CONTRACT FOR CONSTRUCTION
(Cooperative Purchasing – BuyBoard–Contract Number #581-19)

PROJECT: **Taylor Annex – Constable 4 Break Room Renovation** ("Project")

GENERAL CONTRACTOR: **Falkenberg Construction Co., Inc.**("GC")
Kady Williams, Construction Manager
250 Cheatham St., Suite 2
San Marcos, TX 78666

ARCHITECT & ENGINEER: **Williamson County Architect** ("A/E")
Trenton H. Jacobs, AIA
3101 SE Inner Loop
Georgetown, TX 78626

COUNTY'S DESIGNATED REPRESENTATIVE: **Williamson County Facilities Management**
Attn: Director of Facilities
3101 SE Inner Loop
Georgetown, Texas 78626

THIS CONTRACT FOR GENERAL CONSTRUCTION ("Contract") is made and entered into effective as of the latest date of the signatories indicated at the conclusion of this document (the "Effective Date"), by and between **Williamson County**, a body corporate and politic under the laws of the State of Texas ("County") and GC.

R E C I T A L S

WHEREAS, County desires to retain a GC for the **Taylor Annex - Constable 4 Break Room Renovation** (hereinafter called the "Project");

WHEREAS, County desires a GC who will render, diligently and competently in accordance with the highest standards used in the profession, all general contractor services which shall be necessary or advisable for the expeditious, economical, and satisfactory completion of the Project; and

NOW, THEREFORE, County and GC, in consideration of the mutual undertakings herein contained, do mutually agree as follows:

ARTICLE 1
SCOPE OF WORK

GC has overall responsibility for and shall provide complete construction services and furnish all materials, equipment, tools and labor as necessary or reasonably inferable to complete the Work, or any phase of the Work, in accordance with the Specifications and Drawings for the Project and County's requirements. The Specifications and Drawings were prepared for County by A/E. GC shall do everything required by the Contract Documents.

ARTICLE 2
GENERAL PROVISIONS

2.1 CONTRACT DOCUMENTS

2.1.1
The Contract Documents consist of this Contract and all exhibits and attachments listed, contained, or referenced in this Contract, the Williamson County Uniform General Conditions ("UGCs"), Supplementary or other Conditions, if any, the Drawings, Specifications, Addenda issued prior to the Effective Date of this Contract, The Bid/Proposal Documents as defined by the Invitation for Bidders/Request for Proposals, and all Change Orders and any other Modifications issued after the Effective Date of this Contract, all of which form this Contract and are as fully a part of this Contract as if attached to this Contract.

2.1.2
This Contract represents the entire and integrated agreement between the Parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. If anything in the other Contract Documents, other than a Modification, is inconsistent with this Contract, this Contract shall govern. To the extent of any direct conflict or inconsistency between any of the Contract Documents, GC shall immediately notify County and seek clarification from A/E and County.

2.1.3
The term "GC" shall be interchangeable with the terms "Proposer," "Bidder," Respondent," "Contractor," and "General Contractor" or other similar terms as appropriate in the Contract Documents.

2.2 RELATIONSHIP OF THE PARTIES
GC accepts the relationship of trust and confidence established by this Contract and shall cooperate with A/E and County and exercise GC's skill and judgment in furthering the interests of County; to furnish efficient construction administration, management services and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with County's interests.

2.3 GENERAL CONDITIONS

2.3.1
The term “Contractor” as used herein or in the UGCs shall mean GC.

2.3.2
The term “Owner” as used herein or in the UGCs shall mean County.

2.3.3
The term “Architect” as used herein or in the UGCs shall mean A/E.

ARTICLE 3
CONTRACT TIME

3.1
County shall provide a Notice to Proceed in which a date for commencement of the work shall be stated. GC shall achieve Substantial Completion of the Work within **ninety (90) calendar days** after such commencement date. As such completion date may be extended by approved Change Orders. Unless otherwise specified in writing, GC shall achieve Final Completion within **thirty (30) calendar days** of Substantial Completion. The time set forth for completion of the work is an essential element of the Contract.

3.2 LIQUIDATED DAMAGES

GC acknowledges and recognizes that County is entitled to full and beneficial occupancy and use of the completed Work following expiration of the Contract Time and that County has entered into, or will enter into, binding agreements upon GC's achieving Substantial Completion of the Work within the Contract Time. GC further acknowledges and agrees that if GC fails to complete substantially or cause the Substantial Completion of any Phase of the Work within the Contract Time, County will sustain extensive damages and serious loss as a result of such failure. In the cases of missed scheduled events, which incur exact losses of revenue and exact expenses for fees and other cancellation costs, GC shall be responsible for the exact amount of damages sustained by County. In other cases, the exact amount of such damages will be extremely difficult to ascertain. Therefore, County and GC agree as set forth below:

3.2.1
Subject to the other terms and conditions herein, if Substantial Completion is not achieved by the date specified above or by such date to which the Contract Time may be extended, the Contract Sum shall be reduced by **Five Hundred Dollars ($ 500) per calendar day** as liquidated damages and not as a penalty, until the date of Substantial Completion. Force majeure shall apply relative to both rain/snow delays (acts of nature) and/or supply delays over which GC has no control, and such force majeure delays shall not be subject to such reduction of the Contract Sum.

3.2.2
County may deduct liquidated damages described herein from any unpaid amounts then or thereafter due GC under this Contract. Any liquidated damages not so deducted from any unpaid amounts due GC shall be payable by GC to County at the demand of County, together with the interest from the date of the demand at a rate equal to the prime interest rate as published by the Wall Street Journal on the **first (1st) business day** after such amounts are demanded.

3.2.3
Notwithstanding anything to the contrary in this Contract, if County is unable to recover any portion of liquidated damages in accordance with the terms and conditions herein because it is found to be unenforceable or invalid as a penalty or otherwise, then, County shall be entitled to recover from GC all of County's actual damages in connection with the failure by GC to achieve Substantial Completion of the Work within the Contract Time, including, without limitation, direct, indirect, or consequential damages.

ARTICLE 4
GC REPRESENTATIONS

4.1
In order to induce County to enter into this Contract, GC makes the following representations:

4.1.1
GC has examined and carefully studied the Contract Documents and the other related data identified in the Bid/Proposal Documents.

4.1.2
GC has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

4.1.3
GC is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

4.1.4
GC has considered the information known to GC; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by GC, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) GC’s safety precautions and programs.

4.1.5
Based on the information and observations referred to in **Paragraph 4.1.4** above, GC does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Sum, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

4.1.6
GC is aware of the general nature of work to be performed by County and others at the Site that relates to the Work as indicated in the Contract Documents.

4.1.7
GC has given A/E written notice of all conflicts, errors, ambiguities, or discrepancies that GC has discovered in the Contract Documents, and the written resolution thereof by A/E is acceptable to GC.

4.1.8
The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 5
THE CONTRACT SUM

5.1 Contract Sum.
County shall pay GC for completion of the Work in accordance with the Contract Documents the amount of **Forty Thousand One Hundred Eighty Six and 16/100 Dollars ($40,186.16)**.

5.2 Contract Payments.
Method and terms of payment of the Contract Sum shall be in accordance with the Contract Documents.

5.3 Owner's Contingency.
County and GC acknowledge the Work has become necessary due to **narrow focus of repairs** that have not allowed for all plans and specifications to be fully developed. Therefore, County and GC anticipate the need for future Change Orders to be issued after the Work commences. To provide funding for such Change Orders, a not to exceed amount of **Four Thousand Eighteen and 61/100 Dollars ($ 4,018.61)** shall serve as the Owner's Contingency from which such changes in the Work are to be paid in accordance with the General Conditions.

5.3.1
Owner's Contingency is controlled solely by County.

5.3.2
Expenditures from the Owner's Contingency must be made by Change Order issued by County in accordance with the General Conditions.

5.3.3
Unless otherwise provided in the Contract Documents, County will not pay a mark-up for profit and overhead on any change paid out of the Owner's Contingency. GC shall not be entitled to any compensation from any unused amounts of the Owner's Contingency.

5.3.4
For purposes of **Local Government Code Section 262.031** (calculation for maximum change order cap), the Contract Sum set out in **Paragraph 5.1** above, plus the Owner's Contingency (set out in **Paragraph 5.3** above), shall serve as the original Contract price.

5.4 Allowable Overhead and Profit Markup on Changes in the Work.
In case of an increase in the Contract Sum due to a change in the Work and in accordance with **UGC 7**, the amounts GC may add to the pricing of a change for overhead and profit are as follows:

5.4.1
For Work performed directly by GC with its Own Employees: GC may add up to **fifteen percent (15%)** for Work performed directly by GC for any specific change.

5.4.2
For Managing Subcontracted Work: GC may add up to **ten percent (10%)** for managing subcontracted Work for any specific change.

Only one percentage, referenced above, shall be used for the purpose of calculating the markup for a specific change amount. For changes involving both additions and deletions, the allowed markup will be allowed only on the net addition. The allowed markup shall cover all overhead expenses and profit of any kind relating to the specific change.

ARTICLE 6
PROJECT TEAM

County's Designated Representative for purposes of this Contract is as follows:

Williamson County Facilities Management
Attn: Director of Facilities
3101 SE Inner Loop
Georgetown, Texas 78626

County shall have the right, from time to time, to change the County's Designated Representative by giving GC written notice thereof. With respect to any action, decision, or determination which is to be taken or made by County under this Contract, the County's Designated Representative may take such action or make such decision or determination or shall notify GC in writing of an individual responsible for, and capable of, taking such action, decision, or determination, and shall forward any communications and documentation to such individual for response or action. Actions, decisions or determinations by County's Designated Representative on behalf of County shall be done in his or her reasonable business judgment unless express standards or parameters therefor are included in this Contract, in which case, actions taken by County's Designated Representative shall be in accordance with such express standards or parameters. Any consent, approval, decision, or determination hereunder by County's Designated Representative shall be

binding on County; *provided, however,* County's Designated Representative shall not have any right to modify, amend, or terminate this Contract or executed Contract Amendment. County's Designated Representative shall not have any authority to execute a Contract Amendment unless otherwise granted such authority by the Williamson County Commissioners Court.

GC's Designated Representative for purposes of this Contract is as follows:

Falkenberg Construction Co., Inc.
Kady Williams, Construction Manager
205 Cheatham St., Unit 2
San Marcos, TX 78666

GC shall have the right, from time to time, to change GC's Designated Representative by giving County written notice thereof. With respect to any action, decision, or determination which is to be taken or made by GC under this Contract, GC's Designated Representative may take such action or make such decision or determination, or shall notify County in writing of an individual responsible for and capable of taking such action, decision, or determination and shall forward any communications and documentation to such individual for response or action. Actions, decisions, or determinations by GC's Designated Representative on behalf of GC shall be done in his or her reasonable business judgment unless express standards or parameters therefor are included in this Contract, in which case, actions taken by GC's Designated Representative shall be in accordance with such express standards or parameters. Any consent, approval, decision, or determination hereunder by GC's Designated Representative shall be binding on GC. GC's Designated Representative shall have the right to modify, amend, and execute Contract Amendments on behalf of GC.

ARTICLE 7
NOTICE

Any notice required to be given under the provisions of this Contract shall be in writing and shall be duly served when it shall have been deposited, enclosed in a wrapper with the proper postage prepaid thereon, and duly registered or certified, return receipt requested, in a United States Post Office, addressed to County or GC at the following addresses. If mailed, any notice or communication shall be deemed to be received **three (3) days** after the date of deposit in the United States Mail. Unless otherwise provided in this Contract, all notices shall be delivered to the following addresses:

County: Williamson County Judge
710 Main Street, Suite 101
Georgetown, Texas 78626

With copy to: Williamson County Facilities Management
Attn: Director of Facilities
3101 SE Inner Loop
Georgetown, Texas 78626

and to: Office of General Counsel
Williamson County Commissioners Court
401 W. 6th Street

Georgetown, Texas 78626

GC: Falkenberg Construction Co., Inc.
250 Cheatham St., Suite 2
San Marcos, TX 78666

Attention: Kady Williams
Construction Manager

Either party may designate a different address by giving the other party **ten (10) days** written notice.

ARTICLE 8
DISPUTE RESOLUTION

Any Claim or Dispute between County and GC shall be resolved in accordance with the provisions set forth in **UGC 15**.

ARTICLE 9
MISCELLANEOUS PROVISIONS

9.1 MEANING OF TERMS
Terms in this Contract shall have the same meaning as those in the UGCs.

9.2 NO WAIVER OF IMMUNITY
Nothing herein shall be construed as a waiver of sovereign immunity by Williamson County.

9.3 GOVERNING LAW
This Contract and all of the rights and obligations of the parties and all of the terms and conditions shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas without reference to its conflicts of law provisions. Williamson County shall be the sole place of venue for any legal action arising from or related to this Contract or the Project in which County is a party.

9.4 ASSIGNMENT
County and GC, respectively, bind themselves, their agents, successors, assigns and legal representatives to this Contract. GC shall not assign this Contract without the written consent of County. If GC attempts to make an assignment without County's consent, GC shall nevertheless remain legally responsible for all obligations under this Contract.

9.5 OTHER PROVISIONS

9.5.1
GC represents and warrants the following to County (in addition to any other representations and warranties contained in the Contract Documents), as an inducement

to County to execute this Contract, which representations and warranties shall survive the execution and delivery of this Contract, any termination of this Contract, and the final completion of the Work:

.1 that it and its Subcontractors are financially solvent, able to pay all debts as they mature, and possessed of sufficient working capital to complete the Work and perform all obligations hereunder;

.2 that it is able to furnish the tools, materials, supplies, equipment, and labor required to complete the Work and perform its obligations hereunder;

.3 that it is authorized to do business in the State of Texas and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work and the project;

.4 that its execution of this Contract and its performance thereof is within its duly authorized powers;

.5 that its duly authorized representative has visited the site of the Project, familiarized himself with the local and special conditions under which the Work is to be performed, and correlated its observations with the requirements of the Contract Documents; and

.6 that it possesses a high level of experience and expertise in the business administration, construction, construction management, and superintendence of projects of the size, complexity, and nature of this particular Project, and it will perform the Work with the care, skill, and diligence of such a contractor.

ARTICLE 10
SCOPE OF CONTRACT AND CONTRACT DOCUMENTS

10.1
This Contract represents the entire and integrated agreement between County and GC and supersedes all prior negotiations, representations, or agreements, either written or oral. This Contract may be amended only by written instrument signed by both County and GC.

10.2
The following documents comprise the Contract Documents:

1. This Contract between County and GC;
2. Exhibit A – Construction Documents
3. Exhibit B – Minimum Insurance Coverages and Minimum Coverage Amounts
4. Exhibit C – Williamson County Vendor Reimbursement Policy
5. Exhibit D – Williamson County Uniform General Conditions

10.3
In the event of a dispute or conflict relating to the terms and conditions of the Contract Documents, applicable documents will be referred to for the purpose of clarification, conflict resolution or for additional detail in the following order of precedence:

1. Contract between County and GC;
2. Special Conditions or Supplementary Conditions (if any);
3. Williamson County Uniform General Conditions;
4. all Addenda issued prior to the Effective Date of the Contract between County and GC; and
5. The Construction Documents

ARTICLE 11
SIGNATORY WARRANTY

The undersigned signatory for GC hereby represents and warrants that the signatory is an officer of the organization for which he/she has executed this Contract and that he/she has full and complete authority to enter into this Contract on behalf of the Company. The above-stated representations and warranties are made for the purpose of inducing County to enter into this Contract.

IN WITNESS WHEREOF, County has caused this Contract to be signed in its name by its duly authorized County Judge, or presiding officer of the Williamson County Commissioners Court in the absence of the County Judge, thereby binding the parties hereto, their successors, assigns, and representatives for the faithful and full performance of the terms and provisions hereof. NO OFFICIAL, EMPLOYEE, AGENT, OR REPRESENTATIVE OF THE COUNTY HAS ANY AUTHORITY, EITHER EXPRESS OR IMPLIED, TO AMEND, TERMINATE, OR MODIFY THIS CONTRACT, EXCEPT PURSUANT TO SUCH EXPRESS AUTHORITY AS MAY BE GRANTED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT.

GC:
Falkenberg Construction Co., Inc.

Docusigned by:
By: John E. Castro
00B8142C8836450...
Signature

John E. Castro
Printed Name

President
Title

Date Signed: December 11, 2023 | 16:08 CST

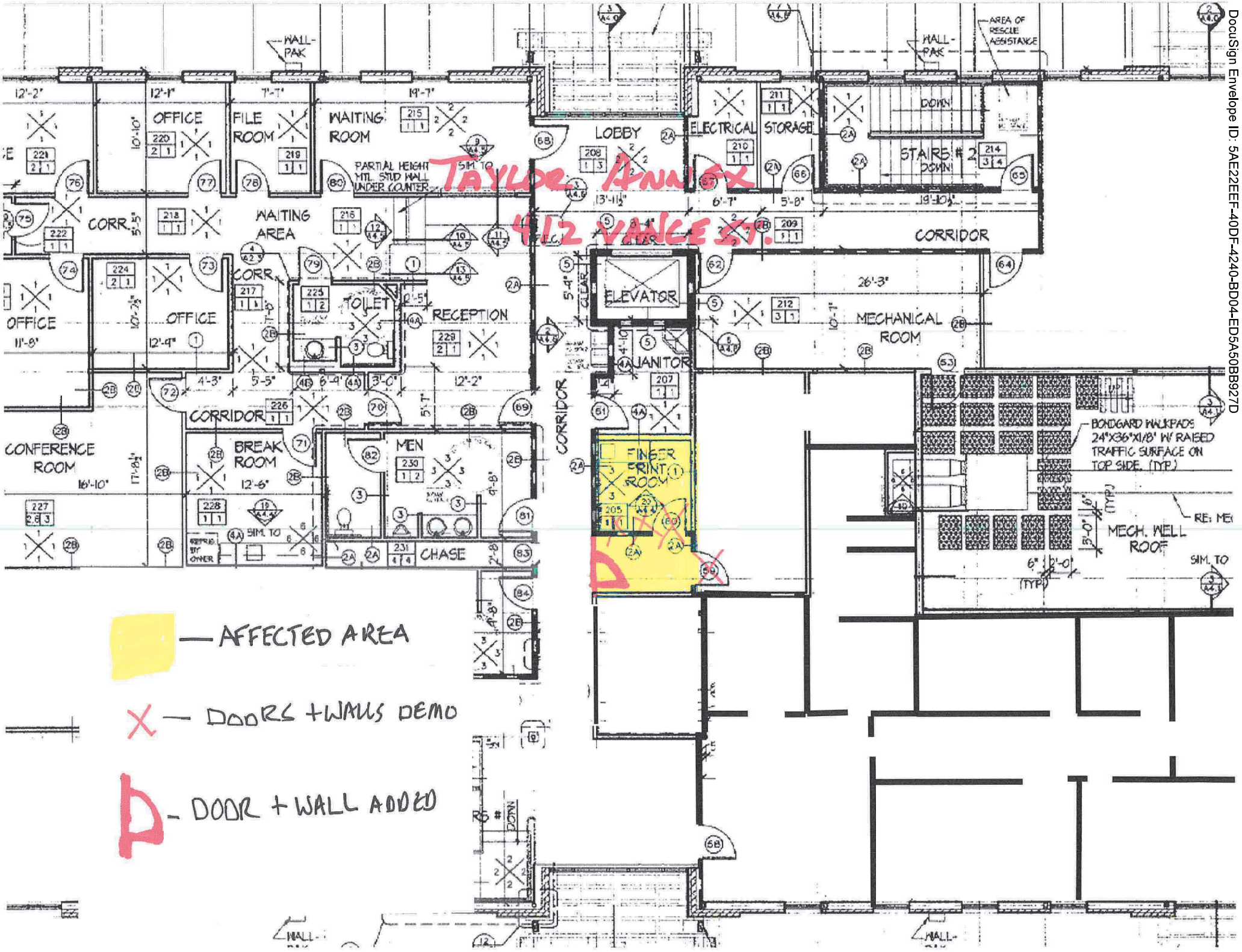
COUNTY:
Williamson County, Texas

By: Valerie Covey
Signature

Valerie Covey
Printed Name

Presiding Officer
Title

Date Signed: Jan 9, 2024



WILLIAMSON COUNTY FACILITIES MINIMUM DESIGN SPECIFICATIONS

DIVISION	ITEM	DESCRIPTION
GENERAL		
	ADA	Meets all current ADA Standards.
	AHJ CODES	Meets all current AHJ standards and codes.
STRUCTURAL		
	ROOF	Design roof structure with the capacity to support future solar panel installation.
	ENVELOPE	Building envelope should be water tight.
	STUDS	All stud walls should be a minimum 20 GA material unless AE suggests otherwise
	ROOF ACCESS	If equipment is installed on roof, access should include at a minimum, a roof hatch for access, preferably with a permanently installed access ladder
FIRE PROTECTION		
	FIRE ALARM	Existing Buildings with Simplex - use Simplex products
		New Buildings or Exist Buildings without Simplex - use Silent Night
	PLANS	Update whole building plans (digital) and coordinate update of fire panel info
ELECTRICAL		
	WIRING	All electrical wire to be installed in hard pipe conduit, except for fixture whips, which should have a maximum length of 6'.
	FIXTURES	Energy efficient technology. LED fixtures or equivalent energy use.
	LIGHTING MOUNTS	No Tapcon masonry mounts since the fixtures are likely to pull-out of masonry walls
	LIGHTING CONTROLS	Acuity - Schedule lighting scene programming 30-days after Occupant move-in.
PLUMBING		
	TRAP PRIMERS	Use threaded connection supply-off of inverted "Y" on lavatory tailpipe
	FIXTURES	Automatic (touch less): toilets, lavatory fixtures.
HVAC		
	FILTER	2" filter racks at any air handler filter location.
		Advanced photo-catalytic oxidation type filtration.
	MAINTENANCE ACCESS	Place all units to allow for ground level maintenance and filter changes. If above ceiling installation is necessary, then install access doors.
		Avoid the necessity of ceiling tile removal to do maintenance. Use items such as catwalks if necessary for ease of maintenance.
	DUCT	All duct should be hard metal duct with exterior insulation, except for register drops can be flex if necessary.
	LOW AMBIENT	Install low ambient kits on all DX, RTU's, etc. to allow for humidity control in cold weather conditions.
	CONTROLS	Controls should be compatible with Wilco's existing automated controls software/hardware.
	C.O. DUCT DETECTOR	Should not be powered by RTU. This allows maintenance to shutdown HVAC without setting off fire alarm.
	SOUND ISSUES	All open-air (open-plenum) areas should be designed with effective sound deadening boots at all return air grills entering office or meeting type space
HARDWARE		
	DOOR HARDWARE	Locksets should be heavy duty cylindrical style with figure-8 style IC core and a 7 pin combination configuration.
		Lockset/Handle Finishes should be brushed stainless (brushed nickel)
		No Piano Hinges on Doors
	RESTROOM HARDWARE	Double roll S.S. toilet paper dispensers, multi-fold towel dispensers, hand dryers
		Key boxes & specefic key box for elevator(s)
ACCESS CONTROL		
	CARD READERS	Where card readers are installed, use multi-class card readers which are compatible with Wilco's software/hardware.
IT		
	DHCP COMPLAINT	Dynamic Host Client Protocol compliant controllers for all devices connected to Wilco IT systems
INSULATION		
	SOUND BATTS	Sound batting should be installed at all office and meeting room walls and ceilings regardless of the quantity or type of building envelope insulation or deck insulation.

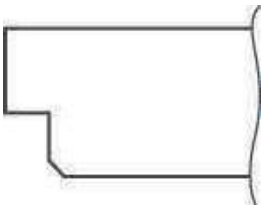
WILLIAMSON COUNTY FACILITIES MINIMUM DESIGN SPECIFICATIONS

CEILING TILE		
	ACOUSTICAL TILE	Sound deadening type, not light weight foam type.
MAINTENANCE		
	FACILITIES CLOSET	All buildings should include a maintenance closet with storage space for such items as touch-up paint, spare lamps, spare ceiling tile,
		spare carpet tiles, ladders, etc.
	JANITORIAL	All buildings should include a mop sink closet with storage space for cleaning supplies on shelving and space for rolling carts/mop buckets.
LANDSCAPING		
	PLANT SELECTION	Use only low water native and adaptive plants. Small turf areas. Overdesign for pedestrian traffic.
	IRRIGATION	Irrigated areas should be kept to a minimum and overall irrigation should be kept to a minimum.
	IRRIGATION CONTROLS	Irrigation that is installed should have controls that are compatible with Wilco's existing automated control and monitoring software/hardware
	DESIGN	Concrete walk around building perimeter. No grass at edge of building. No small turf islands, use mulching materials instead.
		No shade trees to interfere with signage, lighting or utilities.
WAREHOUSE / GARAGE / SHOPS		
	SAFETY/HEALTH	Hand wash sink, eyewash stations, water fountain, ice machine floor drain.
	ORIENTATION	Building orientation should be such that the overhead doors face North and South to allow for prevailing wind ventilation and/or install large exhaust fans for mechanical ventilation.
MISCELLANEOUS		
	COMMISSIONING	No commissioning of buildings required. A fully functional and maintainable building is expected as part of the construction contracting and professional services
		contracting process.
	TRAINING	Provide training for specialty systems/items
	LABELS	Labels on ceiling grid for above ceiling equipment locations including all electrical disconnects, water valves, HVAC equipment etc.
	HAND DRYERS	Automatic hand dryers at restrooms.

Armstrong CEILING SOLUTIONS

DUNE: 1777

DUNE | 1777

EDGE	DIMENSIONS	ACOUSTICS
 Beveled Tegular 9/16 in	 24 in x 48 in x 5/8 in	0.50 NRC 35 CAC

NOTE: Shape drawings are not to scale.

PERFORMANCE

- DUNE panels are part of the SUSTAIN portfolio, and meet the most stringent industry sustainability compliance standards today
- Upgrade look at a modest price
- CEILING-2-CEILING Post-consumer Recycled Content options: Items 1773HRC, 1774HRC, 1775HRC, 1776HRC, 1777HRC
- USDA-Certified Biobased Product – 99%
- Durable – Scratch-resistant
- Non-directional visual reduces scrap and installation time

Material	Mineral Fiber
Texture	Fine
Surface Finish	Factory applied latex paint

	ACOUSTICS	
NRC	Sound Absorption (NRC)	0.50
CAC	Sound Blocking (CAC)	35
	FIRE	
	Fire Performance	Class A (UL)
	Light Reflectance	81%
	Sag/Humidity Resistance	HumiGuard Plus
	Insulation Value	R Factor-BTU: 1.60 BTU R Factor-Watts: 0.28 m2 K/W
	BioBlock	Yes
	Durability	Scratch Resistance
	Special Applications	Library Music / Language Room

Shape	Rectangle
Weight	0.75 PF2
Sq Ft (Sq Ft / Carton)	64
Pieces / Carton	8
ASTM Classification	Type: III, Form: 2, Pattern: C E
Installation Method	Grid (Suspended)

SUSTAINABILITY PROFILE

RECYCLED CONTENT UP TO

41%

RECYCLABLE THROUGH ARMSTRONG RECYCLING PROGRAM

LEARN MORE

SUSTAINABLE PRODUCT SEARCH TOOL

greengenie
SUSTAINABLE PRODUCT SEARCH TOOL

GET STARTED

HIGH PERFORMANCE SUSTAINABLE CEILING SYSTEMS

SUSTAIN™

LEARN MORE

USDA BIOPREFERRED® PROGRAM

USDA CERTIFIED BIOBASED PRODUCT
PRODUCT 99%

LEARN MORE

8/8/2022

WILLIAMSON COUNTY
1848
FACILITIES DEPARTMENT

Trenton Jacobs
County Architect

MEMO

To: Project Managers and Consultant Design Teams
From: Trenton Jacobs, County Architect
Re: WILCO Standard Paint Color Selections

To minimize complications with an ever-changing list of interior paint colors throughout the County, the Facilities Department shall direct consultant design teams to utilize the following pre-approved paint colors list:

SW 7019	Gauntlet Gray
SW 7067	Cityscape
SW 7074	Software
SW 7018	Dovetail
SW 6234	Uncertain Gray
SW 7017	Dorian Gray
SW 7016	Mindful Gray
SW 6218	Tradewind
SW 6254	Lazy Gray
SW 7064	Passive
SW 7667	Zircon
SW 6078	Realist Beige
SW 7527	Nantucket Dune
SW 6107	Nomadic Desert
SW 7038	Tony Taupe
SW 9117	Urban Jungle
SW 6081	Down Home

SW 7069	Iron Ore (Painted Door Frames)

Deviations from this list (for unique facility needs) may be requested in writing by the consultant design team.

