-sided bonding. Coordinate sealant installation with the application of the flooring and Division 9 specifications.

3.12 CUTTING CONCRETE

A. Obtain Architect/Structural Engineer's written approval prior to cutting concrete for installation of other work.

3.13 PATCHWORK AND REPAIRS

A. Notify Architect/Structural Engineer of any defective areas in concrete to be patched or repaired. Repair and patch defective areas with non-shrink grout. Cut out defective areas over two inches in diameter to solid concrete, but not less than a depth of one inch. Make edges of cuts perpendicular to the concrete surface.

3.14 DEFICIENT CONCRETE COMPRESSIVE STRENGTH

A. In the event that concrete tests indicate a 7-day or 28-day strength below that which was expected or specified, the Contractor with the agreement of the Architect/Engineer shall have the mix adjusted so that subsequent concrete will comply with the minimum strength requirements. The Owner may require core specimens to be taken and tested, at the Contractor's expense. If core tests fall below minimum requirements, as determined by the Architect/Engineer, the concrete in place will be deemed to be defective. This concrete shall be removed and replaced or strengthened in a manner acceptable to the Owner and Architect/ Engineer, at the Contractor's expense. Any demolition or repair of other materials or systems as a result of repair or replacement of defective concrete shall be at the Contractor's expense.

3.15 CONCRETE FINISHES

A. Finish concrete in accordance with ACI 301, ACI 117, and ACI 302.1.

B. Finish concrete slabs to flatness and levelness tolerances which correspond to FF 25/FL 20 minimum overall for composite of all measured values per placement and FF 17/FL 15 minimum for any individual floor section.

C. For concrete slabs to receive owner furnished equipment, finish to floor flatness and floor levelness tolerances stated in the equipment manufacturer's recommended guidelines.

D. For shored construction, FL values do not apply if slab is tested after shoring is removed.

E. For unshored construction, FL does not apply.

F. Slabs which do not meet the flatness and levelness criteria shall be repaired or replaced.

ISSUED	DATE
Early Release Package	**12/06/2021**

END OF SECTION

SECTION 03 6200
NON-SHRINK GROUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes non-shrink grout under base plates, bearing plates, or as otherwise required by the structural engineer-of-record.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

1.3 REFERENCES

A. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).

B. ASTM C1107 – Standard Specification For Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)

1.4 QUALITY ASSURANCE

A. Structural Testing/Inspection Agency shall perform the following quality related items:
   1. Perform compressive strength tests in accordance with ASTM C109 with 2-inch x 2-inch cubes. Test one cube at three days, two cubes at seven days and three cubes at 28 days. Perform one compressive strength test for each ten bags of grout used and/or perform one test minimum for each day of grouting, whichever is more frequent.

1.5 SUBMITTALS

A. Submit product data sheets for review.

PART 2 - PRODUCTS

2.1 GROUT

A. Provide a non-shrink, non-metallic grout that complies with ASTM C1107.

B. Grout shall have a minimum compressive strength of 6000 psi at 28 days.

C. Grout placed in exterior exposed conditions or areas subject to moisture shall be free of gypsum.

2.2 WATER

A. Provide clean, potable water.

PART 3 - EXECUTION

3.1 HANDLING

A. Store and protect non-shrink grout from moisture and contamination.

3.2 PREPARATION

A. Remove mud, dirt and other foreign materials from areas to be grouted.

B. Apply grout to rough concrete surface; roughen concrete as necessary prior to placing grout.

3.3 MIXING

A. Mix grout to its fluid, self-leveling consistency in accordance with manufacturer’s recommendations. Do not retemper grout. Do not exceed manufacturer's maximum limit on water content or use at a consistency which produces free bleeding. Mix grout in a paddle-type mortar mixer. Do not mix by hand.

3.4 PLACEMENT

A. Consolidate grout to provide uniformity. Do not vibrate grout.

B. Use forms to contain grout.

3.5 PROTECTION

A. Protect grout and areas to be grouted from excessive heat and cold in accordance with manufacturer's specifications. Protect grout from excessive drying shrinkage resulting from wind or direct sunlight. Protect areas grouted from excessive vibrations for three days.

ISSUED	DATE
Early Release Package	**12/06/2021**

END OF SECTION

SECTION 05 1200
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes fabrication and erection of structural steel indicated in the Contract Documents or otherwise required for proper completion of the work.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

C. Section 05 3000 - Steel Decking.

1.3 **REFERENCES** (CURRENT EDITION ADOPTED BY THE BUILDING CODE USED FOR THE PROJECT DESIGN AS LISTED IN THE STRUCTURAL DRAWINGS)

A. AISC (American Institute of Steel Construction)
   1. Specification for Structural Joints Using High-Strength Bolts
   2. 303 - Code of Standard Practice for Steel Buildings and Bridges
   3. Manual of Steel Construction

B. ANSI (American National Standards Institute) / AISC (American Institute of Steel Construction)
   1. 360 - Specification for Structural Steel Buildings

C. AWS (American Welding Society)
   1. A5.1 - Specification for Carbon Steel Electrodes for Shield Metal Arc Welding
   2. A5.17 - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding
   3. A5.20 - Specification for Carbon Steel Electrodes for Flux Cored Arc Welding
   4. A5.5 - Specification for Low-Alloy Steel Covered Arc Welding Electrodes
   5. D1.1 - Structural Welding Code

D. ASTM (American Society for Testing and Materials)
   1. Structural Shapes Plates and Bars
      a. A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
      b. A29 - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
      c. A36 - Standard Specification for Carbon Structural Steel
      d. A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
      e. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
      f. A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
      g. A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
      h. A913 - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)
      i. A992 - Standard Specification for Structural Steel Shapes

j. A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
k. A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)

2. Structural Fasteners
   a. A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
   b. A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
   c. A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength
   d. A563 - Standard Specification for Carbon and Alloy Steel Nuts
   e. F436 - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions
   f. F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
   g. F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series
   h. F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
   i. F3125 - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
3. Other
   a. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   b. A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel
   c. A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
   d. A786 - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
   e. B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
   f. F1136 - Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners
   g. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

E. SSPC - Steel Structures Painting Manual.

F. Research Council on Structural Connections (RCSC) – Specification for Structural Joints Using High Strength Bolts.

1.4 SUBMITTALS

A. Shop drawings shall be submitted for review.
   1. Contact Structural Engineer's Construction Administration Division prior to detailing structural steel shop drawings.
   2. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacings and locations of all structural steel members, including connections, attachments, anchorages, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the headed shear connectors.
   3. Reproduction of Structural Drawings for shop drawings is not permitted.

B. Erection drawings shall be submitted for review.

C. Certification that the fabricator meets the required qualifications shall be submitted.

D. Certification that the erector meets the required qualifications shall be submitted.

E. The documents listed in Section N3.2 of ANSI/AISC 360 shall be maintained and submitted for review upon request.

F. Shop measurements of camber shall be maintained and submitted for review upon request. Field measurements of camber shall be submitted for review.

G. If inspections are not required at the fabricator's premises, at completion of fabrication, the approved fabricators shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.

H. If inspections are required at the fabricator's premises, prior to delivery of structural steel to the project, inspection reports shall be submitted.

I. Ultrasonic testing reports for complete penetration welds shall be submitted.

1.5 QUALITY ASSURANCE

A. Qualified fabricators
   1. Fabricators that are both building code approved and AISC certified:
      a. The special inspections described in section 1.05B only apply to work done in the field and are not required for work done on the premises of the fabricator.
      b. Fabricator shall perform ultrasonic testing on 100 percent of the complete penetration welds performed in the shop. For welds less than 5/16" thick, a magnetic particle test may be performed.
   2. Other fabricators:
      a. The special inspections described in section 1.05B are required for both work done in the field and work done on the premises of the fabricator.

B. Structural Testing/Inspection Agency shall perform the following quality related items:
   1. Inspection of fabricators
      a. The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
      b. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.
      c. A minimum of one trip per week is recommended. The first trip should be scheduled in the early stages of fabrication.
      d. Contact Structural Engineer prior to initial inspection.
   2. Fabricator and erector documents
      a. Verify reports and certificates as listed in Section N3.2 of ANSI/AISC 360 for compliance with construction documents.
   3. Material verification of structural steel
      a. The inspector shall conduct periodic inspections to verify high-strength bolts, nuts, and washers:
         1) Verify that the identification markings conform to the ASTM standards, specified in the approved construction documents.
         2) Verify the manufacturer's certificate of compliance.
      b. The inspector shall conduct periodic inspections to verify the structural steel:
         1) Verify that the identification markings conform to the ASTM standards, specified in the approved construction documents.
         2) Verify the manufacturer's certified mill test reports.
      c. The inspector shall conduct periodic inspections to verify the weld filler materials:
         1) Verify that the identification markings conform to the AWS specification, specified in the approved construction documents.

2) Verify the manufacturer's certificate of compliance.

4. Embedments including Anchor Bolts
   a. Verify diameter, grade, type, length, embedment and configuration of embedments.
   b. Expansion Anchors
      1) Verify proper installation in accordance with manufacturer recommendations and ICC-ES Code Report requirements. This includes, but is not limited to, verifying the location of the anchor including any edge distance and spacing requirements, drill bit type and size, hole depth, hole cleaning technique (if applicable), anchor type, size, embedment and installation procedure.
   c. Adhesive Anchors
      1) Verify proper installation in accordance with manufacturer recommendations and ICC-ES Code Report requirements. This includes, but is not limited to, verifying the location of the anchor, any edge distance and spacing requirements, drill bit type and size, hole depth, hole cleaning technique (very important), anchor type, size, embedment and installation procedure including adhesive expiration date and proper dispensing.
5. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents.
   a. Camber
      1) Measure 25 percent of all cambered steel members (in field) prior to erection for compliance with AISC 303. Camber shall be checked at mid-point of member length.
      2) Additional measurements may be required at the Structural Engineer's discretion.
6. Structural steel welding:
   a. Inspection shall be in accordance with AWS Structural Welding Code.
   b. Inspection tasks Prior to Welding
      1) Observe or perform for each welded joint or member the QA tasks listed in ANSI/AISC 360, Table N5.4-1.
   c. Inspection tasks During Welding
      1) Observe or perform for each welded joint or member the QA tasks listed in ANSI/AISC 360, Table N5.4-2.
      2) The inspector shall perform continuous monitoring of complete penetration groove welds, partial penetration groove welds, multi-pass fillet welds, and single-pass fillet welds greater than 5/16".
      3) The inspector shall perform periodic monitoring of single-pass fillet welds less than or equal to 5/16".
   d. Inspection tasks After Welding
      1) Observe or perform for each welded joint or member the QA tasks listed in ANSI/AISC 360, Table N5.4-3.
   e. Nondestructive testing (NDT) of welded joints
      1) Complete joint penetration welds
         a) Ultrasonic testing shall be performed on 100 percent of complete joint penetration groove welds. For welds less than 5/16" thick, a magnetic particle test may be performed.
         b) A reduction in rate of ultrasonic testing to 25 percent for an individual welder or welding operator is permitted when the conditions of Section N5.5e of ANSI/AISC 360 have been met.
         c) If the rate of testing has been reduced, the rate of testing shall return to 100 percent if conditions of Section N5.5f of ANSI/AISC 360 have been met.
      2) Magnetic particle testing or penetrant testing shall be performed on all thermally cut surfaces of access holes when material t > 2".
      3) Radiographic testing or ultrasonic testing shall be performed on welded joints subjected to fatigue as noted in the construction documents when required by ANSI/AISC 360, Appendix 3, Table A-3.1.

7. Structural steel bolting:
   a. Inspection and testing shall be in accordance with AISC Specification for Structural Joints Using High-Strength Bolts.
   b. Inspection Tasks Prior to Bolting
      1) Observe or perform tasks for each bolted connection in accordance with QA tasks listed in ANSI/AISC 360, Table N5.6-1.
      2) For connections with fully tensioned bolts, prior to visual and physical testing, tension testing using a calibration device (Skidmore-Wilhelm) must indicate tensions at least 5% in excess of the AISC minimum. Structural steel erector shall supply the tension calibration device. The inspector shall observe the pre-installation testing and calibration procedures.
      3) For connections with snug tight bolts, pre-installation verification testing is not applicable.
   c. Inspection Tasks During Bolting
      1) Observe the QA tasks listed in ANSI/AISC 360, Table N5.6-2
      2) The inspector shall perform continuous inspection (including 100% of the connections) of bolt installation for tensioning when the calibrated wrench or the turn-of-nut method without match marking methods are used.
      3) The inspector shall perform periodic inspection (including a minimum of 10% of the connections) of bolt installation for tensioning when the turn-of-nut method with match marking techniques, the direct tension indicator, or the alternate design fastener (twist-off bolt) methods are used.
      4) For connections with Snug Tight Bolts, the inspector shall perform periodic inspection (including a minimum of 10% of the connections) of connections with snug tight bolts.
   d. Inspection Tasks After Bolting
      1) Perform tasks for each bolted connection in accordance with QA tasks listed in ANSI/AISC 360, Table N5.6-3.
8. Steel elements of composite construction
   a. Headed Studs
      1) Headed stud bases shall be qualified through an Application Qualification Test (AQT) in accordance with AWS D1.1, Section 7.6 and Annex G. In lieu of an AQT, the manufacturer's Qualification Test (QTD) data may be used. Equipment settings from AQT, or QTD, as applicable, shall serve as the basis for the field production setups.
      2) Pre-production testing and operator qualification shall be performed in accordance with Section 7.7 of AWS D1.1, except that a minimum of three studs shall be tested for each start, and shift, as defined by AWS D1.1 Section 7.7.1. Pre-production testing for each operator is required if more than one.
      3) All production (fabrication) studs shall be visually inspected in accordance with Section 7.8 of AWS D1.1.
      4) All production (fabrication) studs shall be subjected to a hammer ping test. Studs with a hollow ping shall be subjected to a bend test.
      5) Additionally, two studs shall undergo a bend test (torque test for a threaded stud) for every 110 studs installed within each set-up. These tests shall be performed as described in Section 7.8 of AWS D1.1 to insure that significant deviation from the initial set-up did not take place. The frequency of these additional tests may be increased as directed by the engineer of record depending on failure rates.
      6) Two additional tests per AWS D1.1 Sections 7.8 shall be performed at the start of any welding of studs through deck onto painted surfaces in order to qualify the procedure and the welder for this condition. These additional tests are not required if the paint has been removed from the welding surface. However, in no instance shall the weld occur through the coating which would be in any manner injurious to the strength and quality of the weld.
      7) Production studs not passing the visual test and bent at 15 degrees shall be left bent. All other studs bent at 30 degrees shall also be left bent.

1.6 FABRICATOR'S QUALIFICATIONS

A. Steel fabricator shall be approved by the Building Official to perform work on their premises without special inspection.

B. Steel fabricator shall be a qualified fabricator who participates in the American Institute of Steel Construction (AISC) Certification program and is designated an AISC Certified Plant, Category BU at time of bid.

1.7 ERECTOR'S QUALIFICATION

A. Erector shall participate in the AISC Certification program and shall be designated an AISC Certified Erector, Category CSE (Certified Steel Erector)

B. Erector shall be experienced in erecting structural systems similar in complexity to this project as evidenced by 10 completed projects.

C. Erector shall have a minimum of 5 years experience in the erection of structural steel.

D. Field welders shall be qualified in accordance with AWS D1.1.

1.8 STORAGE

A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

PART 2 - PRODUCTS

2.1 ANCHOR RODS

A. Anchor rods shall be threaded rods conforming to ASTM F1554 Gr. 36 unless noted otherwise on the drawings. The anchor rods shall be threaded at both ends.

B. Provide a heavy hexagonal nut threaded and tack welded to the bottom of each rod unless noted otherwise on the structural documents. The nut shall conform to ASTM A563 Grade A or DH.

C. Provide heavy hexagonal nut and plain steel washer at the top of each rod. The nut shall conform to ASTM A563 Grade A or DH and washer shall conform to ASTM F844. Leveling nuts and washers shall be provided as deemed necessary by the contractor for erection.

D. Provide square plate washers conforming to A36 with standard holes in lieu of top steel washers on base plates with oversize holes. Oversized holes are defined as any hole that is larger than a standard hole as defined in Chapter J of the ANSI/AISC 360. Recommended maximum base plate holes as given in the AISC Manual of Steel Construction are considered oversized holes and should not be exceeded.

2.2 ROLLED STEEL SHAPES, PLATES, AND BARS

A. Rolled steel W and WT shapes shall conform to ASTM A992, 50 ksi minimum yield strength, unless noted otherwise on the contract drawings. ASTM A572, Grade 50 may be substituted for ASTM A992.

B. Rolled steel M, S, C, MC, and L shapes shall conform to ASTM A36, 36 ksi minimum yield strength, unless noted otherwise on the contract drawings.

C. Plates and Bars shall conform to ASTM A36, 36 ksi minimum yield strength, unless noted otherwise on the contract drawings.

2.3 SQUARE/RECTANGULAR HOLLOW STRUCTURAL STEEL SECTIONS

A. Square/rectangular hollow structural steel sections shall conform to ASTM A500, Grade C, 50 ksi minimum yield strength or ASTM A1085.

2.4 ROUND HOLLOW STRUCTURAL STEEL SECTIONS

A. Round hollow structural steel sections shall conform to ASTM A500, Grade C, 46 ksi minimum yield strength or ASTM A1085.

2.5 ROUND HOLLOW STEEL PIPE

A. Round hollow steel pipe shall conform to ASTM A53, Grade B, 35 ksi minimum yield strength.

2.6 NON-HIGH-STRENGTH FASTENERS

A. Non-high-strength bolts shall conform to ASTM A307, Grade A, 60 ksi minimum, where noted on the Structural Drawings.

B. Hardened steel washers shall conform to ASTM F436.

2.7 HIGH-STRENGTH FASTENERS

A. High-strength bolts shall conform to ASTM F3125 as noted on the Structural Drawings.

B. Provide 3/4-inch minimum diameter bolts, unless noted otherwise.

C. Hardened steel washers shall conform to ASTM F436.

D. Spline-type tension control bolts, plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.

E. Do not use load indicating washers.

2.8 HEADED STUDS

A. Headed steel studs shall conform to the requirements of AWS D1.1 and shall be Type B made from ASTM A108 material.

B. Provide 3/4-inch diameter headed steel studs, unless noted otherwise.

C. Provide heat-resistant ceramic arc shields with studs.

2.9 POST-INSTALLED ANCHORS

A. Post-installed anchors installed into structural concrete shall be ICC approved for use in cracked concrete.

B. Post-installed anchors installed into concrete block shall be approved for use in the block type (grout filled or hollow) under consideration.