WILLIAMSON COUNTY
(512) 943-1193 Cell (512) 966-9472
Trenton.Jacobs@wilco.org www.wilco.org
3101 SE Inner Loop
Georgetown, TX 78626

BACK TO RESULTS

SKILL I0461

COLOR SHOWN:
FINESSE 00505
24 INCHES X 24 INCHES

PRODUCT COLLECTION:
RATIONAL

ROOM VIEW SWATCH VIEW

1 of 6

INSTALLATION METHOD: MONOLITHIC

6 SWATCH COLORS:

SAVVY 00100 | CUNNING 00405 | FINESSE 00505 | APTITUDE 00515 | MOXIE 00590 | EXPERTISE 00705

pdQ Available

QUANTITY:

1

SAMPLE SIZE:

24 in x 24 in

ADD SAMPLE TO BASKET

TECHNICAL DOCUMENTS

SPECIFICATIONS

PRODUCT SWATCH:
FINESSE 00505

PRODUCT STYLE:
SKILL I0461

PRODUCT COLLECTION:
RATIONAL

PRODUCT TYPE:
CARPET

PRODUCT CATEGORY:
CARPET TILE

RECOMMENDED ADHESIVE:
LOKWORX+ CARPET TILE ADHESIVE, SHAW 5100, SHAW 4151, SHAW 3800, SHAW 5036, LOKWORX CARPET TILE ADHESIVE

PRIMARY BACKING:
NON-WOVEN SYNTHETIC

SECONDARY BACKING:
STRATAWORX® TILE

WEAR RATING:
HEAVY

DYE METHOD:
100% SOLUTION DYED

FIBER:
SOLUTION Q® NYLON

PRODUCT SIZE:
24 INCHES X 24 INCHES
60.96 CM X 60.96 CM

PERFORMANCE TESTING

RADIANT PANEL / ASTM E648":
CLASS I

WARRANTY

15 YEAR COMMERCIAL LIMITED WARRANTY

PDQ DETAILS:

10 BUSINESS DAYS
MAXIMUM ORDER OF 2,500 SY
PER COLOR

THIRD PARTY CERTIFICATES

CRADLE TO CRADLE CERTIFIED®
SILVER LEVEL (VERSION 3.1)

HEALTH PRODUCT DECLARATION (HPD)
1,000 PPM DISCLOSURE

ENVIRONMENTAL PRODUCT DECLARATION(EPD)
3RD PARTY CERTIFIED IN ACCORDANCE WITH ISO14044, ISO14025 & EN15804

DECLARE
LBC COMPLIANT

NSF 140
GOLD

CRI GREEN LABEL PLUS (GLP)
GLP9968

ENVIRONMENTAL GUARANTEE
PICKUP & DELIVERY AVAILABLE IN AMERICAS

PRODUCT PACKAGING
100% RECYCLABLE

DOWNLOAD FULL SPECS

WILCO
TEXAS

Building Commissioning Guideline, Volume 1.1
July 21, 2023

Wilco Facilities Commissioning Guideline Final Version

FOREWORD

The commissioning process is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems and assemblies meets defined objectives and criteria. The commissioning process begins at project inception and continues for the life of the facility through the occupancy and operational phases. Because this guideline details a process, it can be applied to both new and renovation projects.

The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the Owner's Project Requirements (OPR). This guideline in concert with our Division 1, 15 and 16 commissioning specifications as well as our Building Closeout and Transition Program describes the overall commissioning process in order to provide a uniform, integrated, and consistent approach for delivering and operating facilities that meet Facilities' ongoing requirements.

This edition of the Recommended Guidelines for Facilities Building Commissioning is intended to assist Facilities project managers during the development and implementation of the commissioning process. It is anticipated that, once the principles stated herein have been tested, updates to the guidelines will be necessary. Comments or suggestions on how to improve this document and the quality of facilities at Williamson County Facilities would be greatly appreciated. Please send all comments to the Commissioning Program Manager at the Facilities in Georgetown, Texas.

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EXECUTIVE SUMMARY

Commissioning is a planned, collaborative, and systematic process of review, testing and documentation collection conducted to confirm that a structure and its subsystems perform as designed and as expected by the building occupant. In most cases, this procedure takes place during the entire project, from planning through final acceptance of the building. Commissioning has been shown to improve building quality in thousands of major projects nationwide. Commissioning (more specifically the commissioning authority) should not be confused with project management or construction management (project manager (PM) and/or construction management (CM)). A project manager is the person assigned responsibility and accountability for the project. This person is responsible for delivering the project in the agreed schedule, to the correct technical specifications, i.e. defined to meet user requirements, and within the approved budget and other specified criteria, e.g. key performance indicators[1].

Construction management is a professional service that applies management techniques to the planning, design and construction of a project from inception to completion for the purpose of controlling time, cost and quality. PM's and CM's share a commonality which focuses resources on time, cost and schedule. Commissioning, in contrast, focuses on the overall quality, operability and completion of the project using the KPI and Owner's project requirements as a basis for the success criteria.

Facilities has opted for three methodologies in the delivery of commissioning services all of which are based on the implementation of the Facilities Cx Guideline and program:

1 Internal staff resources provide all commissioning necessary for small to mid size projects and retrofits.
2 Independent commissioning authorities contracted by Facilities for large or mission critical projects where Facilities internal resources cannot commit or fulfill the necessary time requirements for the successful completion of commissioning task.
3 Collaborative approach in which Facilities internal staff will act as the CxA project manager and coordinate a team of individual contract designees or internal staff to fulfill the commissioning program requirements.

Regardless of the methodology, the CxA (Commissioning Authority) should be chosen based on experience and in a manner similar to consulting engineers and architects where experience, resources, skills and the required amount of availability and flexibility are appropriately addressed.

[1]The Key Performance Indicators (KPI) determined at the beginning of the project, reflect directly on the key objectives (goals) of the project and provide the basis for project management trade-off decisions during the course of the project. At the completion of the project these KPI's will be the most relevant measures to confirm the acceptability of the project and its product by the project's stakeholders as being successful. The KPI's will also be documented in a Williamson County Facilities Management Central database to continually evaluate building metrics, value and lifecycle cost benefits (Location TBD).

Facilities Factors Supporting the Need for Building Commissioning
■ Unclear Owner's Performance Requirement (OPR) ■ Complex building systems ■ Increased specialization without integration ■ Unclear standards and criteria for gauging system performance ■ Lack of functional performance testing ■ Conflicts between specifications and applicable codes ■ Conflicts between program management and long term operability ■ Inadequate system documentation ■ Current maintainability and accessibility problems ■ Inadequate provision for maintenance, O&M manuals and training ■ Numerous change orders and cost overruns ■ Unfinished systems at project completion ■ Poor quality of design and installation ■ Lack of records including change order authorization and agreements to reduce scope ■ Current reality of significant unbudgeted time for follow-up to remedy errors and omissions using operating budgets ■ Facilities PMs overworked ■ Potential lack of OEM at project turnover ■ Typically no construction manager on the job ■ Lack of appropriate resources to develop, implement and perform necessary quality assurance programs.
Sources: U.S. General Services Administration Building Commissioning Guide, July 2003, Facilities Initial Project Evaluation October 5, 2006

It is anticipated that the Facilities commissioning program will be available for all projects as a resource and management tool. The Facilities Commissioning Program team will/can provide all materials and resources necessary for the announcement, review and selection of an outside third party commissioning firm. The Facilities Commissioning Program team can also manage the commissioning process by providing actual commissioning services or by ensuring that contracted independent commissioning firms are fulfilling their contractual obligations. Facilities PMs should look for a staff that includes both professional engineers and experienced technicians when awarding projects to CxA firms until such time as the release of this program. One should also expect commissioning

service providers to participate in the national commissioning community through conferences, continuing education, and as participants in national peer organizations.

All building programs at Facilities will require commissioning for at least the mechanical, life safety, and electrical portions of the project. As Key Performance Indicators are evaluated, commissioning may expand to a total building function. The determination of whether to use an independent or internal staff commissioning provider should be evaluated using this simple criteria:

Use of an independent third party commissioning provider is considered standard procedure for all new building projects.

Use of the collaborative program should be considered when the complexity of the project or the time commitments couldn't be completely fulfilled by Facilities' internal staff or in situations in which multiple remodel projects are being assigned to one Facilities internal staff to manage the commissioning aspects.

Program managers should anticipate a budget between .75 percent to 3.0 percent of the new building construction for total building commissioning. If only select systems are to be commissioned, then the recommendation is to budget an average of 3.0 percent of the system component cost for commissioning of that system. These fees are exclusive of travel, videotaping, testing-adjusting and balancing (TAB) work, and extra certifications beyond occupancy. If 3.0 percent of the new building construction is less than $3.5k and the project will require third party commissioning, it is recommended to use the estimate of $3.5K amount due to a minimum amount of time needed to perform the commissioning process.

While the cost of commissioning constitutes only a very small part of the cost of the initial construction process, it has been shown to be a significant, positive contributor to the economical construction and maintenance of the facility for years to come. In a recent study conducted for the U.S. Department of Energy, the cost of commissioning was actually determined to be a negative number for the Owner. The expected first cost increase for these services actually lowered the entire first cost of the project. Metrics below do not reflect the additional long-term operational savings

COMMISSIONING METRICS (These Numbers need to be revised)
U.S. DOE
Cross Section of Building Types (Administrative, Data Center, Production, Research)

Project Types	Average Total Cost of Construction (millions)	Average Square Feet (thousands)	Average # of Deficiencies Discovered	Average Commissioning Cost	Net Cost Cx Cost-Cost of corrections prior to turn over.
Project "A" Type	$14	36	622	$155,000	-$128,960
Project "B" Type	$48.6	360	528	$265,000	-$162,925
Project "C" Type	$10	55	650	$168,000	-$396,875
Project "D" Type	$10.1	52	473	$123,000	-$202,527

SECTION 1 - WHAT IS COMMISSIONING?

Simply stated, commissioning is the process of making sure a building works as intended. A more complete definition is:

> **"Systematic process of assuring by verification and documentation, from the design phase to minimum of one year after construction, that all facility systems perform interactively in accordance with the design documentation and intent, and in accordance with the Owner's requirements, including preparation of operation personnel"** [2]

Let us take a closer look at this definition:

Commissioning is *systematic*. Benefits from commissioning can be achieved no matter when the process starts. The earlier one begins the process of commissioning, the greater the potential benefits are. The maximum benefit will be achieved when commissioning is a part of the project from the very start. Furthermore, commissioning must be *integrated* into the project, meaning that commissioning is made integral to every stage of the project: design, construction, acceptance, and post occupancy (warranty).

The factors of *planning* and *integration* are two key points that set commissioning apart from traditional construction quality assurance processes. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)[3], a leader in HVAC issues, offers several resources that are helpful for becoming acquainted with commissioning for mechanical systems. Another important resource for learning about commissioning is the Facilities Online Commissioning resource tool (www.Facilitiesxxx.Facilities.com) that provides a self-paced course on Facilities commissioning standards, resources and programs.

Historically, the term "commissioning" has referred to the process by which the heating, ventilation and air conditioning (HVAC) systems of a building were tested and balanced according to established standards prior to acceptance by the building Owner. Facilities, however, recognizes that the use of commissioning is key for the integrated nature of all building systems performance that impact our sustainability, workplace productivity and security. Because all building systems are integrated, a deficiency in one or more components can result in sub-optimal operation and performance among other components. Remedying these deficiencies can result in a variety of benefits including:

[2] GSA Guideline "Building Commissioning"

[3] ASHRAE can be contacted in Atlanta, GA at 404-636-8400 or e-mailed at edu@ashrae.org. The ASHRAE web site can be accessed at www.ASHRAE.org.

- Lower utility bills through energy savings
- Improved environmental/health conditions and occupant comfort
- Improved system and equipment function
- Improved building operation and maintenance
- Better building documentation
- Shortened occupancy transition
- Significant extension of equipment/system life cycle
- Reduced construction cost
- Increased reliability of building systems
- Improved building occupant productivity
- INCREASED BOTTOM LINE PROFITIABILITY

This highly integrated approach has been adopted by the National Institute of Building Sciences (NIBS), General Services Administration (GSA), Department of Energy (DOE), Department of the Navy, and many other federal, public and private entities. According to the GSA,[4] the largest owner and operator of buildings in the United States, commissioning will become business as usual due to the tremendous benefits it bestows upon the projects. Furthermore, total building commissioning is the Public Buildings Service process for quality assurance in new construction and facility modernization. "It is the process for achieving, validating and documenting that the performance of the total building and its systems meet the design needs and requirements of the Owner."

1.1 Planned and Integrated Commissioning is Crucial

Using the Facilities commissioning process during the design phase does not significantly change the way the design firms do business or the way we should manage our projects. It provides the design firm with additional information they need to do their job, requires that they document all assumptions, and that they submit quality design products. In essence, it requires them to fulfill their contract obligations to us!

Each design option developed by the design team must be linked back to the OPR (Owner's Performance Requirement) document. When a specific OPR cannot be met, that situation should be identified and the reason given as to why it cannot be met. The project team then evaluates the design options on their ability to meet the OPR as a whole. Tradeoffs are made based on cost, risk, schedule or other considerations, and the OPR is updated to reflect the decisions made.

[4] GSA publication "*GSA Guide to Building Commissioning"*

The process of selecting each design option is critical in that the designers are working as part of the project team to hone the shape, size, and type of facility and components to meet the OPR. Sufficient time must be spent during this step to ensure that all questions and concerns have been addressed and agreed to by the project team. Mistakes that are not caught during this step have repercussions throughout the life of the facility.

The implementation of commissioning during design is important because of several key services and benefits that the process provides to us including:

Commissioning Benefits During Design Phase
■ Early introduction to the commissioning plan avoids exposing team members to unexpected reviews and service requirements during the course of the project. ■ The CxA should confirm that the Owner's Performance Requirement (OPR) is complete during design phase. If not complete, the CxA should develop the initial OPR document that will be turned over to the A/E team so that the Basis of Design (BoD) can be developed. The OPR document is described in more detail later in this paper. ■ The CxA contributes to the documentation of the Basis of Design (BoD) in several ways. Once the designers begin submitting their BoD information, the CxA must review the information to verify that it is a quality effort and to help reduce the occurrence of omissions. Next, as a part of the design review, the CxA must also compare the BoD information supplied by the designers with the OPR, to verify that the design does not violate the Owner's requirements. ■ The CxA should check the construction plans and specifications during the pre-bid phase to confirm that the documents include provisions for commissioning, including systems testing and sequence of operation verification. ■ The CxA should provide the requirements for commissioning in the specifications so that the general contractor is aware of their responsibilities prior to submitting a bid. ■ The CxA's presence at pre-bid and preconstruction conferences should further acquaint construction personnel with the commissioning process and draw the constructor(s) into the project team. ■ The CxA should document any changes that are made to the BoD, and identify them to other members of the design team so that the design team can insure the coordination of the drawings and specifications. ■ The CxA can aid the designers by supplying a consistent format for guidance, which is likely to be very valuable to designers new to the BoD and the commissioning process.

1.2 Commissioning is Collaborative, Systematic, and Documented

Commissioning is *collaborative*. It is a team process from the very beginning. *One of the most important responsibilities of the CxA is team formation and the development of an accepted and standardized communications protocol.* The experienced commissioning professional verifies that quality is included in the project from start to finish by creating a heightened respect for quality within the team. To be sure, there is a certain amount of error identification, both in design and construction; but mainly, quality is built in, not inspected in!

Commissioning is *systematic*. Commissioning includes testing all items in all modes of operation. Equipment is first inspected in a static condition to assure it is installed correctly **(Field Verification)**. Moving equipment is then started up and electrical equipment energized for the first time under controlled conditions **(Functional Verification)**. After equipment is started up, systems of equipment are tested running together to prove that the system as a whole will operate as required **(Performance Verification)**.

Systematic refers to the commissioning building blocks of review, inspection, startup, and testing. It also refers to the "systems" nature of modern buildings. The commissioning process is organized by system components, including air handling units, pumps, boilers, chillers, water treatment, fire alarms, smoke evacuation, door locks, roofs, and walls. Grouping the building into subsystems makes it easier to understand how the building works and provides a framework for commissioning.

Commissioning is *documented.* The value of commissioning remains long after the building is accepted and turned over to the O&M staff. In the course of commissioning, key parameters of the systems are documented, organized, and preserved in the commissioning report. Not the least of these items is the OPR. The commissioning report records the intended use of the building and its various spaces so that if operation and maintenance personnel change, O&M staff will be able to understand why things work the way they do.

The review and approval of the O&M manual and the organization of the training program are also assigned to the CxA. This further insures that the tools required for future correct building operation are provided for Facilities' operational staff by the time of the completion of the project.

SECTION 2 - WHY COMMISSION?

There are two main benefits of commissioning:

- Facilities can have assurance of a correctly operating building at completion.
- Facilities can have a basis for confidence in continued correct operation due to documentation and staff training.

Recent studies conducted by Department of Energy indicate that on average the operating costs of a commissioned building range from 8% to 20% below that of a non–commissioned building. Certain available commissioning implementation tools, such as energy modeling and verification, may even result in a negative capital investment cost. Facilities' goal in adopting building commissioning is:

- To safeguard our building interest, by implementing solutions that best represent and meet the long term efficiency and functionality of all buildings and meet the expectations of our customers
- To improve facility operations
- To optimize the value received for each construction dollar spent
- To improve Indoor Air Quality (IAQ) and decrease liability due to IAQ problems
- To reduce unnecessary energy consumption
- To increase the productivity of our employees

To better understand these benefits, consider the increase in the complexity of building components over the past three decades. A greater increase in the complexity of building components has come about in the last thirty years than in the 200 years before. Thirty years ago, buildings operated by microprocessors were a novelty. Now nearly all buildings are operated by a Building Automation System (BAS) and large research facilities may have hundreds of microprocessors controlling everything from lights and comfort to the safety and security needs of the occupants. The same is true regarding automatic valves, actuators, solid-state sensors, occupancy sensors, CO_2 sensors, variable frequency drives, pure water systems, fume hoods, biological hoods, and other modern appurtenances.

Consider the increasing use of technology to meet the demands of safety and efficiency. The energy crisis of the 1970s brought about a huge increase in America's energy consciousness. This is reflected today in building codes as well as design standards. Buildings must operate at a higher level of efficiency than they did thirty years ago. They attain this level of efficiency largely by using the sophisticated components described above, coupled with complex computerized building operating strategies.

Benefits of Commissioning for Facilities

- Reduce change orders
- Reduce project delays
- Enforce start-up requirements
- Shorten building turnover period
- Reduce post-occupancy corrective work
- Minimize effects of design defects
- Improve indoor environment and employee productivity
- Increase building maintainability and reliability
- Reduce energy and operating costs
- Increase value through better quality construction
- Enhance move in experience of our customers
- Reduce overall cost of new building delivery
- Provide market awareness of sustainable efforts at Facilities

Consider also the increase in the use of new materials over the past two decades. New materials have been incorporated into wall finishes, insulation, carpet, ceiling tiles, window coverings, office equipment, furniture, paper, books, cleaning agents, and almost every other item to be found in the modern workplace. All these items either cost less or provide better service. Some do both. Unfortunately, many of them contain untested chemicals that deteriorate the building air quality and cause allergic reactions for some workers unless a building's HVAC systems are operating correctly.

Top Deficiencies Discovered in Facilities' New and Existing Buildings
■ Incorrect scheduling of HVAC and day lighting systems ■ Incorrect heating and cooling sequence of operations ■ Incorrect calibration of sensors and instrumentation ■ Lack of control strategies for optimum comfort and efficient operation ■ Malfunctioning air- and water-side economizers ■ Under-utilized computer-based control systems ■ Short-cycling of HVAC equipment leading to premature failure ■ Lack of design intent and building documentation ■ Lack of training for building operators or service contractors ■ Missing specified and paid-for equipment ■ Lack of uniform building deficiency tracking ■ Occupancy determined by schedule not functionality ■ Lack of turnover standards and documentation ■ No warranty documentation ■ No design intent determined for buildings ■ No measurable KPI's ■ Meeting OPR can take years ■ Lack warranty troubleshooting procedures and standards ■ Lack standards of review for controls and points prior to acceptance ■ Lack of acceptance program ■ No energy consumption tracking or verification program ■ Lack of consistent O&M training program ■ Lack of clearly defined roles of all parties and their responsibilities

2.1 Commissioning for Maintenance

In the same way that engineering fees have remained relatively fixed, funding for maintenance and operations has stayed about the same on a unitary (per square foot) basis for a great number of years. Maintenance funding fails to reflect the increased complexity of buildings, as well as the need and cost for education and ongoing re-training of the O&M staff.

An ever-widening gap has developed between what a constructor installs and what O&M staff members are ready to accept. System components can be correctly sized, specified,

and supplied, but not installed, adjusted, and integrated to work optimally on the job. The consequence is that the noncommissioned building does not work correctly when it is built and the O&M staff does not have the time to figure out why. In fact, the O&M staff may be unaware that the building is operating incorrectly until the occupants complain.

Unfortunately, by this time, the building occupants' productivity has been reduced and they have come to expect no better than the poor building environment given them. Already, this new building is in an operations death spiral in which the building staff spends all their time attacking the symptoms of installation and design problems but have no training or time to attack the root causes. Evidence of such a situation may be seen in the bypassing and disconnecting of automatic controls, whether because of a lack of operational and maintenance training or because of equipment that has not been tested and adjusted to work smoothly as part of the overall installation. The result is steadily deteriorating environmental quality in the workspace, reduced energy efficiency, and building performance that falls short of the Owner's expectations.

The cost of these consequences is huge and can easily add up to many times the cost of commissioning.

Commissioning is the quality management process applied to building construction. It builds quality into the project and confirms correct operation through testing.

SECTION 3 - WHEN TO COMMISSION?

Facilities' Commissioning process should be performed on all new buildings and on any building remodel projects costing approximately $50,000 or more. On projects smaller than this, Facilities should execute its Commissioning Lite process. Projects that involve the installation of Electrical and/or HVAC equipment that has to be integrated into existing systems. Commission should be done on projects that change occupancy and/or intent of area of the building.

3.1 Budgeting for Commissioning

When considering budget criteria for commissioning, project managers should consider the following factors: What is the cost to Facilities if the building is energy inefficient? Environmentally wasteful? Inflexible? Seismically unsafe? Inaccessible? Unresponsive to client needs and Costly to Operate?

No set standards can be applied to determine the proper cost of commissioning for every building. The extent of desired commissioning services will affect the budget requirements. Factors such as building complexity, systems to be commissioned, critical operations inside the building, level of testing required, operation and maintenance goals, training requirements, project duration, and travel requirements all need to be considered in the budgeting process.

- Total building commissioning cost ranges from 0.75% to 3.0% of construction cost.

Cost Savings from Building Commissioning
■ Energy savings of 20 to 50 percent ■ Maintenance savings of 15 to 35 percent ■ Reduction of claims of 2 to 10 percent ■ Reduction of in-house overtime costs ■ Reduction of trouble-shooting costs
Source: Building Owners and Managers Association (BOMA) cost data for office buildings

Testing of sophisticated electrical systems such as emergency generators, uninterruptible power supply (UPS) systems, automatic transfer gear, etc, when included in the CxA contract will increase the cost of the electrical system commissioning.

Section 3 – When to Commission?

Various surveys on the cost of commissioning have been conducted throughout the U.S. and Canada. These surveys provide a starting point for budgeting. The data collected to date, indicate the cost of commissioning appears to range from 1.5% to 4.5% of the cost of the systems to be commissioned. For a building of average complexity and construction schedule, the cost of commissioning should be about 3.0% of the construction cost for the systems being commissioned. An average cost for basic commissioning of mechanical and electrical systems appears to be 3.0% and 1.5% respectively. For commissioning of sophisticated buildings such as research facilities and laboratories, this range can rise to 3.5% to 4.0%. For commissioning of simple fan-coil systems, the cost will be below these values. In the event that total building commissioning is desired, we recommend using 1% to 3.0% of the total construction cost in the project budget.

SECTION 4 - COMMISSIONING DELIVERY METHODS

The "How To" process of commissioning begins with the decision-making requirement of "Which delivery method?" As important as it is to implement a commissioning process, the method selected is crucial to the success of a project. Relationships and trust established at the onset of the project are the significant drivers for success. Many factors and variables (procurement, purchasing, resources, budget, schedule) greatly influence which delivery method is chosen. Facilities has adopted three primary commissioning delivery methods, which are outlined below.

4.1 Commissioning Delivery Methods

The combination of variables in the commissioning delivery selection process has led to the development of primary commissioning delivery methods adopted at Facilities:

- Engagement of independent commissioning provider
- Sole Facilities internal staff resource performs commissioning services
- Collaborative approach where Facilities internally manages a team of contracted providers

Which method is employed is driven primarily by project cost and complexity together with resource availability. While we may assume that it is always better to use internal Facilities resources from an operations support team, our experience suggests that time allocation, conflicting priorities and lack of excess capacity have degraded our ability to provide this service. Thus, for most projects our standard procedure would be the engagement of an independent CxA provider who would fulfill the obligations as outlined in our commissioning program.

Facilities has purchasing and procurement regulations and procedures in place to support this process. Therefore, the details of these processes are not enumerated here. Instead, the focus is on explanation of the delivery methods. In subsequent sections, development of the Scope of Work, Scope of Services, and other project specific aspects are covered.

4.2 Understanding and Evaluating the Options—Pros and Cons

Pros and cons stated herein are given for extreme effect to illustrate the stereotypical point. As further illustrative examples, imaginary quotes are listed in "role playing" fashion to demonstrate possible scenarios. We believe that in real life, the teams, players, and examples given may well be more moderate than the examples given here.

At the same time that the project delivery method is chosen and the decision is made to include commissioning, the commissioning delivery method should also be determined.

4.2.1 Option 1: Engagement of Independent Commissioning

In this option, an independent, separate entity assumes responsibility for administering and implementing the Facilities commissioning program under contract directly to Facilities.

Again, whenever Facilities selects this choice, the CxA should be separated from the design element or construction management unit in order to provide Facilities with the independence required for the commissioning process to be successful and to avoid any conflicts of interest.

The CxA should have a separate professional services contract in place with Facilities. (It is envisioned that a separate Facilities business partner (DBP) may manage this program for Facilities. If so, a project manager would contact the DBP, and they would arrange for all commissioning services) The CxA should be independent of the other stakeholders (Owner's project manager, A/E, construction managers, and construction contractors). It is important that the CxA has design, construction, and operations experience for the type of systems and assemblies included in the project. Expertise and experience in successfully implementing the Facilities commissioning process should take priority over knowledge of all systems and assemblies. The CxA should have internal technical resources for each specific system and assembly. Contracting for commissioning process services through a separate, independent professional enables the CxA to focus on the commissioning process and to avoid potential conflicts of interest. This separate relationship allows the CxA to act independently as director of commissioning process activities and to focus on the functionality of systems and assemblies relative to the OPR. For this reason, the CxA must be able to communicate directly with the Facilities project manager. Additionally, for the commissioning process to be successful there must be a cooperative atmosphere among all parties to avoid adversarial relationships. To achieve this, all parties should be represented on the commissioning team.

The CxA will implement the detailed Facilities commissioning program requirements, which verify the OPR, and subsequent deliverable task as outlined in the Facilities Commissioning Specification. While Facilities maintains standard commissioning specifications and design guidelines, the CxA will review the Facilities Standard Commissioning Specifications and Design Guidelines and suggest any modifications that are necessary with the Facilities project manager. Therefore, regardless of the selection of a CxA and the use of design guidelines the CxA is a contributor to the project specifications (construction contract documents).

Pros

- Classical independent consultant can provide impartiality without a link to profitability or reverse incentives.
- Data is provided directly to Facilities (saves time, translation).
- The fox is not guarding the hen house.

- Since they are not responsible for the design, the independent CxA is more likely to ask questions, acting as the Facilities' advocate to identify failure scenarios.
- They may bring field testing experience to the design phase.

Cons

- The third party role can result in "reporting" without resolution. Because the independent authority is not responsible for design or construction.
- Who takes the lead to resolve issues or effect change and action where needed?
- If not brought on board early enough, or brought without buy-in to the team and the design or construction process to date, the independent firm can lack the "can do" attitude earned by the rest of the team. It may introduce rework and potential conflict with A/E and or the general contractor.

4.2.2 Option 2: Owner-Led Commissioning

In this method, Facilities implements the Facilities Commissioning Program via in-house staff. No external third party authority, constructor or designer is retained. Facilities must have an experienced field commissioning and management team on staff trained in the use and implementation of the Facilities Commissioning Program and tools. This would also include the capability to provide all necessary commissioning disciplines (mechanical, electrical, etc.) in a timely and effective manner. While the CxA can be an employee of Facilities, they should not be part of the project design team. Whenever this choice is made by Facilities, the CxA should be separated from the design element in order to provide Facilities with the independence required for the commissioning process to be successful and to avoid any conflicts of interest.

Pros

- Facilities retains control and decision-making ability over all other parties.
- Quick, single-point action is possible.
- No information translation loss from CxA team to Facilities.
- Facilities' team retains all the lessons learned during the commissioning process.
- Provides Facilities with another opportunity for designer and constructor performance evaluation.

Cons

- Facilities may not have enough staff or staff with enough detailed technical knowledge.
- Facilities may not be able to maintain impartial control and decision-making ability.
- Owner may not have a sufficiently assertive manager to run the commissioning process well and resolve conflicts in a timely manner. For example, the case may

arise in which a difference of opinion exists between a headstrong design engineer and an unyielding mechanical trade subcontractor about some system requirement, which needs to be resolved decisively and quickly.

- Facilities' CxA leader may not be empowered to make decisions, take risks, or resolve gray issues given that the same project managers who may have been affected by commissioning may judge their employment advancement.
- True completion of a commissioned facility may be less likely without the benefit of state-of-the-industry professionals.
- True total cost, including callbacks, problems, and downtime may greatly exceed the apparent initial savings of not having an external CxA.

4.2.3 Collective Commissioning Program

In this option, Facilities internal staff will lead the commissioning process in concert with industry professionals and/or tradesmen. The use of this delivery approach has been designed to augment as necessary the labor or expertise short fall that can be found within facilities and engineering. The use of this delivery model is ideal for quick turnaround projects, retrofits and renovations. As in the other delivery methods, the Facilities Commissioning Program will be implemented completely however, the Facilities Commissioning project manager will assign segmented tasks to his team for execution.

Pros

- Reduce the need for additional full time facilities staff
- Enable the Facilities Commissioning Program for aggressive small projects with short turnaround times
- Emulates success criteria found in larger Facilities project experience

Cons

- Who takes the lead to resolve issues or effect change and action where needed?
- Potential for fox guarding the hen house (conflict of interest)
- Potential for drive by reporting

SECTION 5 - IMPLEMENTING THE COMMISSIONING DELIVERY PROCESS

Commissioning will now be implemented on all Facilities projects. In order to begin the program several questions in regards to project programming may be helpful to review.

5.1 Q: As a Facilities Project Manager, which delivery method should I use?

A: As soon as the project begins programming and/or preliminary design, the Facilities PM should decide the Cx delivery method that will be used for the project. Generally, the appropriate choice of delivery method is determined by a combination of items, including the following:

- The level of sophistication of the building
- The level of sophistication and availability of Facilities' in-house resources
- The budget that is available for the commissioning effort
- The skill sets of the parties that will be involved in the construction project (low bid, versus CM, versus negotiated, geographic region etc.)
- The experience of contractors and their subs with the commissioning process
- The skill sets of the commissioning service providers who will be sent a CWA
- If the DCP is approved, consultations with the program director for commissioning will aid in this effort.
- As discussed earlier, while Facilities would prefer to use internal resources, for most projects involving new facility construction, data centers, manufacturing or extensive renovation, the use of an independent provider pre-approved by Facilities would be the logical choice.

5.2 Q: When should I select the commissioning delivery method?

A: The commissioning process should be started early in the programming or pre-design phase. If that is not possible, the CxA should be selected early enough for them to contribute as a member of the design team. As defined previously, commissioning is a systematic process beginning in the design phase. At this point, the design team can begin working with the CxA to (1) develop the commissioning-focused quality assurance procedures for the design; (2) develop the building product that meets the Owner's performance requirements; and (3) develop the drawings and specifications that will facilitate commissioning during the construction phase.

5.3 Q: What level of commissioning is appropriate?

A: Williamson County Facilities Management, expects that all projects will fulfill the intent and requirements of the Facilities Commissioning Program. The depth and amount of resources are a function of the complexity and the critical nature of the building systems. Obviously, a mission critical process has greater needs than a spec office complex. The Facilities customer, PM, and the design/engineering team should work together to determine the needs. A***s a minimum, all mechanical, electrical, plumbing, security, and critical systems will be commissioned. This would include the following typical deliverables:***

- Predesign/Planning development of OPR
  a. Development of initial commissioning plan
  b. Training for project team on Facilities' CxA
- The Design Stage
  a. Maintain master issue log in Facilities' (Database TBD)
  b. Schematic review
  c. Design document review at 50% & 100%
  d. Construction Document review at 50%, 75% & 95%
  e. Review and modification of specifications regarding commissioning
  f. Development of checklist for equipment
  g. Development of functional testing requirements
- The Bidding Stage-Respond to questions concerning commissioning requirements
- Construction
  a. Submittal reviews concurrent with Facilities
  b. Development of commissioning schedule
  c. Site observation
  d. Witnessing of critical systems
  e. Review RFI & change order logs and submittals
  f. Deficiency tracking (Database TBD)
  g. Reporting
  h. Asset data collection
  i. Test and balance verification
  j. Review of O&M drafts
  k. Review of training program
  l. Static inspection (field verification) of components and systems
  m. Startup (functional verification)
- Acceptance
  a. Initial functional performance testing
  b. Integrated functional performance testing (performance verification)
  c. Deficiency resolution tracking
  d. Review of as-built drawings and completeness
  e. Acceptance of O&M manuals and systems manuals (soft & hard)

f. Delivery of commissioning report

- O&M staff training and documentation
- Warranty review and seasonal testing
  a. Review of outstanding issues
  b. Review of building optimization needs
  c. Deferred testing
  d. Lessons learned presentation.

5.4 Q: When do we implement the commissioning process?

A: In most cases, the earlier in the project that commissioning activities can begin; the greater the effect they can have on the performance and outcome of the design, construction, and commissioning process. Various reasons for this advantage include the following:

- The CxA needs to develop a relationship of trust with the design team and with Facilities' staff. When CxAs are brought in late in the design phase, the designers have a tendency to view them as adversaries and not members of the team.
- The CxA needs to have a full understanding of the OPR. Such an understanding can be communicated more effectively in face-to-face meetings with all parties involved, rather than in written form only.
- Ideally, the team members selected to perform commissioning will have extensive experience with startup and troubleshooting of buildings. They may identify design issues that will be much less costly to correct on the drawings than after the systems are constructed.
- It is important that the constructor have a clear understanding of the constructor's role in the commissioning process. The CxA should list those requirements clearly in the specifications, especially when using a CM to help with the construction budgeting process.
- The CxA will help to ensure that sufficient balancing devices, measuring devices, and control items are included in the bid documents, which is more cost effective than adding these devices to the project through the "change-order" process.

5.5 Q: What are the benefits of early commissioning?

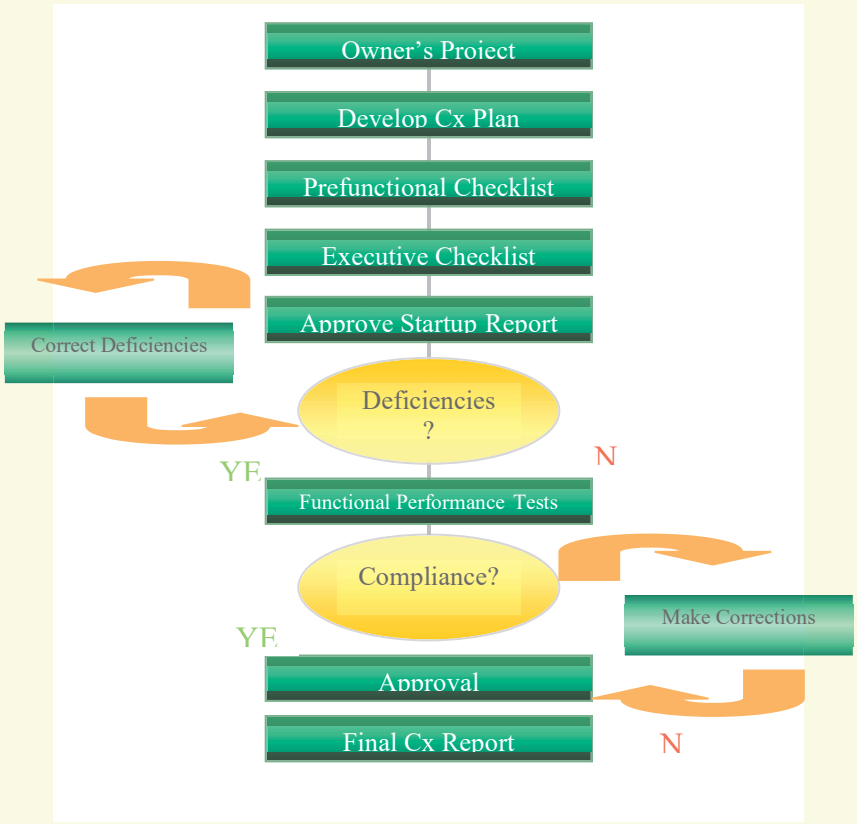
A: In almost every case, the earlier in the project that the commissioning activities can begin, the greater the benefit they can bring to the performance and outcome of the design and construction processes, and the commissioning process itself. Why is this true? Because these processes all profit from collective experience, feedback loops, and lessons learned and shared. If the commissioning

entity is able to influence or create the design intent document, they can bring their knowledge from the field of "what works" to the design stage, resulting in a building that, by design, will have a better chance of working as intended.

SECTION 6 - THE COMMISSIONING PROCESS—STEP-BY-STEP

A comprehensive view of the integrated commissioning process can be considered to have nine distinct phases in the following order:

- Predesign/Planning
- The Design Stage
- The Bidding Stage
- Early Construction
- Static Inspection (Field Verification)
- Startup (Functional Verification)
- Shakedown (Performance Verification)
- O&M Staff Training and Documentation
- Warranty Review and Seasonal Testing



Commissioning Process

6.1 The Commissioning Process—Predesign/Planning

A sample Owner's Performance Requirement is included in Appendix G of the Facilities Commissioning Plan.

The most important components of this early phase of the project are the Owner's Performance Requirement (OPR) and the Basis of Design (BoD) documents.

The OPR is Facilities' *intention and expectation* of the *design and operations* of the building. It is the Owner's requirements for a successful building. It is a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting documentation. In order for the project to be successful, the project team must achieve these requirements and document the achievement.

Regardless of what the document includes, it is architectural in origin: having been developed in association with the project design team. The document is performance-based and concentrates on what the occupants *need* instead of focusing on how the design team will provide it.

This does not mean that architectural considerations are foremost in the document. If only mechanical and electrical systems are being commissioned, then a sufficient OPR may be 90% those disciplines and 10% architectural issues (such as building code requirements, occupancy, etc.). The OPR, once complete, is then turned over to the A/E design team. They have the responsibility to develop the BoD, the primary document that translates the Owner's needs into building components such as occupancy type, room size, population, air quality, etc. The design team will produce design documents based on the BoD.

The job of the CxA is to assure that components have been supplied and installed correctly according to the bid documents, and to assure that the occupant's needs are met as described in the OPR. Therefore, the CxA needs both the OPR, based on the architect's knowledge of the occupants' needs and the design itself, showing the specified solution.

The OPR should be referred to frequently in the construction process. At the pre-bid conference, the design team should present it and solicit ideas from the constructor. It is true that the constructor will build according to the plans and will expect change orders for any work not shown on the plans. It is also true that some constructors will count on making money from such change orders and so will tend not to suggest improvements prior to bidding. However, some constructors may make such suggestions prior to bidding if they are given a chance to see the actual intent of the structure. If they are given only the design, and not the intent, they cannot be expected to help improve the project without change orders.

The document should be presented again at the pre-construction conference. The presentation of the OPR document at the pre-bid and preconstruction conferences should

be used as a team-building tool in defining a common goal. This is where the communication and team-building skills of the CxA are very important.

When the OPR is presented to the constructor team, the Basis of Design should accompany it. The Basis of Design explains how the design team chose certain systems and space arrangements to meet the needs of the occupants.

The most basic inclusion in the OPR is the general description of the building type (for example, data center, fulfillment center, support facility, office building, etc.). Beyond the building type, details are stated such as the occupant's age group, particular needs with regard to air quality, outside air volume, occupant load, and pattern of occupancy.

For instance, the OPR might describe a testing area that is to hold one hundred persons for two hours, be empty for an hour after that, all the while providing comfort and operating at maximum energy efficiency. The Basis of Design could specify a variable air volume system integrated with occupancy sensors and special programming, while the actual design in the bid documents could specify components, air volumes, and the required control sequence. Commissioning would assure that the equipment has been supplied and installed correctly, the air volumes and control sequence are correct, and the overall system "works" at each occupancy level.

6.2 The Commissioning Process—The Design Stage

The CxA can enhance quality during the design stage after a competent review of the design documents. The CxA should coordinate this review with any design review Facilities may perform. Generally, reviews performed by Facilities engineering review group are limited to programmatic and code compliance and constructability issues. The review performed by the CxA should determine, at a minimum, that the documents:

- Are consistent with the OPR
- Specify commissionable systems
- Include inspection and testing details
- Include equipment parameters that can be verified
- Incorporate a layout that allows testing and maintenance
- Fully describe the commissioning process for the bidders

The CxA should review the contract documents during development and should offer comments and recommendations.

The review process does not transfer responsibility for the design, nor is it intended that the CxA “check” or “warrant” the design. Responsibility for design rests fully with the design professional. However, the review process should be used to provide an additional quality control feature to augment the design process.

The Facilities PM should monitor this process and make certain that procedures are in place within the team so that issues the CxA raises are reviewed and the team comes to a consensus about them. If a consensus cannot be reached on an issue, the process should document the issue and Facilities should provide a decision and direction in consultation with the appropriate design professional.

The CxA will also review the contract documents to confirm that each piece of equipment or system is capable of being tested and has objective performance parameters that can be confirmed. For example, the CxA will confirm that pumps and other hydronic devices have test ports specified to allow flow measurement and maintenance access at air handling units or at straight duct lengths where airflow measurements must be taken.

6.3 The Commissioning Process - Writing the Specifications

Sample commissioning specifications are included in the Appendices.

The CxA should review the Facilities Commissioning Specifications and Construction Guideline and modify as required (with approval from the Facilities project manager). Any modification to the specifications should follow the appropriate division as determined by the Construction Specification Institute's (CSI) *MasterFormat*™ classification of construction systems.

Section No.	Document/Section	List of Contents	Scope of Contents
01100	SUMMARY OF WORK	Work covered by contract documents Identification of separate prime contractors	Describe commissioning process activities as part of the project. Alert the contractor that FACILITIES has contracted for commissioning process services with a separate CxA. Delineate contractor's scope of work relative to the commissioning process.
01200	PRICE AND PAYMENT PROCEDURES		No special commissioning requirements
01310	PROJECT MANAGEMENT AND COORDINATION	Provisions about coordination of commissioning process activities among contractors and subcontractors; project meetings	Coordination of meetings and conferences

Section 6 – The Commissioning Process

Section No.	Document/Section	List of Contents	Scope of Contents
01300	SUBMITTALS	Procedures for submittals	Submittal requirements for commissioning process activity reports and schedules should be specified in Sections 01811 to 01819 Add requirements here for additional copies from contractor to CxA and for approved submittals to be distributed to CxA
01400	QUALITY ASSURANCE		No special commissioning process requirements
01500	TEMPORARY FACILITIES AND CONTROLS		No special commissioning process requirements
01600	PRODUCT REQUIREMENTS		No special commissioning Process requirements
01700	EXECUTION REQUIREMENTS		General requirements for construction checklists in terms of format and submittal requirements.
01731	CUTTING AND PATCHING		No special commissioning process requirements
01770	CLOSEOUT PROCEDURES		Include requirements for CxA to review and approve O&M documentation
01810	COMMISSIONING PROCESS		General administrative and procedural requirements without regard to specific systems and assemblies.

Section 6 – The Commissioning Process

Section No.	Document/Section	List of Contents	Scope of Contents
01811	BUILDING ASSEMBLIES COMMISSIONING REQUIREMENTS	Substructure Superstructure Building shell Exterior wall assemblies Roof assemblies Building interior Separations Paths of egress	Construction checklists Assembly description Performance requirements Prerequisites to Testing System or Assembly Test requirements Test Reports
01812	CONVEYING SYSTEMS COMMISSIONING PROCESS REQUIREMENTS	Elevators and lifts Escalators and moving walks	Construction checklists Assembly description Performance requirements Perquisites to testing system or assembly test requirements Test Reports
01813	PROTECTIVE SYSTEMS COMMISSIONING PROCESS REQUIREMENTS	Fire suppression (including pumps, sprinkler and standpipe piping and terminal devices) detection and alarms (including fire, smoke, gas and leak) Lighting protection Cathodic protection	Construction checklists Assembly description Performance requirements Prerequisites to testing system or assembly test requirements Test reports
01814	PLUMBING SYSTEMS COMMISSIONING PROCESS REQUIREMENTS`	Water distribution Sanitary waste Storm drainage Other plumbing systems	Construction checklists Assembly description Performance requirements Prerequisites to testing system or assembly test requirements Test reports
01815	HVAC SYSTEMS COMMISSIONING PROCESS REQUIREMENTS	Heat generation (including central equipment, distribution systems, and terminal devices) Refrigeration (including central equipment, distribution systems and terminal devices) Ventilation (including central equipment, distribution systems and terminal devices) HVAC control systems (including central equipment, distribution systems, and terminal devices)	Construction checklists Assembly description Performance Requirements Prerequisites to testing system or assembly test requirements Test reports

Section No.	Document/Section	List of Contents	Scope of Contents
01816	ELECTRICAL SYSTEMS COMMISSIONING PROCESS REQUIREMENTS	Power distribution (including central equipment, distribution circuits, and terminal devices) Lighting (including fixtures and controls)	Construction checklists Systems description Performance requirements Prerequisites to testing System or assembly test requirements Test reports
01817	COMMUNICATIONS SYSTEMS COMMISSIONING PROCESS REQUIREMENTS	Voice and data Sound and video	Construction checklists Systems description Performance requirements Prerequisites to testing System or assembly test requirements Test reports
01820	DEMONSTRATION		Coordination requirements with CxA
01830	OPERATING AND MAINTENANCE DOCUMENTATION		Coordination with CxA
	INDIVIDUAL SECTIONS IN DIVISION 2 THROUGH 16	Field quality control tests Adjusting and balancing Cleaning Demonstration	A statement requiring commissioning process Activities to be accomplished for system, subsystem, or equipment components as a part of its parent system. A statement that requires contractor to complete construction checklists and perform tests.

6.4 The Commissioning Process - The Preliminary Commissioning Plan[5]

Even though standard specifications for commissioning have been developed, the CxA will review and modify if necessary and develop procedure and specification into a preliminary commissioning plan. This plan extends Facilities' original system-by-system commissioning procedure into a scope of work that names actual components and systems

[5] See Sample Commissioning Plan in Appendix "X"

in the design documents. The CxA should develop procedures for each of the systems to be commissioned. This interim plan should be incorporated into the specifications to give the constructor the best possible idea of his part in the process. After the bid is awarded and submittals are approved, the CxA writes the formal commissioning plan that completely describes the commissioning work.

6.5 The Commissioning Process—The Constructor Selection Stage

The selection of the constructor is a brief but important time in the commissioning process. This is the first opportunity to bring the constructor(s) into the process, and it is vital that the constructor cooperate in the commissioning process if the team is to reach the goal of a quality building. Constructor personnel perform the inspection and testing required by the CxA. It takes constructor time, and it costs the constructor money. It also saves the constructor time and money through reduced callbacks and the early and fair resolution of problems. Overall, the constructor and subcontractors will save more than they spend on commissioning, although they may not believe this at first.

As the bidders/proposers prepare their bids/proposals, there will be questions about their roles in commissioning. The CxA should answer these questions, either at a pre-bid/pre-proposal conference, in writing, or both. Although commissioning is still a new and developing practice for Facilities, it has been found that most constructors readily accept commissioning once they understand it. Furthermore, they accept the process much more readily if the CxA exhibits a positive, helpful, cooperative approach right from the start. This is a key aspect of independent third party commissioning. The CxA team leader should have excellent leadership and team building skills.

In addition to answering constructor questions, the CxA may need to answer questions for the design team. This is especially true if the project bids/proposals come in over the cost estimate. The CxA may be called upon to evaluate the savings in commissioning costs that should result from cutting portions of the project out to make the required budget. Indeed, the CxA may be required to help defend the commissioning process itself from elimination in view of a budget problem.

When the pre-bid/pre-proposal conference is organized, the CxA should be placed on the agenda to present a brief overview of the commissioning process and answer specific questions posed by the constructors. The questions and answers that come out of this conference, including those related to commissioning, should be recorded in the minutes and issued in writing to all bidders/proposers as an addendum. The CxA should provide answers to commissioning questions to the Owner’s project manager.

Subsequent addenda will answer questions posed to Facilities and the design team after the pre-bid/pre-proposal conference; however, they may or may not include commissioning questions. All commissioning questions posed by the constructor should be routed through the Facilities PM and then to the CxA to assure that each response is sent in an identical form to all constructors and all members of the design team. The CxA should review any

addendum to confirm that revised drawings and specifications do not reduce the commissioning requirements or capabilities. The CxA should stay alert to any changes in construction time as related to addenda. If there are significant changes in the project that will affect the time for CxA services, make sure adequate time is added to the constructor's construction time in the addenda to allow for commissioning.

Proposals to cut commissioning because of cost should be met with resistance. Facilities expects that all projects will be commissioned to ensure our assets have been designed, built and capable of being operated as intended. It is wrong to compromise quality to address minor budget concerns. The cost of correcting our facilities after project turnover is considerably more than the fees for commissioning. The cost of unplanned facility shutdown due to a systems failure is unacceptable.

6.6 The Commissioning Process—Early Construction

The beginning of the construction process includes the following commissioning-related activities:

- Preconstruction meeting
- Development of the construction schedule and schedule of values
- Submittal of equipment and materials
- Completion of the final commissioning plan

During the early stages of construction, the CxA will continue to answer questions for the constructor and verify that commissioning is being integrated into the construction process. The best venue for this is the preconstruction meeting.

The first item of discussion is the schedule. Developing the schedule is actually two tasks: 1) getting commissioning milestones placed on the construction schedule, and 2) including contractor commissioning activities in the schedule of values. The construction schedule and schedule of values are key documents that allow Facilities to track the construction process. Having commissioning included in these is a good way to confirm that the constructor is an active part of the commissioning team.

The CxA works with the constructor and, if necessary, the subcontractors to discuss phasing and timing of commissioning. This schedule gives the constructor an idea about what commissioning information must be included in the constructor's overall schedule. The constructor is required to integrate the information into the overall schedule of the project. In this way, all subcontractors are given additional notice about the requirement for commissioning.

When the schedules are submitted, copies are routed to the CxA for review with regard to commissioning milestones. The commissioning milestones shown on the tentative schedule of commissioning activities should be integrated into the overall schedule by the time the schedule is submitted for approval. Although it is true that this schedule may be

revised many times before the bulk of the commissioning activities are accomplished, these activities should be a part of the schedule from the start. As other milestones are revised, the commissioning schedule should be revised accordingly.

As the constructor makes equipment submittals to the design engineer, the Facilities PM should route copies of the approved submittals to the CxA for information only. The CxA does not approve submittals (that is the engineer's job), but the CxA does comment to the Facilities PM if there is anything in the submittals that appears seriously wrong. The CxA should make sure that any submittal requirements for items key to commissioning are not left off constructor submittals.

Commissioning procedures include static inspection, startup, and functional test descriptions. The CxA writes and assembles these procedures as part of the commissioning plan as equipment information is available from submittals. As the documents are completed, they should be submitted to the PM and the designer for approval, and then to the constructor for scheduling. Meetings between the CxA and the constructor serve to further clarify the intent of the process and keep the constructor involved.

The final draft of the commissioning plan is completed during the early stages of construction after all equipment submittals have been approved and before equipment has arrived on the site. It starts with the requirements on a system-by-system basis and provides more detail based on the actual design and the equipment ordered. The commissioning plan developed at this point should have detailed information on the support required from constructor personnel. Specifically, each inspection and test should be annotated to show the responsible subcontractor.

6.7 The Commissioning Process—Static Inspection (Field Verification)

As the commissioning plan is completed, equipment is ordered, and the building foundation and framing is beginning, the static inspection phase of commissioning begins. The static inspection phase lays the foundation for equipment startup by confirming that equipment is installed in such a manner that it can function in a safe and effective manner. In general, this includes verifying items in the list below, among other things.