2.10 WELD ELECTRODES

A. E-70 series low hydrogen electrodes shall conform to AWS A5.1, A5.5, A5.17, or A5.20.

B. Properly store electrodes to maintain flux quality.

2.11 PRIMER

A. Oxide primer shall conform to AISC Specifications, Code of Standard Practice, and SSPC Steel Structure Painting Manual, unless indicated otherwise.

B. Paint primer shall be free of lead and chromate and shall comply with State and Federal volatile organic compound (VOC) requirements.

C. Paint primer shall be compatible with finish coating.

2.12 GALVANIZING

A. Galvanized steel coating shall conform to ASTM A123.

B. Galvanize bolts, nuts, and washers in accordance with ASTM F2329 when used to connect steel members that are specified to be galvanized.

C. Post-Installed anchors specified to be galvanized shall be mechanically galvanized in accordance with ASTM B695, Class 65, Type I.

PART 3 - EXECUTION

GENERAL

A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.

B. The Erector shall provide all required temporary erection bracing and shoring necessary to safely erect the structural frame to withstand construction loading as provided in ASCE 37.

C. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

3.2 ANCHOR BOLT (ROD) SETTING

A. Provide templates for setting anchor bolts (rods). Position anchor bolts (rods) by using templates with two nuts to secure in place prior to placement of concrete.

B. Do not erect steel where anchor bolt (rod) nuts will not have full threads.

3.3 CONNECTIONS

A. Provide a minimum of two fasteners at each bolted connection.

B. Ensure fasteners are lubricated prior to installation.

C. Provide high-strength bolted connections in accordance with AISC Specification for Structural Joints Using High-Strength Bolts.

D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

3.4 FASTENER INSTALLATION

A. Install high-strength bolts according to AISC Specification for Structural Joints Using High-Strength Bolts for type of bolt and type of joint specified.

B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.

3.5 HEADED STUDS

A. Headed studs shall be welded in accordance with AWS D1.1.

B. Locate studs directly over the web of beams with flanges less than 0.3 inches thick.

C. The minimum center spacing shall be 6 diameters along the longitudinal axis of the beam and 4 diameters transverse to the longitudinal axis of the beam.

D. Where double rows of studs are required, begin double rows at each end of the beam.

E. Remove shields after welding studs.

F. Headed stud welding shall not take place when the temperature is below 0 Degree Fahrenheit, or when the welding surface is not dry.

3.6 WELDING

A. Comply with AWS Structural Welding Code. Use prequalified weld procedures.

B. Provide end returns where fillet welds terminate at end or sides. Returns shall be continuous for a distance of not less than two times the nominal size of the weld.

C. Complete penetration joints shall be backgouged to sound metal before the second side is welded or have 1/4-inch root opening with 3/16 x 1-inch backing bar. Access holes are required. Filling access holes is not required.

D. Remove all slag and weld splatter from deposited weld metal.

3.7 SPLICING

A. Splice members only where indicated unless authorized in writing by Structural Engineer.

B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

3.8 CUTTING

A. Do not use flame cutting to correct errors unless authorized in writing.

B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

3.9 MILL SCALE

A. Remove loose mill scale.

3.10 BOLT HOLES

A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

3.11 PRIMING STEEL

A. Prime steel that is not encased in concrete, plaster, or sprayed fireproofing. Do not shop prime in areas to be field welded, contact surfaces of slip critical connections, or areas to receive special finishes.

B. Field prime, as required, steel that has been welded or that is not primed after connections have been tightened.

C. Verify primer requirements with Architect for buildings without fireproofing.

3.12 GALVANIZING

A. Galvanize environmentally exposed steel; for example, mechanical equipment supports.

B. Touch-up welds and abrasions in galvanized members in accordance with ASTM A780.

ISSUED	DATE
Early Release Package	**12/06/2021**

END OF SECTION

SECTION 05 3000
STEEL DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes steel decking as indicated on Drawings, specified herein, and needed for a complete and proper installation.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

C. Section 05 1200 - Structural Steel.

1.3 REFERENCES

A. AISI-S100, North American Specification for the Design of Cold-Formed Steel Structural Members

B. ANSI/AWS D1.1 - Structural Welding Code / Steel.

C. ANSI/AWS D1.3 - Structural Welding Code / Sheet Steel.

D. ANSI/AWS A5.5 - Specifications for Carbon Steel Electrodes for Shielded Metal Arc Welding.

E. ANSI/SDI RD - Design Standard for Steel Roof Deck

F. ANSI/SDI C - Design Standard for Composite Steel Floor Deck-Slabs

G. ANSI/SDI NC - Design Standard for Non-Composite Steel Floor Deck

H. ANSI/ASSE A10.3 - Safety Requirements for Powder Actuated Systems.

I. ANSI/SDI QA/QC - Quality Control and Quality Assurance for Installation of Steel Deck

J. ASTM A653 / A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

K. ASTM A924 / A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

L. ASTM A1008 / A1008M - Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy and High Strength Low Alloy with Improved Formability.

M. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

N. FS TT-P-664 Federal Specification for Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant.

O. FS QQ-S-775D Federal Specification for Steel Sheets, Carbon, Zinc Coated.

P. SDI Steel Deck Institute Manual of Construction with Steel Deck (MOC3)

Q. SDI Diaphragm Design Manual, 4th Edition.

R. SDI Roof Deck Design Manual (RDDM)

S. SDI Floor Deck Design Manual (FDDM)

T. SDI Code of Standard Practice (COSP)

1.4 SUBMITTALS

A. Notify the Structural Engineer prior to detailing shop drawings.

B. Submit product data for each type of deck, accessory, and product indicated.

C. Submit detailed shop drawings showing layout and types of deck panels, weld or mechanical fastener types and sizes, weld or mechanical fastener patterns, conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Where variances in substrate thickness require the use of multiple mechanical fastener types, the layout locations of each fastener type must be clearly indicated in plan on the shop drawings. Include calculations and required information if not completely covered by load tables and products data.

D. Mechanical fasteners shall be permitted to fasten deck to support framing where specifically indicated on the Drawings or in lieu of welding where approved by the Structural Engineer. Where mechanical fasteners are proposed in lieu of welds, include calculations in accordance with SDI Diaphragm Design Manual, 4th Ed., indicating equivalent diaphragm strength to specified attachment pattern.

E. Upon request, submit mill certification that the steel supplied meets the required specifications.

F. Upon request, submit written welding procedures and certificates for welding personnel.

G. Submit manufacturer's specifications, load tables and installation instructions for each type of decking and accessories. Include manufacturer's certifications to show compliance with supplementary framing, sump pans, cant strips, curb openings, special jointing and other accessories.

H. Submit manufacturer's test reports, for record only, from a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
   1. Mechanical fasteners
   2. Acoustical roof deck

1.5 QUALITY ASSURANCE

A. Steel deck installer shall have completed a minimum of five projects with similar steel deck material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Welding procedures and personnel shall be qualified in accordance with ASW D1.1 and AWS D1.3.

C. Operators of Powder-actuated tools shall be certified in accordance with ANSI/ASSE A10.3.

D. Structural Testing/Inspection Agency shall perform the following quality related items:
   1. Verify placement of deck for alignment and proper lap.
   2. Verify deck gage.
   3. The inspector shall verify welding procedures and welder qualifications prior to the start of work.

4. Inspection of puddle welds and mechanical fasteners shall be considered to comply with the periodic inspection of floor and deck welds required by the schedule of special inspections section 1704.3e.
   a. Welds: Visually inspect 100% of welded connections for proper size, quality, and pattern. Measure all weld sizes where adequacy is inconclusive based on a visual inspection. All welds with inadequate size or other deficiencies must be repaired.
   b. Mechanical fasteners: Visually inspect 100% of connections for proper type, embedment, and spacing. Examine washer condition and ensure deck is clamped to the supporting steel framing. Measure all fastener embedments where adequacy is inconclusive based on a visual inspection. All deficient mechanical connectors must be corrected by replacing the deficient connector.
5. All personnel installing steel deck mechanical fasteners shall be trained on-site by the connector manufacturer in proper installation procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide steel deck sheets of three spans minimum wherever possible.

B. Provide steel deck that has been approved under the applicable Underwriter's Laboratory (UL) and / or Factory Mutual (FM) ratings applicable to the project.

C. Structural properties of steel deck shall be calculated in accordance to AISI-S100, North American Specification for the Design of Cold-Formed Steel Structural Members.

D. Provide steel deck type as indicated in the Contract Documents.

E. Steel deck, closures, and accessory gages shall be determined by the steel deck supplier's design engineer who is licensed in the project state. The design of the steel deck shall be the sole responsibility of the deck supplier and its design engineer. The deck shall be designed to resist the design loads provided in the Contract Documents. Deck gage shall not be less than the minimum gage indicated in the contract documents.

2.2 MATERIAL AND FINISH

A. Galvanized Steel Sheet
   1. Steel Sheet shall conform to ASTM A653 and shall have a minimum yield strength of 33,000 pounds per square inch.
   2. Galvanizing shall conform to ASTM A653 with a minimum coating of G30, G60 or G90 on both sides. The coating shall conform to Federal Specification QQ-S-775-d, Type I, Class E.

2.3 TOLERANCE

A. Uncoated thickness shall not be less than thickness as listed below:

Gage No.	Design Thickness (inches)	Minimum Thickness (inches)
18	0.0474	0.045
20	0.0358	0.034
22	0.0295	0.028

B. Panel length shall be within plus or minus ½-inch of specified length.

C. Panel cover width shall be no greater than minus 3/8-inch, plus ¾-inch.

D. Panel camber and / or sweep shall be no greater than ¼-inch in 10 foot length.

E. Panel end out of square shall not be greater than 1/8-inch per foot of panel width.

2.4 DECK ACCESSORIES

A. Provide accessories, clips, and other items as required for deck installation. Sheet steel for accessories shall be of the same material and finish as steel deck.

B. Provide Roof Sump pans when required by Architect. Fabricate sump pan from a single piece of 14 gage galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide. Recess pans not less than 1-1/2 inches below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

C. Provide Cant Strips when required by Architect. Fabricate cant strips from 20 gage sheet steel. Bend to form a 45 degree cant not less than 5 inches wide with top and bottom flanges not less than 2 inches wide, unless otherwise shown.

D. At all concrete filled deck (insulating, light-weight structural, and normal-weight structural) provide closures for columns, girders, where panels change direction, and end closures for panels not closed by bent plates or other means. Closures shall be fabricated of steel sheet of the same material and finish as the concrete filled deck.

E. Flexible Closure Strips shall be Vulcanized, closed-cell, synthetic rubber.

F. Galvanizing Repair Paint shall meet ASTM A780 with dry film containing a minimum of 94 percent zinc dust by weight.

G. Repair Paint shall be lead- and chromate-free rust-inhibitive primer complying with performance requirements of FS TT-P-664.

2.5 DECK ATTACHMENT

A. Welds
   1. Use E-60 series electrodes conforming to AWS A5.1.
   2. Welding washers shall be fabricated from sheet steel shaped to fit the deck rib, shall be a minimum thickness of 0.0598-inches, and shall have a factory punched nominal 3/8-inch diameter hole.

B. Mechanical Fasteners
   1. Approved Manufacturers and Types: Mechanical fasteners shall be one of the following types or approved equal. Approved equal shall be determined by the Structural Engineer based on submittal of appropriate manufacturer's diaphragm shear and tension test data and design recommendations. Products shall be chosen based on the actual thickness of substrate within the limits indicated below.
      a. Hilti:
         1) X-HSN24 (substrate thickness: 0.125 in. to 0.375 in.)
         2) X-ENP-19 L15 (substrate thickness: 0.25 in. or thicker)
      b. Pneutek:
         1) SDK63-series (substrate thickness: 0.155 in. to 0.25 in.)
         2) K64-series (substrate thickness: 0.187 in. to 0.312 in.)
         3) K66-series (substrate thickness: 0.28 in. or thicker)
      c. Simpson:
         1) Strong-Drive XL (substrate thickness: 0.125 in. to 0.375 in.)
         2) Self-Drilling X Screws (substrate thickness: 0.125 in. to 0.375 in.)
   2. Where fasteners are exposed to the elements in their final condition, an AISI 304 stainless steel sealing cap with bonded neoprene washer shall be installed over each fastener. Alternately, fasteners with coatings that have met the requirements of ASTM G85 Annex E for 140 cycles are permitted.

C. Sidelap Fasteners:
   1. Seam Welds: 1-1/2 in. long fillet welds in accordance with AWS D1.3 procedures.
   2. Mechanical Sidelap Connectors: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel, No. 10 minimum diameter screws.

2.6 ROOF DECK

A. Roof Deck shall comply with ANSI/SDI RD Standard For Steel Roof Deck except as modified by the contract documents.

B. Provide vented deck if required by lightweight insulating concrete system. Percent venting shall be determined by the supplier based on project conditions and insulating concrete system to be used.

C. Deck shall be designed in accordance with ANSI/SDI RD Standard For Steel Roof Deck Section 2.4.A.1 through Section 2.4.A.7.
   1. Deck shall be designed for a total service load of 50 pounds per square foot and a live service load of 20 pounds a square foot
   2. Deck shall be designed for a net wind service uplift load of 50 pounds per square foot.

2.7 COMPOSITE FLOOR DECK

A. Composite Floor Deck shall comply with ANSI/SDI C Standard For Steel Floor Deck except as modified by the contract documents.

B. Deck shall be designed in accordance with ANSI/SDI C Standard For Steel Floor Deck Section 2.4 excluding Section 2.4.A.6, Section 2.4.B.6, and Section 2.4.B.8.
   1. Fresh unit weight of structural-lightweight concrete shall be assumed to be 120 pcf.
   2. Deck as a form design shall include an additional 5 pounds per square foot to account for concrete ponding.
   3. Composite slab shall be designed for a total service load of 225 pounds per square foot and a live service load of 150 pounds per square foot.

PART 3 - EXECUTION

3.1 GENERAL

A. Load conditions shall not exceed SDI sequential loading formulas.

B. Installer must examine the areas and conditions under which steel decking is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

C. Deck panels and accessories shall be installed according to the SDI Manual of Construction with Steel Deck, placement plans, and requirements of this Section.

D. Deck panels shall be placed on structural supports and adjusted to final position with ends aligned, and attached securely to the supports immediately after final positioning.

E. Place deck in straight alignment for the entire length of the run of the sheets.

F. Do not weld deck in place until all bolted and welded connections for the structural frame are complete. A minimum of one floor over the area to be decked is to be bolted and welded prior to welding deck in place.

G. Deck ends over supports shall be installed with a minimum end bearing of 1-1/2-inches.

H. Deck shall be protected by planking or other approved means to avoid overloading and / or damage from construction loading.

I. Accessories (including closures) shall be anchored to supporting members by arc spot welds or self drilling screws at 12-inch max spacing.

J. Deck bundles shall be located to prevent overloading of supporting members and deck panels shall only be placed on concrete that has reached a minimum of 75% of its specified design strength.

K. Install roof sump pans over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12-inches apart with at least 1 weld at each corner.

3.2 CONCENTRATED LOADS

A. Concentrated loads hanging from the deck are limited to the locations, frequency, and magnitudes shown on the structural drawings. If no limitations are given consult the Architect/Structural Engineer.

3.3 CUTTING

A. Cut holes in deck indicated by the Drawings. Other holes required shall be supplied by those requiring them. Obtain written authorization for additional holes and cutting not indicated on erection drawings.

B. Cut holes in deck after concrete is in place, has reached 75% of its design strength, and after a minimum of 7 days.

3.4 WELDING

A. All welding of deck shall be in accordance with ANSI/AWS D1.3, Structural Welding Code – Sheet Steel. Each welder shall demonstrate an ability to produce satisfactory welds using a procedure such as shown in the SDI Manual of Construction with Steel Deck and as described in ANSI/AWS D1.3.

B. Provide weld washers for deck thinner than 22 gage.

C. Weld metal shall penetrate all layers of deck material at end laps and shall have good fusion to the supporting members.

D. Where two panels butt, fasten each deck unit with separate welds.

3.5 MECHANICAL FASTENING

A. Gauge powder-actuated tool systems to the base material steel type, steel deck type and thickness prior to final installation. Confirm appropriate power regulation and powder-actuated cartridge type prior to final installation.

B. Verify axis of fastener is within +/- 10 degrees of perpendicular to the deck prior to driving.

C. Where two panels butt, fasten each deck unit with separate fasteners.

3.6 SHORING

A. Contractor may elect to shore deck to reduce deflection and overrun of concrete.

B. Shoring shall be in place before deck erection begins.

C. Shoring shall be left in place until the slab attains 75% of the specified design strength and a minimum of 7 days.

D. Do not shore structural beams or girders unless indicated on Drawings or authorized in writing by Structural Engineer.

3.7 ROOF DECK

A. Deck ends shall be lapped a minimum of 2-inches at supports.

3.8 COMPOSITE FLOOR DECK

A. Deck ends shall be butted over supports. Maintain a maximum space of 1/4 inch between ends of abutting units. Lapping ends of panels is not acceptable.

B. In no case shall the ridges of the composite deck be located over beams or girders running parallel to the span of the deck.

C. Built in hanger tabs that bear on structural steel shall be flattened or removed.

3.9 NONCONFORMING WORK AND REPAIRS

A. Work not conforming with the contract documents shall be repaired or replaced at the Contractor’s expense.

B. Additional testing and inspection required to determine compliance of corrected work shall be at the Contractor’s expense.

C. Repair damaged galvanized coatings on both surfaces of the deck with galvanized repair paint according to ASTM A780 and manufacturer’s written instructions.