- Equipment location: Are unit locations according to plans and practical requirements? For example, is air handling units positioned to allow full access door openings for maintenance?
- Installation of instrumentation: Are installations performed according to manufacturers' requirements (such as laminar flow for flow sensing devices) and according to engineering requirements (such as duct pressure sensors located 3/4 of the distance to the furthest point in a VAV duct system)?
- Drain piping: Are drains sloped as specified and have pipes been pressure tested?
- Sheaves: Are all sheaves aligned properly?

- Connection to power and other utilities: Have utility connections been verified?

- Pipe and duct support: Are these items properly suspended for safety and function?

The CxA provides checklists[6] to construction personnel to carry out these inspections. These checklists incorporate manufacturers' requirements and other basic steps that typically would be done even without the commissioning process and, therefore, should not take a great deal more time to process than would the normal checkout procedure. As the constructor submits completed checklists, the CxA spot-checks the forms. If the checklists have not been completed accurately, shortcomings will become known as the group attempts to begin Functional Performance Tests (FPTs). If FPTs are cancelled and rescheduled, the constructor is responsible for the cost of repeat testing (an important notice to be included in the specifications).

Examples of inspection activities are as follows:

6.7.1 Piping and HVAC Ductwork

- During construction, piping and ductwork should be inspected for correct installation and should be pressure tested.
- Items affecting maintenance, such as valve locations, damper access panels, plumbing cleanout access, and sloped piping for drainage, etc., should be checked during construction inspections.
- Domestic water and sanitary sewer piping testing is a contractor quality assurance requirement—as well as a code requirement—and should be witnessed by Facilities' representative, the architect, or the CxA.
- Low-pressure (less than 3 inches static pressure water gauge) ductwork need not be pressure tested. However, all ductwork should be inspected visually before insulation for correct joining and supports.
- Testing, adjusting, and balancing (TAB) of air and water systems should have been preliminarily performed and ready for startup of the HVAC equipment. CxA to verify.

6.7.2 Air Handling Units and Other Major HVAC Equipment

- Air handling units (AHUs), make-up air units, rooftop heating and cooling units, and similar equipment should be inspected for mechanical items such as properly functioning case drains, filter seals, maintenance access, general air tightness, and vibration isolator supports.

[6] See Sample Checklist in Appendix "A"

- Control devices, such as sensors and actuators, should be verified as complete according to the Building Automation System (BAS) points list and control diagrams. These devices should be correctly located and completely and soundly installed.
- All electrical wiring is to be confirmed as installed properly, in conduit, terminated, grounded, and tested to confirm power and correct polarity (for motor rotation).
- HVAC piping should be inspected for air handling units, including coil connections, control valve locations, balance valves and test ports, bypasses, drain pans and traps, and maintenance isolation valves.
- Lubrication points for fan and motor bearings, as well as all movable supports, should be checked and mounting fasteners confirmed.

6.7.3 Building Automation System (BAS) Controls

- The controls contractor should perform a complete point-to-point checkout of all control devices throughout the building. Checkout is used to confirm that the engineer's point list is installed as designed. CxA to validate.
- For laboratories or other critical environments as defined by Facilities, all input and output devices in the critical zones should be calibrated to NIST (National Institute of Standards and Technology) traceable standard at the job site. Critical devices are defined in the contract documents in the I/O summaries or I/O list. Factory calibrations are not acceptable. The CxA must certify that this activity has taken place prior to Functional Performance Testing.

6.7.4 Electrical Systems

- During construction, power feeder cables are to be tested for proper insulation and dryness. Owner representative or CxA should monitor tests.
- Switchgear, panelboards, etc., are to be inspected for proper connections and grounding.
- Authorized testing companies should certify building electrical grounding and lightning protection systems.

6.7.5 Fire Protection and Life Safety Systems

- Fire service water line piping is to be flushed and tested; NFPA (National Fire Protection Association) certificate is required.
- Aboveground fire protection piping is to be flushed and tested (preferably per floor). Witness is normally by local fire officials. NFPA certificate is required.

- Smoke and heat detection sensors at air moving equipment are to be checked and verified for proper installation.

6.8 The Commissioning Process—Startup (Functional Verification)

Equipment is to be started up for the first time with required factory representatives in attendance. The equipment should be tested at all required speeds and preliminary programming should be completed as required to allow subsequent safe and easy starting. On most projects historically, the main issues that arise during equipment startup are related to control software for the temperature control system.

6.9 The Commissioning Process—Shakedown (Performance Verification)

After equipment has been proved at startup, Functional Performance Tests (FPTs) are to be conducted to confirm that the pieces work together. Tests must confirm that smoke causes air handling units (AHUs) to shut down and dampers to go into smoke-control modes. Other tests must assure that valves open on calls for heating and cooling and close when the set-point is satisfied. Tests should further assure that AHU economizer cycles respond to outdoor air temperatures and indoor calls for cooling, and that freeze protection actually shuts down the required equipment. AHU discharge temperature control should be checked at the unit and at the central energy management and control station.

Dampers should be cycled and checked for leakage, especially face and bypass dampers on steam coils. All actuators should be stroked full-open and full-closed to check for binding, calibration, and correct Building Automation System (BAS) addressing.

Functional tests include checking BAS parameters, such as programmed addresses, sensor calibration factors, occupied/unoccupied programming, and trend logging. Programming charts, sequences of operation, block wiring diagrams, and wiring termination diagrams should be included in the report. All BAS tuning variables, such as response times, damping variables, delays, and interlocks, should be included in the report.

Critical facilities, as defined by Facilities, will have the control input and output points loop calibrated. Inputs will be simulated with signal generators (4-20mA, 0-10vDC, etc.) and values reported on the central station console to be checked against published loop calibration tolerances of the manufacturer. Outputs will be loop calibrated so that when the system calls for an output device to be at the 50% open position, the device is physically checked to be in that position. 10% open and 90% open are also checked in addition to full open and full closed. Variable speed drives will also be checked in this manner.

A sample of items included in the subcontractor's Testing, Adjusting, and Balancing (TAB) report should be checked for accuracy. If a substantial failure rate is encountered, all failures should be corrected and a different sample chosen for a repeat test at the constructor's expense. Check all TAB parameters on AHUs and associated return/exhaust

fans. On critical facilities such as laboratories, clean rooms and data centers, Facilities may want to check 100% of the TAB readings

The Functional Performance Tests are the heart of the commissioning process, but they are also the most difficult and time consuming. This is when the team-building skills of the CxA pay off. If the CxA has succeeded in gaining the trust of the constructors by this time, the chances of completing the FPTs in a timely manner will be markedly increased. The best method of earning and keeping a good working relationship with constructors is constant communication. As the FPTs proceed, the CxA should constantly keep the constructors informed as to upcoming testing.

As inspection and testing proceed, the CxA may find a number of items that do not appear to work as intended. In some instances, the intended operation will be unclear and, in such cases, the CxA should submit a Request for Information (RFI) to the Facilities PM in the same manner that a constructor would submit an RFI. After confirming the intended mode of operation, the CxA can proceed with testing.

If equipment or systems are found to be malfunctioning, these problems should be listed on a deficiency form or listing. This form should indicate the test and item involved; it also tracks the status of the problem as it is corrected. The CxA will need to perform a varying amount of retesting because of system and equipment failures during the initial testing. The amount of retesting that is paid for by Facilities and the amount that is passed back to the constructor should be very clearly spelled out in the construction contract.

6.10 The Commissioning Process—O&M Staff Training and Documentation

A properly designed and constructed building cannot function properly without an adequately trained Operations & Maintenance (O&M) staff. Unfortunately, inadequate O&M training is a traditional shortcoming on most construction projects. Problems with O&M training include unqualified trainers, insufficient training time, and incomplete O&M manuals and record drawings. Training is often conducted before systems are fully functional (before the completion of performance verification testing), or is focused on *discrete* systems while failing to address the *interoperability* of modern building systems. Building users also tend to send the wrong personnel to training sessions, or miss scheduled training sessions entirely. The result of errors such as these will be an ill-prepared, overwhelmed O&M staff, and building problems from the start.

A qualified commissioning authority's requisite in-depth knowledge of the design intent and building systems makes them an ideal candidate to assist in O&M training. The following is a list of items that need to be prepared for an orderly transition of the building from construction to occupancy. The CxA is an ideal resource to help implement the following:

- **Review preventative maintenance plan.**
  This task is directly tied to the development of the O&M staffing. The commissioning authority can assist in a facility preventative maintenance plan that makes best use of O&M staffing to ensure that systems are properly maintained and running at peak efficiency.
- **Review facility record drawings.**
  The accuracy of facility records can be verified during functional and performance verification testing.
- **Prepare framed instructions showing the sequence of operations and interoperability for major systems and components.**
  Framed instructions displayed beside major equipment items (chillers, boilers, air handling units, HV units, emergency generators, etc.) can be a major aid for training, routine preventative maintenance, and equipment troubleshooting.
- **Review asset lists and Computerized Maintenance Management System (CMMS) input forms.**
- **Document warranty coverage and warranty claims procedures (both standard warranties and any extended manufacturer's warranties).** Most standard warranties provide one-year of coverage for major equipment items from the date of installation. This warranty date may be weeks or months before building turnover to the customer. In some instances, manufacturers will offer equipment warranties beyond the standard one-year period, while others may include limited services during the warranty period. This type of information is usually found either in the equipment documentation or in the O&M manuals. The CxA should research the appropriate documentation and prepare a consolidated warranty list for the customer.
- **Prepare a recommended list of spare parts, bench stock, overbuy, and special tools/equipment required for the first year of building operation.**
- **Review O&M manuals.**
  O&M training should never be performed without the benefit of completed O&M manuals. Regrettably, O&M manuals are often incomplete, or they are completed *after* the scheduled O&M training. The CxA can provide quality assurance by reviewing the O&M manuals for completeness, accuracy, and timeliness.
- **Coordinate and supervise constructor and subcontractor O&M training (using the system's O&M manuals and framed instructions).**
  Usually, the constructor should schedule all O&M training, but the commissioning authority can coordinate and supervise O&M training to ensure that it meets users' needs.

O&M training is not a traditional task for commissioning authorities, but it is one for which they are well suited. The constructor (with oversight by customer) traditionally provides the services shown above, or else the customer performs these tasks themselves. Unfortunately, many customers are not staffed to manage these activities. Customers

desiring the commissioning authority's assistance with O&M training should include specific O&M training tasks in their commissioning RFP.

6.11 The *Commissioning* Process - Final Report

By the completion of training or shortly thereafter, the CxA should have completed the commissioning final report. This report is a collection of all that has gone on before. As such, it contains copies of the following:

- OPR
- Basis of design
- Pre-functional checklists complete
- Functional checklists complete
- TAB reports
- System schematics
- Control strategies and set points
- Deficiency log
- Guidelines for energy accounting

The commissioning final report, the TAB report, the O&M manuals, and the record drawings and specifications form the bulk of the documentation that will be left with the O&M staff at the new building. Additional information on building controls that includes block wiring diagrams, as-built control diagrams and sequences of operation will also be included in either the commissioning final report or the O&M manual.

6.12 The Commissioning Process—Warranty Review and Seasonal Testing

- **The First Year of Building Operation**

  At the completion of training and all other work required by the contract documents, the building will be occupied. There should be a specific notice in the specifications indicating to the constructor that the successful completion of commissioning is a requirement for the issuance of the architect's final certificate.

  Issues may arise during the one-year warranty period, but if the CxA process has been followed, the issues should be minor and readily handled by the O&M staff armed with documentation and training. Overall, the commissioned building should provide the working environment required for the occupants and the O&M staff can concentrate on establishing an effective preventative maintenance program that should work for the life of the building.

- **Seasonal Testing**

  It is likely that certain parts of the building mechanical system cannot be adequately tested due to the season of the completion. For instance, testing of a boiler system might be difficult in the summer and testing of a chiller and cooling tower might be difficult in the winter. Checking an outside air percentage is much easier when there is a substantial difference in temperature between the outside air and the return air.

  For this reason, commissioning plans should include off-season testing to allow testing certain equipment under the most appropriate test conditions. This requirement must be clearly spelled out in the specifications because it will require some constructor personnel to return to the site after the project is completed. It is also necessary to withhold money for this activity in addition to that usually withheld for warranty items.

  It is also recommended to have the systems tested during the shoulder seasons (spring/fall). Items to look for include proper dehumidification sequences and partial load performance of mechanical systems.

- **Building Automation System (BAS) Trend-Logging**

  During the completion of Functional Performance Testing, the CxA is also asked to assist in the programming of the BAS to include the trend logging of a selected group of key performance indicators. These indicators usually include temperatures and pressures for boiler and chiller operations, duct pressures, outside airflows, and some typical variable air volume (VAV) boxes operating parameters, and unitary equipment performance parameters.

  Trend-logging is a valuable part of the training program and allows the staff to get started on the right foot, thus ensuring that the established building performance is maintained for the life of the building. Some specification writers may ask that temporary flow monitoring equipment be installed to verify system operation. The agency's designer should consider making the flow monitoring equipment permanent and include it as part of the project so that the operations and maintenance staff can continue to use the instrumentation.

Section 7 – Transition Program

7.1 Project Closeout

The process of project closeout is not a sole responsibility of the Facilities Commissioning Program. In fact, the closeout process will engage all of the project stakeholders in a systematic approval process that will aid in the transition of the project from a state of construction to occupancy. The CxA will have specific tasks within the process and will also perform the role in administering and documenting the completion of this program. Facilities Building Management (DFBM) has developed the Building Acceptance - Occupancy Approval Process & Checklist for use with all of our construction projects. The process & checklist is a management tool for assuring the successful completion and satisfactory occupancy for our projects. It provides a summary of actions and goals to be performed by and information to be produced by the project designers, contractors and Facilities personnel.

To assist the project designers, contractors, and Facilities FM personnel during the construction phase of each project, the checklist identifies multiple series of related actions, tasks, milestones and information submittals that should be considered for each project. The checklist is not comprehensive; it must be modified for the specific requirements for each project, which will require the coordination of the CxA with the entire project team - deleting items that are not applicable and adding items as appropriate.

The Facilities Building FM Management Team, including personnel from Corporate Planning (CP), Project Management & Construction (PMC), Facility Operations (FOps) and Resource Planning (RP) is responsible for making sure that each checklist item and any other project specific issue is identified and incorporated into the custom checklist for each project.

In the following text, each checklist item is defined. These definitions provide a brief explanation of the actions or items and describe why these actions are beneficial to the successful completion of the construction project. Some of the definitions also include the purpose or use to which these actions will be put.

A PROJECT START

Successful project management depends on developing a plan & schedule for getting to the end of the project - a road map. For each new project, the Facilities Project Management Team will meet with the designer and contractor to create the project plan and schedule. In addition to identifying the specific items required by the project, the time frames shown in the checklist should be adjusted to account

for the duration of the construction schedule. Other tasks should also be completed at the start of the project.

A.1 Prepare construction emergency contacts list, post on the Facilities FM network and Facilities CxAlloy website. Distribute to all stakeholders.

The Facilities project manager shall prepare and maintain a directory of emergency contact telephone numbers for the architect, consulting engineers, contractor and primary subcontractors (particularly site, mechanical, electrical and fire protection subcontractors). The emergency contacts list should include the network communications help desk number for emergencies, such as scheduled and unscheduled outages for splices, cable cuts or other line damage.

A.2 Facilities management administrative activities

The Facilities Project Management Team will accomplish the following tasks:

A.2.1 Project construction overview meeting

As described above this meeting shall be conducted to adjust project plan and schedule, with consideration for proper advance notices, for the quantity and recipient(s) of deliverables, activities and inspections.

A.2.2 Building plans to building services / facilities management

Building Services / Resource Management will analyze the design documents to determine the requirements for building maintenance and custodial staffing, supervisory assignments, schedule for hiring, etc.

A.2.3 Building equipment preventative maintenance identification designations

From facility management reviews of the 100% design construction documents, the ID numbers for all of the building equipment and appropriate building systems shall be provided to the general contractor and subcontractors for tagging this equipment as it is installed. These ID’s should include identification of utilities, valves, tap points, equipment, service access, test points, and related features.

A.2.4 Facilities management and other Facilities customers notified of anticipated occupancy date.

The anticipated occupancy date will be used to establish a milestone to benchmark the entire checklist against.

A.2.5 Date confirmed with Facilities FM Security for lock installation and keying.

The FM lock shop will be informed early in the construction process about issues related to door and hardware deliveries. With consideration of the anticipated occupancy date, their schedule for lock installation and keying can be planned to assure that the building is ready before occupancy.

B CONSTRUCTION PROGRESS INSPECTIONS

During the construction phase of the project, the CxA and other consultants will perform regular site observations. The CxA will provide detailed reports as to the status and adherence to the construction documents, in compliance with Facilities' design and construction standards and with consideration to the maintenance and operation of the building systems. This is a contractual requirement for our commissioning providers. This is part of the on-going quality process that is commissioning. We ask for this because this is what commissioning buildings is all about.

B.1 Periodic inspections by the Facilities commissioning coordinator and/or project manager to invite other Facilities FM personnel as appropriate.

B.2 Environmental Health and Safety office

The EH&S personnel use these opportunities to inspect the building regarding the issues as required by Facilities policies and regulations. They will verify that buildings are capable of handling any hazardous waste products that may be generated.

C COMMISSIONING ACTIVITIES

Commissioning is a critical component of the construction process at Facilities. The commissioning authority is charged with the responsibility of defining the testing necessary to validate that each new building will perform in accordance with its intended design.

C.1 Construction Tests

Construction tests are performed on building systems to verify that the in-place construction will perform as it is intended, i.e. to keep the rain and weather out, to insulate properly and in the case of building equipment, to operate at 100% of its designed / manufactured capacity.

Examples of these tests are:

C.1.1 Roof Assembly test
Test to validate the roof system will withstand the live loads and wind loads that may bear on it, AND

To keep the rain and weather out…

C.1.2 Window Assembly Water Test
Test to validate the windows will withstand the rain and wind loads that may bear on it, AND
To keep the rain and weather out…

C.2 Special Equipment (Customer or Building Operations)
Any special equipment that will be installed in a building shall be defined as to purpose, location, operation, testing for functionality and accessibility for maintenance and future replacement.

C.2.1 Review location and required utility connections

C.2.2 Review special maintenance requirements

C.3 Fire alarm inspection by engineer/consultant and system certification by (sub)contractor (NPFA13,72)

C.4 Elevator inspection by commissioning authority or consultant, and elevator coordinator for use by general contractor

C.5 Elevator inspection by state inspector, consultant, PMC project manager and FM elevator coordinator for Facilities use and operation

Facilities network to verify elevator phone line

C.6 Chiller inspection by project managers, engineers and mechanics for construction operation

C.7 Chiller inspection by project managers, engineers and mechanics for Facilities use and operation
See C.6 above.

C.8 Endorsement of general contractor's insurance company for beneficial occupancy (if applicable)

This activity provides the project manager a confirmation that aspects of the construction contract have been fulfilled with regard to proper insurance coverage and release.

C.9 Endorsement of Facilities Surety for beneficial occupancy (if applicable)

C.10 Contact Facilities Risk Management to start Facilities insurance coverage

D NETCOM

The Network Communications Department at Facilities Information Systems (IT) is responsible for the inspection and acceptance of contractor installed wiring & wiring pathways and the spaces dedicated to communications within the facility. Typically (IT) is responsible for the equipment and final installation activities to properly connect each building to the Facilities telephone and computer systems, including making the terminations at each telephone and computer connection. In some cases, IT may directly install wiring and wiring pathways within the facility. To properly install, service and maintain these systems within the facility, IT must have the opportunity to inspect the contractor-installed systems before they are enclosed in wall and ceiling assemblies. As part of fulfilling this checklist, the project manager shall coordinate with IT personnel and the contractor to establish the schedule for fulfilling these inspection and installation requirements as the construction work progresses.

D.1 Communication rooms - inspection & acceptance by IT

Completion to include wall, ceiling and floor finishes plus backboards and grounding. A door with a construction lock is required at this stage as well as "live" power to AC outlets.

D.2 Horizontal & vertical pathways - IT acceptance of contractor installed raceways, conduits and wiring (station cable)

Inspection for cable pathways completion to Facilities' specs and wiring installation to acceptable practices.

D.3 Entrance pathways - IT acceptance of contractor installed building service entrance

D.4 Installation of IT provided equipment and terminations (and possible vendor installed wiring) and system activation.

Contingent upon communications room completion and acceptance.

D.5 Installation of IT vendor installed entrance cable

D.6 Removal of provided AE/contractor telephone equipment

D.7 Final shut-off of construction telephone and network access connections, including stopping monthly invoicing. If applicable.

E FACILITIES FM TRAINING

E.1 Training of facilities operations personnel on building systems

The need for the training to occur during this time frame is so the appropriate personnel can be trained on the actual operation of the equipment. They will be responsible for this equipment, and they need to fully understand it and have the opportunity to ask questions, before the building is turned over to facilities operations.

F 30 DAY MEETING

Status update on schedule and issues 30 days from acceptance.

G FINAL INSPECTIONS AND PUNCH LISTS

G.1 General contractor's preliminary punch list

A preliminary punch list by the contractor should be accomplished towards the end of the construction phase of the project. Ideally, the contractors punch list should be documented in writing and distributed to the rest of the project team. All items on the punch list should be completed by the contractor and his subcontractors prior to the start of the architects and engineers punch list.

G.2 Punchlists prepared by architect, engineers and consultants

The creation of the architect's punch list should be coordinated by Facilities' project management team and attended by an owner's representative who has been active and familiar with the project. The engineers and consultants punch list should be coordinated and input on an ongoing basis in Facilities' database (TBD) commissioning tool.
Punch list for substantial completion

G.3 Punchlists prepared by commissioning consultant, Facilities' project manger and team should be documented in Facilities' database tool (TBD).

G.4 Owner Insurance Provider inspection of life safety systems, PMC project manager and other Facilities personnel present

These are all life safety issues and equipment functionality needs to be verified at least 30 days before building turnover. These items need to be approved for proper operation before the facility is accepted and documented in Facilities' database (TBD).

G.5.1 Fire alarm system
G.5.1.1 Connect fire alarm system to fire & police department (if applicable)

G.5.2 Fire sprinkler/suppression systems

G.5.2.1 Connect fire pump alarm to fire & police department (if applicable)

G.5.3 Fire pump test

G.5.4 Emergency generator operation/load bank test

G.5.5 Fire extinguishers (installed and functional)

G.5.6 Other life safety systems and equipment

G.6 Local jurisdiction fire protection inspection completed

G.7 Local jurisdiction building inspections completed

G.8 Local jurisdiction certificate of occupancy issued

H FACILITIES FINAL CLOSE-OUT TASKS

H.1 Facilities' locks installed

Locks are required to assume ownership of the building and ensure the security of customer areas, mechanical rooms, etc.

H.1.1 Maintenance shops and custodial receive keys

H.1.2 Facilities security receive (master) keys

H.1.3 Communications rooms keyed

H.2 Building signage installed

H.3 General Contractor's final building cleaning

H.4 Facilities custodial final inspection for acceptance

Final cleaning by the contractor and acceptance by Facilities custodial provides a positive hand-off of cleaning responsibilities.

H.5 Facilities custodial first cleaning

H.6 Facilities utility meter activation

Facilities utility meter activation transfers utility cost from the construction budget to the building operating expense.

I PROJECT CLOSE-OUT DOCUMENTS

We ask for this volume of work to allow us to have the tools we need to take over the care of a new building. These documents will be used to facilitate our effort to care for the structure and its occupants.

I.1 Project construction records transferred to PM central filing for reference.

Including all construction correspondence, change orders, test reports, financial records, surveys, etc.

I.2 Project records transferred to FM archives and/or Facilities Management

I.3 All of the general contractor's close-out documents shall be reviewed and approved by the architect and received and accepted by Facilities.

I.3.1 Index of complete GC close-out documents attached to all parts of the GC Close-out Documents Submittal

We ask for this document to have an organized list of all documents furnished on a project for our reference at any time. We use this list to quickly determine just what has been prepared for that particular building.

I.3.2 Directory of all contractor, subcontractor, manufacturer and vendor information

We ask for this information so that we can find names, addresses, and phone numbers of all players in the project. We use this to contact anyone we need to in the care of the building. The information should include contact name, company address, telephone number, facsimile number and email address with each referenced to service provided or system or material installed, etc.

I.3.3 Copies of all certifications

We ask for this so we will know what issues have been documented. We use this to find out the particulars of any single issue that has been noted or certified in case we need to look into this particular part.

Include the following items:
Appropriate certifications and acceptance information
Use and occupancy permits
Certificate of inspection from fire marshall
DOL on pressure vessels, boilers, elevators, etc.
Public health inspections
Inspections by other governing authorities

I.3.4 Copies of all general contractor-provided maintenance agreements and service contracts

We ask for these so we will have the information gathered on these agreements. We use this to find out what the particulars of these agreements are when a question arises about the doing of any one issue. This allows us to get into the details and fix the problem. The information should include contact name, company address, telephone number, facsimile number and email address referenced to service provided or system or material installed, etc.

I.3.5 Copies of all general contractor obtained construction materials testing reports

We ask for these in order to be aware of just what issues of testing, such as concrete strength, the contractor did and recorded. We use these to answer questions that come up in the care of the building such as add-ons or repairs.

I.3.6 As-built drawings

As-Built drawings are needed to be able to maintain and troubleshoot building systems from the first day of ownership. Locations and descriptions of equipment are required prior to ownership to establish the preventative maintenance program for the building.

We ask for copies of the as-builts so that we can see that they are distributed to everyone who needs them. We all use these to do our particular thing – such as answer questions about adding on to some utility line, etc. We know the groups that have this need for such archives; building mechanic, zone shop, and IT.

A copy of construction drawings with the contractor's construction notes added may be submitted to Facilities for reference until the final as-built electronic and hard-copy documents have been delivered. The project manager should consider delivery and acceptance of these preliminary and final documents as a prerequisite for reductions in withholding and final payment.

As-built drawings must show all field changes.

I.3.6.1 As-built drawings reviewed and approved by architect, engineer, and commissioning authority

I.3.6.2 As-built Drawings (electronic and hard copy) received and accepted by Facilities and posted in Facilities Management database (TBD)

I.3.6.3 As Built drawings distributed within Facilities (commissioning coordinator) using CAFM Tool in FMIS pulled from Facilities database (TBD).

I.3.7 O&M manuals completed, reviewed by A/E team, and commissioning authority. O&M manuals are needed so we can familiarize the building mechanics with the equipment before it is covered up and they can compare the manuals to the actual equipment. Equipment specs provide repair/replace material requirements to establish warehouse requirements for maintenance support.

The O&M manuals should be delivered to the commissioning authority in advance of the thirty-day delivery target in the schedule. The ONLY exception to this O&M manual delivery goal is for projects of 90 days or less duration, in which case these manuals must be delivered as soon as possible, but, at a minimum, prior to completion of the project.

O&M manuals must include the information as outlined in the specifications but at a minimum contain the following information:

a. Description of each unit and component parts, clearly identifying the specific part installed – if cut sheets are used, plainly mark the item included in the work
b. Manufacturer's printed operating and maintenance instructions with drawings and text to clearly illustrate proper operation and a logical sequence of maintenance procedure.
c. Servicing and lubrication schedule with list of lubricants. Show last contractor service and date for first FM service.
d. Preventative maintenance instructions for each piece of equipment.
e. As-installed control diagrams by controls manufacturer including sequence of operations.
f. Performance data information on all mechanical components and equipment, such as pump curves.

The general contractor and architect shall be directed to finish the submittal process as early in the construction schedule as possible.

Goal for O&M manuals delivery to be as soon as contractor's completed submittals are approved.

I.3.8 As-installed building finishes data submitted, reviewed by A/E team, and received and accepted by Facilities.

We ask for these specific paint formulas and for their usage location to be shown on the prints so that we can care for the building. This is particularly important for touch-up work. As-built building finishes data must include the following information:

a. Schedule of installed finishes.
b. Cleaning care instructions with manufacturers recommended agents and methods.
c. Paint Schedule for all surfaces, with paint manufacturer's paint mixture formulas.

I.3.9 As-built building systems data submitted, reviewed by A/E team, commissioning authority and received and accepted by Facilities.

We ask for this in order to have information necessary to care for the building, to be able to adjust systems to optimize performance, and for training of our staff. As-built building systems data must include the following information:

a. Installer’s coordinated drawings with installed color-coded piping diagrams and wiring diagrams.
b. As-installed electric circuit directories of panel boards.
c. Charts of valve tag numbers with the location and function of each valve.

I.3.10 Attic stock received and accepted

Attic stock needs to be stored before the customers start moving into the building. Materials are often needed immediately after the customers move in due to minor damages associated with the move. If attic stock is not stored before move in, customers tend to need extra storage space and will acquire the unclaimed open areas.

I.3.11 Computer for monitoring building systems installed and functioning

Mechanics need the ability to monitor the building systems prior to customers moving in so that they can monitor what is going on in the building. This also allows time for training on the computer.

I.3.12 Warranty summary information
I.3.14 Warranties, including all guarantees and bonds executed by vendors, manufacturers, suppliers and subcontractors received and accepted

Warranty information is needed so that we can determine who has the repair responsibility and for how long. We do not want to void any such warranty by performing maintenance that prematurely places equipment liability with facilities operations.

I.4 All of the Facilities close-out documents shall be prepared by facilities management and reviewed by project management & construction and plant.

I.4.1 Copy of Owner-Contractor Agreement

We ask for this to have the document that states the particulars of the arrangements between these two entities. We use this to answer any potential questions about this agreement that might come up such as who exactly is responsible for a particular issue.

I.4.2 Test and Balance Report delivered and accepted

Test and Balance is needed as a baseline to ensure proper air distribution and as a reference for future troubleshooting.

I.4.3 Copies of all Facilities-provided maintenance agreements and service contracts

We ask for these so we will have the information gathered on these agreements. We use this to find out what the particulars of these agreements are when a question arises about the doing of any one issue. This allows us to get into the details and fix the problem. The information should include contact name, company address, telephone number, facsimile number, and email address referenced to service provided or system or material installed, etc.

I.4.4 Copies of all Facilities obtained Construction Materials Testing Reports

We ask for these in order to be aware of just what issues of testing, such as concrete strength, the contractor executed and recorded. We use these to answer questions that come up in the care of the building such as add-ons or repairs.

I.4.5 Copy of the final Design Intent program document

I.4.6 Copy of all Owners obtained final surveys

I.4.7 Copy of all Owner obtained geotechnical reports and soils analysis reports

I.4.8 Copy of all Owners obtained seismic reports

I.4.9 Final Commissioning Report delivered

I.4.10 COMMISSIONING IS SUBSTANTIALLY COMPLETE

I.5 Complete sets of final building close-out documents distributed within Facilities (project manager & commissioning coordinator). See action J.3.6.3 above.

J BUILDING COMPLETION

J.1 Jurisdiction Certificate of Occupancy

The local jurisdiction Certificate of Occupancy is merely an instrument of the county's acknowledgement that the building appears to comply with the minimum requirements of applicable building and life safety codes for occupancy. It does NOT constitute formal approval that the building is completely finished nor completely functional and serviceable.

J.2 General contractor certification of training completion and Facilities acceptance

J.3 General contractor notice to architect of substantial completion

J.4 Substantial Completion Certificate prepared and signed by the architect

J.4.1 Outstanding punchlist inspection attached.

J.5 Substantial Completion Certificate signed by general contractor

J.6 Substantial Completion Certificate received and accepted by Facilities

J.7 FM directors final building inspection (walk-through)

K POST-OCCUPANCY INSPECTIONS & EVALUATIONS

K.1 WARRANTY INSPECTIONS

K.2 General contractor evaluations

K.2.1 Optional subcontractor evaluations

K.3 Architect, engineer and consultant evaluations

SECTION 8 - DEFINITIONS

***Acceptance*:** A contractually defined action that permits an activity to commence or continue.

***Basis of Design*:** A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

Construction Management: Construction management is a professional service that applies management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost and quality. PMs and CMs share a commonality which focuses resources on time, cost, and schedule.

***Commissioning*:** See Commissioning Process.

***Commissioning Activity*:** A component of the commissioning process.

***Commissioning Authority*:** An entity identified by the Owner who plans, schedules, and coordinates the commissioning team to implement the commissioning process.

***Commissioning Plan*:** A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

***Commissioning Process*:** A quality-focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's project requirements.

***Commissioning Process Progress Report*:** A written document that details activities completed as part of the commissioning process and significant findings from those activities; it is continuously updated during the course of a project.

***Commissioning Process Report*:** A document that records the activities and results of the commissioning process.

***Commissioning Team*:** The individuals who, through coordinated actions, are responsible for implementing the commissioning process.

***Construction Checklist*:** A form used by the contractor to verify that appropriate components are on-site, ready for installation, correctly installed, and functional.
ASHRAE Guideline 0-200X, *The Commissioning Process.*

***Construction Documents*:** This includes a wide range of documents, which will vary from project to project, Owner's needs, regulations, laws, and countries. Construction documents usually include the project manual (specifications), plans (drawings) and general terms of the contract, especially those required by subcontractors and vendors, suppliers and manufacturers of equipment, assemblies and systems.

***Continuous Commissioning Process*:** A continuation of the commissioning process well into the occupancy and operations phase to verify that a project continues to meet current and evolving Owner's project requirements. The continuous commissioning process activities are on-going for the life of the facility.

***Contract Documents*:** This includes a wide range of documents, which will vary from project to project, Owner's needs, regulations, laws, and countries. It frequently includes price agreements, construction management process, sub-contractor agreements or requirements, requirements and procedures for submittals, changes, and other construction requirements, timeline for completion, and the construction documents.

***Coordination Drawings*:** Drawings showing the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.

***Issues Log*:** A formal and ongoing record of problems or concerns, and their resolution, which have been raised by members of the commissioning team during the course of the commissioning process.

***Nominal Group Technique*:** A formal, structured brainstorming process used to obtain the maximum possible ranked input from a variety of viewpoints in a short period of time. The typical approach is a workshop session where a question is presented, the attendees record their responses individually on a piece of paper, the individual responses are recorded on a flip chart without discussion in a round-robin fashion, all of the responses are discussed, and then the individuals rank their top five responses.

***Owner's Project Requirements*:** A written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

Project Manager: A project manager is the person assigned responsibility and accountability for the project. This person is responsible for delivering the project in the agreed schedule, to the correct technical specifications, i.e., defined to meet user requirements, and within the approved budget and other specified criteria.

***Retro-Commissioning*:** The commissioning process applied to an existing project that was not previously commissioned; this guideline does not specifically address retro-commissioning.

***Systems Manuals*:** A system-focused composite document that includes the operation manual, maintenance manual, and additional information of use to the Owner during the occupancy and operations phase.

***Test Procedure*:** A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

***Training Plan*:** A written document that details the expectations, schedule, budget, and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.

***Verification*:** The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's project Requirements.

SECTION 9 - ROLES AND RESPONSIBILITIES

Understanding and defining the role of each participant is vital to the success of the commissioning process. This section provides an example of the responsibilities of each participant in a comprehensive commissioning process. These responsibilities shall be documented in the contracts between Facilities and the contractor(s), and Facilities and the design professionals. The responsibilities of each participant should be included in the contract documents.

The responsibilities of Facilities, commissioning authority, design professionals, Facilities project manager, general contractor, and manufacturers are detailed below.

9.1 Facilities PM

- Include a statement regarding design professional commissioning responsibilities and scope in the request for design services.
- Develop and commit to the Owner's project requirements for the facility and its use.
- Assign operations and maintenance personnel and schedule them to participate in the various meetings, training sessions, and observations/inspections as follows:
  - Design phase coordination meetings
  - Construction phase coordination meetings
  - Initial owner-training session at initial placement of major equipment
  - Maintenance orientation and inspection
  - System testing verification meetings
  - Procedures meeting for testing systems
  - Owner's training session
  - Verification demonstrations
  - Functional performance tests
  - Final review at acceptance meeting
- Review and approve any changes made to Owner’s project requirements
- Review and approve the construction documents
- Review and comment on the commissioning authority’s commissioning process
- Review and comment on the commissioning authority’s progress reports
- Review and comment on the commissioning authority's verification reports
- Review and accept the commissioning authority's commissioning process report

9.2 Commissioning Authority

- Organize and lead the commissioning team.
- Facilitate and document the Owner's project requirements.
- Verify that the commissioning process activities are clearly stated in all scopes of work.
- Integrate the commissioning process activities into the project schedule.
- Prepare a commissioning plan that describes the extent of the commissioning process to accomplish the Owner's project requirements. Update the commissioning plan during each phase of the project to incorporate changes and additional information.
- Review and comment on the ability of the design documents to achieve the Owner' project requirements for the commissioned systems and assemblies.
- Prepare the commissioning process activities to be included as part of the project specification. Include a list of all individual trade contractor responsibilities for all the commissioning process activities (list contractors by name, firm, and trade specialty, if known).
- Execute the commissioning process through the writing and review of commissioning process reports, organization of all commissioning team meetings, tests, demonstrations, and training events described in the contract documents and approved commissioning plan. Organizational responsibilities include preparation of agendas, attendance lists, arrangements for facilities, and timely notification to participants for each commissioning process activity. The commissioning authority shall act as chair at all commissioning events and ensure execution of all agenda items. The commissioning authority shall prepare minutes of every commissioning process activity and send copies to all commissioning team members and attendees within five workdays of the event.
- Review the plans and specifications (during pre-design and the design phases) with respect to their completeness in all areas relating to the commissioning process. This includes verifying that the Owner's project requirements have been achieved, and that there are adequate devices included in the design to properly test the systems and assemblies and to document the performance of each piece of equipment, system, or assembly.
- Schedule all document review coordination meetings.
- Attend the project's pre-bid meeting to detail the design professional or contractor commissioning process requirements.

- Schedule the pre-design and pre-construction commissioning process meeting within 45 days of the award of the contract at some convenient location and at a time suitable to the attendees. The purpose of this meeting will be reviewing the complete commissioning process and establishing tentative schedules for the design phase and construction phase commissioning activities.
- Develop the initial format to be used for issues logs throughout and for each phase of the commissioning process.
- Schedule the initial Owner training session so that it will be held immediately before the contractor training. This session will be attended by Facilities' O&M personnel, the design professionals, the contractor, and the commissioning authority. The commissioning authority will review the Owner's project requirements and the design professional(s) will review the basis of design.
- Coordinate the development of contractor training.
- Attend a portion of the contractor training sessions to verify the Owner's project requirements are achieved.
- Receive and review the systems manuals as submitted by the contractor. Verify that they achieve the Owner's project requirements. Insert systems descriptions as provided by the design professional(s) in the systems manuals.
- Witness system and assembly testing. Verify the results and include a summary of deficiencies.
- Supervise the commissioning team members in completion of tests. The test data will be part of the commissioning process report.
- Periodically review record drawings for accuracy with respect to the installed systems. Request revisions to achieve accuracy.
- Verify that the systems manuals and all other design and construction records have been updated to include all modifications made during the construction phase.
- Repeat implementing tests to accommodate seasonal tests or to correct any performance deficiencies. Revise and resubmit the commissioning process report.
- Prepare the final commissioning process report.
- Assemble the final documentation, which includes the commissioning process report, the systems manuals, and all record documents. Submit this documentation to Facilities for review and acceptance.
- Recommend acceptance of the individual systems and assemblies to the Owner (per the defined project requirements).

9.3 Design Professional

- Participate and assist in the documentation of the initial Owner's project requirements.
- Document revisions to the Owner's project requirements and obtain approval from the Owner.
- Document the basis of design.
- Prepare contract documents, including the integration of the commissioning process requirements and activities provided by the commissioning authority.
- Prepare contract documents that coordinate required interfaces between systems and assemblies.
- Attend the pre-design and design phase coordination and review meetings.
- Attend the construction phase pre-bid and pre-construction meetings as scheduled by the commissioning authority.
- Specify and verify that the operation and maintenance of the systems and assemblies has been adequately detailed in the construction documents.
- Review and incorporate, as appropriate, the commissioning authority's comments from their submittal reviews.
- Participate in the initial operation and maintenance personnel and occupant training session by presenting the project basis of design.
- Participate in other training as detailed in the training program.
- Review test procedures submitted by the contractor and or CxA.
- Review and comment on the commissioning authority's periodic commissioning process progress reports and issues log reports.
- Review and accept record documents as required by contract documents.
- Review and comment on the final commissioning process report.
- Recommend final acceptance of the systems to Facilities.

9.6 General Contractor

- Include costs for commissioning process activities in the contract price.
- Include commissioning process requirements and activities in all contractors' contracts.
- Provide adequate accessibility as required to properly operate and maintain the facility.
- Issue a statement that certifies all work has been completed and the facility is operational, in accordance with contract documents.
- Provide acceptable representation with the means and authority to prepare and

coordinate implementation of the commissioning process as detailed in the contract documents.

- Issue the appropriate final reports to the design professionals for review and acceptance.
- Remedy deficiencies identified by the commissioning authority during their verification of the installation or tests.
- Review and comment on the final commissioning process report.

9.7 Trade Contractor(s)

- Include costs for commissioning process activities in the contract price.
- Include commissioning process requirements and activities in each purchase order or subcontract written.
- Obtain cooperation and participation of all subcontractors and manufacturers.
- Attend the pre-construction and commissioning team meetings.
- Include commissioning process milestones in the project schedule.
- Implement the training program as detailed in the contract documents.
- Provide submittals to Facilities, design professionals, and the commissioning authority.
- Notify the commissioning authority when systems and assemblies are ready for testing.
- Demonstrate the performance of assemblies and/or operation of systems to the commissioning authority.
- Complete the construction checklists as the work is accomplished. Provide the completed construction checklists to the commissioning authority.
- Continuously maintain the record drawings and submit as detailed in the contract documents.

9.8 Manufacturers

- Provide all the information required for the operation and maintenance of the system or assembly as part of the initial submittal.
- Provide the requirements to maintain the warranty as part of the initial submittal.
- Coordinate and accomplish factory tests as detailed in the contract documents.
- Provide training as detailed in the training program contained in the contract documents.
- Demonstrate operation and performance of the system or assembly as detailed in the contract documents.

APPENDIX A – SCOPE OF WORK (SAMPLE DOCUMENT)

1.0 General

The **[Facilities Inc., *insert Project Name]*** is committed to commissioning this facility to ensure that all systems are complete and functioning properly prior to substantial completion and that facility staff have adequate system documentation and training.

The commissioning process shall oversee and coordinate the traditionally separate functions of equipment startup, system performance testing and balancing, control system calibration, construction and system documentation, and training.

Specific requirements of the commissioning process and responsibilities, duties, and obligations of the commissioning authority (CxA) team are described in Section 2, Commissioning Tasks. To accomplish these tasks, the CxA shall be required to coordinate his or her activities with other entities. The specific responsibilities of the mechanical contractor and his or her associated subcontractors are defined in Division 15, and those of the electrical contractor and his or her associated subcontractors in Division 16 of the contract documents. The commissioning process does not take away from or reduce the responsibility of the project designers or installing contractor to provide a finished and fully functioning product.

The primary role of the CxA shall be to develop and coordinate the execution of a commissioning plan; observe and document the installation, checkout, startup, and equipment and system testing to establish that equipment and systems are functioning in accordance with the requirements of the contract documents; and to assist Facilities in developing correct and complete documentation of the construction effort. The CxA will not be responsible for design concept, design criteria, compliance with codes, design, or general construction scheduling, cost estimating, construction management, or construction supervision. The CxA may assist the design team with design issues, problem solving, or the correction of construction non-conformance or deficiencies, but ultimate responsibility for meeting the project objectives and requirements resides with the A/E team and general contractor.

2.0 Commissioning Tasks

The following tasks will be accomplished by the CxA to provide commissioning during programming, design and construction, acceptance, and warranty phases of the project.

2.1 Systems to Commission

Specific systems that shall be commissioned include:

- Building automation systems, including linkages to remote monitoring and control sites.
- Chillers, pumps, piping, cooling towers, and associated equipment.
- Boilers, pumps, piping, and associated equipment.
- Air handling units.
- Exhaust fans.
- Terminal units.
- Unit heaters and unit ventilators.
- Heat exchangers.
- Computer room A/C units.
- HVAC and control systems.
- Plumbing systems.
- Fire protection systems.
- Service water heaters, pumps, and associated equipment.
- Compressed air and vacuum system equipment.
- Emergency power and uninterruptible power supply (UPS) system.
- Utility metering systems.
- Smoke control systems – interfaces, egress pressurization.
- Fire alarm systems.
- Security, access control, and CCTV systems.
- Lighting control systems.
- Voice/data communications systems.
- Public address systems.
- Power distribution system.
- Electrical system from the building entrance through the main switchboard, switchgear, and to the distribution panels.

2.2 Design Phase

The CxA shall complete the following tasks during the design phase:

- Coordinate and supervise the commissioning work during design.
- Prepare and distribute the design phase commissioning plan.

- Attend initial meetings with **[*insert date*]** and design team to discuss role of CxA, and coordination of design.
- Obtain the **[*insert Project Name*]** "Owner's Performance Requirements" information and the "Basis of Design" information from the Owner and design team.
- Provide design and constructor team members with commissioning items to be considered during design.
- Perform a focused design review at the end of design development, 50%,75% and 95% design stages, which shall include the following: a) input regarding making the building easier to commission; b) how building O&M can be made easier (accessibility and system control, etc.); and c) how utility usage and indoor environmental quality can be improved.
- Revise and prepare commissioning specifications for the construction bid documents for all systems and equipment that are to be commissioned.
- Have the commissioning specifications approved by the A/E team and included in the A/E construction specifications.
- Prepare draft functional tests for equipment and systems to include in specifications.
- Submit test procedures to design team for review and comments.
- Attend three-design team review meetings to discuss comments on plans and coordinate specifications.
- Review bids and contractor pricing regarding commissioning activities and submit evaluations to the **[*Project Name/PM*]**.

It is assumed that the A/E will provide adequate written design intent, basis of design, and full sequences of operations, complete with points lists and control schematics for all equipment and systems for inclusion in the O&M manuals and for the CxA to use in writing functional tests.

2.3 Construction Phase

The CxA shall complete the following tasks during the construction phase:

- Conduct a partnering meeting with the constructor team to discuss commissioning scope, plan, and schedule.
- Coordinate the commissioning work and, with the general constructor (GC) and Facilities project manager (PM), ensure that commissioning activities are being scheduled into the master schedule.
- Continue to update schedule and coordination throughout construction with GC and subcontractors.

- Submit final commissioning plan for construction with coordination and activities for **[*insert Project Name*]** and GC review.
- Review and approve normal contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
- Ensure that O&M material is submitted to the CxA team as the contractor receives it. This material will be needed to assist in finalizing startup and testing procedures.
- Prepare final pre-functional and final functional test procedures for the equipment and systems.
- Submit test procedures to contractor for comments on appropriate startup, operations, and systems safety.
- Coordinate with the contractor to witness startup of major equipment.
- Review and approve TAB execution plan.
- Perform monthly site inspection during rough-in of systems and equipment.
- Maintain a deficiency log of any items found to be a problem, poorly installed, or discrepancies.
- Attend up to **[*insert quantity*]** on-site meetings for review of progress, coordination, and issues resolution. More than **[*insert quantity*]** on-site meetings will be considered work outside the normal scope of work.
- Witness a sample of pipe test and flushing procedure, sufficient to be confident that proper procedures were followed.
- Witness a sample of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed.
- Witness a sample of checkout, TAB, end-to-end testing, and calibration of controls.
- Observe first pre-functional test of each type of system, including mechanical, controls, electrical, and specialty systems.

2.4 Acceptance Phase

The CxA shall complete the following tasks during the acceptance phase:

- Continue to update schedule and coordination throughout construction with GC and subcontractors.
- Obtain pre-functional reports from constructor with sign-offs that the systems have been checked out.
- Oversee TAB, including 25% check of diffusers, grilles, hoods, terminal devices, and equipment testing, and document findings.

- Witness performance testing of smoke control systems.
- Witness functional testing of each major piece of equipment to demonstrate that each item of equipment and system is operating according to the OPR and contract documents. Functional testing shall include operating the system and components through each of the written sequences of operation. Test on respective HVAC equipment shall be executed during both heating and cooling seasons.
- Provide troubleshooting to assist in resolving control problems, as they are uncovered. Functional testing shall be performed on all control points.
- Check system graphics to assure all graphics are developed and points are mapped to graphics.
- Keep a detailed log of testing of each piece of equipment.
- Maintain a deficiency log of any items found to be a problem, poorly installed, or discrepancies. Provide the log and test results to the Facilities PM, SDR, and GC with recommended actions.
- Coordinate retesting as necessary. One retest will be provided as part of normal checkout. More than one retest will be considered work outside the normal scope of work.
- Notify the Facilities PM and GC of the unacceptable findings if 10% of identical pieces of equipment fail to perform to the requirements of the contract documents due to manufacturing defects not allowing it to meet its submitted performance spec, and request explanation of problem and proposed solution from the GC; then review the proposed solutions.
- Attend weekly meetings while on-site for functional testing.
- Attend up to [***insert quantity***] additional on-site meetings for review of progress, coordination, and issues resolution. More than [***insert quantity***] on-site meetings will be considered work outside the normal scope of work.
- Review O&M documentation for completeness. This review shall be in parallel with the A/E team's review of the O&M documentation for conformance to the project specification.
- Provide the user staff with a one-day systems training on "how the building is supposed to operate."
- Review, pre-approve, and coordinating training of the [***insert project name***] operating personnel by the contractor.
- Perform seasonal testing checkout of equipment, September for cooling system and January for heating systems.
- Prepare three copies of the commissioning management report (commissioning final report). The report shall include an executive summary, list of participants and roles, brief building description, and the following sections:
    - OPR

- Basis of Design
- Pre-functional checklists complete
- Functional checklists complete
- TAB reports
- System schematics
- Control strategies and set points
- Deficiency Log
- Guidelines for energy accounting

2.5 Warranty Phase

The CxA shall complete the following tasks during the warranty phase:

- Return to the site quarterly and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning.
- Interview facility staff and identify problems or concerns they have with operating the building as originally intended.
- Identify deficiencies that may come under warranty or under the original construction contract.
- Provide one day of additional training for users and staff in building system operations.
- Prepare a detailed evaluation after ten months on the status of warranty issues for the **[*insert project name*]**.
- Attend up to four on-site meetings—in addition to the quarterly site reviews—to discuss warranty issues.

2.6 Systems and Equipment Not Included in Commissioning:

- **[*Insert systems*]**

3.0 Schedule

The project design and construction is scheduled as follows:

Schematic design	**[*insert date*]**
Design development documents	**[*insert date*]**
30% design	**[*insert date*]**
60% design	**[*insert date*]**
90% design	**[*insert date*]**
Construction documents	**[*insert date*]**
Bid date	**[*insert date*]**

Award date	[*insert date*]
Construction notice to proceed	[*insert date*]
Final commissioning & punch list	[*insert date*]
Beneficial occupancy	[*insert date*]

4.0 Test Equipment

The installing contractors shall provide all tools, or the use of tools required to start, checkout, and functionally test equipment and systems, except for specified testing with supplemental portable data loggers, which shall be supplied and installed by the CxA.

To expedite air-water balance testing, and to minimize additional cost to the contractor, the CxA will verify the TAB contractor's air-water balance values, using their own engineers, field technicians, and test equipment.

Data logging equipment, monitoring devices, specialized equipment, and software not required to be provided by the installing contractor in the contract documents, and provided by the CxA to monitor, confirm, or verify the contractor's testing procedures, shall remain the property of the CxA. Equipment provided shall meet the minimum accuracy, calibration, and performance standards required by the performance test.

APPENDIX B - WHAT IS AN OWNER'S PERFORMANCE REQUIREMENT (OPR)/DESIGN INTENT?

An OPR/Design Intent is a document that defines the building Owner's expectations and goals for a building. The OPR is the basis for evaluating whether or not the design and construction of the building will be satisfactory to the Owner. Proposed changes and deviations from the original design must be weighed against the OPR. The OPR is a "living" document in that it is updated and revised throughout the design and construction process based upon the decisions made along the way.

The purpose of the OPR is to provide clear documentation of the Owner's requirements for a successful project, for communication to all parties involved in the project. Therefore, it should be written in non-technical language, and avoid the use of terminology that may be specific to only one group of people. It should be understandable by everyone involved in the project, including the Owner, maintenance staff, constructor team, architect, engineers, and equipment manufacturers

The reason that an OPR document is required, regardless of the project stage when starting commissioning, is that the OPR sets forth the goals and criteria against which the success of the project is to be evaluated.

No single format is required for use to document an OPR because of the variation in different Owners' requirements for a successful building, the type of building being constructed, and the writing style of the person creating the OPR document.

However, the information in the OPR is usually presented from general to specific. Items such as background on the building, a description of commissioning, functional uses of the spaces in the building, and general goals for the building are presented first. Information that is more detailed, such as measurable values to test or obtain during design, (e.g., lighting levels, energy savings, and reduced occupant complaints), is then presented.

A possible OPR format list is shown below as an example.

- General project description
- Objectives
- Functional uses
- General quality of materials and construction
- Occupancy requirements
- Indoor environmental quality requirements
- Performance criteria
- Budget considerations and limitations

Appendix B – Owner's Performance Requirement

This list of one possible format for an OPR begins with a general project description to familiarize the reader with the size, features, and history of the building that is to be constructed. The objectives that are to be met during design and construction are listed second.

Next, the functional uses of the buildings are listed, which are the general types of usable spaces, that will be present in the building. Examples include cafeteria, closed office space, open office space (partitions), classrooms, and computer rooms. Each functional use area generally requires distinct building features, systems and equipment in order to be able to perform the intended tasks.

The general quality of materials and construction required for the project are then described. Typically, this description includes a specific quality requirement for a specific type for equipment, material, or construction. An example might be a requirement that all HVAC equipment shall have a lifespan not less than 20 years, or there shall be no constructor callbacks due to defective materials/construction for a period of five years.

Occupancy requirements are listed next, to include the intended number of people and the occupancy schedule for each functional use area. Indoor environmental quality requirements, such as lighting levels, noise levels, temperature and humidity requirements, and ventilation requirements for each functional use area, would be also included.