D. Repair damaged paint coatings on painted sides of the deck with repair paint.
   1. Wire brush and clean rust spots, welds, and abraded areas.
   2. Repair paint shall be of same color as shop-primed deck where exposed to view.

E. Replace or supplement under-driven and over driven mechanical fasteners with adjacent, properly installed fasteners.

ISSUED	DATE
Early Release Package	12/06/2021

END OF SECTION

SECTION 221313

FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. City of Lake City Utility Department Standards & Details and Approved Materials manual, current edition.

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Nonpressure and pressure couplings.
3. Expansion joints and deflection fittings.
4. Backwater valves.
5. Cleanouts.
6. Encasement for piping.
7. Manholes.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Special pipe fittings.

B. Shop Drawings: For the following:

1. Manholes: Include plans, elevations, sections, details, and frames and covers.

C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

D. Field quality-control test reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe, pipe fittings, and seals from dirt and damage.

B. Do not store plastic manholes, pipe, and fitting in direct sunlight.

C. Handle manholes according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Owner’s written permission.

PART 2 - PRODUCTS

A. All products and materials shall comply with the standards and specifications of the City of Lake City Utility Department Standards & Details and Approved Materials manual, current edition., and product manufacturer.

PART 3 - EXECUTION

A. Installation of all sanitary sewer components shall comply with the regulations, standards, and specifications of the City of Lake City Utility Department Standards & Details and Approved Materials manual, current edition.

ISSUED	**DATE**
EARLY RELEASE PACKAGE	**12/06/2021**

END OF SECTION 221313

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Lighting control equipment.

1.2 RELATED WORK

A. Foundations and pads required for equipment furnished under this division of the specifications.

B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.

1.3 QUALITY ASSURANCE

A. Comply with applicable local, state and federal codes.

B. Comply with applicable requirements of recognized industry associations which promulgate standards for the various trades.

C. Employ only qualified journeymen for this work. Employ a competent qualified electrician to supervise the work.

1.4 STANDARDS

A. Perform work specified in Division 26 in accordance with standards listed below including amendments or revisions. When these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Designer.

B. National Fire Codes (NFPA) including, but not limited to following:
   1. NFPA-70 - National Electrical Code. 2017 Edition.
   2. NFPA-99 - Health Care Facilities. 2018 Edition.
   3. NFPA-101 - Life Safety Code. 2018 Edition.
   4. NFPA-110 Standard for Emergency and Standby Power Systems. 2016 Edition.

C. Applicable Codes:
   1. Florida Building Code 2020, 7th Edition.
   2. Florida Building Code Accessibility 2020, 7th Edition.
   3. State of Florida Administrative Code No. 59A-3.
   4. The Guidelines for Design and Construction of Health Care Facilities 2018 Edition.
   5. Florida Administrative Code (FAC) Chapter 69A-3.012 and Chapter 69A-60.

D. Should any work be construed as being contrary to or not conforming to aforementioned codes, such alleged confliction to be brought to attention of Architect in writing ten (10) days prior to bid date for review so that such point in question may be resolved. All work to be installed in strict conformity with applicable codes without additional cost to Owner.

E. Contractor to submit and/or file with proper authorities all necessary specifications and drawings as required by governing authorities.

1.5 DESIGN REQUIREMENTS

A. Complete Short Circuit, Protective Device Coordination, and Arc Flash Study to meet requirements of NFPA 70 and NFPA 70E.

1.6 SUBMITTALS

A. Within fifteen (15) days after contract has been awarded, Contractor to submit to Designer for review a complete list of materials, equipment, and accessories proposed for use, listing the item and manufacturer's name only.

B. Based upon aforementioned approved listing, Contractor to submit an electronic copy of COMPLETE BROCHURES AND SHOP DRAWINGS OF ALL MATERIALS, FIXTURES, AND EQUIPMENT that he proposes to use giving the names of manufacturers, trade name and specific catalog numbers.

C. Brochures to be submitted in time to allow fifteen (15) days from date of receipt in Engineer's office before final approval or disapproval is required to meet construction schedule. Submittals to bear Contractor's stamp of approval evidencing he has examined and checked same and information contained therein is in accordance with contract requirements, and any deviations to be clearly marked. Approval of shop drawings not to be construed as permitting departure from the contractual documents.

D. Above-mentioned brochures to be submitted and approved before any materials are ordered.

E. In the event that within time stated above contractor fails to submit complete list of materials, equipment and accessories in proper form, the Designer reserves the right to select a full line of materials, fixtures, and equipment, which shall be binding upon Contractor for these materials, fixtures, and equipment as the case may be and which shall be used in his work.

F. Brochures: Submit complete descriptions, illustrations, specification data, etc. of all materials, fittings, devices, fixtures, special systems, etc., including the following:
   1. Lighting Controller
   2. Lighting.

G. Proposed items to be clearly indicated when other items are shown on same sheet. When proposing items other than those specified, brochures to contain both specified item sheets and proposed item sheets for ease of comparison. On request from Designer, samples shall be submitted and/or set up, as directed, for inspection and approval. Samples will be returned to Contractor.

1.7 OPERATING AND MAINTENANCE MANUALS

A. Prior to final acceptance of the project, furnish to Owner complete bound sets and electronic copies of operation and maintenance manuals of instructions for operation and maintenance of all pieces of equipment and systems provided under this division of specifications.

B. Manuals to also include all submittal data on all materials and equipment. Clearly indicate items provided on this project. A list giving name and address of nearest supply house carrying spare parts and name of Installation Contractor to be given to Owner.

C. Verbally instruct Owner's representatives. Contractor to obtain letter signed by the owner's representative indicating that the in-service training has been completed.

D. Three sets of the following data are required:
   1. Operating and maintenance instructions.
   2. Spare parts lists.
   3. Copies of approved submittal data.

1.8 DELIVERY AND STORAGE

A. Insofar as possible, deliver items in manufacturers' original unopened packaging. Where this is not practical, cover items with protective materials, to keep them from being damaged. Use care in loading, transporting, unloading, and storage to keep items from being damaged.

B. Store items in a clean dry place and protect from damage.

C. All damaged painted surfaces of equipment to be touched up to match original paint.

1.9 RECORD DRAWINGS

A. Keep a set of prints at the job site exclusively for recording deviations from the drawings.

B. Record locations and depths of buried and concealed conduits from fixed easily identifiable objects, such as building walls. Where conduits are concealed in walls, indicate distances off of building corners or other building features not likely to be disturbed by future alterations.

C. Mark deviations in colored pencils so that work of various systems can be easily identified.

D. When work is completed, record all deviations on clean copies of drawings.

E. Submit copies of completed "record drawings" to Owner's Representative for distribution.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications to be new and have UL listing, or listing by other recognized testing laboratory when such listings are available.

B. Contractors shall contact CED-Nashville or Graybar-Nashville to obtain pricing for all electrical products included in the specifications sections listed below, per HCA's purchasing agreement:
   1. Lance Smith
      CED-Nashville
      330 19th Avenue North
      Nashville, TN 37203
      HCA@ced-nashville.com
      615-329-2601
   2. Linda Lard
      Graybar-Nashville
      825 8th Avenue South
      Nashville, TN 37217
      HCA@graybar.com
      615-743-3208

a. 26 0519 Low-Voltage Electrical Power Conductors and Cables-600 Volt and Below
b. 26 0526 Grounding and Bonding for Electrical Systems
c. 26 0533 Raceways and Conduit Systems
d. Controllers

PART 3 - EXECUTION

3.1 COORDINATION

A. Intent:
1. These sections of specifications and drawings form a complete set of documents for the electrical work of this project. Neither is complete without the other. Any item mentioned in one shall be as binding as though mentioned in both.
2. The intent of these specifications and drawings is to form a guide for a complete electrical installation. Where an item is reasonably necessary for a complete system but not specifically mentioned, such as pull boxes, fittings, expansion fittings, support hangers, etc., provide same without additional cost to Owner.
3. Electrical layouts indicated on drawings are diagrammatical only. Exact location of outlets to be governed by project conditions. The Designer reserves the right to make any reasonable changes (approximately 6 feet) in location of junction boxes, or equipment prior to roughing-in of such without additional cost to Owner.

B. Deviations:
1. No deviations from specifications and drawings to be made without full knowledge and consent of Designer.
2. Should Contractor find during progress of work that existing conditions make desirable a modification of the requirements of any particular item, report such item promptly to Designer for his decision and instructions.

C. Insofar as it is possible to determine in advance, leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should contractor neglect doing this, any cutting and/or patching required to be done is at this contractor's expense.

D. Visit site and be informed of conditions under which work must be performed. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work involved.

E. Designer to be mediating authority in all design related deviations and disputes arising on the project.

F. Coordinate to assure that proper points of service transformer locations, voltage characteristics and capacity of service are in accordance with contract drawings.

3.2 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of this contract.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through existing floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves and holes in slabs between floors to be properly sealed, fire proofed and water proofed.

D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.3 FOUNDATIONS AND PADS

A. Provide foundations and pads required for equipment provided under this division of specifications. Coordinate proper size and location of foundations, pads, anchor bolts, and other items to be built into structure.

B. Concrete to be in accordance with concrete division of these specifications.

3.4 TESTS

A. On completion of work, installation to be entirely free from grounds, short circuits, and open circuits. Perform a thorough operational test in presence of Owner or his representative. Balance all circuits so that feeders to panels be not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

B. Furnish Owner, as a part of closing file, a copy of such tests including identification of each circuit and readings recorded. Test information to be furnished to Owner includes ampere readings of all panels and major circuit breakers, insulation resistance reading of motors and transformers.

C. Prior to final observation and acceptance, test, leave in satisfactory operating condition all electrical systems and equipment including but not limited to the following:
1. Electrical distribution system.

3.5 INSPECTION FEES AND PERMITS

A. Obtain and pay for all necessary permits and inspection fees required for electrical installation.

3.6 IDENTIFICATION OF EQUIPMENT

A. Properly identify all contactors with permanently attached black (normal power), yellow (life safety power), orange (critical power), green (equipment power), and purple (essential distribution) phenolic plates with 1/4" engraved lettering on the face of each attached, with two sheet metal screws. Starters and relays connected by the electrical tradesman to be identified by him whether furnished by him or others.

3.7 DEMOLITION

A. Contractor shall visit the site before submitting a bid to acquaint himself with existing conditions.

B. Remove existing conduit and wire from areas to be remodeled, back to panelboard, cabinet or junction box.

C. Lighting fixtures and conductors removed shall be offered to the Owner. If he chooses to retain these items or a part of these items, turn those chosen over to him. Items rejected by the Owner shall be removed from the project site by the contractor.

3.8 OBSERVATIONS

A. When field observation services are a part of the project scope, Engineer's office will provide periodic observation of the progress of work specified herein. Purpose of the observation is to ensure compliance

of Contractor's work with specifications and drawings. Engineer's office will also observe tests required of Contractor as called for in other sections of specifications.

3.9 WARRANTY-GUARANTEE

A. Designer reserves right to accept or reject any part of installation which does not successfully meet requirements as set out in these specifications.

B. Contractor shall and hereby does guarantee all work installed under this division shall be free from defects in workmanship and materials for a period of one year from date of final acceptance, whichever is earliest. The above parties further agree that they will repair and replace any defective material or workmanship which becomes defective within the terms of this warranty-guarantee.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION

SECTION 26 0519
LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES 600 VOLT AND BELOW

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide a complete system of conductors for lighting, power, and controls throughout building.

B. Refer to drawings for sizes of conductors.

PART 2 - PRODUCTS

2.1 CONDUCTORS - POWER AND LIGHTING

A. Provide 98% conductivity copper conductors with 600-volt insulation.

B. 600-volt insulation for conductors installed in underground raceways shall have XLP (cross-linked polyethylene) insulation, Type XHHW-2.

C. Stranded cables are acceptable for conductors #14 AWG and larger. Solid cables shall be utilized for conductors smaller than #14 AWG.

D. Conductors shall be manufactured by Southwire, General Cable or approved substitute.

E. Provide white or gray colored neutral conductors; provide black or color coded phase conductors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wiring in a homerun conduit shall be limited to two, 3-phase homeruns.

B. Each circuit shall have a separate neutral conductor.

C. Install pull boxes in circuits or feeders over 100' long.

D. All conductors shall be continuous from origin to panel or equipment termination without splices where possible. Where splices and taps are necessary or are required for branch circuits, they shall be made in splice boxes with suitable connectors. Feeder conductors shall not be spliced.

E. Make all splices or connections only at outlet, pull or junction boxes.

F. Use pulling compound to pull conductors.

G. Bend radius on conductors shall be less than the limitations listed by the cable manufacturer.

H. Deliver all conductors to job site new and in original wrapping, package or reel.

I. All conductors and connections shall test free of grounds, shorts, and opens.

J. For 20-amp, 120-volt branch circuits, provide No. 10 wire in lieu of No. 12 wire for any branch circuit in excess of 90 linear feet to prevent excessive voltage drop. Where branch circuit exceeds 175 linear feet, use No. 8 wire.

K. Use Ideal wing nuts, Scotchlok Type Y, R, G, or B, or approved equivalent connectors for fixture connections at outlet boxes.

L. Make feeder taps and joints with OZ type T, PT, PM or PTS, or approved equivalent clamp connectors as manufactured by Kupler, or with approved compression sleeves. Wrap connectors with No. 10 electro-seal or approved equivalent plastic filler and vinyl tape.

M. Leave a minimum of 8" slack wire in every outlet box whether it be in use or left for future use.

N. Color code conductors as follows:

CONDUCTOR COLOR CODE	
	120/208 Volt
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green

O. If the above conflicts with existing color coding, match existing.

P. Use factory color coded conductors where commercially available. If not, use black wire and band with color tape.

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END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The entire system of raceways and equipment to be grounded and bounded in accordance with Article No. 250 and No. 517 of latest edition of National Electrical Code and any local regulation or governmental governing authority.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. All branch circuits shall have a separate green grounding conductor installed in same conduit as phase and neutral conductor from panel ground bus to device. The grounding conductor shall be sized in accordance with Table 250.122 of N.E.C.

2.2 GROUND CLAMPS

A. O-Z Gedney, Steel City, or approved substitute.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Effectively bond all grounding conductors to grounding electrodes, equipment enclosures and ground busses.

B. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.

C. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.

ISSUED	DATE
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END OF SECTION

SECTION 26 0533
RACEWAYS AND CONDUIT SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide a complete conduit system with associated couplings, connectors, and fittings.

B. Conduits shall be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.

C. Provide each fixture and other wiring devices with a galvanized outlet box of appropriate size and depth for its particular location and use unless indicated otherwise.

D. Provide pull and junction boxes of appropriate size and depth or as indicated on the drawings and as specified hereinafter.

1.2 SUBMITTALS

A. Submittal for products furnished under this section is not required.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. IMC and EMT conduit shall be hot-dip galvanized, or electrogalvanized steel by Allied, Wheatland Tube, Republic Conduit, Western Tube, or approved substitute.

B. Erickson couplings for IMC, shall be used where neither length of conduit can be rotated.

C. IMC conduit connectors from 1/2” to 4” trade sizes shall use compression type.

D. EMT conduit connectors from 1/2” to 2” trade sizes shall use set screw type. EMT conduit connectors from 2-1/2” to 4” trade sizes shall use two set screw type.

E. Weatherproof hub shall be complete with sealing "O" ring or sealing locknuts.

F. Provide polyvinyl chloride (PVC) conduit, Type 40, and associated couplings, connectors, and fittings. PVC conduit shall be UL listed and 90 degrees C UL rated.

G. Outlets and junction boxes shall be Steel City or approved substitute.

H. Provide 4" square x 1-1/2" deep boxes for switches and receptacles in drywall partitions. Use square cut plaster rings of proper gauge and depth.

I. Provide 4" x 1-1/2" octagonal boxes for ceiling outlets. For increased cubic capacity provide 4" x 2-1/8" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square boxes for ceiling outlets.

J. Provide galvanized malleable iron condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

K. Pull and junction boxes shall be by Hoffman or approved substitute.

L. For exterior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4 inch flanges, bolted covers with full gaskets forming a completely water-tight assembly, equal to Hoffman, Concept Series.

M. For exterior work in graded areas outside the building, provide heavy duty sidewalk junction boxes externally flanged for flush mounting. Covers to be fully gasketed, watertight and secured with plated screws or bolts. Crouse-Hinds Type WJB or approved substitute.

N. Conduit is to be color coded from the factory in accordance with facility's current color coding standard, where no standard exits for color coding, provide in accordance with FacilitiGroup guidelines. As an alternative, contractors may submit for evaluation a deduct to omit use of factory-painted conduit. Tape or paint are to be used to identify circuits and junction boxes and/or fittings are to be painted in accordance with facility standard or color table.

2.2 ELECTRICAL METALLIC TUBING (EMT)

A. Use Electric Metallic Tubing (EMT) for:
   1. Indoor branch circuits and feeders where concealed or where exposed and not subject to physical damage.

2.3 INTERMEDIATE METAL CONDUIT (IMC)

A. Use Intermediate Metal Conduit (IMC) for:
   1. Branch circuits installed in concrete slabs at ground floor.
   2. Branch circuits installed exposed below 6 feet above finished floor.
   3. Branch circuits installed in wet locations.

2.4 POLYVINYL CHLORIDE (PVC)

A. Use PVC for:
   1. Exterior underground branch circuits.

B. PVC conduit shall not be used for feeders or branch circuits inside the building.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Minimum size of conduits shall be 1/2 inch (16 mm) for controls circuiting and 3/4 inch for feeder circuits and multiple branch circuits.

B. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors, and fittings.

C. Make bends or offsets with standard ells or field bends with an approved bender.

D. Run conduits concealed in floor slabs, below slabs, or in walls in direct line with long sweep bends or offsets. Run exposed conduits and conduits run above lay-in ceilings parallel to and at right angles to building lines. Group multiple conduit runs in banks.

E. Secure conduits to all boxes and cabinets with two locknuts and bushings so system will be electrically continuous from service to all outlets.

F. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

G. Complete conduit systems before pulling conductors.

H. Provide cable supports in conduits rising vertically in accordance with the National Electrical Code, Article 300-19.

I. Provide nylon pull cord in all empty conduits. Steel wire not acceptable as pull wire.

J. Where IMC conduit is installed in a cabinet, junction box, pull box, or auxiliary gutter, conductors shall be protected by an insulated bushing. Locknuts shall be installed on conduit outside and inside enclosure.

K. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated hub, complete with recessed sealing "O" ring or sealing locknut shall be used.

L. In concrete slabs, block up conduit from forms and securely fasten in place. All conduits in slabs shall have a minimum of 1-1/2 inches concrete coverage above and below.

M. Conduits for branch circuits shall be terminated directly into panelboard enclosure without the use of pull boxes, junction boxes, wireways, or auxiliary gutters, unless the panelboard enclosure does not provide sufficient surface area for all conduits. Where such cases exist, the contractor shall notify the Designer. In no case will splices in such boxes, wireways, etc., be permitted.

N. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit, and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

O. Standard HCA color coding:
   1. Purple: Essential Distribution not listed herein
   2. Yellow: Life Safety Branch
   3. Orange: Critical Branch
   4. Green: Equipment Branch
   5. Red: Fire Alarm System

P. If the above conflicts with existing color code, use existing.

Q. No conduit shall be installed in elevated slabs.

3.2 EMT

A. Do not use electric metallic tubing in cinder concrete or cinder fill where subject to permanent moisture unless protected on all sides by a layer of noncinder concrete at least 2 inches thick or unless the EMT is at least 18 inches under the fill. Use of set-screw fitting is not acceptable in concrete or in fill under slab.

3.3 PVC

A. Use threaded fittings for all connectors and adapters.

B. Provide code sized ground conductors in all power conduit runs.

C. No PVC shall emerge from the ground or the concrete slab or encasement. PVC shall convert to rigid metal prior to its emergence.

D. Make bends with standard ells or with an approved heat bender.

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END OF SECTION

SECTION 26 4313
(TVSS) TRANSIENT VOLTAGE SURGE SUPPRESSION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide 3-phase, 4-wire Surge Protective Devices (SPDs) at electrical panels as indicated on the panelboard schedules and on the riser diagram.

B. Provide individual circuit surge protection devices, as required by the Florida Building Code, for all circuits exiting or entering the building structure, where panelboard used is not equipped with an SPD.

1.2 RELATED WORK

A. Panelboards.

B. Section 26 0526 – Grounding and Bounding for Electrical Systems.

1.3 STANDARDS

A. UL compliance: Listed to UL 1449 current edition by an OSHA approved Nationally Recognized Test Lab (NRTL)

B. ANSI/IEEE compliance: Comply with ANSI/IEEE test procedures.

C. National Electric Code - Section 280 and 285.

D. UL96A.

E. NFPA 760.

1.4 SUBMITTALS

A. Submit product data and shop drawings as required by Section 26 0500.

B. Submittals shall include the following:
   1. Complete manufacturers' data for each suppressor indicating part numbers and rated voltages and currents.
   2. Product performance analysis with graphic display of let-thru waveforms and peak clamping voltages for ANSI C62.41 tests, Categories A3 & B3 ringwaves and C1 & C3 impulses.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. SPDs shall be as manufactured by Square D, Eaton, or approved equal.

B. The suppressor manufacturer shall offer factory repair service for all units, which will include replacement for non-repairable sealed units.

2.2 WARRANTY

A. SPD devices shall be warranted for a minimum of 10 years.

2.3 SPECIFICATIONS

A. General:

1. SPD shall be internally fused, capable of allowing the suppressor's maximum rated transient current to pass through the suppressor without fuse operation. SPD shall be listed as a Type1 SPD without the need for upstream over current protection for safe operation.
2. Proper operation of the suppressor elements on each phase shall be indicated by a normally-on LED or lamp. Also, normally closed contacts shall be used for remote annunciation of suppressor failure.
3. The SPD shall be compatible with the electrical system voltage, current, and distribution configuration.
4. The SPD maximum continuous operating voltage shall be 115% of the nominal RMS voltage with no degradation. The MCOV value shall be a tested value as outlined in UL1449. The MCOV shall not be a claimed value based solely on the MCOV of the surge component used in the design, nor based solely on the 115% over voltage test outlined in UL1449.
5. The SPD shall be sine-wave tracking to provide added protection against oscillatory transients, such as Category A and B Ringwaves.
6. Failure of the SPD shall not cause any disruption of power.
7. Unit shall operate without the need for an external overcurrent protection device and be listed as such.
8. Protection Models – The SPD multi protect all models if the electrical system being utilized.

B. Distribution Panel SPD Devices:

1. The SPD shall have a surge current capacity of 60,000 amps (8 x 20 microsec) minimum per mode.
2. SPD devices shall meet or exceed the following operating characteristics and ratings: (Series Ratings)
3. The SPD shall be a Type1 or Type2 SPD per UL1449.
4. The unit shall not have more than 10% deterioration or degradation of the UL1449, Voltage Protection Rating (VPR) due to repeated surges. Acceptable clamping values are shown below based on test procedures outlined in UL1449.

System Voltage	Mode	UL 1449 Fourth Edition VPR Rating
120/208	L-G	800
	N-G	800
	L-L	1200
277/480	L-N	1200
	L-G	1200
	N-G	1200
	L-L	2000

PART 3 - EXECUTION

3.1 WORK INCLUDED

A. The SPD shall be internally mounted to the panelboard. Individual circuit devices may be installed external to the panelboard.

B. Ground the SPDs and cabinets in accordance with the manufacturer's instructions, the National Electrical Code (section 280 and 285), and wiring diagrams shown on the drawings.

C. The SPD shall not include multiple replacement modules.

D. All conductors associated with SPDs shall be installed in conduit. Minimum conductor size shall be #8 AWG copper. Conductors shall be as short and as straight as possible with no unnecessary length or turns. A maximum length of 12 inches is required where possible.

E. SPDs shall be connected in parallel with main conductors. Service entrance SPDs shall incorporate the use of an internally mounted disconnect. Panelboard surge protectors shall be equipped with interval overcurrent/disconnecting device. Where 12 inches of lead length is not possible utilization of a low impedance preassembled cable assembly is required to lower the clamping voltages of the installed system to acceptable levels. Lead length must include phase connection plus neutral or ground.

F. Mounting position of the SPD and overcurrent protection device shall be coordinated to minimize the total phase, neutral and ground cable lengths to achieve minimum installed system clamping voltages.

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END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services necessary for installation of all exterior lighting fixtures, lamps, poles, pole bases etc. for:
   1. Helipad lighting.

B. Refer to details and arrangements shown on drawings.

C. Provide concrete bases for pole manufacturers as required, refer to details for additional information.

D. Fixtures, poles, and appurtenances, shall be suitable for exterior use, shall be UL listed, and shall be of standard design for intended application.

1.2 SUBMITTALS

A. Submit for approval prior to purchasing fixtures complete shop drawings and brochures including photometrics for each type of exterior lighting system specified. Shop drawings and brochures shall be specific and shall include all pertinent data and accessories. If substitute fixtures are proposed, include cuts of both specified fixture and proposed equivalent fixtures including photometrics of both fixtures.

B. If requested by Architect or Designer, submit a sample fixture which will be returned after inspection by Architect or Designer.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Electrical contractors must contact Graybar Electric Supply or CED in Nashville, TN for all lighting fixture and lighting control quotations. Fixtures are to be quoted and ordered through Graybar Electric Supply Nashville or CED Nashville - Corporate Accounts without exception.
   1. Contact:
      Linda Lard
      Graybar-Nashville
      825 8th Avenue South
      Nashville, TN 37217
      HCA@graybar.com
      615-743-3208
   2. Contact:
      Lance Smith
      CED-Nashville
      330 19th Avenue South
      Nashville, TN 37203
      HCA@ced-nashville.com
      615-329-2601

B. Contactors and selector switches shall be Square D or Cutler-Hammer.

C. Lighting Contactors: Square D or Cutler-Hammer.

2.2 MATERIALS

A. Provide luminaire and pole assemblies as scheduled.

B. Luminaires, including all components, shall be designed to meet extreme temperature (low), moisture, and wind conditions in area.

C. Poles: Steel, round, designed for wind load in the area of installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install luminaires and poles on concrete bases. Provide all anchor bolts and bolt hole circle templates.

B. Ground all luminaires to poles and all poles to equipment grounding conductor or to separate 3/4" diameter x 10' copperweld ground rod driven at base of each pole.

C. Each pole mounted outside lighting luminaire shall have its conductors spliced to the branch circuit connectors in the pole base. Provide a Tron waterproof fuse holder with time delay fuse (1.5 X luminaire current) in the pole base for each ungrounded conductor for each luminaire.

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END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, and removing/abandoning site utilities.
8. Temporary erosion and sedimentation control.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and

other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as indicted on Drawings.

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.

2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

C. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Owner.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises as directed.

D. Utility Locator Service: Notify Florida One-Call and the local municipalities for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree protection measures are in place and permits have been issued.

F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to the Drawings.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to local requirements.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned.

1. Arrange with utility companies and Owner to shut off indicated utilities.

2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Owner’s written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.

3. Use only hand methods or air spade for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated. Onsite geotechnical engineer to provide guidance during construction.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Dispose of surplus topsoil which exceeds the quantity to be reused. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches.

2. Do not stockpile topsoil within tree protection zones.

3. Dispose of excess topsoil as specified for waste material disposal.

4. Select subparagraph above or below.

5. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

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END OF SECTION 311000

SECTION 312000

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs, walks, pavements, turf and grasses, and other areas.
3. Subbase course for concrete.
4. Subbase course for asphalt paving.
5. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 312319 "Dewatering" for lowering and disposing of ground water during construction.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

C. All earthwork to be performed and materials used shall be in accordance with the Geotechnical Engineering Report. In the event of a discrepancy between the above-referenced standards, the plans, and/or any portion of this specification section, the order of precedence will be the above-referenced report, the City Design Standards, and then these specifications. The Contractor shall contact the engineer in the event of a discrepancy.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Material: Course placed between the subgrade asphaltic concrete paving.

C. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

D. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

E. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

F. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

H. Fill: Soil materials used to raise existing grades.

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D-1586.

J. Structures: Slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at the Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.

b. Coordination of Work with utility locator service.

c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.

d. Extent of trenching by hand or with air spade.

e. Field quality control.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D-2487 and ASTM D-2488.

2. Laboratory compaction curve according to ASTM D-1557 and ASTM D-1586.

C. Blasting plan to be approved by authorities having jurisdiction\.

D. Seismic survey report from seismic survey agency.

E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.6 QUALITY ASSURANCE

A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:

1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.

2. Seismographic monitoring during blasting operations.

B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.

2. Seismographic monitoring during blasting operations.

C. Geotechnical Testing Agency Qualifications: Qualified according to ASTM D-1557 and ASTM D-1586 for testing indicated.

1.7 FIELD CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Owner not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Owner’s written permission.

3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

D. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Owner.

E. Utility Locator Service: Notify Florida One-Call and the local municipalities for area where the Project is located before earth-moving.

F. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in the Drawings are in place.

G. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.

2. Parking vehicles or equipment.

3. Erection of sheds or structures.

4. Impoundment of water.

5. Excavation or other digging unless otherwise indicated.

6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

H. Do not direct vehicle or equipment exhaust towards protection zones.

I. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

Generally, the on-site Geotechnical engineer will provide guidance related to the soil materials on the Project. Final review and acceptance of on-site soil properties, materials, and compaction requirements will be the sole responsibility of the on-site geotechnical engineer.

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials approved by the geotechnical engineer when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Verify with geotechnical engineer regarding on-site soils free from organics and debris being suitable for use as fill within the pavement areas.

C. Unsatisfactory Soils: Verify with geotechnical engineer regarding materials which do not comply with the requirements for acceptable material or which, cannot be compacted to the specified or indicated density.

D. Subgrade: Stabilize the subgrade to materials to a minimum Limerock Bearing Ratio (LBR) of 40, as specified by Florida Department of Transportation requirements for Type B Stabilized Subgrade. The subgrade material should be compacted to at least 98 percent of modified Proctor maximum dry density (ASTM D-1557).

E. Base Material: The base course should have a minimum Limerock Bearing Ratio (LBR) of 100 and should be compacted to 98 percent of modified Proctor maximum dry density (ASTM D-1557).

F. Select Fill: USCS Classification CL and/or SC, with a Plasticity Index between 10 and 20.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.
6. Drainage Fabric

PART 3 - EXECUTION

Generally, the on-site Geotechnical engineer will provide guidance related to the soil preparation and execution on the Project. Final review and acceptance of on-site soil properties, materials, and compaction requirements will be the sole responsibility of the on-site geotechnical engineer.

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Perform blasting without damaging adjacent structures, property, or site improvements.

2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Testing Agency when excavations have reached required subgrade.

B. If Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.

2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place all backfill in strict accordance to Geotechnical Report for this project.

B. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for Record Documents.

3. Testing and inspecting underground utilities.

4. Removing concrete formwork.

5. Removing trash and debris.

6. Removing temporary shoring and bracing, and sheeting.

7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

C. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Roadways: Provide backfill to comply with local municipality requirements and recommendations by the on-site geotechnical engineer.

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.

2. Under walks and pavements, use satisfactory soil material.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. All compaction in strict accordance with Geotechnical recommendations.

B. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment.

C. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under pavements, scarify and recompact existing subgrade and each layer of backfill or fill soil material at 98 percent. Refer to Geotechnical Report for thickness.

2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.

3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.

2. Walks: Plus or minus 1 inch.

3. Pavements: Plus or minus ½ inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.16 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

2. Place base course material over subbase course under hot-mix asphalt pavement.

3. Shape subbase course and base course to required crown elevations and cross-slope grades.

4. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.

5. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.

6. Compact subbase course and base course per geotechnical recommendations.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer per geotechnical recommendations.

3.17 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.

2. Determine that fill material classification and maximum lift thickness comply with requirements.

3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D-1556, ASTM D-2167, ASTM D-2937, and ASTM D-6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area, as indicated in Geotechnical Report, but in no case fewer than 3 tests.

2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 312000

SECTION 31 2310
EXCAVATING, BACKFILLING, AND COMPACTING FOR STRUCTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes the excavation, backfilling and compacting required for the structures shown in the Contract Drawings.

1.2 RELATED SECTIONS

A. Section 01 3324 - Structural Submittals.

B. Section 01 4524 - Structural Testing/Inspection Agency Services.

1.3 REFERENCES

A. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

B. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

D. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 DEFINITIONS

A. Granular sub-base: Granular fill directly beneath slabs-on-grade.

B. Granular Backfill: Fill immediately behind foundation elements or retaining walls.

C. Structural fill: Fill under the structure other than the granular sub-base.

1.5 SUBMITTALS

A. Upon request, submit soil test reports performed by the Structural Testing/Inspection Agency.

1.6 QUALITY ASSURANCE

A. Structural Testing/Inspection Agency shall perform the following quality related items:
   1. Verify structural fill complies with specifications.
   2. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
   3. Observe proofrolling.
   4. Perform a sufficient number of field density tests to verify compaction of structural fill. As a minimum, perform one test per lift for every 2500 square feet of fill placed.

5. Verify foundation bearing capacity.
6. Verify quantities of material removed and quantities of material placed where Unit Prices are involved.

1.7 SURVEY

A. Prior to construction, have structure location staked and certified by a licensed surveyor. If discrepancies between actual lines and elevations exist, notify Architect/Structural Engineer before proceeding with layout of structure.

1.8 SUBSURFACE CONDITIONS

A. Copies of a subsurface investigation of the site will be made available upon request. The data is not intended as a representation or warranty of the continuity of such conditions. Owner will not be responsible for interpretation or conclusions drawn therefrom by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all conditions that may be encountered.

B. Contractor may examine the site and make his own subsurface explorations at no additional cost to the Owner. Notify Owner prior to making any subsurface explorations.

1.9 EXISTING UTILITIES

A. Locate existing underground utilities by careful hand excavation. If utilities are to remain in place, provide protection from damage during construction operations.

B. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Owner or others, unless written permission is given by the Architect and then only after temporary utility services have been provided.

C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions.

D. Repair damaged utilities to satisfaction of utility owner.

1.10 NOTICE

A. Notify the Architect/Structural Engineer 48 hours prior to the beginning of any excavation work.

PART 2 - PRODUCTS

2.1 GRANULAR SUB-BASE

A. Granular sub-base shall be sound and free-draining, such as sand, gravel or crushed stone with less than 10% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.2 GRANULAR BACKFILL

A. Backfill shall meet the requirements of the granular sub-base.

2.3 STRUCTURAL FILL

A. Structural fill shall consist of clayey sand, sand, or sandy clay with a plasticity index less than 7.

B. Structural fill shall be free of organics, debris and deleterious materials.

PART 3 - EXECUTION

3.1 STRIPPING

A. Strip vegetation, topsoil, roots, and other unsuitable material to a depth determined by the Structural Testing/Inspection Agency but not less than one foot, nor less than 10 feet outside the perimeter of the structure.

B. Stockpile sufficient amounts of topsoil as required to cover areas to be landscaped with a minimum of six inches of material.

3.2 EXCAVATION

A. Excavation shall be considered unclassified.

B. Perform excavation to the depths and limits on the Drawings and as specified herein.

C. Do not excavate to full depth when there is probability of frost forming or ground freezing in excavation before concrete is placed.

D. Remove unsuitable soils located by proofrolling (see PROOFROLLING section below) and as noted in the geotechnical report.

E. Ground water may be encountered during the foundation excavation. Provide a system for controlling the ground water to a level at least three feet below the lowest point of the excavation.

F. Keep excavations dry by sloping ground away from holes and trenches.

3.3 PROOFROLLING

A. After stripping or excavation and before any fill placement, fill areas shall be proofrolled with a minimum of two coverages of a loaded dump truck or scraper in each of two perpendicular directions.

B. Areas found to be soft or pumping shall have the soft soil removed and replaced with structural fill and compacted as outlined herein.