Performance criteria for the various building systems and equipment are included next. These criteria are used to select the types of equipment systems for the building during the design stage and are used in the turnover stage to develop the functional performance test procedures.

Finally, budget considerations and limitations are included. While building Owners would like to receive the best possible building they can get, they are nearly always bound by budget limitations.

The OPR should be as specific as possible to provide clear direction to designers and constructors in effort to eliminate the need on their part to guess or interpret an Owner's requirements. For example, instead of only stating that comfort in the space shall be maintained, the OPR should provide a definition of what the Owner considers comfort to be, such as specific temperature, humidity, and noise level. In addition, there must be some way to verify the content of the OPR. In order to do so, a specific value, or range of values, that is acceptable and testable, should be included. For example, an area specified to be "quiet" cannot be verified because of subjective interpretations of quiet. However, an area specified to be below 35NC when occupied can be tested and verified. Note the difference in the example below.

Typical Statement:

Appendix B – Owner's Performance Requirement

Comfort in space shall be maintained.

Contrast that with the OPR content, would / should read (with blanks filled):
Comfort in the space shall be maintained; Owner defines comfort as:

- Temperature of
- Humidity of
- Airflow of
- Noise
- No glare

This narrative is developed directly from the Owner's program information. This narrative is prepared almost entirely by the project architect and contains "performance" criteria as opposed to design solutions (although tentative design solutions may need to be identified in the course of verifying the budget).

- Function of structure
- Location
- Utilities
- Life expectancy
- Level of quality
- Size and/or population
- Functional floor plan
- Temperature
- Humidity
- Fume control
- Particulates
- Environmental system requirements by area:
- Illumination
- Noise
- Vibration
- Acoustics
- O&M access
- Energy efficiency
- Emergency systems
- Life safety criteria
- Special design concerns
- Special O&M concerns
- Budget
- Reliability of environmental systems-redundancy

APPENDIX C – FACILITIES COMMISSIONING PLAN

Facilities Building Commissioning Plan for *Facilities Project Name*

Section 1 Overview

The Facilities Building Commissioning Plan is a source of information on the key steps that must be completed throughout the design, construction, acceptance, and operation of the new facility to assure the Owner's Performance Requirements are met. Commissioning has been adopted as the process for quality assurance in building design and construction. Commissioning is a systematic process for designing, constructing, and operating a building/system using lessons and tools from industrial quality programs. During the construction phase, commissioning focus is placed on key systems. This includes verification of the installation**,** training**,** and system documentation.

This Facilities Building Commissioning Plan has been specifically developed for this project to aid the building design, construction, and operation team in ensuring the quality of the project. It is important to understand that the Facilities Building Commissioning Plan provides a framework for the commissioning and quality assurance process. It may be modified and adapted to meet unforeseen quality control issues and opportunities throughout the project.

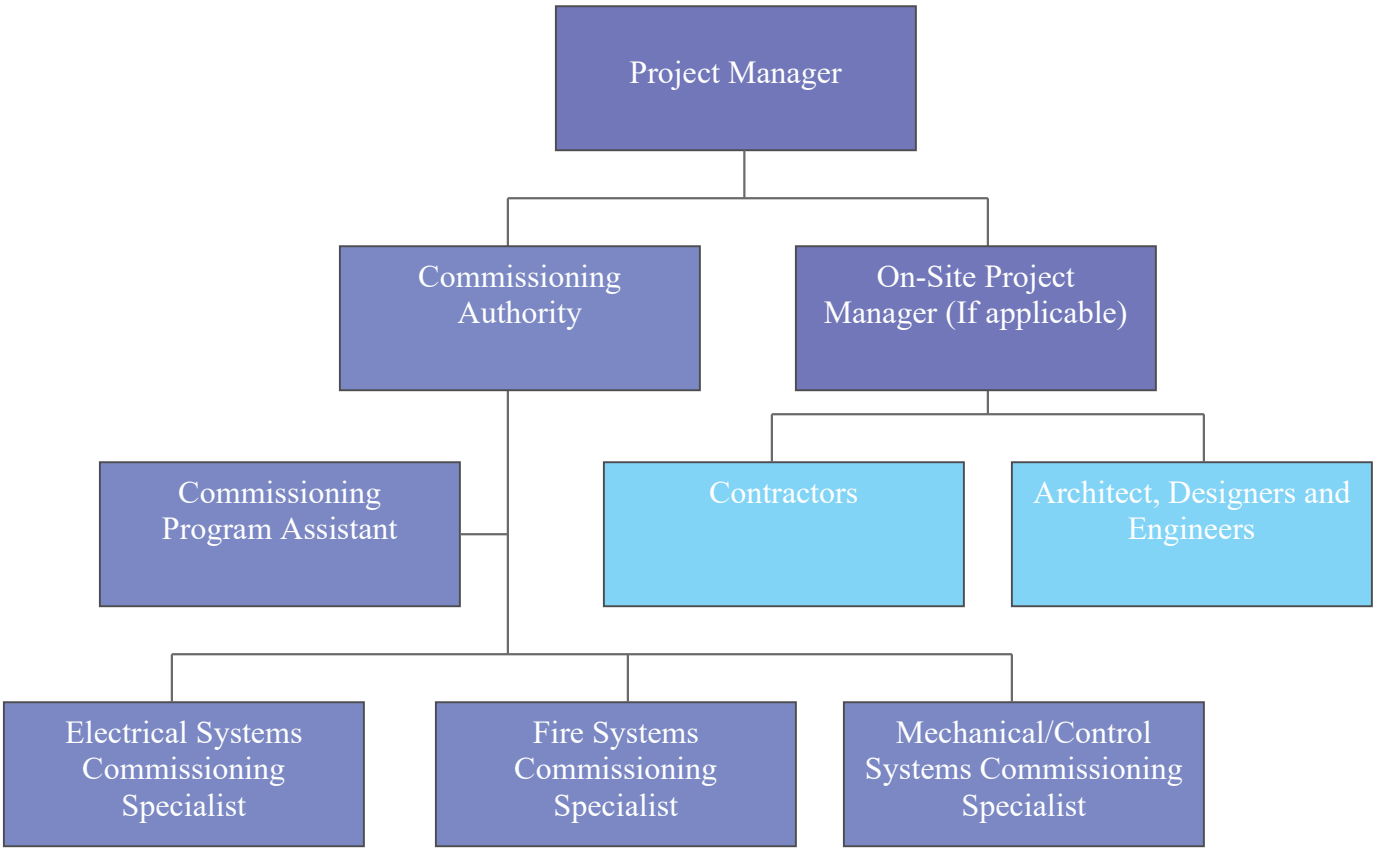
This quality assurance process is the quality program for achieving a collaborative and systematic process of review, testing and confirmation that all components, assemblies, and systems will perform as required.

The commissioning process has many benefits to the entire commissioning team. Construction commissioning benefits the Owners by providing a nonbiased, third-party system expert, who can help identify issues early and reduce first year operation costs. This is accomplished by verification and documentation that systems function as designed and meet the intent of the OPR. Construction commissioning benefits the contractors by providing coordination between trades and identifying potential rework issues, warranty calls, and service callbacks.

Section 2 Communication Protocol and Organization Chart

The key to an effective project is to ensure that there are well-defined lines of communication between all parties involved in the project. Communication is maintained throughout the project by a conscious effort of the various commissioning team members. The specific communication structures developed for this project ensure efficient identification and resolution to issues through the use of clear and concise procedures.

The commissioning team for this project is as follows: The reporting structure is as indicated.



Section 3 Cx Plan Overview

The high-level overview for this Cx project is as follows:

Pre-design Activities:
- Develop Owner's Performance Requirements (OPR)
- Train project team on use of Facilities Management database (TBD)

Design Phase Activities:
- Maintain master issue's log in Facilities Management database (TBD)
- Review Basis of Design (BoD) document for thoroughness
- Review engineer's drawing packages including schematic design, design development, and construction documents
- Development of commission specifications
- Development commissioning plan
- Development of pre-functional checklists for all commissioned equipment
- Development of functional performance tests for all commissioned equipment

Bid Stage Activities
- Provide responses to questions regarding commissioning requirements

Construction Phase Activities:
- Maintain master issues log in Facilities Management database (TBD)
- Develop commissioning activity schedule
- Perform submittal reviews of commissioned equipment/systems
- Perform site observation visits
- Witness start-up of critical systems
- Perform test and balance verification
- Review draft O&M manuals
- Review training program
- Collect and track completion of pre-functional checklists

Acceptance Phase Activities
- Initial functional performance testing
- Integrated functional performance testing
- Deficiency resolution tracking
- Review as-built documentation
- Review final O&M manuals (hard and soft copies)

Warranty Phase Activities
- Review status of outstanding issues
- Perform deferred functional testing
- Perform seasonal testing
- Review system performance and optimization needs
- Conduct lessons learned workshop

Section 4 Design Phase

Design Review

Design reviews will be performed in conjunction with the design document submittals. The design review consists of a review of the schematic design documents, the design development documents, and the construction documents. These reviews are to ensure proper coordination has occurred between the disciplines, the design is constructible, and the design meets the requirements of the owner.

Installation/Pre-startup Checklists

The Installation/Pre-startup Checklist is a document that provides key information and allows tracking of the construction activities and progress. It documents that the equipment is installed properly, adequately accessible, in good condition, and ready for startup and functional performance testing.

- A checklist will be issued for each major piece of equipment or for components in a system. CxA will determine what will be included in each checklist.
- The CxA will provide the checklists to the contractor early on the construction phase. If the contractor has his own checklists, he may use them upon agreement from the CxA.
- The contractor will complete the checklists and return them to the CxA.
- The contractor should return the checklists to the CxA as he completes them.
- Equipment checklists must be returned to the CxA before commencement of functional performance testing of that equipment or system.

See Figure 4-1 for an example checklist.

Figure 4-1 – Example Checklist

Section 5 Written Work Products

Table 5-1 lists the formal written work products related to commissioning that will be developed over the course of the project.

Table 5-1: Formal Written Work Products

Product	Created By	Product Description and Form	Expected by Date	Received By
Cx Plan	CxA	Final Cx plan for construction phase	10/31/24	All Cx team
Cx Schedule	CxA	Initial summary schedule and detailed version	11/27/24	All Cx team/PM and Senior Staff.
Equipment Submittals	All Contractors	Detailed data on all commissioned equipment.	11/21/24 and 11/27/24 Request made to PM	Cx Team currently does not have this information.
Site Observation Reports	CxA	Report of observations made during site visit	12/12/24 through 12/18/24 and 1/13/25 through 1/18/07	PM Team
Issues Log	CxA	List of deficiencies and non-compliance with Contract Documents identified during Cx	1st published 01/02/25 Updated weekly after 1st publication.	PM Team and GC
Cx Progress Reports	CxA	Gives scheduling needs and update, deficiency report, Cx progress	01/15/25 to 01/19/25 and Cx Alloy Implemented	PM Team
Start-up Plan	All Contractors	Plan for the start-up of each commissioned piece of equipment or system.	Cx Team Created and delivered on 01/13/25 However -Equipment was already started. Cx Team Requested Start-up documents from PM and GC.	PM Team and GC
Blank Start-up Data Forms	All Contractors	Forms for recording start-up information.	01/13/25	CxA
Completed Start-up and Pre-functional Data Forms	All Contractors	Filled out verification checklists, tests, startup and initial checkout.	1 week after startup completion	
Pre-functional Checklists	CxA	Checklists to be used by the Contractors to formally communicate readiness for functional testing.	01/13/25	PM Team and GC
TAB Data Forms	TAB Contractor	Forms to be used to record TAB data.	6weeks before TAB	CxA
Final TAB report	TAB Contractor	Final TAB report with method and results.	Within 3 weeks after TAB completion	CxA
Functional Performance Test Procedures and Forms	CxA	Full description of test procedures in “form” format.	01/13/25	PM Team and GC
Functional Performance Test Deficiency Report Form	CxA	Documentation of deficiency discovered during testing.	3 days after test	Owner; A/E
Completed Functional Performance Test Forms	Contractors and CxA	Recorded documentation of the test on the form	1 week after test	Owner; A/E
O&M Manuals	All Contractors	Documentation of design, equipment, operations and maintenance, as-builts, etc.	90 days after approved submittals	CxA; Normal others
Training Plan	Contractors	Topics and methods	60 days before training	CxA; Normal others

Table 5-1: Formal Written Work Products

Product	Created By	Product Description and Form	Expected by Date	Received By
Training Completion Documentation	CxA	List of trainees, completed hrs and topics and approvals	Within 2 weeks after training completion	Owner
Final Cx Report	CxA	4-6 page summary report with important findings, etc.	Draft within 60 days of substantial completion	Owner
Deferred Testing Reports	CxA	Documentation of seasonal and deferred tests	Within 2 weeks of test	Owner
Recommissioning Manual	CxA			Owner

Section 6 Commissioned Systems and Equipment

The following systems, equipment, and their components are included in the scope of the commissioning activities and are considered to be commissioned systems and equipment.

Table 6-1: Commissioned Systems and Equipment

System and Equipment	Sampling Rate
Electrical	
Power Distribution System	
Switchboard	100%
Panelboards	100%
Dry-Type Transformers	100%
Disconnects/Starters	100%
Wiring Devices	100%
Lighting System	
Luminaires	100%
Occupancy Sensors	100%
Dimming System	100%
Emergency Power System	
Engine-Generator Set	100%
Automatic Transfer Switches	100%
Egress Lighting	100%
Exit Signage	100%
Grounding System	
Counterpoise	100%
Lightning Protection	100%
Data Center	
UPS and PDU	100%
CRAC Units	100%
Generator	100%
Mechanical	
HVAC	
Air Handling Unit Function & Building Pressurization	100%
Dampers	100%

Fans & Drive Motors	100%
Terminal Units	100%
Unit Heaters	100%
Variable Frequency Drives	100%
Valves	100%
Chilled Water System	
Chiller	100%
Pumps	100%
Control Valves	100%
Distributed Digital Control – Building Automation	
Alarms	100%
BACnet Compatibility	100%
Control Points	100%
Man Machine Interface	100%
Monitored Points (Digital And Analog)	100%
Offsite Monitoring	100%
Programming	100%
Sequences of Operation	100%
Set Points and Archives	100%
Exhaust System	
Dampers, Louvers	100%
Controls	100%
Fans & Drive Motors	100%
Plumbing Systems	
Domestic Potable Water System	
Backflow Preventers	100%
Controls	100%
Hot Water Recirculation Pumps	100%
Pressure Regulators	100%
Vacuum Breaks	100%
Valves	100%
Water Heaters and Pressure Relief Valves	100%
Sanitary Sewer Systems	
Cleanouts	100%
Piping and Supports	100%
Traps (Self Priming and Non Self-Priming)	100%
Vents	100%
Storm Sewer Systems	
Piping and Supports	100%
Roof Drains	100%
Fire Protection Systems	
Sprinkler Systems	
Panels	100%
Sprinkler Heads	100%

Standpipe	100%
Valves	100%
Fire Alarm	
Control Panel	100%
Addressable Devices	100%
Tamper & Flow Switches	100%

Section 7 Commissioning Meetings

The CxA shall conduct a commissioning kick-off meeting early in the construction phase to discuss specific roles and responsibilities of the contractors. During this meeting the CxA shall review the OPR, Basis of Design, and unique contract document requirements.

Throughout construction, most commissioning issues will be handled during regularly scheduled project meetings. If specific topics require additional discussion, the commissioning team shall meet immediately after the project meeting.

Other commissioning meetings may occur at other times mutually agreed to by the commissioning team.

Section 8 Site Visits

Site visits are the primary method used during the Construction Phase to verify that installed systems and equipment comply with the OPR. The site visit procedures use a statistical approach to verify compliance. This includes performing general inspections, verifying installed equipment complies with the contract documents, and verifying pre-functional checklists have been accurately completed.

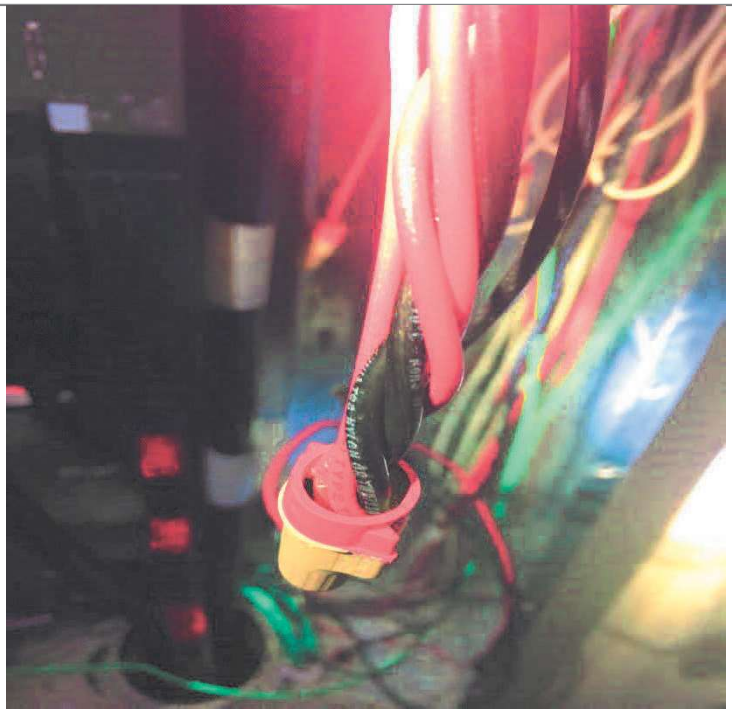
The CxA team will perform site visits, with increasing frequency. As construction progresses and systems and equipment installations are completed.

Upon arrival, the CxA team shall notify the PM before entering the jobsite. The CxA's shall follow all safety policies and regulations implemented by the General Contractor. After completing the site visit, the CxA shall meet with the PM to discuss any potential issues observed or to note any safety concerns. A Site Observation Report shall be published on the Facilities Management database (TBD) website. This report will outline any observed issues and provide recommendations for resolution. The SOR may include construction issues, access and maintenance issues, safety issues, or other issues. The General Contractor shall respond to the issues within the contractual response time. See Figure 8-1 for an example Site Observation Report.

Figure 8-1 – Example Site Observation Report

1. **Photo Description – Building Main - PVC male adapters and bushings are damaged and broken.**

2. **Photo Description – Condenser disconnects are located behind the units not allowing adequate working space for the disconnect.**



3. **Photo Description – Panel LE - Wire joints in the panel have exposed copper past the covering of the connector.**

4. **Photo Description – Main Service – fuse installation method caused damage to the fuse and fuse clips.**

Section 9 Installation/Pre-startup Checklists.

The Installation/Pre-startup Checklist is a document that provides key information and allows tracking of the construction activities and progress. It documents that the equipment is installed properly, adequately accessible, in good condition, and ready for startup and functional performance testing.

- A checklist will be issued for each major piece of equipment or for components in a system. CxA will determine what will be included in each checklist.
- The CxA will provide the checklists to the contractor. If the contractor has his own checklists, he may use them upon agreement from the CxA.
- The contractor will complete the checklists and return them to the CxA.
- The contractor should return the checklists to the CxA as he completes them.
- Equipment checklists must be returned to the CxA before commencement of functional performance testing of that equipment or system.

See Figure 9-1 for an example checklist.

Figure 9-1 Example Checklist

AC-3.2

Checklist

Equipment Tag: AC-3.2 *Complete By:* *Notes:*

System: Rooftop Air Conditioning *Checklist Type: Pre-Functional*

Date: *Equipment Type:* Air Handler Unit

Item No.	Description	Answer	Comment
1.	Correct model number and configuration		
2.	Unit free of damage		
3.	Damaged paint surface repaired.		
4.	Coil surface area is free of damage.		
5.	All access doors open fully and freely		
6.	Manufacturer's startup completed an report attached.		
7.	All shipping bolts and installation materials are removed.		
8.	Access clearance maintained.		
9.	Record drawings accurate.		
10.	Access is provided to all dampers and sensors (access doors installed)		
11.	Smoke detector installed in supply duct and return duct.		
12.	Ductwork is clean and free of debris.		
13.	Flex connector installed at supply and return duct connections.		
14.	Condensate drain piping routed to roof drain.		
15.	All condensate drain pipe insulated.		
16.	Disconnect and safety switch installed.		
17.	Supply fan and motor lubricated and aligned.		
18.	Return fan and motor lubricated and aligned.		
19.	Unit starts ad runs without any unusual noise or vibration.		
20.	Test and balance complete.		

Note: This is an example and can be reconstructed to match the functional testing required

Section 10 O&M Manual Reviews

The Contractor will forward a copy of each related O&M manual submittal to the CxA for review. The draft of the O&M manual should be completed and submitted for review 90 days after approved equipment submittals are returned to the contractor. Since each specification section is a different O&M manual section, the O&M manual can be completed and submitted one section at a time.

See Figure 10-1 for an example Submittal Review report.

Figure 10-1 – Example Submittal Review

TBD

Section 11 Issue Log Description

All issues identified during the course of the project shall be tracked using the Facilities Management database Issues Log (TBD). The purpose of the Issues Log is to communicate issues identified during the course of the project to the commissioning team and track those issues to resolution. All issues shall have responses within two weeks from identification.

The Issues Log shall contain detailed descriptions of problems identified during the construction phase, along with recommended corrective actions. Each issue is tracked in a database with the following information:

- Unique identifier
- Date of issue identification
- Applicable test number
- Applicable system or equipment number
- Location of issue
- Description of issue
- Recommended corrective action
- Responsible party
- Expected date of response

Issues can be sorted by any of the above information and provided to the commissioning team in customized reports. See Figure 11-1 for an example Issues Log report.

TBD

Figure 11-1 Example Issues Log Report

TBD

Figure 10-1 – Example Submittal Review

Section 12 Functional Performance Tests

The CxA shall develop Functional Performance Tests to demonstrate that the commissioned systems and equipment operate properly in all modes of operation. Testing shall begin at the component level and progress upwards in complexity to the equipment and system level. When all systems have passed their functional performance tests, the systems shall be tested together to verify operation as a whole in a building wide System Integration Test.

Each FPT is written in a pass/fail format, with yes being the correct response and no being a failed response. Prior to testing the CxA will provide the FPT procedures to the Contractor and all applicable subcontractors for review.

The Contractor shall complete and submit all applicable equipment pre-functional checklists prior to scheduling of testing. When the equipment and systems are ready to test, the FPT will be scheduled for a time mutually convenient to the Contractors and the CxA. The CxA will orchestrate the Functional Performance Test and provide attendee sign-in sheets shall be used to verify the attendance of all witnesses. The Contractor shall be responsible to provide personnel and equipment to perform the testing and to correct problems found during the testing.

If the total time required to correct minor problems during testing is greater that fifteen (15) minutes, the test shall be considered failed and must be repeated in its entirety. If a major problem is discovered during the test, the Contractor shall correct the problem. Prior to retesting, the Contractor shall submit to the CxA the required data indicating that the deficient items have been corrected. After review of this information by the CxA, a retest will be scheduled. During the course of the retest, if at any point a major deficiency is discovered, the test will be stopped.

See Figure 12-1 for an example FPT.

Figure 12-1 Example FPT

VAV-1-2.3

FUNCTIONAL PERFORMANCE TEST

Equipment/Systems: VAV-1-2.3	*Test Supervisor:*	*Discipline:* Mechanical
Test Date:	*Witnesses:*	*Notes:* Exterior Zone
Test Time:	*Equipment Type:* VAV Terminal Uni:	

Item No.	Description	Answer	Comment
1.	Setting Verification		
2.	Record the maximum airflow (L/M).		
3.	Record the minimum airflow (L/M).		
4.	Record the flow area (sqm/m).		
5.	Record the programmed pick up gain (PUG).		
6.	Record the temperature dead band (*F).		
7.	Space Sensor Verification		
8.	Is the space temperature sensor communicating with the terminal unit?		
9.	Is the space temperature sensor communicating with the BAS?		
10.	Is the space temperature sensor located such that it is out of the supply air flow?		
11.	Is the space temperature sensor located such that it is away from the external heat sources?		
12.	Record the space temperature sensor reading (*F).		
13.	Record the cooling setpoint (*F).		
14.	Is the programmed cooling setpoint programmed for 72 *F?		
15.	Record the heating setpoint (*F).		
16.	Is the heating setpoint programmed for 68*F		
17.	Record the heating setpoint night setback temperature setpoint (*F)		
18.	Is the heating night setback temperature programmed for 68*F?		
19.	Cooling Mode Verification		
20.	Verify or make the appropriate air handling unit in the "Occupied" mode.		
21.	Record the discharge air temperature from the air handling unit (*F).		
22.	Make zone temperature > cooling setpoint + 2*F.		
23.	Is the supply air damper modulating to maintain the maximum scheduled airflow?		
24.	Record the damper position open (% open)		
25.	Record the airflow achieved (L/M).		
26.	Record the discharge air temperature at diffuser (*F).		
27.	Is the discharge air temperature appropriate for cooling mode?		
28.	Make zone temperature < cooling setpoint – 1 *F.		
29.	Is the supply air damper modulating to maintain the minimum scheduled airflow?		

Note: This is an example and can be reconstructed to match the functional testing required

Section 13 Training

The CxA will review training materials prior to scheduled training sessions. These reviews are to verify that that the trainees receive pertinent information to operate and maintain the facility according to the manufacturer's instructions and the OPR. The contractors will submit proposed training agendas and materials to the CxA for review and comment at least sixty (60) days before the anticipated training date. The contractor will incorporate and modify the proposed material based on these comments and other comments submitted by the Owner or the Architect. The contractor will coordinate with the Owner's O&M personnel for a mutually convenient time to conduct the training sessions.

Section 14 Lessons Learned Workshop

After final completion, a lessons-learned workshop will be held to determine what went well during the project and what could be improved in the next project. This workshop will focus on the identification and documentation of clear and unbiased views of all team members. The information gained during this workshop may then be integrated into the next construction project in order to improve the process.

The lessons learned workshop will use a nominal group process to facilitate discussion. The workshop will be facilitated by the CxA to elicit the key concerns of the project team. The workshop will be organized to encourage the identification of all relevant issues and to encourage the interaction and discussion among all team members.

Trenton Jacobs

From: Trenton Jacobs
Sent: Monday, February 28, 2022 4:00 PM
To: Chris Ball; Jeffrey Hancock; Christi Stromberg; Rory M. Tierney; Nathan Pearl; Daniel Shea; Thomas Solis
Cc: Dale Butler
Subject: RE: WilCo CAT5-6 cable colors

Updates to Cable colors for POTS lines…

Badge Readers = RAINBOW
Public Safety = RED
POTS Lines = GRAY
Security (cameras and connect to Lenel Panel) = YELLOW
IT Data Drops, Light Controls, A/C = BLUE
IT Wireless AP = WHITE

Trenton H. Jacobs, AIA
County Architect

WILLIAMSON COUNTY 1848 FACILITIES

3101 SE Inner Loop
Georgetown, TX 78626

512-943-1193 Office
512-966-9472 Mobile

Surveys can be completed at: Customer Feedback
Should you need Facility Maintenance Services please submit a work order at: Service Request

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From: Trenton Jacobs
Sent: Friday, November 12, 2021 12:19 PM
To: Chris Ball <cball@wilco.org>; Jeffrey Hancock <jeff.hancock@wilco.org>; Christi Stromberg <CStromberg@wilco.org>; Rory M. Tierney <rory.tierney@wilco.org>; Nathan Pearl <npearl@wilco.org>; Daniel Shea <dshea@wilco.org>; Thomas Solis <tsolis@wilco.org>
Cc: Dale Butler <dbutler@wilco.org>
Subject: RE: WilCo CAT5-6 cable colors

Based in Chris's feedback current standard colors for cabling…

Cabling Specification

Department of Technology Services

4/1/2020

Chris Ball
Infrastructure Engineer

Table of Contents

I. GENERAL

A. Purpose

1. The purpose of this document is to provide a standard defining the structured communications cabling systems to be installed within Williamson County facilities. It is geared toward leveraging our legacy cabling infrastructure while upgrading to more recent technologies in new installations. The goal is to accomplish this in the most economic and systematic fashion possible, and in a manner compliant with the latest codes, cabling standards and industry best practices.

2. Within this document, the facilities owner is Williamson County, and shall be referred to as such, or as “Wilco”, or as “Technology Services”. Bidding low-voltage installers shall be referred to as “Contractor”.

3. This specification defines quality standards and practices common to all Williamson County network cabling specifications.

4. In addition to this global cabling standard, individual projects will also have associated documentation such as Requests for Proposals (RFP), facility drawings, project schedules and requirements pertaining to that job. Such collateral will be referred to in this document as “Project-specific Documentation”, “Project Documentation”, or simply “Construction Documents”. Any conflict between this general specification and any project-specific documentation shall be brought to the attention of Williamson County by the Contractor and must be resolved in writing.

5. It is the responsibility of the installing contractor to evaluate these general recommendations and adapt them effectively to actual projects. Contractor is responsible for identifying and bringing to the attention of Williamson County any design directions that may be improved. All such changes shall be approved in writing from Technology Services.

6. Note that while many portions of this global specification are addressed to "The Contractor", these requirements apply equally to anyone doing the network cabling and infrastructure work within Williamson County, whether those persons are outside contractors or persons directly employed by Technology Services.

B. Scope of Work - Typical

1. Contractor shall be solely responsible for all parts, labor, testing, documentation and all other processes and physical apparatus necessary to turn over the completed cabling system and associated infrastructure fully warranted and operational for acceptance by Technology Services.

2. This specification includes structured cabling design considerations, product specifications and installation guidelines for low-voltage network systems and associated infrastructure including, but not limited to:

    a. Cabling Sub-system 1 – Horizontal Copper

    b. Cabling Sub-system 2 - Intrabuilding Fiber Backbone Cabling

c. Cabling Sub-system 3 – Interbuilding Fiber Backbone Cabling

d. Telecommunications Pathways

e. Communications Racks and Cable Managers

f. Communications Grounding Systems

g. Cabling Labeling and Administration

3. In addition to systems specifications, this document also addresses applicable codes and standards, contractor qualifications and requirements, system warranties and system testing and acceptance.

4. Products to be used in Williamson County network infrastructure projects are listed in “Appendix C” at the end of this document.

C. Applicable Regulatory References

1. Contractor is responsible for knowledge and application of current versions of all applicable standards and codes. In cases where listed standards and codes have been updated, Contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

2. ANSI/TIA:

a. TIA-526-7 (OFSTP-7) (2008) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

b. TIA-526-14-B (2010) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant

c. ANSI/TIA/EIA-598-C (January 2005) Optical Fiber Cable Color Coding

d. ANSI/TIA-568-C.0 (September 2010) Generic Telecommunications Cabling for Customer Premises

e. TIA-568-C.0-1 (September 2010) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling

f. ANSI/TIA-568-C.1 (February 2009) Commercial Building Telecommunications Cabling Standards

g. TIA-568-C.1-2 (November 2011) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates

h. ANSI/TIA-568-C.2 (August 2009) Balance Twisted Pair Communications and Components Standards

i. TIA-568-C.2-2 (November 2014) Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2: Additional Considerations for Category 6A Patch Cord Testing

j. TSB-155-A: Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T

k. TSB-184: Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling

l. ANSI/TIA-568-C.3 (June 2008) Optical Fiber Cabling Components Standard

m. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors

n. TSB-4979 (August 2013) Practical Considerations for Implementation of Multimode Launch Conditions in the Field

o. TIA, TSB-140 Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems

p. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems

q. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard

r. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers

s. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics

t. TIA-569-C (May 2012) Telecommunications Pathways and Spaces

u. TIA-569-C.1 (February 2013) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces

v. TSB-190: Guidelines on Shared Pathways and Shared Sheaths

w. ANSI/TIA-606-B (June 2012) Administration Standard for Telecommunications Infrastructure

x. TIA-607-C (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises

y. TIA-607-B-1 (January 2013) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum

z. TIA-607-B-2 (August 2013) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises Addendum 2 – Structural Metal

aa. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard

bb. ANSI/TIA-598-C-2005, Optical Fiber Cable Color-coding

cc. TIA-1152 (September 2009) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

dd. ANSI/TIA-862-A (April 2011) Building Automation Systems Cabling Standard

ee. TIA-1005-A (June 2012) Telecommunications Infrastructure Standard for Industrial Premises

ff. TSB-162-A (November 2013) Telecommunications Cabling Guidelines for Wireless Access Points

gg. ANSI/TIA-4966 (May 2014) Telecommunications Infrastructure Standard for Educational Facilities

3. ISO/IEC

a. ISO/IEC 11801 Edition 2.2: Information Technology – Generic Cabling For Customer Premises

b. ISO/IEC TR 11801-99-1 – Balanced cabling for 40Gbps channels – (2014-2015)

c. ISO/IEC 24764 Edition 1.0: Information Technology – Generic Cabling Systems For Data Centres

d. ISO/IEC 24764-1 - Data Centers - Amendment to add Intermediate Distributor (ID) for large or modular data centers

e. ISO/IEC 14763-2 Edition 1.0: Implementation and Operation of Customer Premises Cabling – Part 2: Planning and Installation

f. ISO/IEC 14763-3 Edition 2 – Testing of Optical Fiber Cabling – methods for inspection and testing of installed optical fiber

g. ISO/IEC TR 29125:2010 Information technology -- Telecommunications cabling requirements for remote powering of terminal equipment

4. National Electric Codes

a. National Electrical Safety Code (NESC) (IEEE C2-2012)

b. ANSI/NFPA 70-2011, National Electrical Code© (NEC©)

c. ANSI/IEEE C2-207, National Electrical Safety Code®

d. National Electrical Code (NEC) (NFPA 70)

5. OSHA Standards and Regulations – all applicable

6. Local Codes and Standards – all applicable

7. BICSI – Building Industry Consultative Services International

e. ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design and Implementation Best Practices

f. Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition

g. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices

h. Network Systems and Commissioning (NSC) reference, 1st Edition

i. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling

j. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

k. BICSI-003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems

l. Telecommunications Distribution Methods Manual, 13th Edition

m. AV Design Reference Manual, 1st Edition

n. Network Design Reference Manual, 7th Edition

o. Outside Plant Design Reference Manual, 5th Edition

p. Wireless Design Reference Manual, 3rd Edition

q. Electronic Safety and Security Design Reference Manual, 3rd Edition

r. Commercial Installation On-the-Job Training Booklet

s. Telecommunications Project Management (TPM) reference, 1st Edition

8. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

9. Knowledge and execution of applicable standards and codes is the sole responsibility of the Contractor.

10. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

D. Wilco Substitution Policy

1. This is a performance-based specification developed from the experience of Technology Services in providing exceptional solutions for all our facilities and departments. As such, substitution of specified systems is discouraged, but allowed if Contractor strictly follows Substitution Policy outlined below.

2. Contractors offering product substitutions or equivalents are responsible for proving equal or superior mechanical and transmission performance to those products listed herein.

3. The process for substituting products other than those specified is as follows:

    a. Any Contractor wishing to offer structured cabling or associated infrastructure products other than those specified shall submit a request for product substitution in writing no less than one week in advance of bid.

Written requests for substitution shall be accompanied by three samples of the substitution product along with associated drawings, specification sheets and engineering documents for evaluation by Technology Services.

Any copper or fiber cabling products that carry signal shall be accompanied by third party laboratory performance test reports from an ITS/ETL proving equivalency in transmission performance.

4. Equal product acceptance must be received from Wilco in writing to be valid.

5. Contractor shall assume all costs for removal and replacement of any substituted product installed without prior written approval. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

E. Contractor Qualifications

1. General

    a. Contractor must have at least 5 years documented experience installing and testing structured cabling systems of similar type and size. Contractor must also provide a list of key installation personnel, their hire dates, and a resume of their experience. Key installation personnel shall include at least one foreman and one journey level installer or technician. By submitting the names of these personnel, the contractor is committing them to the execution of the project outlined in this specification. No temporary labor shall be allowed, all contractor employees shall be full time, and proof showing full time employment must be on file.

    b. Contractor shall have offices and service personnel based with a fifty-mile radius of Williamson County and be capable of same-day response to service calls.

    c. At anytime Wilco can request background checks on personnel working on county property.

Contractor shall employ at least one BICSI Registered Communication Distribution Designer “RCDD”. The RCDD shall provide approval on the design, installation, and documentation of this communications system along with making sure all Panduit Certification Plus System Warranty documentation and requirements are met and submitted to Panduit upon completion of the project. The RCDD must be local to the office where work is taking place.

The contractor shall not subcontract voice/data/video/fiber cabling, termination or testing without the written permission of Panduit and Williamson County. If any work is subcontracted it shall be to an approved Panduit PartnerONE Certified Installer (Silver/Gold/Platinum) in good standing.

Contractor shall have all necessary permits, licenses, and inspections required for the performance of data, voice, and fiber optic cable installations.

Contactor shall be a current Panduit PartnerONE Certified Installer (Silver/Gold/Platinum) or accepted substitute manufacturer (See Substitution Policy). A copy of the corporate manufacturer certification must be included with all quotes.

At least 30 percent of the technicians on the job must have a current Panduit Certified Copper Technicians certificate, or accepted substitute manufacturer, to install copper distribution systems.

At least 30 percent of the technicians installing any Fiber Distribution Systems must have a current Panduit Certified Fiber Technicians certificate, or accepted substitute manufacturer certificate, to install fiber distribution systems

The Telecommunications contractor must provide a project manager to serve as the single point of contact to manage the installation, speak for the contractor and provide the following functions:

- Initiate and coordinate tasks with the Williamson County Project Manager and others as specified by the project schedule.
- Provide day to day direction and-site supervision of Contractor personnel.
- Ensure conformance with all contract and warranty provisions.
- Participate in weekly site project meetings.
- This individual will remain project manager for the duration of the project. The contractor may change Project Manager only with the written approval of Williamson County.

Contractor Project manager must be manufacturer certified in the copper and fiber information transport systems to be installed.

2. References

    a. Communications Contractor shall provide with bid, a list of three reference accounts where similar Data, Voice, Fiber Optic Cable, and related equipment installation work was performed within the last year (twelve-month period).

3. Termination of Services

    a. Williamson County reserves the right to terminate the Communication Contractor's services if at any time the Technology Services Engineer or Facilities Project Manager determines the Communication Contractor is not fulfilling their responsibilities as defined within this document.

Contractor's appearance and work ethics shall be of a professional manner, dress shall be commensurate with work being performed.

Dress displaying lewd or controversial innuendos will strictly be prohibited.

Conduct on Williamson County property will be professional in nature.

Any person in the Contractor's employ working on a Williamson County project considered by Williamson County to be incompetent or disorderly, or for any other reason unsatisfactory or undesirable to the Department of Technology Services, such person shall be removed from work on the Wilco project.

Upon termination, the Communications Contractor shall be restricted from the premises and compensated for the percentage of work completed satisfactorily.

4. Other Contractor Responsibilities

    a. All Contractors working within a Wilco facility are fully responsible for understanding and adhering to all rules and requirements listed in Appendix A – "Wilco Contractor/Vendor Rules and Regulations".

    b. All Contractors working within a Wilco facility department is fully responsible for understanding and adhering to all rules and requirements listed in Appendix B – "POLICY & PROCEDURE CONCERNING ALL ELECTRICAL, TELECOMMUNICATIONS AND NETWORKING INSTALLATIONS AND/OR MODIFICATIONS".

    c. Confirmation of Pathway and Cable Manager Sizing:

        - Wherever cabling pathways or managers are installed, it is the Contractor's responsibility to confirm pathway or manager sizing to represent no more than 35% fill according to manufacturer's fill charts based on projected cable densities when racking systems and cabling pathways are fully populated.
        - Pathways overfilled upon installation will not be accepted and shall be remedied at Contractor expense.

    d. Contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job. All work areas will be cleaned at the conclusion of the workday and no tools or materials shall be left in a manner as to pose a safety hazard.

Contractor must remove all abandoned cable per Article 800 of the National Electrical Code and per TIA and BICSI standards, recycling these materials where possible. Removal of orphaned cable is mandatory. Contractors must consider this when placing bids.

Contractor shall abide by the regulations set by local Williamson County's Security Policy pertaining to access and conduct while on Wilco property.

Contractor shall all obey all posted speed limits and parking regulations at the Williamson County facilities where the work is being performed.

F. Warranty

1. General

    a. Contractor shall provide a Panduit Certification Plus Warranty on all copper and fiber permanent cabling links.

It is understood the Panduit Certification Plus Warranty is a system performance warranty guaranteeing for 25 years from acceptance that the installed system shall support all data link protocols for which that Category of copper cabling system or fiber OM/OS designation of fiber optic system is engineered to support according to current and future IEEE and TIA standards.

The Panduit Certification Plus Warranty may be invoked only if the cabling channel links are comprised of continuous manufacturer approved components, including patch cords, equipment cords and fiber jumpers.

Upon acceptance of Warranty, Panduit will mail a notification letter to the installer and a notification letter and warranty certificate to Williamson County.

2. Contractor Warranty Obligations

    a. Installation firm (Contractor) must be a current Panduit PartnerONE Certified Installer (Silver/Gold/Platinum) or approved equivalent manufacturer in good standing and shall include a copy of the company installation certification with the bid.

Contractor shall name a supervisor to serve on site as a liaison responsible to inspect and assure all terminations are compliant to factory methods taught in Panduit Technician Certification Training, or approved equal, and according to all Standards cited in the Regulatory References section of this document.

Contractor liaison (project supervisor) shall have a current, up-to-date Panduit Certified Technician (PCT) certificate in both copper and fiber. Copies of the copper and fiber certificates of the Panduit liaison shall be submitted with the bid. These requirements are the same for accepted equivalent manufacturers. See "Substitution Policy" for mandatory procedure when offering substitutions.

Fiber optic cabling system additions and upgrade to existing facilities shall match the fiber type (OM/OS designation) of the system to which it is being installed. Contractor shall under no circumstances mix different OM/OS classes of cable or termination devices (connectors) within the same system.

All intra-building new fiber optic installations shall utilize an appropriate cable construction as specified herein.

All UTP cable pulled and terminated shall be Category 6/6A cable and connectivity whether new or legacy systems.

All UTP terminations within the Williamson County (new) projects shall be terminated using the T568B pin-out (wire map). Legacy additions shall match the copper pin-out of the facility to which cabling is being added-to or upgraded.

Contractor shall install all racking and support structures according to cited Standards in such fashion as to maintain both cited industry standards as well as manufacturer recommendations for uniform support, protection, and

segregation of different cable types,

Contractor is responsible for maintenance of maximum pulling tensions, minimum bend radius, and approved termination methods as well as adhering to industry accepted practices of good workmanship.

Contractor is responsible for understanding and submitting to Panduit all documents required prior to project start to apply for the Panduit Certification Plus Warranty. These include but are not limited to the project information form and SCS warranty agreement. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

Contractor is responsible for understanding and submitting to Panduit all documents required at project end. These include, but are not limited to completed warranty forms, passing test reports and drawings of floor plans showing locations of links tested. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

Test results shall be delivered in the tester native format (not Excel) and represent the full test report, summaries shall not be accepted. Contact your Panduit representative for a current list of approved testers, test leads and latest operating systems.

The Communications Contractor will correct any problems and malfunctions that are warranty-related issues without additional charge to Williamson County for the entire warranty period.

The warranty period shall commence following the final acceptance of the project by Williamson County and written confirmation of Warranty from Panduit. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

<END OF SECTION>

II. Installation and Maintenance Guidelines

A. Maintenance of Patch Fields

1. Any persons, whether with a Contractor or Williamson County, adding or moving copper or fiber optic patch (equipment) cords shall do so in a neat, workmanlike fashion in keeping with the intended cable management concept and according to all industry best practices as outlined in cabling standards and applicable BICSI publications referenced in this document.

2. Persons performing such moves, adds or changes (MACs) shall further adhere to the following:

    a. Use existing cabling management pathways and take care to place cable like with like, maintaining original segregation strategies for separating fiber and copper cables as well as any separation necessary between different types of copper cables.

Cables shall be dressed neatly within patch management pathways with care taken to maintain minimum bend radius of not less than 4 times the cord outer diameter for copper and not less than a 1" bend radius for fiber jumpers as per ANSI/TIA 568-C.0.

All patch cords used shall be of same copper Category or fiber OM/OS designation as the media used in the permanent cabling links.

Patching in all cases shall be done using factory terminated cords manufactured for that purpose. Hand terminated patch cords will not be accepted.

All patch cords or jumpers must be completely contained within supplied cable management paths. Cables draped across the front cabinets or racks will not be accepted and shall be remedied at Contractor's expense.

Any persons installing or moving fiber optic patch cords for any reason will clean the connector with lint-free wipes and 99% or higher isopropyl alcohol before replacing the connector in a patch or equipment port.

Any technicians, whether with Williamson County or Contractors performing moves, adds or changes within patch field will label additions to the system according to the labeling conventions in place at that facility.

Any persons with Williamson County or installing Contractor performing moves, adds or changes within patch field will record the move according to record system in place at that facility.

B. Cable Pulling and Termination

1. General

    a. Contractor is responsible for installing systems according to all applicable codes and the standards cited in this document.

Contractor shall use grommets/bushings to protect the cable when passing through metal studs or any openings that can possibly cause damage to the cable. This includes grommets on ends of hard conduit where used.

Do not deform the jacket of the cable. The jacket shall be continuous, free from pinholes, splits, blisters, burn holes or other imperfections.

Install proper cable supports, spaced less than 5 feet apart, and within manufacturer's requirements for fill ratio and

load ratings.

Leave a pull string to the end of each conduit run. Replace pull string if it was used for a cable pull.

Note service loops may not touch the drop-ceiling assembly. Any portion of the communications cabling contacting ceiling structures must be remedied at the Contractor expense.

Label every cable within 12 in. of the ends with self-laminating wire wrap cable appropriate to that cable size. Use a unique number for each cable segment as required by the project documentation and the labeling section of this document.

Dress the cables neatly with hook and loop fire retardant cable ties. Plastic ties are NOT approved

Contractors installing cabling systems in Williamson County facilities shall install plenum rated cable in all instances. Non-plenum cable is not allowed and shall be removed at Contractor's expense.

2. Copper

    a. When making additions to legacy systems, Contractor shall match the cabling configuration (pinout) of the existing systems. Legacy systems at Williamson County are in most cases T568B.

Within all new installations within Williamson County facilities, contactor shall use copper pinout T568B.

All four pair Category 6/6A cable runs shall be kept to a maximum permanent link length of 83 meters when using a total 10 meters of 28 awg" small diameter" patch cords.

Use low to moderate force when pulling cable. Maximum tensile load may not exceed 25' lbs. maximum pulling force per 4 pair cable.

No pathway, including conduits shall have greater than a 35% fill per manufacturer fill charts. Contractor is responsible for bringing to the attention of Williamson County project manager any insufficiently sized conduit or cable pathways discovered on site or in project documentation.

Keep Category 6/6A cables as far away from potential sources of EMI (electrical cables, transformers, light fixtures, etc.) as required in cited TIA Standards.

All copper horizontal cabling shall have slack service loops no less than 12" at the work area (equipment outlet) and not less than 3 feet in the telecommunications room.

Service loops may be wall mounted or contained in pathways or racking systems if done in a neat, workmanlike fashion using concentric circles or s-turns.

All UTP patching shall be accomplished using modular patch panels as indicated elsewhere in this document.

All removed copper cable is to be disposed of in a Williamson County recycling bin designated for "copper" or removed from the property to be disposed of by Contractor if this is the instructions in the project documentation.

3. Fiber

    a. When making additions to legacy systems, Contractor shall match the fiber type and fiber connectors used within that system.

Within all new fiber installations within Williamson County, contactor shall utilize an approved fusion splice termination method. See product section and Appendix C for details.

When installing fiber cable, Contractor shall maintain a minimum bend radius, both under pulling load and static (installed), per requirements outlined within TIA standards, or manufacturer's recommendations, whichever is the most stringent.

Fiber terminations shall be done according to recommendations of TIA, manufacturer's requirements and accepted industry best practices.

All unjacketed fiber shall be contained within appropriate fiber enclosures. Exposed tight-buffered or loose-tube strands will not be tolerated and shall be remedied at Contractor's expense.

Contractor shall perform test setup and testing according to guidelines in the "Testing and Acceptance" section of this document.

<END OF SECTION>

III. Cabling Systems and Associated Infrastructure

A. Cabling Subsystem I – Horizontal Cabling System

1. Horizontal Cabling systems will NOT be utilized within the Rackspace. There will be 1U between the Patch Panel and the next to allow a 48P Switch to fit in-between and the utilization of 1ft Cables will be used.

2. Metal Conduit

    b. Contractor shall size conduit large enough to accommodate at least 50% growth. I.e. conduit for 4 cables shall be sized to accommodate 6 cables at less than 40% calculated fill based on cable OD.

3. Equipment Outlets (Faceplates)

    a. When adding horizontal cabling to existing facilities within Williamson County, Contractor shall match the existing cable plant regarding color of existing raceway and faceplates.

Flush mount faceplates in new projects shall be Panduit Mini-Com® faceplates (or approved equivalent) with label fields as called for in the project documentation.

- Faceplates with no labels shall include painted combination head screws.
- The faceplates shall mount to standard U.S. NEMA boxes and adapters with screw-to-screw dimensions of 3.28" (83.3mm).
- Faceplates shall be available with or without labels.
- Dedicated sloped versions shall be available for improved bend radius control and decreased requirements in wall depth.
- Each faceplate shall accept Mini-Com ® modules that can be individually inserted and removed as required.

    b. See Appendix C for faceplate part numbers.

4. Equipment Outlets – Surface Boxes

    a. Wireless access points on walls and ceilings utilize Category 6A horizontal runs (drops)

        - Terminated at location with TX6A™ Category 6A Field Term RJ45 Angled Plug

    b. IP Cameras on walls and ceilings utilize Category 6A horizontal runs (drops)

        - Terminated at location with Two-hole Boxes (Ceiling) or Junction Box with Mini-Com single gang vertical faceplate (Wall).

    c. Two-hole boxes shall further meet the following requirements:

        - Boxes shall be in electric ivory or international white as called for in project-specific documentation.
        - Able to accept all Mini-com ® Modules
        - Include mounting screws and adhesive tape

- Be compatible with Panduit® LD3, LD5, and LD10 Raceway.

5. Copper Jacks

   a. Modular jacks shall be Panduit Category 6/6A Mini-Com® TG-Series Jack Modules (or approved equivalent) and have the following characteristics.

      - The eight position modules shall be used in all work areas and shall meet the connector requirements of the TIA/EIA Category 6/6A standard.
      - The wiring scheme label shall be available with both T568A and T568B wiring schemes.
      - The modules shall terminate four pair 24 and 22 AWG 100-ohm solid unshielded twisted pair cable.
      - The modules shall be universal in design, including complying with the intermate ability standard IEC 60603-7 for backward compatibility.
      - Category 6/6A modules shall have UL and CSA approval. The modules shall have ETL verified Category 6/6A performance and ISO Class E performance (as defined in ISO/IEC 11801) in both the basic and channel links.
      - They shall be rated for 75°C maximum operating temperature heat capacity.
      - They shall be universal in design, accepting six or eight pair modular plugs without damage to the outer module contacts.
      - The modules shall be able to be re-terminated a minimum of 10 times and be available in 11 standard colors for color-coding purposes.
      - The module shall snap into all Mini-Com® outlets and patch panels.

Consult project documentation for jack color coding in use for that installation.

See Appendix C at the end of this document for part numbers.

6. Category 6/6A Unshielded Twisted Pair Cable

   a. Category 6/6A UTP cable shall be plenum jacket.

For cable colors on actual project, consult the project documentation.

See Appendix C at the end of this document for cable part numbers.

7. Distributor I (Horizontal Patch Panels) – standard density patch panels

   a. Williamson County copper patch panels in the horizontal patch fields shall be flat 1 RU or 2 RU Mini-Com® type with frames of either metal or molded polymer.

      - Patch panels shall be available in standard density 24 and 48-port configurations.
      - Patch panels include pre-numbered labels with writable surface

For instructions for which patch panel to use consult project-specific documentation.

For detailed part numbers see “Appendix C” at the end of this document.

8. Small Diameter Category 6/6A Copper Patch Cords

    a. Copper patching of Category 6/6A links in Williamson County facilities shall use Panduit 28 awg "small diameter" patch cords having the following characteristics:

        - Cable diameter not more than 0.150 in. (3.8mm) nominal.
        - FCC and ANSI compliance: Meets ANSI/TIA/EIA-1096-A; contacts plated with 50 micro inches of gold for superior performance.
        - IEC compliance: Meets IEC 60603-7 c (UL) US listed: UL 1863, CSA standard C22.2.
        - PoE compliance: Meets IEEE 802.3af and IEEE 802.3at for PoE applications in bundle sizes up to 48 cables.
        - Operating temperature: 14°F to 140°F (-10°C to 60°C).
        - Storage temperature: -40°F to 158°F (-40°C to 70°C).
        - Plug housing: UL94V-0 rated clear Polycarbonate.
        - Contacts: Gold plated phosphor bronze.
        - RoHS compliance: Compliant.
        - Flammability rating: CM/LSZH dual rated.

For in telecom patch fields, Wilco projects use color coded small diameter patch cords to indicate various circuits. These colors and circuits they represent are as follows:

Blue = Common Data Drops
Black = Utility (AC/Building Maint.)
Yellow = Security (Cameras/Door Access)
White = Wireless AP
Red = Public Safety

Consult project documentation for how color coding is to be used on that job.

See Appendix C for part numbers.

9. Surface Mount Raceway – Wall Mount

    a. Panduit LD-Series or T-Series Raceways.

10. Modular Furniture Raceway

    a. Office and administrative areas repurposing used modular furniture may require additional cable pathway space and shall utilize Pan-Way ® Office Furniture Raceway System, or approved equivalent.

    b. Such modular furniture raceway shall provide cable paths along the top of modular furniture partitions dropping services (equipment outlets) at work surface level.

c. Modular furniture raceway must meet the following requirements:

- UL listed in accordance with UL-5C requirements for Class 2 Communication Cable Management Systems.
- Maintains bend radius control throughout the entire office furniture raceway system as required by TIA/EIA-568-B and 569-B.
- Faceplates are compliant with the labeling requirements of the TIA/EIA-606-A standard.
- Robust design and tamper resistant closure increases product stability and prevents damage to cabling during and after installation.
- Product supplied with adhesive backing for fast and easy installation.
- Creates a virtually invisible solution for routing data cables on panels from all common manufacturers with a top cap width between 1.88" and 2.30".
- Designed for use with Mini-Com ® Connectivity, also accepts all common manufacturers' connectivity with use of a NEMA standard 70mm faceplate or module frame.