3.4 PLACEMENT OF STRUCTURAL FILL

A. Do not place structural fill on subgrade that contains frost, mud or is frozen.

B. Structural fill shall be placed and compacted in 8-inch thick loose layers.

C. Compact structural fill to 98 percent of the maximum dry density as measured by Standard Proctor, ASTM D698. The water content during fill compaction should be kept within +/-2 percent of the optimum moisture content.

3.5 PLACEMENT OF GRANULAR SUB-BASE

A. Do not place granular sub-base on subgrade that contains frost, mud or is frozen.

B. Compact granular sub-base to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698. The water content during subbase compaction should be kept within +/-2 percent of the optimum moisture content.

3.6 PLACEMENT OF BACKFILL

A. Backfill behind wall shall be placed in layers of six inches.

B. Compact backfill behind walls to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698. The water content during backfill compaction should be kept within +/-2 percent of the optimum moisture content.

3.7 CLEAN UP

A. Remove excess excavated materials from job site and upon completion leave site in clean condition.

ISSUED	DATE
CONSTRUCTION DOCUMENTS	12/06/2021

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.
6. Asphalt surface treatments.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.

C. All paving to be performed and materials used shall be in accordance with the Geotechnical Engineering Reports. In the event of a discrepancy between the above-referenced standards, the plans, and/or any portion of this specification section, the stricter of the requirement will govern. The Contractor shall contact the engineer in the event of a discrepancy.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

2. Job-Mix Designs: Certification, by FDOT, of approval of each job mix for the Work, shall be proved with all product mix submittals.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each paving material, by a qualified testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by FDOT.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of FDOT for asphalt paving work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.

2. Slurry Coat: Comply with weather limitations of ASTM D 3910.

3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Base Material: limerock meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Latest Edition.

2.2 ASPHALT MATERIALS

A. Surface Course: should consist of FDOT Type SP asphaltic concrete meeting the requirements of FDOT Standard Specifications for Road and Bridge Construction, Latest Edition. Asphalt binder shall be PG 67-22.

2.3 AUXILIARY MATERIALS

A. Joint Sealant: AASHTO M 301, hot-applied, single-component, polymer-modified bituminous sealant.

B. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

1. Color: As indicated.

C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.

1. Color: As indicated

D. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).

2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

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

3.2 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.

2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

E. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of ¼ inch (6 mm).

1. Clean cracks and joints in existing hot-mix asphalt pavement.

2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.4 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.

2. Place hot-mix asphalt surface course in single lift.

3. Revise first subparagraph below to higher temperature if thin lifts in cool weather are likely. See National Asphalt Pavement Association recommendations.

4. Spread mix at a minimum temperature of 250 deg F (121 deg C).

5. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.

6. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches (25 to 38 mm) from strip to strip to ensure proper compaction of mix along longitudinal joints.

2. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the specified density.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).

2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: ¼ inch (6 mm).

2. Surface Course: 1/8 inch (3 mm).

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

C. Asphalt Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch (3 mm) of height indicated above pavement surface.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner shall engage a qualified testing agency to perform tests and inspections.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D-1557.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than 3 cores taken.

F. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

ISSUED	**DATE**
EARLY RELEASE PACKAGE	**12/06/2021**

END OF SECTION 321216

SECTION 321313

CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for driveways, parking lots, curbs and gutter, and walkways.

B. All concrete paving to be performed and materials to be used shall be in accordance with the Geotechnical Engineering Report and the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, and the applicable requirements in the American Concrete Institute's Manual of Concrete Practice. In the event of a discrepancy between the above-referenced report and any portion of this specification section, the stricter of requirements will govern. The Contractor shall contact the Engineer in the event of a discrepancy.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

C. Material Test Reports

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

F. Preinstallation Conference: Conduct conference at the Project Site.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:

a. Concrete mixture design.

b. Quality control of concrete materials and concrete paving construction practices.

2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.

c. Ready-mix concrete manufacturer.

d. Concrete paving subcontractor.

e. Manufacturer's representative of stamped concrete paving system used for detectable warnings.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials and 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.

D. Plain-Steel Wire: ASTM A 82/A 82M.

E. Deformed-Steel Wire: ASTM A 496/A 496M.

F. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.

G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Portland Cement Type I, Type IA, Type III, or Type IIIA.

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source, with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

1. Color: As selected by the Owner.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.5 RELATED MATERIALS

A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.6 PAVEMENT MARKINGS

A. Pavement Marking to be thermoplastic unless otherwise noted.

1. Color: As indicated.

2.7 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1820 mm) long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4 inch (19 mm) in diameter, 10-inch (254-mm) minimum length.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa) or as otherwise indicated.

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.

3. Slump Limit: maximum of 5 inches at time of placement, 3 inches for curb and sidewalk, plus or minus 1 inch.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instruction

1. Use water-reducing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M[and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

Generally, the on-site Geotechnical engineer will provide guidance related to the concrete paving sections and materials on the Project. Final review and acceptance of the concrete properties, materials, and compaction requirements will be the sole responsibility of the on-site geotechnical engineer.

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

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

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

F. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than ½inch or more than 1inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together; and,

G. Joint Sealants: All joints shall be sealed with approved exterior pavement joint sealants and shall be installed per manufacturer's recommendations.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

G. Screed paving surface with a straightedge and strike off.

H. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

I. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

J. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1.

L. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by a combination of moisture curing, moisture-retaining-cover curing, or curing compound.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch (19 mm).

2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).

3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/2 inch (13 mm).

4. Joint Spacing: 3 inches (75 mm).

5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.

6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint or thermoplastic until layout, colors, and placement have been verified with Architect.

B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint or thermoplastic with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates.

3.11 WHEEL STOPS

A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.

B. Securely attach wheel stops to paving with not less than two galvanized-steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed.

C. Concrete paving will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 321313

SECTION 321314

CONCRETE SIDEWALK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this Section.

1.02 WORK INCLUDED

A The work specified in this Section consists of the construction of concrete sidewalk in accordance with these Specifications and in conformity with the lines, grades, dimensions and notes shown on the plans.

1.03 RELATED WORK

A Section 024119 – Selective Demolition

B Division 31 – Earthwork

PART 2 - PRODUCTS

2.01 CONCRETE

A. Concrete shall be Class I Concrete, with a minimum compressive strength of 3,500 psi in accordance with Section 346, Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.

2.02 FORMS

A. Forms for this work shall be made of either wood or metal and shall have a depth equal to the plan dimensions for the depth of concrete being deposited against them. They shall be straight, free from warp or bends, and of sufficient strength when staked, to resist the lateral pressure of the concrete without displacement from lines and grade. Forms shall be cleaned each time they are used and shall be oiled prior to placing the concrete.

2.03 SUBGRADE AND GRADING

A. Excavation shall be made to the required depth, and the foundation material upon which the sidewalk is to be set shall be compacted to a firm, even surface, true to grade and cross-section, and shall be moist at the time that the concrete is placed.

2.04 JOINTS

A. Expansion joints between the sidewalk and the curb, and at all other locations indicated on the plans, shall be 1/4-inch wide, formed with a preformed joint filler. Preformed joint filler shall meet the requirements of AASHTO M153 or AASHTO M213.

B. Contraction joints may be of the open type or may be sawed. Open type contraction joints shall be formed by staking a metal bulkhead in place and depositing the concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be edged with a tool having a 1/2-inch radius.

If the CONTRACTOR elects to saw the contraction joints, a slot approximately 1/8 inch wide and not less than 1-1/2 inches deep shall be cut with a concrete saw after the concrete has set, and within the following periods of time:

Contraction joints shall be constructed at not more than twenty (20) foot intervals, and shall be in place within twelve (12) hours after finishing.

PART 3 – EXECUTION

3.01 PLACING

A. The concrete shall be placed in the forms to the required depth and shall be vibrated and spaded until mortar entirely covers its surface.

3.02 FINISHING

A. Screeding: The concrete shall be struck-off by means of a wood or metal screed, used perpendicular to the forms, and floated in order to obtain the required grade and remove surplus water and laitance.

B. Surface requirements: The concrete shall be given a broom finish. The surface variations shall not be more than 1/4 inch under a ten-foot straightedge, nor more than 1/8 inch on a five-foot transverse section. The exposed edge of the slab shall be carefully finished with an edging tool having a radius of 1-1/2 inch.

3.03 CURING

A. The concrete shall be continuously cured for a period of at least 72 hours. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently, to permit application of the curing material without marring the surface.

B. Wet burlap, white-pigmented curing compound, waterproof paper or polyethylene sheets may be used for the curing.

ISSUED	**DATE**
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END OF SECTION 321314

SECTION 321373

CONCRETE PAVING JOINT SEALANTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 – General Requirements shall govern the work under this section.

1.2 WORK INCLUDED

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.

2. Joints between cement concrete and asphalt pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated. In the event of a discrepancy between this specification section and City of Lake City Design Criteria, the City's Design Criteria shall govern. The Contractor shall notify the Engineer in the event of a discrepancy.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (4.4 deg C).

2. When joint substrates are wet or covered with frost.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 – PRODUCTS

2.1 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.

2.2 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

1. Available Products:

a. Crafco Inc.; RoadSaver Silicone.

b. Dow Corning Corporation; 888.

B. 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.

1. Available Products:

a. Crafco Inc.; RoadSaver Silicone SL.

b. Dow Corning Corporation; 890-SL.

2.3 HOT-APPLIED JOINT SEALANTS

A. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.

1. Available Products:

a. Crafco Inc.; Superseal 444/777.

b. Meadows, W. R., Inc.; Poly-Jet 3406.

B. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.

1. Available Products:

a. Koch Materials Company; Product No. 9005.

b. Koch Materials Company; Product No. 9030.

c. Meadows, W. R., Inc.; Sealtight Hi-Spec.

d. Approved equals.

2.4 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 Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth 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 depth, 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 depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.

2. Do not stretch, twist, puncture, or tear backer materials.

3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

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END OF SECTION 321373

SECTION 321723

PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this Section.

1.02 WORK INCLUDED

A. The work covered by this Section shall include the furnishing of all labor, equipment and materials necessary to construct and install all pavement marking, and striping in accordance with the plans and these specifications.

1.03 RELATED WORK

A. Section 321216 – Asphalt Paving

B. Section 321313 – Concrete Paving

1.04 QUALITY ASSURANCE

A. Perform all work in accordance with the requirements of local agencies.

PART 2 - PRODUCTS

2.01 Chlorinated rubber-alkyd type, as per Fed Spec. No. TT-P-115, Type III, or shall be Code T-1, conforming to Section 971-12.2 of the Florida Department of Transportation Standard Specifications.

1. Paint shall be factory mixed, quick drying and non-bleeding type.
2. Color shall be as per D.O.T. requirements.
3. Striping, arrows, lane markers and stop bars shall be provided with paint containing reflective additive.

2.02 Thermoplastic paint shall conform to the applicable Technical Specifications (Section 711) of the Florida Department of Transportation.

2.03 Traffic paint shall conform to the applicable Technical Specifications (Section 710) of the Florida Department of Transportation.

PART 3 - EXECUTION

3.01 TRAFFIC AND LANE MARKINGS

A. Sweep dust and loose material from the sealed surface.

B. Apply paint striping as indicated on the drawings, with suitable mechanical equipment to produce uniform straight edges.

1. Apply in not less than (2) two coats as per manufacturer's recommended rates of applications.

C. Protect pavement markings until completely dry in accordance with manufacturer's recommendations.

ISSUED	**DATE**
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END OF SECTION 321323

SECTION 328400

IRRIGATION

PART I – GENERAL

1.01 SCOPE

A. The work covered by this specification shall include the furnishing of all labor, materials, tools and equipment necessary to perform and complete the installation of an automatic irrigation system as specified here- in any incidental work or specified which can reasonably be determined to be part of the work and necessary to provide a complete and functional system.

B. The work covered by this specification also includes all permits, federal, state and local taxes and all other costs, both foreseeable and unforeseeable at the time of construction.

C. No deviation from these specifications or agreement is authorized or shall be made without prior written authorization signed by the Owner or his duly appointed representative.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: A firm specializing in irrigation work with not less than five (5) years of experience in installing irrigation systems similar to those required for this project.

B. Coordination: Coordinate and cooperate with other contractors to enable the work to proceed as rapidly and efficiently as possible.

C. Inspection of Site: The Contractor shall acquaint himself with all site conditions, including underground utilities before construction is to begin. Contractor shall coordinate placement of underground materials with contractors previously working underground in the vicinity or those scheduled to do underground work in the vicinity. Contractor is responsible for minor adjustments in the layout of the work to accommodate existing facilities.

D. Protection of Existing Plants and Site Conditions: The Contractor shall take necessary precautions to protect site conditions to remain. Should damages be incurred, this Contractor shall repair the damage to its original condition at his own expense. Any disruption, destruction, or disturbance of any existing plant, tree, shrub, or turf, or any structure shall be completely restored to the satisfaction of the Owner and his representatives, solely at the Contractor's expense.

E. Protection of Work and Property: The Contractor shall be liable for and shall take the following actions as required with regard to damage to any of the Owner's property.

1. Any existing building, equipment, piping, pipe coverings, electrical systems, sewers, sidewalks, roads, grounds, landscaping or structure of any kind (including without limitation, damage from leaks in the piping system being installed or having been installed by Contractor) damaged by the Contractor, or by

his agents, employees, or subcontractors, during the course of his work, whether through negligence or otherwise, shall be replaced or repaired by Contractor at his own expense in a manner satisfactory to Owner, which repair or replacement shall be a condition precedent to Owner's obligation to make final payment under the Contract.

2. Contractor shall also be responsible for damage to any work covered by these specifications before final acceptance of the work. He shall securely cover all openings into the systems and cover all apparatus, equipment and appliances, both before and after being set in place to prevent obstructions on the pipes and the breakage, misuse or disfigurement of the apparatus, equipment or appliance.

3. All trenching or other work under the leaf canopy of any and all trees shall be done by hand or by other methods so that no branches are damaged in any way.

   Buildings, walks, walls, and other property shall be protected from damage. Open ditches left exposed shall be flagged and barricaded by the Contractor by approved means. The Contractor shall restore disturbed areas to their original condition.

4. The Contractor shall be responsible for requesting the proper utility company to stake the exact location of any underground lines including but not limited to electric, gas, telephone service, water, and cable.

   The Contractor shall take whatever precautions are necessary to protect these underground lines from damage. In the event damage does occur, all damage shall be completely repaired to its original condition, at no additional cost to the Owner.

   The Contractor shall take whatever precautions are necessary to protect these underground lines from damage. In the event damage does occur, all damage shall be completely

5. The Contractor shall request the Owner, in writing, to locate any private utilities (i.e., electrical service to outside lighting) before proceeding with any excavation. If, after such requests and necessary staking, private utilities which were not staked are encountered and damaged by the Contractor, they shall be repaired by the Owner at no cost to the Contractor. If the Contractor damages staked or located utilities, they shall be repaired at the Contractor's expense.

F. Codes and Inspections: The entire installation shall comply fully with all local and state laws and ordinances and with all established codes arrange for all necessary inspections and shall pay all fees and expenses in connection with same, as part of the work under this Contract. Upon completion of the work, he shall furnish to the "Owner" all inspection certificates customarily issued in connection with the class of work involved.

G. The Contractor shall keep on his work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Owner, or Owner's representative.

H. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor.

I. The Owner's Landscape Architect or designated individual shall have full authority to approve or reject work performed by the Contractor. The Owner's Authorized Representative shall also have full authority to make

field changes that are deemed necessary.

J. Final Acceptance: Final acceptance of the work may be obtained from the Owner upon the satisfactory completion of all work. Acceptance by the Landscape Architect and/or Owner in no way removes the Contractor of his responsibility to make further repairs, corrections and adjustments to eliminate any deficiencies which may later be discovered.

K. Guarantee: All work shall be guaranteed for one year from date of final acceptance against all defects in material, equipment and workmanship to the satisfaction of the Owner. Repairs, if required, shall be done promptly at no cost to the Owner.

1. The guarantee shall also cover repair of damage to any part of the premises resulting from leaks or workmanship, to the satisfaction of the Owner. The Contractor shall not be responsible for work damaged by others. Repairs, if required, shall be done promptly. The guarantee shall state the name of the Owner, provide full guarantee terms, effective and termination date, name and license number of Contractor providing guarantee, address, and telephone number. It shall be signed by the chief executive of the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

2. If, within ten (10) days after mailing of written notice by the Owner to the Contractor requesting repairs or replacement resulting from a breach of warranty, the Contractor shall neglect to make or undertake with due diligence to make the same, the Owner may make such repairs at the Contractor's expense; provided, however, that in the case of emergency where, in the judgment of the Owner, delay would cause serious loss or damage, repairs or replacement may be made without notice being sent to the Contractor, and Contractor shall pay the cost thereof.

L. The Contractor shall provide full, 100% irrigation coverage in all areas designed with proposed plantings, in accordance with the site's governing permitting requirements and as designed.

M. On-site Observation: At any time during the installation of the irrigation system by the Contractor, the Owner or Landscape Architect may visit the site to observe work underway. Upon request, the Contractor shall be required to uncover specified work as directed by the Owner or material, workmanship or method of installation not meet the standards specified herein, the Contractor shall replace the work at his own expense.

N. Workmanship: All work shall be installed by qualified, skilled personnel, proficient in the trades required, in a neat, orderly, and responsible manner with recognized standards of workmanship. The Contractor shall have had considerable experience and demonstrated ability in the installation of sprinkler irrigation systems of this type.

1.04 SUBMITTALS

All materials shall be those specified and/or approved by the Landscape Architect.

A. Product Data: After the award of the Contract and prior to beginning work, the Contractor shall submit for approval by the Owner and Landscape Architect, two copies of the complete list of materials, manufacturer's technical data, and installation instructions which he proposes to install.

B. Commence no work before approval of shop drawings, material list and descriptive material by the Landscape Architect.

C. Shop Drawings: The Contractor shall record on reproducible shop drawing plans, all changes that may be made during actual installation of the system. Provide controller sequencing and control valve locations.

1. Immediately upon installation of any piping, valves, wiring, sprinklers, etc., in locations other than shown on the original shop drawings or of sizes other than indicated, the Contractor shall clearly indicate such changes on a set of blueline prints. Records shall be made on a daily basis. All records shall be neat and subject to the approval of the Owner.

2. The Contractor shall also indicate on the record prints the location of all wire splices, original or due to repair, that are installed underground in a location other than the controller pedestal, remote control valve box, power source or connection to a valve-in-head sprinkler.

3. These drawings shall also serve as work progress sheets. The Contractor shall make neat and legible notations thereon daily as the work proceeds, showing the work as actually installed. These drawings shall be available at all times for review and shall be kept in a location designated by the Owner's Representative.

4. Progress payment request and record drawing information must be approved by Landscape Architect before payment is made.

5. If in the opinion of the Owner or his representative, the record drawing information is not being properly or promptly recorded, construction payment may be stopped until the proper information has been recorded and submitted.

6. Before the date of the final site observation and approval, the Contractor shall deliver one set (copies) of reproducible record drawing plans and notes to the Landscape Architect. Record drawing information shall be approved by the Landscape Architect prior to submittal to Owner for final payments, including retentions.

W. Operations and Maintenance Manuals: The Contractor shall prepare and deliver to the Owner, or his designated representative within ten (10) calendar days prior to completion of construction, a hard cover binder with three rings containing the following information:

1. Index sheet stating the Contractor's address and business telephone number, list of equipment with name (2) and address(es) of local manufacturer's representative(s).

2. Catalog and parts sheets on every material and equipment installed under this Contract.

3. Complete operating and maintenance instruction on all major equipment. Include initial controller schedule and recommended schedule after establishment period.

4. Demonstrate to and provide the Owner's maintenance personnel with instructions for major equipment and show evidence in writing to the Owner, or his designated representative at the conclusion of the project that this service has been rendered.

PART II: PRODUCTS

2.01 MATERIALS

Material and equipment shall be supplied by the Contractor. No substitutions shall be allowed without the prior written approval of the Owner/Landscape Architect. The Contractor shall inspect all materials and equipment prior to installation, and defective materials shall be replaced with the proper materials and equipment. Those items used in the installation found to be defective, improperly installed or not as specified, shall be removed and the proper materials and equipment installed in the proper manner, as interpreted by the Owner/Landscape Architect. The Contractor shall remove all damaged and defective pipe and equipment from the site.

2.02 PIPING

A. General Provisions: All materials throughout the system shall be new and in perfect condition unless otherwise directed by the Landscape Architect.

B. Polyvinyl Chloride Pipe (PVC): (Where indicated on plan, use non-potable purple piping.)

1. Laterals: PVC shall conform to the requirements of ASTM Designation D 2241, Class 1120 or 1220. All lateral piping less than 3" in diameter shall be Class 200 SDR-21.

2. Main Line Under Pressure: PVC shall conform to the requirements of ASTM Designation D 2241, Class 1120 or 1220, Schedule 40 with belled end for solvent weld connection.

3. Pipe Markings: All PVC pipe shall bear the following markings:
   Manufacturer's Name
   Nominal Pipe Size
   Schedule or Class
   Pressure Rating of PSI
   NSF (National Sanitation Foundation) Approval
   Date of Extrusion

2.04 PVC JOINTS

Joints in PVC pipe smaller than 3" shall be solvent welded in accordance with the recommendations of the pipe manufacturer; the solvent cleaner and welding compound furnished with the pipe.

2.05 THREADED CONNECTIONS

A. Threaded PVC connections shall be made up using Teflon tape only.

B. Connection between mainline pipe fittings and automatic or manual control valves shall be made using Schedule

80 threaded fittings and nipples.

2.06 SOLVENT CEMENT

A. General: Provide solvent cement and primer for PVC solvent weld pipe and fittings recommended by the manufacturer. Pipe joints for solvent weld pipe to be belled end. Pipe joints for gasketted pipe to be intrical ring type. Insert gaskets will not be accepted.

B. Thrust Blocks: Main line piping 3" or greater in diameter shall have thrust blocks sized and placed in accordance with the pipe manufacturer's recommendations or, in the absence of specified recommendations by the pipe manufacturer. 3000 PSI concrete thrusts shall be properly installed at tees, elbows, 45's, crosses, reducers, plugs, caps and valves.

2.07 PIPE AND WIRE SLEEVES

A. Sleeves to be installed:

1. The Contractor shall install irrigation system pipe and wire sleeves conforming to the following:

a. All pipe sleeves shall extend a minimum of 36" beyond the edges of pavement.

b. All pipe sleeves to be installed beneath future/existing road surfaces shall be PVC pipe Schedule 40 or jack and bore steel pipe as per FDOT specifications, and as shown on plans.

c. All irrigation system wires shall be sleeved separately from main or lateral lines.

d. All pipe sleeves shall be installed at the minimum depth specified for main lines, lateral lines, and electric wire.

e. Contractor shall coordinate all pipe sleeve locations and depths prior to initiating installation of the irrigation system.

2.08 DRIPLINE/ SPRINKLER HEADS

A. Inline Emitter Tubing

1. Pressure-Compensating Landscape Dripline

a. The inline emitter shall be welded to the inner circumference of the polyethylene tubing. The inline emitter shall have dual outlet ports, 180° apart, ensuring only one port has contact with the ground when the tubing is installed at grade and mulched over.

b. Emitter shall pressure compensate by lengthening the emitter's turbulent flow path. The emitter shall be cylindrical in shape and provide surface area for filtration throughout 360° of its outer circumference. This increased filtration surface area shall assure that the water that enters the inline emitter can always come

from the cleanest part of the flow path in the polyethylene tubing regardless of how the inline tubing lays on the ground.

c. Landscape Dripline tubing shall be brown in color and conform to an outside diameter (O.D.) of 0.630 inches (16 mm) and an inside diameter (I.D.) of 0.540 inches (13,7 mm) and wall thickness of 0.045 inches (1,1 mm).

d. Landscape Dripline shall have factory installed, pressure-compensating, inline emitters with spacing as indicated on shop drawings.

e. The flow rate from each installed inline emitter shall be consistent when inlet pressure is between 8.5 and 60 psi (0,7 to 4,1 bars). GPH rating indicated by specified model

f. Operating pressure range: 8.5 to 60 psi (0,7 to 4,1 bar).

g. Model: Pressure-Compensating Landscape Dripline as indicated on plans

B. Spray Sprinklers:

1. The sprinkler shall be a fixed spray type designed for in-ground installation. The nozzle shall elevate 6" (or as designated on plan) when in operation. The body of the sprinkler shall be constructed of non-corrosive heavy duty Cycolac. A filter screen shall be in the nozzle piston. All sprinkler parts shall be removable through the tip of the unit by removal of a threaded cap.

2. Riser mounted sprays shall be as indicated on the plans. The sprinkler shall consist of a nozzle and body. The body of the riser-mount sprinkler shall be constructed of non-corrosive materials. A cone strainer shall be a separate part with the nozzle assembly to allow for easy flushing of the sprinkler. Maximum working pressure at the base of the sprinkler shall be 40 PSI.

2.09 AUTOMATIC CONTROL VALVE

The automatic remote control valves shall be as specified on the plans, or approved equal.

2.10 GATE VALVES

A. Gate valves for 3/4" through 2-1/2" shall be of brass or bronze construction, solid wedge, IPS threads, non-rising stem with wheel operating handle, for a continuous working pressure of 150 PSI.

B. Gate valves for 3" and larger: Iron body, brass or bronze mounted AWWA gate valves, with a clear waterway equal to the full nominal diameter of the valve, rubber gasket for a continuous working pressure of 150p PSI. Valve shall be equipped with a square operating nut.

2.11 VALVE BOXES

A. For gate valves, use AMETEK #10-181-014 box with #10-181-015 locking lid.

B. For control valves 3/4" through 2", the drip valve assemblies, use AMETEK #10-181-014 box with #10-181-015 locking lid, or sized as necessary to effectively house the equipment.

C. For control wiring splices, use AMETEK #10-181-014 box with #10-181-015 locking lid.

2.12 IRRIGATION WIRING

A. Wiring used for connecting the electric control valves to the controllers shall be Type UF, 600 volt, single strand, solid copper with PVC insulation 4/64" thick. Size shall be 14 gauge, red for "hot" or lead wires, and common wire to be 14 gauge, white in color.

B. Contractor shall perform an ohm test on ground to assure adequate protection against surges and indirect lightning strikes.

2.13 MISCELLANEOUS MATERIALS

A. Drainage Backfill: Cleaned gravel or crushed stone, graded from 1" maximum to 3/4" minimum.

B. Metalized Underground Tape: The detectable, underground utility marking tape shall consist of a minimum: 5 mil (0.005") overall thickness; five-ply composition; ultra-high molecular weight, 100% virgin polyethylene; acid, alkaline and corrosion resistant; with no less than 150 pounds of tensile break strength per 6" width; color-code impregnated with color stable, lead-free, organic pigments suitable for direct burial. Tapes utilizing reprocessed plastics or resins shall not be acceptable. The detectable, underground utility marking tape shall have a 35 gauge (0.0035") solid aluminum foil, core encapsulated within a 2.55 mil (0.00255") polyethylene backing and a 0.6 mil (0.006") PET cover coating. The laminate on each side shall consist of a 0.75 mil (0.00075") layer of hot LPDE, poly-fusing the "sandwich" without use of adhesives.

2.14 AUTOMATIC CONTROL SYSTEM

A. An Independent Station Controller: Furnish a solid state controller, as specified on the plans.

a. Each station shall be capable of timing from zero (0) minute to 99 minutes per station in one (1) minute increments.

b. Each station shall be capable of operating two (2) 7VA electric valve-in-head solenoids.

c. The stand-alone controller shall have two (2) possible programs.

d. The stand-alone controller shall provide global percentage increase/decrease (water budget) for all stations simultaneously, from ten (10) to two hundred (200) percent, in ten (10) percent increments.

e. All stations shall be able to be turned on/off manually buy operating timing mechanism or by manual switch at station output.

f. The stand-alone controller shall incorporate an integral MOV surge protection into the terminal block for each of its 24 VAC field wire outputs. Controller power input wires will also incorporate surge protection.

g. The control panel shall provide continuous display time. It shall have alphanumeric displays of descriptive English menus and legend identifiers with cursor selection of function and precision value adjustment by rotary dial input.

h. The stand-alone controller shall be UL listed and FCC approved.

i. The stand-alone controller shall have 117 VAC, 60 Hz input, 26.5 VAC, 60 Hz output for operating 24 VAC solenoids.

j. The stand-alone controller cabinet shall be a lockable and weather-resistant outdoor cabinet. Mount as noted on plans.

k. The controller shall be equipped with lightening protection, by the Contractor, on both the primary (120v) and each secondary (24v) circuit. The controller circuits shall be grounded to a copper clad grounding rod located at each controller.

l. The controller shall be equipped for a water conservation device. as specified.

PART III: EXECUTION

If, in the opinion of the Landscape Architect, the labor furnished by the Contractor is incompetent, unskilled, or unreliable, his equipment inadequate, improper or unsafe, or if the Contractor shall fail to continuously and diligently execute the construction, the Landscape Architect or Owner shall, in writing, instruct the Con- tractor to remove all such causes of noncompliance and the Contractor shall promptly comply.

3.01 INSPECTION

The Contractor shall examine the areas and conditions under which landscape irrigation system is to be installed and notify the Landscape Architect in writing of conditions detrimental to the proper and timely completion of the work. The Contractor shall proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Landscape Architect.

3.02 PREPARATION

The Contractor shall provide sleeves to accommodate piping under walks or paving. The Contractor shall coordinate with other trades and install to accurate levels prior to paving work. Cutting and patching of paving and concrete will not be permitted. The Contractor shall maintain all warning signs, shoring, barricades, flares and red lanterns, as required by any local codes, ordinances or permits.

3.03 TRENCHING AND BACKFILLING

A. Excavation: The Contractor shall stake out the location of each run of pipe, sprinkler heads, sprinkler valves and isolation valves prior to trenching. Excavation shall be open vertical construction sufficiently wide to provide free working space around the work installed and to provide ample space or backfilling and tamping. Trenches for pipe shall be cut to required grade lines, and compacted to provide accurate grade and uniform bearing for the full length of the line. The bottom of the trenches shall be free of rock or other sharp edged objects. Minimum cover shall be as follows:

Pipe and Wire Depth

Pressure Mainline	18" at top of pipe from Finish Grade
Lateral Piping (rotor)	12" at top of pipe from Finish Grade
Lateral Piping (pop-up)	12" at top of pipe from Finish Grade
Control Wiring	Side of main Line

B. Minimum Clearances: All pipelines shall have a minimum clearance of six inches from each other and from lines of other crafts. Parallel lines shall not be installed directly over one another. No lateral line shall be installed in the main-line trench.

3.04 INSTALLATION OF PIPING

A. PVC Pipe and Joints: The Contractor shall not install solvent wild pipe when air temperature is below 40ø F. Installation shall be in accordance with the manufacturer's instructions.

1. Only the solvent recommended by the pipe manufacturer shall be used. All PVC pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer, and it shall be the Contractor's full responsibility to make arrangements with the pipe manufacturer for any field assistance that may be necessary. The Contractor shall assume full responsibility for the correct installation.

3.05 BACKFILLING PROCEDURES

Initial backfill on PVC lines shall be pulverized native soil, free of foreign matter. Within radius of 4" of the pipe shall be clean soil or sand. Plant locations shall take precedence over sprinkler and pipe locations. The Contractor shall coordinate the location of trees and shrubs with the routing of lines and final head locations.

A. Backfill and Compaction: The Contractor shall leave trenches slightly mounded to allow for settlement after the backfilling is completed. The Contractor shall clean the site of the work continuously of excess waste materials as the backfilling progresses, and leave in a neat condition. No trenches shall be left open for a period of more than 48 hours. Protect open trenches as required.

a. The Contractor shall carefully backfill excavated materials approved for backfilling, consisting of earth, loam, sand, and other approved materials, free of rock and debris over 1" in size. Backfill shall be compacted to original density of surrounding soil without dips, sunken areas, or irregularities.

b. The Contractor shall conform to DOT requirements for methods and required compaction percentages, for roads and paving.

c. The Contractor shall hand place the first 6" of backfill (or to top of pipe) and have it walked on so as to secure the position of the pipe and wire.

d. No wheel rolling will be allowed. The Contractor shall remove rock or debris extracted from backfill materials and dispose of offsite. The Contractor shall fill any voids left in backfill with approved backfill materials.

B. Existing Lawns: Where trenching is required across existing lawns, uniformly cut strips of sod 6" wider than trench. The Contractor shall remove sod in rolls of suitable size for handling and keep moistened until replanted. The Contractor shall replant sod within 48 hours after removal, roll and water generously. The Contractor shall resod any areas not in healthy condition equal to adjoining lawns 10 days after replanting.

C. Seeded Area: Trenching will be required across existing seeded areas, primarily roadway edging. The Contractor shall conform to the requirements of seeding, Section 02930 for the reseeding of the disturbed trench area.

D. Pavements: Install sleeving prior to setting new pavement in place. Directional bore piping under already-set or existing paving materials as per local regulatory codes. No cutting and patching of already-set or existing pavement will be permitted.

3.06 VALVES

A. Isolation Valves: Shall be sized corresponding to adjacent pipe size. Specified valve boxes shall be installed flush with finish grade in such a manner that surface forces applied to their exposed area will not be transmitted to the piping in which the valve is installed nor any other piping, wiring or other lines in the vicinity of said valves.

B. Gate Valves: Install where shown, in valve boxes.

C. Electric Control Valves: Shall be installed in specified valve boxes. The valve shall have 6" of 3/4" pea gravel installed below the bottom of the valve. If the valve box does not extend to the base of the valve, a valve box extension shall be installed. Electric control valves shall be installed where shown and grouped together where practical. The Contractor shall place no closer than 24" to walk edges, bikeway edges, buildings and walls. The Contractor shall adjust the valve to provide flow rate or rated operating pressure required for each sprinkler circuit.

3.07 CONDUIT AND SLEEVES

A. Conduit and Sleeves for Control Wiring and Main/Lateral Pipe: The Contractor shall provide and install where necessary. Contractor shall coordinate locations of previously installed sleeving with the General Site Contractor.

The Contractor shall coordinate installation of sleeves with work of other disciplines.

3.08 CONTROLS

A. The Contractor shall connect electric control valves to controllers in a clockwise sequence to correspond with station settings beginning with Stations 1, 2, 3, etc. Automatic controllers shall be provided and installed by the Contractor. All zones will be labeled on the controller.

B. Controllers shall be equipped with lightning protection and grounded to a standard 5/8" copper clad steel ground rod driven a minimum of 8' into the ground and clamped.

C. The electrical service to the controllers shall be performed by an electrical subcontractor in compliance with NEC requirements.

3.09 CONTROL WIRE

A. Control wiring between the controller and electric valves shall be buried in main line trenches or in separate trenches. Electrical connection at valve will allow for pigtail so solenoid can be removed from valve with sufficient slack to allow ends to be pulled 12" above ground for examination and cleaning.

B. An expansion loop shall be provided at every valve at 100' o.c. Expansion loop shall be formed by wrapping wire at least eight times around a 3/4" pipe and withdrawing pipe.

C. The wire shall be bundled and taped every ten feet. The wire shall be laid in the trench prior to installing the pipe being careful to install wire beneath and 6" to the side of the main pipeline.

D. Electrical connections to electric control valves shall be made with Rainbird Pen-Tite or Techdel GT-3-GEL - Tite connectors or equal.

Power Connections: Electrical connections to power and signal wires shall be made using 3M 82-A2 power cable splice kits.

3.10 SPRINKLER HEADS

A. General Provisions:

1. Sprinkler heads shall be installed as designated on the shop drawings. Heads shall be installed on flexible PVC. Top to be flush with finish grade or top of curb.

2. Spacing of heads shall not exceed the maximum indicated on the shop drawings (unless directed by the Landscape Architect). In no case shall the spacing exceed the maximum recommended by the manufacturer.

B. Head Types:

1. Pop-up- Rotary Sprinkler Heads: Shall be installed on flex joint and be set with top of head flush with finish grade. Heads installed at curb shall have 6" to 10" between perimeter of head and concrete. Heads placed at

edge of pavement having no curb shall be installed 24" from edge of pavement.

2. Spray Pop-up Sprinkler Heads: Shall be installed on flexible PVC and be set with top of head flush with finished grade. Sprinkler heads placed adjacent to curbs will be installed 9" from concrete. Sprinkler heads placed adjacent to pavement having no curb shall be installed 24" from the edge of pavement.

3.11 COMPLETION

A. Flushing: Before sprinkler heads are set, the Contractor shall flush the lines thoroughly to make sure there is no foreign matter in the lines.

The Contractor shall flush the main lines from dead end fittings for a minimum of five minutes under a full head of pressure.

B. Testing: The Contractor shall notify Landscape Architect and Owner forty-eight (48) hours in advance of testing.

Prior to backfilling of main line fittings, Contractor shall fill the main line piping with water, in the presence of the Owner/Landscape Architect, taking care to purge the air from it by operating all the sprinkler control valves one or more times and/or such other means as may be necessary. A small, high pressure pump or other means of maintaining a continuous water supply shall be connected to the main line and set so as to maintain 100 PSI in the main line system for two (2) hours without interruption. When this has been accomplished and while the pressure in the system is still 100 PSI, leakage testing shall be performed in accordance with AWWA Standard C-600. Pressure readings shall be noted and make up water usage shall be recorded. Should the rate of make up water usage indicate significant leakage, the source of such leakage shall be found and corrected and the system then retested until the Owner/Landscape Architect is satisfied that the system is reasonably sound. Lateral line testing shall be conducted during the operating testing of the system by checking visually the ground surface until no leaks in this portion of the system are evident. Leaks shall be repaired or paid for by the Contractor at any time they appear during the warranty period.

C. Adjustment and Coverage of System: Coordinate pressure testing with adjustments and coverage test of system so both may occur at the same time. The Contractor shall balance and adjust the various components of the system so that the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to pressure regulators, pressure relief valves, part circle sprinkler heads, and individual station adjustments on the controllers.

3.12 WARRANTY

A. The Contractor shall fully warrant the landscape irrigation system for a period of one (1) year after the written final acceptance and will receive a written confirmation from the Landscape Architect that the warranty period is in effect.

B. During the warranty period, the Contractor will enforce all manufacturer's and supplier's warranties as if made by the Contractor himself. Any malfunctions, deficiencies, breaks, damages, disrepair, or other disorder due to materials, workmanship, or installation by the Contractor and his suppliers shall be immediately and properly corrected to the proper order as directed by the Owner and/or Landscape Architect.

C. Any damages caused by system malfunction shall be the responsibility of the Contractor who shall make full and immediate restoration for said damages.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 028400

SECTION 329200

TURFS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sodding.
2. Seeding.
3. Erosion-control material(s).

B. Related Requirements:

1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Three years' experience in turf installation.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Landscape Industry Certified Technician - Exterior.
b. Landscape Industry Certified Lawncare Manager.
c. Landscape Industry Certified Lawncare Technician.

5. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass

Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5percent weed seed:

1. Bermudagrass (Cynodon dactylon)

2.2 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species:

1. Quality: State-certified seed of grass species as listed below for solar exposure.
2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
3. Sun and Partial Shade: Proportioned by weight as follows:

JANUARY 1 – MAY 1	ITALIAN RYE	33%
	KOREAN LESPEDEZA	33%
	SUMMER OATS	34%
MAY 1 – JUNE 1	SUDAN SURGHAM	100%
JUNE 1 – JULY 1	STARR MILLET	100%
JULY 15 – JANUARY 1	BALBOA RYE	67%
	ITALIAN RYE	33%

2.3 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

A. Wood Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.5 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

B. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

B. Fill cells of erosion-control mat with planting soil and compact before planting.

C. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

D. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h).

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

E. Protect seeded areas from hot, dry weather or drying winds by applying planting soil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch and roll surface smooth.

3.6 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.7 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Bahia grass to a height of 3 inches.

D. Turf Postfertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Engineer:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even- colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.11 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 90 days from date of planting completion.
2. Warranty plant materials for a period of one year after date of substantial completion against defects, including death and unsatisfactory growth, except for defects resulting from neglect by the Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond the control of the Contractor.
    a. Within the contract limits, the contractor shall produce a dense, well established lawn. The contractor shall be responsible for the repair and re-sodding of all eroded, sunken or bare spots (larger than 12”x12”) until certification of acceptability by the Owner’s Representative. Repaired sodding shall be accomplished as in the original work (including re-grading if necessary).

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 329200

SECTION 329300

PLANTS SHRUBS AND GROUNDCOVERS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Supply and plant trees, shrubs, and ground cover as indicated on the Drawings and in the Details.

B. Maintain and water trees, shrubs, and ground cover as per the Specifications.

C. The Owner's representative reserves the right to adjust the number and location of any of the designated types and species to be used at any of the locations shown, in order to provide for any unanticipated effects which might become apparent after the substantial completion of other phases of the project, or for other causes.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.03 MEASURE AND PAYMENT

A. No separate payment shall be made for material or work under this Section. All costs shall be included in the bid items to which the work pertains.

1.04 REFERENCES/STANDARDS

A. Plant specifications are as indicated in the current edition of ANSI 260.1, "American Standard for Nursery Stock," hereinafter referred to as AAN.

B. Plant names are as taken or derived from *Standardized Plant Names*, 2nd edition, 1942, prepared by the American Joint Committee on Horticultural Nomenclature. Where there are plant names covered therein, the custom of the nursery trade is followed.

C. Plant hardiness zones are as indicated on the "Plant Hardiness Zone Map," USDA, Misc. Publication #814.

D. Where reference is made to American Society for Testing and Materials (ASTM), these specifications, referenced numbers only, are made a part of this Specification as if herein reproduced.

E. Authority for Nomenclature, Species, etc.: For the designated authority in the identification of all plant material, refer to two publications of L.H. Bailey: "Hortus III" and "Manual of Cultivated Plants," and ensure that all specimens are true to type, name, etc., as described therein. For the standard nomenclature, refer to the publication of the American Joint Committee on Horticultural Nomenclature, "Standard plant Names."

1.05 SUBMITTALS

A. Contractor shall be responsible for whatever inspection of plant material which may be required by local, state, or federal law and any necessary Certificate of Inspection shall accompany each shipment

B. Contractor shall obtain and submit soil samples of topsoil to be used to an approved testing agency and then submit the results of same to the Architect, along with recommendation as to quantity of lime (to achieve a final pH of 5.5 to 7.0) or other additives required.

C. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials.

D. Provide detailed written instructions and recommendations to be followed by the Owner for properly maintaining landscape work following installation.

1.06 QUALITY ASSURANCE

A. Qualifications: Contractors or subcontractors performing work under this Section shall be qualified to do such work and hold the appropriate registration, license, or other permit as required by state or local law.

B. Requirements of Regulatory Agencies

1. Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work.

2. Contractor shall comply with all requirements of state and regulatory agencies in transporting materials.

C. Quality Standards

1. Only use nursery-grown material. Use nursery grown plant material that complies with all required inspection, grading, standards and plant regulations in accordance with the latest edition of the Florida Department of Agriculture's "Grades and Standards for Nursery plants." Except where a lesser grade might be specifically specified in the plans, ensure that the minimum grade for all trees and shrubs is Florida No. 1. Ensure that all plants are the proper size and grade at the time of delivery to the site, during the project construction period and during the plant establishment period. Ensure that plant material are true to type and species and plant materials not specifically covered in Florida Department of Agriculture "Grades and standards for Nursery plants" conform in type and species, standards and designations in general acceptance by Florida Nurseries.

2. Plant Materials: Comply with AAN. No inspection or sealing of plant materials specified in this Section change or modifies those requirements.

3. Plant Names: See 1.04B above.

4. Plant Identification

a. Mark plant bundles properly for identification and for checking.

b. Provide each tree and shrub with a legible, weatherproof label. Securely attach each label with rot-resistant rope or wire, attached so that plants are not damaged.

c. Do not remove tags until after plant materials have been approved by the Owner's Representative and the local governing body (if plantings are required to meet local ordinances), and upon direction of the Owner's Representative.

5. Plant Quality

a. Provide sound, healthy, vigorous, freshly dug, nursery grown stock, free from plant diseases and insect eggs. Heeled-in stock or stock from cold storage will not be accepted.

b. Provide plants:

i. With healthy, normal root systems.

ii. Which have been grown for at least 2 years under climatic conditions similar to those where scheduled for planting.

iii. Which have been grown in properly spaced blocks.

iv. Which have been transplanted or root pruned at least twice, and at least once in the past three years.

v. With a habit of growth normal for the species, and which are equal to (or exceed) measurements specified in Plant Schedule.

vi. With symmetrical growth typical for the variety and species. Match plants for symmetry of a grouping where required.

vii. Plants will be acceptable if well-grown, with a single stem, well-shaped, and bushy, and have sufficient well-spaced branches to give an appearance equal to those with multiple canes specified in the Plant Schedule.

viii. Plants that do not have normal balance of height and spread typical for the species will not be acceptable.

6. Plant Root Systems

a. Balled and burlapped plants are designated on the list as "B & B."

b. Container grown plants are indicated as "Cont."

7. Plant Substitutions

a. Plant variety substitutions will be permitted only upon submission of proof that the designated species is not obtainable, and after written approval for the substitution is given by the Owner's Representative. Such substitutions will be handled through an appropriate change order.

b. All plants will be of the size specified or larger (if approved by the Architect). The use of larger material than that specified will not increase the Contract Price, and the use of larger material will not be permitted as a balance against smaller materials than specified.

8. Planting Season: The season for planting extends from March 15 to November 31. Planting may be done at other times only with the Owner's Representative's written permission.

D. Delivery, Storage, and Handling

1. All plant materials shall be handled and packed in accordance with good nursery practices. Material shall be adequately protected during transit to prevent windburn, drying, or overheating. Upon delivery, plant materials will be adequately protected from the sun, freezing, and/or drying winds.

2. When plants cannot be planted immediately after delivery:

a. Place plants on clean lawn surface, in protected area, away from heat-gaining materials such as pavements and masonry construction.

b. Cover roots and root crowns with moist sod or approved mulch to protect them from sun and wind.

c. Water as necessary to keep them in good condition.

d. Where required, plant materials may be stored in a temporary shed or by heeling-in, using good nursery practice.

3. Plant materials which are not adequately protected, left out of the ground unprotected overnight, left with roots exposed to the sun, improperly protected during transit, unloading, heeling-in, or during the planting operation shall be rejected and removed from the site.

4. Packaged materials shall be delivered in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site.

1.07 JOB CONDITIONS

A. Site Inspection:

a. Contractor shall familiarize him/herself with the site, the plans, the specifications, special provisions, and plan requirements, and is responsible for calling any discrepancies or special problems to the attention of the Architect.

b. Examine site, architectural, mechanical, and electrical plans, and record documents for locations of utility lines. Use caution when excavating and when placing stakes to avoid damage to utility lines.

Should such damage occur to lawns, walks, paved areas, or utilities, have repairs made by appropriate trade at Contractor's expense.

c. In the event of interference between utility lines or obstructions and plan locations, notify the Owner's Representative.

B. Protection:

1. Protect, maintain, and restore bench marks, construction stakes, monuments, and other reference points affected by this work. If such items are displaced or destroyed by this work, they will be reestablished by a licensed surveyor at no expense to the Owner. After items have been permanently set, certify the work and furnish certification to the Owner's Representative.

2. Utilities: The locations of existing underground piping and electrical ducts, where shown on the Drawings or otherwise directed, are only considered as approximate. The Contractor shall exercise particular care in locating such utility lines by hand digging to prevent them from being damaged by excavating equipment.

3. Protect buildings, roads, walks, and other construction.

4. Plant Materials

a. Plants to remain shall be protected by the erection of a substantial temporary fence or other suitable means if not already accomplished by others.

b. Protect existing trees and other vegetation indicted to remain in place against unnecessary cutting, breaking, and skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within the drip line, excess foot or vehicular traffic, or parking of vehicles within the drip line. Provide temporary fences, barricades, or guards as required to protect trees and vegetation to be left standing.

c. Provide protection for roots over 1-1/2 inches in diameter that are cut during construction operations. Temporarily cover all exposed roots with wet burlap to prevent roots from drying out. Provide earth cover as soon as possible, making sure that burlap is kept wet until such time.

d. Repair or replace trees and vegetation damaged by construction operations in a manner acceptable to the Owner's Representative. Damaged trees are to be repaired and restored to full growth status, as determined by a qualified tree surgeon.

e. No equipment, materials, trash, or other debris will be stored under trees to remain.

f. Replace any damaged lawns with new seed to match existing.

C. Environmental Requirements

1. Burning: No burning of trash or construction materials will be permitted.

2. Dirt on Pavements: Where the Contractor's equipment is operated on any portion of the pavement used by traffic, the Contractor shall clean the pavement of all dirt and debris at the end of each day's operation.

3. Dust Control: Dust control operations shall be performed by the Contractor to keep the amount of dust and dirt to a minimum. Water used for dust control shall be furnished and applied by means of tanks equipped with suitable sprinkling devices. All water used shall be paid for by the Contractor. The Owner's Representative along with the Contractor's Representative shall determine when water is required to alleviate or prevent dust nuisance.

4. Disposal of Vegetative Material: Comply with local and state requirements for the disposal of trees and shrubs.

5. Silting or Washing: No silting or washing of material will be allowed to extend beyond the limits of the property or construction limits line as applicable. Should such silting or washing occur, construct and maintain sediment basin(s) at no expense to the Owner.

D. Weather Limitations

1. Unfavorable Weather: During dry weather or in drought, balled plants shall be set in their pits and backfilled with loam ¾ full and the pit then filled to the brim with water. When still wet, soil backfill shall be settled by insertion of the handle of a shovel or other stick to subgrade, and rocked back and forth until the soil and water are well mixed, after which the backfill shall be completed and the next day firmed by tamping.

2. Protection from Sun, Wind, and Frost: At all times, plants must be adequately protected from the drying action of wind and sun. Plants distributed to planting beds for immediate planting shall be kept covered by wrapping or earth covering. During cold weather, the roots shall be protected from frost by heeling-in.

3. Cold and/or Wet Weather: Planting operations shall stop when soil is frozen or when topsoil is muddy.

E. Coordination

1. Sequencing/Scheduling: Contractor shall keep him/herself informed of the construction progress of all other Contractors and/or subcontractors working on the project, particularly where they affect his/her work, and shall coordinate his/her work with that of other Contractors to ensure efficient and orderly progress of the work.

2. Work in close coordination with trades performing the following:

   a. Site grading and filling

   b. Utilities excavating and backfilling

   c. Irrigation system installation

d. Lawns installation

1.08 MAINTENANCE

A. During Planting: See Part 3, Execution of this Specification.

B. After Planting: See separate applicable specifications.

1.09 PLANT MATERIAL GUARANTEE

A. Warranty plant materials for a period of one year after date of substantial completion against defects, including death and unsatisfactory growth, except for defects resulting from neglect by the Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond the control of the Contractor.

B. Warranty all 2 inch caliper or larger trees for a period of two years after the date of substantial completion.

C. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during the warranty period. Make replacements during the growth season following the end of the warranty period. Replace trees, shrubs, or ground cover plants which are in doubtful condition at the end of the warranty period unless, in the opinion of the Owner's Representative, it is advisable to extend the warranty period for a full growing season. Another warranty inspection will be conducted at the end of the extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub, or ground cover plant) will be required at the end of the warranty period, except for losses or replacements due to Contractor's failure to comply with specified requirements.

PART 2 PRODUCTS

2.01 PLANT MATERIALS

A. A list of plants required for this work is included on the Drawings. Should any discrepancy occur between the Plant List and the Drawings, the Drawings shall govern.

B. All plants are subject to the inspection of the Architect before digging. An approval of material on such inspection shall not be construed as an acceptance of it. Final acceptance will not be made until the material has been delivered and inspected at the site of the project.

2.02 MATERIALS FOR PLANTING

A. Topsoil: Natural, fertile, friable, productive soil, neither excessively acid nor alkaline, and free from toxic substances, stones, weeds, clay, clods, roots, cinders and debris.

B. Sand: Clean, sharp, and free from admixtures which might inhibit plant growth.

C. Commercial Fertilizer: Time release type containing 6 percent nitrogen, 12 percent phosphorus, and 12 percent potassium. Deliver fertilizer in unopened, original containers bearing manufacturer's guaranteed analysis.

D. Sulphur: Elemental sulphur, 99 percent derived from secondary nutrient sulphur. Sulphur should be used to create an acid soil condition for ericaceous plants. Rates of application shall be determined by pH according to soil test to produce pH of 5 to 5.5.

E. Lime: Ground limestone containing not less than 45 percent of calcium oxide, and ground to such fineness that the residue on #30 and #200 sieves is not more than 0.5 percent and 15 percent, respectively.

F. Peat: Horticultural peat composed of not less than 60 percent decomposed organic matter by weight, oven-dried. Delivered to the site in a workable condition free from lumps.

2.03 MATERIALS FOR STAKING

A. Staking materials: See planting details for specific requirements.

B. Wire for guying or fastening trees to stakes: No. 12 gauge, galvanized steel, annealed. Galvanized shall comply with ASTM A 392, Class III.

C. Hose to encase wires at tree contact: Two-ply reinforced rubber garden hose, minimum ¾ inch size.

D. Turnbuckles: Turnbuckles shall be manufactured from a good grade of steel, galvanized in accordance with ASTM A 153, and shall measure nominally 3/8" x 6".

2.04 MISCELLANEOUS MATERIALS

A. Herbicide: Herbicide shall be commercially approved, pre-emergent herbicide to prevent weed seed germination.

B. Anti-desiccant/Anti-transpirant: Anti-desiccant/anti-transpirant shall be in liquid form and shall comply with ASTM Specification E 96.

C. Tree trunk wrapping: Wrapping shall be standard nursery-type burlap, or heavy crepe paper produced for this use.

D. See details on construction documents for other items required.

2.05 MULCHING MATERIALS

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees: Apply organic mulch ring of 3-inch average thickness, with 12-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic hardwood mulch 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

2.06 WATER

A. Use clean water free from substances which might inhibit plant growth. Water is to be provided or arranged for by the Contractor.

2.07 TEST KIT

A. Contractor shall utilize a soils testing kit for determining pH factor of soil. Submit results to owner along with written plan to amend soil to pH suitable for selected plants.

2.08 MATERIALS FOR UNDERDRAINS

A. Pipe shall be perforated PVC with sock.

B. Gravel shall be durable #8 stone.

C. Soil separator shall be fiberglass material, water permeable, thickness approximately ½ inch, weight approximately 3 pounds per cubic foot.

2.09 EROSION CONTROL MATS

A. Mats shall be jute mesh or excelsior mats.

B. Wire staples shall be 6 inches long, made from 11 gauge steel wire bent to a long "U" shape.

PART 3 EXECUTION

3.01 LAYOUT

A. Stake out proposed plant locations and outlines for planting areas and obtain approval of the Owner's Representative before beginning planting.

3.02 TESTING

A. Test soil as often as necessary to determine pH factor of untreated soil.

B. Where test indicates adjustment of pH factor is required, add lime or sulphur, as necessary, to adjust to proper pH factor.

C. After adding corrective substances, retest soil. Retest and correct until correct pH factor is attained.

D. Keep record of:

1. Locations where tests are made.

2. Readings before corrections are made.

3. Readings after corrections are made.

3.03 SOIL PREPARATION

A. Mix soil and additives indicated on Drawings when soil and additives are relatively dry. Thoroughly mix with hand tools or rotary tiller.

1. Mix soils to be used for filling around plants in pits.

2. Mix soils in entire shrub beds, not just pits for individual plants.

3. Mix topsoil to be used for top dressing ground cover beds.

B. Apply specified herbicide at rates specified on product packaging.

C. Bed preparation:

1. Shrub beds: Mix soil and additives to a depth of 18 inches, rake smooth, and leave clean and ready for planting.

2. Ground cover beds: Mix existing soil and additives to a depth of 12 inches. Top dress beds with 12-inch deep prepared topsoil. Rake smooth, and leave clean and ready for planting.

D. Tree pits are to be prepared with soil mix 1.5 times the depth and width of root ball.

3.04 EXCAVATING AND PREPARING PLANT PITS

A. Excavate plant pits to depths and to profiles specified and indicated. Pits shall be circular in outline. Pit depths specified below shall be measured in relation to finished grade.

B. "B & B" and container grown plants:

1. Diameter: 12 inches greater than ball of plants.

2. Depth: 6 inches greater than depth of ball or roots. (Note: Large, heavy shrubs can be set directly on pit bottoms.)

C. Where pit depth is over-excavated, backfill with prepared topsoil to fill depth so that balls or root structure of plants will be at correct height.

3.05 UNDERDRAINS

A. Excavate for underdrains to depth specified and indicated in the locations shown on the Plans.

B. Install pipe and aggregate as per the Details.

C. Pipe is to flow to the low pint(s) as indicated, with no sags to trap water.

3.06 PLANTING TREES AND SHRUBS

A. The Planting Details show the planting height in relation to existing surface as a general rule. Should local practice indicate other (such as higher), Contractor may do so with the approval of the Architect. However, this does not change any required guarantees.

B. In individual pits, set plants so that after settlement they will be at same levels as originally grown.

1. Center plants in pits and place them upright.

2. Face each plant to give best appearance to closest observation point.

3. Cut off broken, frayed, and dead roots.

4. Handle plants so as to prevent damage.

C. Planting "B & B" and Container-Grown Plants:

1. Comply with guidelines outlined in 3.06 A and B above.

2. Set "B & B " plants in pits. Thoroughly wet burlap. Loosen tie material and carefully roll back burlap so that ball is not broken. Cut the loose burlap and tie material; do not pull tie material or burlap out from under balls.

3. Before planting container grown plants, carefully remove plants from containers so that earth and roots are not disturbed. Handle with care and set into pits as whole units.

3.07 BACKFILLING PLANT PITS

A. When plants are in positions in pits, place prepared topsoil until pit is approximately 3/4 full.

B. Compact and settle soil by watering thoroughly.

C. After water has soaked in, complete backfilling to finished grade and again compact and settle soil by thoroughly soaking.

D. If further settling occurs, add additional soil so that finished backfilling is even with finished grade. Do not fill above root crowns of plants.

E. Form ridges of topsoil around individual trees, and groups of shrubs as indicated on Drawings.

3.08 PLANTING GROUND COVER (Also see Erosion Control below.)

A. Container-Grown Ground Cover:

1. Position where indicated on Drawings.

2. Plant and backfill as specified above for container-grown plants.

B. Bare Rooted Ground Cover

1. Position where indicated.

2. Plant in prepared beds at same level as originally grown.

C. Water entire beds containing ground cover to point of saturation.

3.09 PRUNING

A. Remove dead and broken branches from plant materials.

B. Prune to retain typical growth habit of individual plants with as much height and spread as practicable. Make cuts with a sharp instrument and cut flush with trunk or adjacent branch to eliminate stubs.

C. Do not prune the central leader on trees. "Head back" cuts at right angles to line of growth is not permitted. Do not pole or top trees.

D. Do not prune plants to less than the size in height or spread as required to meet applicable community ordinances (as applicable). Coordinate this item with the Architect.

3.10 WRAPPING

A. Wrap trees from ground level to first branches.

3.12 MULCHING

A. After plants have been set and cultivation within groups of plants has been completed and approved, cover the area within the outline of each planting pit or bed with a smooth layer of Organic Shredded Hardwood mulch.

B. After placing mulch, thoroughly wet it to prevent displacement by wind.

3.13 EROSION CONTROL

A. Install erosion control on ground cover beds before planting. Requirement for protection will depend on slope and type of soil.

B. Jute Mat: After beds are prepared, spread jute mats smoothly, and roll or tamp to press into soil. At upper ends of slopes, turn down and bury end of each roll 6 inches deep, and firmly tamp soil against turned down mat. Overlap lateral edges of adjacent mats 2 inches.

C. Excelsior Mats: After beds are prepared, spread excelsior mats smoothly. Do not roll or tamp. At upper ends of slope, turn down, bury, and tamp ends as specified for jute mat. Do not overlap lateral edges of adjacent mats. Butt edges snugly.

D. Staples

1. Where edges of mats join and at ends of beds, place staples 3 feet O.C. parallel to slope.

2. At upper ends of slopes, place staples through mat, 1 foot O.C. perpendicular to slope.

3. Place other staples as necessary to hold mats in place.

E. When planting in areas covered by mats, cut openings in mats large enough to install plants, but not larger than necessary. After planting, and when backfilling, bury cut edges of mats in edges of plant pits and backfill soil.

3.14 MAINTENANCE

A. Begin maintenance as soon as each plant is in place and continue maintenance until all planting has passed final acceptance of the total facility by the Owner's Representative. Maintenance includes the following: spraying for insect control; watering; weeding; cultivating; removal of dead material; resetting plants to proper grades or upright position; restoration of plant sources and mulch; and other operations to keep plant healthy and looking good.

B. Protect lawn areas during this work.

3.15 CLEANUP

A. As work progresses, keep grounds free from debris and paved areas free from debris and dirt.

B. When work is otherwise complete, clean grounds and pavements. Remove excess materials and equipment from project site.

3.16 FINAL INSPECTION

A. At the end of the guarantee period(s), Contractor is to make an inspection of the plantings with the Owner's Representative at a time mutually acceptable to both parties. If agreement as to time cannot be reached, the Owner's Representative may make the inspection on his/her own.

B. As a result of the inspection, a list of deficiencies will be prepared and given to the Contractor.

3.17 REPLACEMENT PLANTING

A. Contractor is to correct deficiencies noted on the list of deficiencies prepared in the final inspection.

1. Remove and replace plants which are not showing satisfactory growth as determined by the Owner's Representative.

2. Replace plants missing due to installation oversight as soon as conditions permit, but during the normal planting season as determined by the Owner's Representative.

3. When there is question regarding the satisfactory establishment of plants, the Owner's Representative may allow plants to remain through another complete growing season as described in 1.09 of this

Section. After that time, Contractor will replace plants that are dead, unhealthy, or in a badly impaired condition, as determined by the Owner's Representative.

4. Replace with plants of same kind and size as specified in Plant List.

B. Deficiencies are to be corrected during the normal planting season for such plantings.

C. Upon correction of any deficiencies, the Owner's Representative will re-inspect the plantings and, if acceptable, the Contractor will be relieved of further responsibility.

ISSUED	DATE
EARLY RELEASE PACKAGE	12/06/2021

END OF SECTION 329300

SECTION 330500

COMMON WORK RESULTS FOR UTILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Identification devices.
6. Grout.
7. Flowable fill.
8. Piped utility demolition.
9. Piping system common requirements.
10. Equipment installation common requirements.
11. Painting.
12. Concrete bases.
13. Metal supports and anchorages.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. ABS: Acrylonitrile-butadiene-styrene plastic.

D. CPVC: Chlorinated polyvinyl chloride plastic.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.

2. Identification devices.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

C. Coordinate size and location of concrete bases.

PART 2 – PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.

    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

    b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.

2. CPVC Piping: ASTM F 493.

3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

4. PVC to ABS Piping Transition: ASTM D 3138.

5. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 (DN 40) and Smaller:

1. Underground Piping: Manufactured piping coupling or specified piping system fitting.

2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 (DN 50) and Larger:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.

E. Plastic-to-Metal Transition Unions:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: MSS SP-107, PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: Factory fabricated, union, NPS 2 (DN 50) and smaller.

a. Pressure Rating: 150 psig minimum at 180 deg F.

b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 (DN 65 to DN 100) and larger.

a. Pressure Rating: 150 psig minimum.

b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 (DN 65) and larger.

a. Pressure Rating: 150 psig minimum.

b. Gasket: Neoprene or phenolic.

c. Bolt Sleeves: Phenolic or polyethylene.

d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 (DN 80) and smaller.

a. Pressure Rating: 300 psig at 225 deg F.

b. End Connections: Threaded.

F. Dielectric Nipples:

1. 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:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.

a. Pressure Rating: [300 psig (2070 kPa) at 225 deg F (107 deg C)].

b. End Connections: Threaded or grooved.

2.4 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

B. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.5 IDENTIFICATION DEVICES

A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.

2. Location: Accessible and visible.

C. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is 1-1/4 inches for ducts, and 3/4 inch for access door signs and similar operational instructions.

1. Material: Fiberboard, Brass.

2. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.

3. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.

D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type.
Include color-coding according to ASME A13.1, unless otherwise indicated.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.

F. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.

G. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.

H. Lettering: Manufacturer's standard preprinted captions as selected by Architect.

I. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.

J. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.

1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.

2. Color: Comply with ASME A13.1, unless otherwise indicated.

K. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.

1. Material: 0.032-inch- thick, [polished brass] [or] [aluminum].

2. Material: 0.0375-inch- thick stainless steel.

3. Material: 3/32-inch- thick plastic laminate with 2 black surfaces and a white inner layer.

4. Material: Valve manufacturer's standard solid plastic.

5. Size: 1-1/2 inches in diameter, unless otherwise indicated.

6. Shape: As indicated for each piping system.

L. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

M. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.

2. Thickness: 1/16 inch unless otherwise indicated.

3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.

4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

N. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.

2. Yellow: Heating equipment and components.

3. Brown: Energy reclamation equipment and components.

4. Blue: Equipment and components that do not meet criteria above.

5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.

6. Terminology: Match schedules as closely as possible. Include the following:

a. Name and plan number.

b. Equipment service.

c. Design capacity.

d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

O. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4 by 5-5/8 inches.

2. Fasteners: Brass grommets and wire.

3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

P. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

2.7 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.

2. Density: 115- to 145-lb/cu. ft.

3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.

4. Aggregates: ASTM C 33, natural sand, fine.

5. Admixture: ASTM C 618, fly-ash mineral.

6. Water: Comply with ASTM C 94/C 94M.

7. Strength: 100 to 200 psig at 28 days.

PART 3 – EXECUTION

3.1 PIPED UTILITY DEMOLITION

A. Refer to Section 024119 "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.

3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.

5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 DIELECTRIC FITTING APPLICATIONS

A. Dry Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric unions.

2. NPS 2-1/2 to NPS 12: Dielectric flanges.

B. Wet Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 and Smaller: Dielectric.

2. NPS 2-1/2 to NPS 4: Dielectric nipples.

3. NPS 2-1/2 to NPS 8: Dielectric nipples.

4. NPS 10 and NPS 12: Dielectric flange kits.

3.3 PIPING INSTALLATION

A. Install piping according to the following requirements and utilities Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas [2 inches above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6.

b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

L. Verify final equipment locations for roughing-in.

M. Refer to equipment specifications in other Sections for roughing-in requirements.

3.4 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.

3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

5. PVC Nonpressure Piping: Join according to ASTM D 2855.

6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.

2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.5 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Install dielectric fittings at connections of dissimilar metal pipes.

3.6 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

3.7 PAINTING

A. Painting of piped utility systems, equipment, and components is specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: According to ASME A13.1.

2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.

3. Locate pipe markers on exposed piping according to the following:

a. Near each valve and control device.

b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.

c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.

d. At manholes and similar access points that permit view of concealed piping.

e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.

2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.9 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Install anchor bolts to elevations required for proper attachment to supported equipment.

6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Section 055000 "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.11 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

ISSUED	**DATE**
EARLY RELAEASE PACKAGE	**12/06/2021**

END OF SECTION 330500

SECTION 334100

STORM UTILITY DRAINAGE PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:

1. Site storm sewer drainage piping, fittings, accessories and bedding.

2. Catch basins, paved area drains, site surface drains and stormwater detention facilities.

3. Connection of building storm water drainage system.

4. Precast concrete, Cast-in-place concrete manholes.

B. All public work to be performed and materials to be used within the street right-of-way, shall be in accordance with City of Lake City and/or FDOT Design Standards. In the event of a discrepancy between the above-referenced standards, the plans, and/or any portion of this specification section, the order of precedence will be the plans, the City/ FDOT Design Standards, and then these specifications. The Contractor shall contact the engineer in the event of a discrepancy.

1.2 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. HDPE: High density polyethylene.

C. RCP: Reinforced concrete pipe

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa). Pipe joints shall be at least silt tight, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Pipe materials, fittings and accessories.

2. Drains.

B. Shop Drawings: For the following:
1. Manholes: Include plans, elevations, sections, details, and frames and covers. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Engineer and Owner no fewer than two days in advance of proposed interruption of service.

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings; NPS 6” to 12” ASTM D 3034, SDR 26, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.2 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), with groove and tongue ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.

1. Class III, Wall B.

2.3 HDPE PIPE AND FITTINGS

A. Pipe shall have a smooth interior and exterior corrugations.

1. 4-through 10-inch (100 to 250 mm) shall meet AASHTO M252m, Type S.

2. 2- through 60-inch (300 to 1500 mm) shall meet AASHTO M294, Type S or ASTM F2306.

B. Pipe shall be joined with joints meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

C. 4-through 60-inch (100 to 1500mm) shall be watertight according to the requirements of ASTM D3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

D. 12- through 60-inch (300 to 1500 mm) diameters shall have a reinforced bell with a bell tolerance device. The bell tolerance shall be installed by the manufacturer.

E. Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306.

F. To assure water tightness, field performance verification may be accomplished by testing in accordance with ASTM C969. Appropriate safety precautions must be used when field-testing any pipe material.

G. Installation shall be in accordance with ASTM D2321 and manufacturer's published installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot. (0.3 m) and for 60-inch (1500 mm) diameters, the minimum cover shall be 2 ft. (0.6 m) in single run applications.

2.4 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.

2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.

3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.5 CLEANOUTS AND PLUGS

A. Installation shall be in accordance with the details and at locations shown on the drawings.

B. All cleanouts shall have a 2' x 2' x 6" thick concrete apron.

2.6 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant 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: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-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 (102-mm) minimum thickness, and lengths to provide depth indicated.

5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

6. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.

7. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).

8. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.

9. Manhole Frames and Covers: Ferrous; 28-inch ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 30-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

    a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

B. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Ballast: Increase thickness of concrete, as required to prevent flotation.

2. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.

3. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).

4. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.

5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.

6. Manhole Frames and Covers: Ferrous; 28-inch ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 30-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

    a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

    b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

2.7 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, 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 (420 MPa), deformed steel.

C. 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 (420 MPa), deformed steel.

2.8 CATCH BASINS

A. Installation shall be in accordance with the details and at locations shown on the drawings.

2.9 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to the details and at locations shown on plans.

B. Frames and Grates: Heavy-duty frames and grates according to the details and at locations shown on plans.

PART 3 – EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.

a. Unshielded flexible couplings for same or minor difference OD pipes.

b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

C. Gravity-Flow, Nonpressure Sewer Piping: As shown on plans.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.

2. Install piping with 36-inch (915-mm) minimum cover.

3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

4. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
   a. Install HDPE pipe according to ASTM D2321.

3.4 PIPE JOINT CONSTRUCTION

A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.

2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.

3. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.

C. Join dissimilar pipe materials with pressure-type couplings.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.

2. Use extra-heavy-duty, top-loading classification cleanouts in firelane areas.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch (25 mm) above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Use heavy-duty, top-loading classification drains in vehicle-traffic service areas.

2. Use extra-heavy-duty, top-loading classification drains in roads areas.

B. Embed drains in 4-inch (102-mm) minimum depth of concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

E. Assemble trench sections with flanged joints.

F. Embed trench sections in 4-inch (102-mm) minimum concrete around bottom and sides.

3.7 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTM C 891.

C. Construct cast-in-place manholes as indicated.

3.8 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.9 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Install outlets that spill onto grade, anchored with concrete, where indicated.

C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

D. Construct energy dissipaters at outlets, as indicated.

3.10CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.11FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.

2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems according to authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate report for each test.

C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

ISSUED	**DATE**
EARLY RELEASE PACKAGE	**12/06/2021**

END OF SECTION 334100