Consult Appendix C for part numbers.

11. Power and Communications Poles

a. Many Wilco offices use power/communications poles to deliver power and data cables from the ceiling into the work area space below.

b. See Appendix C for part numbers for 11' and 13' power/communications poles.

C. Cabling Subsystem II – Intrabuilding Fiber Backbone

a. Intrabuilding single mode Fiber Trunks are for Use within Buildings.

b. On additions to existing Williamson County fiber cable plant, Contractor shall match existing fiber and connector types.

c. In new Williamson County projects, backbone fiber running between telecom spaces within buildings (cabling subsystem II) shall be single mode Opti-Core® Fiber Optic Indoor Plenum Rated Interlocking Armored Cable and shall further have the following characteristics:

- Used in intrabuilding backbone, building backbone, and horizontal installations for riser (OFCR), plenum (OFCP), and harsh environments
- Interlocking aluminum armor eliminates the need for inner duct or conduit to provide a smaller crush resistant pathway for design flexibility and a lower installed cost
- Fiber strand count listed in drawings.
- Sheath markings provide positive identification, quality traceability, and length verification
- 900µm standards-based color-coded buffer coating protects fibers during handling and allows for easy identification and stripping
- Cable design and flexible buffer tubes allow for quick breakout and ease of routing

Contractor shall terminate tight-buffered cable constructions with Panduit Opti-cam LC fiber connectors.

See Appendix C for part numbers.

D. Cabling Sub-system III – Interbuilding Fiber Backbone

1. Single mode Fiber Trunks for Use Between Buildings

    a. On additions to existing Williamson County fiber cable plant. Contractor shall match existing fiber and connector types.

In new Williamson County projects, backbone fiber running between buildings (cabling subsystem III) shall be Panduit Opti-Core® Gel-Free Fiber Optic Indoor/Outdoor All-Dielectric Cable, or approved equivalent.

Loose tube outside plant cable shall be terminated in the entrance facility using approved Panduit fusion pigtails with appropriate Panduit fan-out kits, splice trays, and splice holders.

Fanout kits shall have the following properties:

- Used to build up 250µm fiber to 900µm loose buffered coating size for connector termination
- • Include 900µm hollow tubing and plastic housings
- • Include adhesive tape for mounting
- • Include TEFLON* powder for easy insertion of fibers

Refer to Appendix C for part numbers.

Interbuilding fiber trunks must have the following features:

- Allows installation using loose tube cable methods within buildings and outdoor environments for transitional aerial and duct applications, and in entrance facilities that require plenum (OFNP) rated cable
- Eliminates the need for building entrance transition point
- All-dielectric cable construction requires no grounding or bonding
- UV resistant cable sheathing meets the light absorption requirement defined by Telcordia GR-20, Issue 2 to withstand harsh outdoor environmental demands
- Dry water-blocking technology allows rapid cable preparation and termination for lower termination costs and time (no messy gel required)
- Available in 6 and 12-fiber counts in “central loose tube” design, and in 24, 36, 48, 72, 96 and 144-fiber counts in a “stranded loose tube” design
- Sheath markings provide positive identification, quality traceability, and length verification
- 250µm buffer coating protects fibers during handling and allows for ease of stripping

See Appendix C part numbers.

E. Fiber Connectivity

1. LC Fiber Connectors

    a. All LC terminations shall be done with Panduit fusion splice pigtails See Appendix C for part numbers on fiber connectors.

2. Fiber Enclosures

    a. Fiber cable terminations shall be contained in 2 RU or 4 RU Panduit FCE series rack mount fiber enclosures, or Wilco approved equal.

    b. Contractor shall select enclosure size as needed for the number of fibers projected to be in that telecommunication space when fully populated.

    c. Contractor shall fill any unused enclosure space with a blank fiber adapter panel (FAP).

    d. FCE enclosures shall further have the following properties:

        - Be able to hold QuickNet ™ Fiber Optic Cassettes, Opticom ® Fiber Adapter Panels, or splice modules.
        - Have a slide-out, tilt-down drawer to provide full front access to all fibers and cables.
        - Employ integral bend radius control and cable management appliances for fiber optic patch cords.
        - Have rear cable management for proper slacking/spooling of trunk cable breakouts and interconnect cables.
        - Have multiple trunk cable entry locations and include fiber optic cable routing kit (grommets, cable ties, spools, strain relief bracket, and ID/caution labels) for different installation configurations.

See Appendix C for part numbers.

3. Fiber Adapter Panels

    a. FCE fiber enclosures shall be populated with fiber adapter panels containing either 6 LC single mode duplex fiber adapters, or 12 LC single mode duplex fiber adapters depending on the density needs of the telecom room.

    b. Consult project documentation to determine whether 6 or 12 LC single mode duplex adapters are to be used on a given job.

Contractor is responsible to blank out any enclosure spaces where adapter panels are not used.

Adapter panels shall further have the following features:

- Loaded with TIA/EIA-604 FOCIS-10 compatible adapters.
- Exceed TIA/EIA-568-B.3 requirements.
- Adapter housing colors follow TIA/EIA-568-C.3 suggested color identification scheme.
- Snap quickly into the front of all Opticom ® components
- Accept FOCIS-10 compatible senior LC connectors at either end or FOCIS-10 junior LC connectors at the inside end for behind the wall applications.

- Both ends accept FOCIS-10 compatible senior LC connectors.
- Junior end also accepts FOCIS-10 compatible junior (fixed ferrule/springless) SC connectors.
- Choice of phosphor bronze or zirconia ceramic split sleeves to fit specific network requirements; zirconia ceramic split sleeves are recommended for OM4/OM4 multimode and OS1/OS2 single mode applications.
- Every adapter is laser marked with Q.C. number to assure 100% traceability.

Consult Appendix C for fiber adapter panels and blank adapter panels.

4. Fiber Patch Cords

a. Fiber patch fields within Williamson County facilities shall utilize riser rated singlemode LC fiber jumpers (fiber patch cords) that have the following properties:

- LC Duplex Fiber Optic Patch Cords, to allow users easy accessibility in tight areas when deploying very high-density LC patch fields.
- Jumpers shall be available in OS1, OS2 and single-mode and be available in in riser (OFNR), plenum (OFNP), and low smoke zero halogen (LSZH) rated jacket materials.

See “Appendix C” at the end of this document for single mode LC jumper part numbers.

F. Cable Pathways

1. Overhead Metallic Pathway

a. Cable delivery over racking systems in telecommunications rooms shall be done with Wyr-Grid® overhead cable tray routing system or College approved equal.

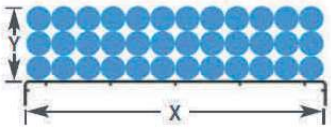
b. Any pathway offered must have the following properties:

- Wyr-Grid® Pathways are provided in four widths: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm).
- Wyr-Grid® System incorporates non-integral Snap-On sidewalls which minimize specification requirements and are offered in three different heights: 2" (50mm), 4" (102mm), and 6" (152mm).
- Wyr-Grid® Splice Connectors have an integral bonding screw that creates a mechanical-electrical bond between cable tray pathway sections.
- Wyr-Grid® Waterfalls are offered in two different configurations that attach to all pathway sections: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm) to facilitate bend radius control and cable management.
- Wyr-Grid® Support Brackets are offered in various widths to accommodate pathways: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm); have integral quick-clip retention; accommodate 1/2" or 12 mm threaded rods.

c. All metallic cable trays must be grounded, and all sections bonded in accordance with listing requirements for the system and per TIA 607-B including most recent revisions, TSB and addenda.

d. Contractor is responsible sizing all pathways to represent no more than a 35% fill upon installation per manufacturer's fill chart below:

Wire Fill for Wyr-Grid® Overhead Cable Tray Routing System



X (in.)	Y (in.)	Internal Area (in^2)	Category 6A (SD) Diameter 6.1mm 0.240"	Category 6A Diameter 7.6mm 0.300"	Category 6 Diameter 6.1mm 0.240"	X (in.)	Y (in.)	Internal Area (in^2)	Category 6A (SD) Diameter 6.1mm 0.240"	Category 6A Diameter 7.6mm 0.300"	Category 6 Diameter 6.1mm 0.240"
12.2	2	24.3	269	172	269	24.2	2	48.3	534	342	534
	4	48.7	538	344	538		4	96.7	1069	684	1069
	6	73.0	807	516	807		6	145.0	1603	1026	1603
18.2	2	36.3	401	257	401	30.2	2	60.3	666	427	666
	4	72.7	804	514	804		4	120.7	1334	854	1334
	6	109.0	1205	771	1205		6	181.0	2000	1280	2000

"Y" equates to the height of the Wyr-Grid® Optional Sidewalls. The internal area defines the allowable fill capacity based on the Wyr-Grid® Pathway width and optional sidewall height. The Wyr-Grid® Pathway cable fill is based on NEC allowable fill of 50%.
The above cable diameters represent the nominal Panduit cable diameter per performance level.

All cable trays and grounding conductors should be clearly marked in accordance with manufacturer's instructions, applicable codes, standards and regulations.

Contractor shall take care to segregate and protect armored fiber from copper cabling in metallic pathway.

Bundled copper and fiber backbones shall be dressed to maintain segregation of cable types throughout the pathway. Innerduct or separate fiber duct is not necessary, due to armored construction on fiber backbone.

See Appendix C for part numbers.

2. J-Hooks

e. J-hook systems used by Williamson County shall be Panduit "J-Pro" series, or approved equivalent.

Contractor installing J-hook systems shall space them no more than 5 feet apart as per TIA 569-C standard.

J-Hook Sizing shall be no greater than 2" and a maximum bundle size of 24 cables. If J-hooks are deemed too small by above criteria, Contractor shall bring this to the attention of Williamson County for resolution in writing.

J-hook systems used by Williamson County shall have the following properties:

- Patented design provides complete horizontal and vertical 1" bend radius control that helps prevent degradation of cable performance.
- UL 2043 and CAN/ULC S102.2 listed and suitable for use in air handling spaces.
- Pre-riveted assemblies allow for attachment to walls, ceilings, beams, threaded rods, drop wires and underfloor supports to meet requirements of a variety of applications.
- Wide cable support base prevents pinch points that could cause damage to cables.
- Cable tie channel allows user to easily install 3/4" (19.1mm) Tak-Ty ® Cable Ties to retain cable bundle.

- Durable non-metallic J Hook materials provide the ability to manage and support a large number of cables.
- Material: Black Nylon 6.6 J Hook with metal attachments.

f. See Appendix C for part numbers.

G. 19” Racks and Rack-mount Cable Managers

1. General:

   a. Wilco will often use a “active rack/passive rack” strategy, putting all active electronics on one rack and all associated patching on an adjacent rack. Consult project documentation for details on job.

2. Two-post Communications Racks

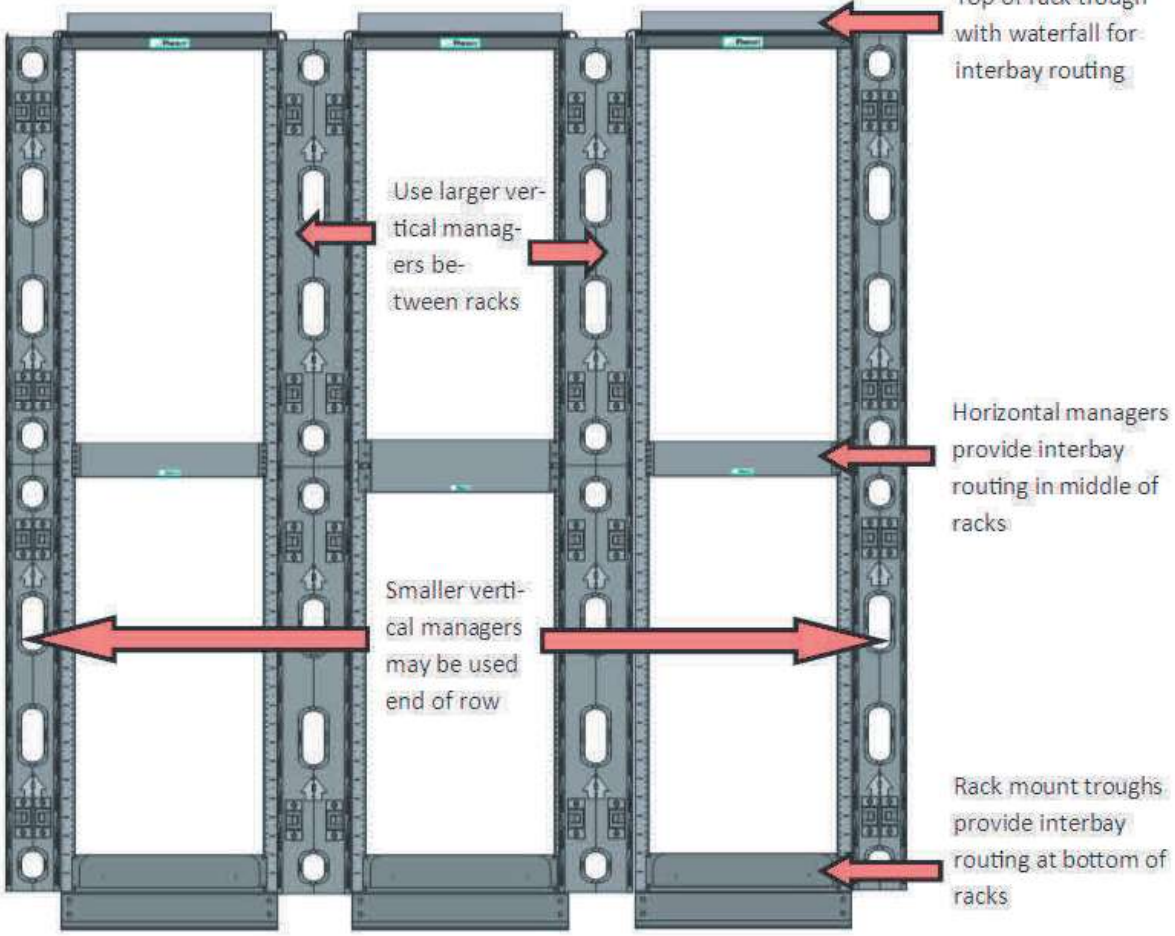
   a. 2-post racks will be Panduit black-powdered aluminum (or Wilco approved equivalent) and have the following properties:

      - 19" EIA rack, aluminum.
      - Dimensions : 84.0"H x 20.3"W x 3.0"D (2134mm x 514mm x 76mm).
      - Rack units numbering up from bottom to allow quick and easy location of rack mount items
      - UL listed for 1,000 lbs. load rating.
      - Double-sided #12-24 EIA universal mounting hole spacing with 24 #12-24 mounting screws included.
      - Accepts all Panduit cable management and patch panel products in addition to any industry standard 19" components.
      - Includes paint piercing washers for assembly to assure electrical continuity between components as pert TIA 607-B Bonding and Grounding Standard.

In telecommunications rooms with multi-bay rack rows configured such that patching will take place between racks, Contractor is responsible to include in design interbay routing pathways at the top, middle and bottom of each bay to provide efficient and neat routing between any two points within rack rows.

Interbay routing shall be provided in the form of top troughs, interbay mid-rack path and flanged shelf at the bottom. See rack configuration example below.

Rack Configuration Example



Size all cable managers to contain no more than 35% fill per manufacturer's fill tables upon installation

Contractor shall use 4RU trough CMLT19 at the base of each rack.

All racks shall be outfitted with a vertical grounding busbar along one rail, with all equipment bonded to ground according to TIA 607-B Bonding and Grounding Standard. See Bonding and Grounding section of this document for details.

See Appendix C for part numbers.

3. 4 Post Racks

    a. Racks in large equipment rooms and data centers may require 4 post racks. These racks shall have the following properties:

        - Independent adjustable front and rear mounting rails can be adjusted while the rack is secured to the floor
        - Printed rack space identification on all equipment rails allows for quick location of rack spaces, speeding
        - installation of rack mount items (shipped numbers up per TIA606 specifications; can be set to number down by flipping the rails)
        - Rack is UL listed for 2,500 lbs. load rating
        - Rear rail construction provides a clear ventilation path for side ventilated switches
        - Multiple mounting holes in top flanges for securing ladder rack
        - Weld nut construction eliminates the need for a second wrench increasing speed and ease of assembly
        - Multiple mounting locations for vertical power strips on any of the four posts or on the adjustable mounting rails
        - Paint piercing washers included

See Appendix C for 4 post racks part numbers.

4. Rack-mounted Cable Management – Vertical Managers

    a. Vertical cable managers shall be PatchRunner™2 Vertical Cable Management System in sizes 6” wide, 8” wide, or Wilco approved equivalent.

Contractor will use double sided (front and back) vertical managers on 2-post racks.

All vertical cable managers shall have dual hinged doors.

Contractor shall choose vertical cable manager width according to manufacturer’s fill tables to not represent more than a 35% fill at installation based on projected worst-case density when racks are fully populated.

Contractor shall bring to the attention of Wilco any case where the populated rack will exceed 35% upon installation for resolution from the Department of Information Technologies.

Vertical cable managers shall have the following features:

- Large finger openings accommodate up to 24 Category 6 cables

- Integral cable retainers on the end of each finger to help contain cables within each rack unit
- Bend radius fingers align with rack spaces to support cables as they transition to the vertical pathway
- Dual hinged covers can be opened 110° to the left or right to provide complete access to the cables inside the vertical pathway
- Snap-on cable retainers can be placed on to fingers to help retain cables in channel during installation and maintenance
- Vertical managers include hinged covers, cable retainers, mounting brackets and #12-24 screws

Part numbers are listed in Appendix C.

5. Rack-mounted Cable Management – Horizontal Managers

    a. No horizonal managers will be used, unless there is an absolute need for them.

H. Cable Accessories

1. Cable Ties

    a. Cable bundles on racks and in pathways shall be bundled with re-enterable hook and loop cable ties that come in continuous rolls. NYLON CABLE TIES ARE NOT PERMITTED UNDER ANY CIRCUMSTANCES.

    b. Contractor is responsible for using plenum hook and loop ties in air-return spaces.

See “Appendix C” for part numbers.

2. Physical Security Devices

    a. Some portions of Williamson County networks require additional physical security devices. These take three forms:

        - Devices that block-out copper and fiber ports in patch fields and faceplates that require a special tool for removal.
        - Devices that lock-in copper patch cords and require a special tool for removal of those patch cords.
        - Devices that temporarily or permanently block USB ports on laptops and computers.

Areas where such devices are required will be called out in the project documentation.

See Appendix C for part numbers.

I. Communications Grounding Network

1. General

    a. Contractor is responsible for bonding to ground all newly placed equipment and installed racks or cabinets per the TIA 607-B Standard.

2. Room Busbars

    a. All Telecommunications spaces and distributor rooms shall have installed an appropriately sized wall-mount busbar with BICSI hole spacing that bonds to the building bonding backbone.

    b. See Appendix C for appropriate room telecommunications grounding busbar.

3. Rack and Equipment Grounding

    a. Contractor is responsible for properly grounding all network equipment, racks and cabinets and bonding them to the wall mounted busbars as described in the TIA 607-C standard.

    b. All newly installed racks and cabinets shall have installed a vertical busbar mounted along one equipment rail to serve as a clean, low-resistance bonding place for any equipment not equipped with a designated grounding pad.

Smaller equipment without an integrated grounding pad shall be bonded to the vertical busbar using a thread-forming grounding screw that is anodized green and includes serrations under the head to cut through oxidation or paint on the equipment flange.

Larger equipment (chassis switches) with a designated grounding terminal shall be bonded to the vertical busbar with an EBC (equipment bonding conductor) kit built to that purpose.

Contractor shall take care to clean (wire brush, scotch brite pads) any metallic surface to be bonded down to bare metal and apply a film of anti-oxidation paste to the surfaces prior to effecting the bond.

All bonding lugs on racks and busbars shall be of two-hole irreversible compression type. Mechanical lugs and single-hole lugs will not be accepted and shall be removed and replaced at Contractor's expense.

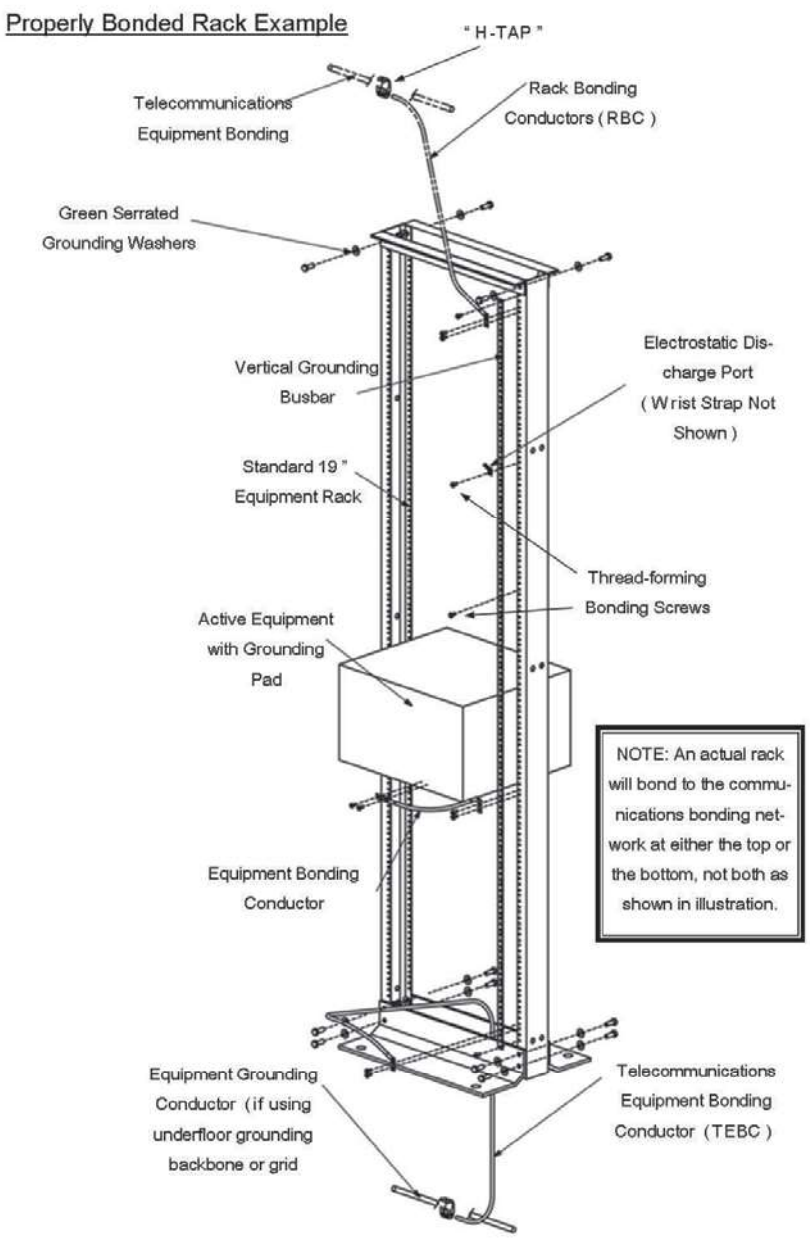
Every rack or cabinet shall have an individual bonding conductor into the grounding network, serially connecting (daisy-chaining) of racks is expressly forbidden and will not be accepted.

Rack Bonding Conductors (RBC) may tap into an overhead or underfloor aisle ground or may run to the wall-mounted grounding busbar in smaller Telecommunications rooms containing 5 racks or less.

A minimum of every other rack or cabinet shall be outfitted with a properly installed and bonded ESD (electro-static discharge) port along with a wrist strap and lead to be used by any technicians servicing network equipment. On four post racks and cabinets these ESC ports and straps shall be provided on front and back to be accessible and able to reach any active equipment needing servicing.

Armored cables shall be properly bonded to the earthing system on both ends with a kit built to that purpose.

For examples of rack grounding refer to the illustrations below:



<END OF SECTION>

IV. Network Labeling

A. General Requirements

1. When labeling any Williamson County network system, Contractor shall adhere to the following requirements:

    a. All cabling added to existing “legacy” installations shall follow the labeling convention in place at that location.

    b. All labeling of installed cabling in new projects shall satisfy all requirements of Williamson County.

    c. Contractor shall, wherever possible pre-print labels using Panduit Easy-Mark software and laser jet printer, or Wilco approved equivalent.

    d. The Panduit PanTher (LS8E) hand-held thermal transfer printer or Wilco approved equivalent shall be used on site to print labels that were unanticipated, or that become damaged in application. Preferred Printer: Epson MP300

    e. This labeling strategy shall, at a minimum, clearly identify all components of the system: racks, cables, panels and outlets, grounding, pathways and spaces like telecommunications rooms.

All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

Labeling will Identify the Floor and Port Number. Ex: 1st floor = 1-201, 2nd floor = 2-201, If there is multiple IDFs on a floor they will be separated as A,B. Example: 1st floor A1-201, B1-201, 2nd Floor A2-201, B2-201.

All label printing will be machine generated by either hand-held labeling systems or computer-generated using programs and materials built specifically for communications labeling.

Handwritten labels will not be accepted and must be remedied at Contractors expense.

Cabling system labels shall utilize materials designed to outlast the cabling elements to which they attach. Office quality labels will not be accepted.

Cable labels shall be self-laminating, appropriately sized to the outside diameter of the cable and placed within view at the termination point on each end.

Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

Machine-generated labels shall be installed behind the clear lens or cover on any device that provides such an option.

All labels will be permanently affixed to installed cables, patch panels, racks, cabinets, and enclosures.

Conduit shall be marked indicating the identification of the cable within.

Labels shall be legible and placed in a position that insures ease or visibility.

Label type must be as listed in Appendix C - Materials section at the end of this document.

<END OF SECTION>

V. Testing and Acceptance

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions.
2. All copper pairs or optical fibers of each installed cable shall be tested and verified prior to system acceptance.
3. Any defect in the cabling system performance or installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors or fibers in all cables installed.
4. All cables shall be tested in accordance with this document, the ANSI/TIA Standards, the PANDUIT® ™Certification Plus System Warranty guidelines and best industry practice.
5. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Link Testing

1. All twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA 1152 and ANSI/TIA 568-C.2 for the appropriate Category of cabling installed using a test unit meeting a minimum IEC IIIe level of accuracy.
2. All testers used must have been factory calibrated by the manufacturer within one year of use or according to factory calibration recommendations, whichever is the more stringent.
3. Contractor shall set references according to manufacturer's recommendation prior to each day's testing and reset references anytime tester is left unused for more than two hours.
4. For warranty purposes, Contractor shall perform the appropriate Permanent Link test. Channel Link testing is rendered void by the movement of patch cords and can be run but not used for final acceptance criteria.

C. Fiber Testing

1. All installed fiber shall be tested for link-loss in accordance with ANSI/TIA-C.0 and shall be within limits specified within ANSI/TIA-C.3, or as spelled out in the project documentation.
2. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in **both directions** at 850 nanometer (nm) **and** 1300 nm using an LED light source and power meter.
3. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

4. Backbone & WAN single-mode fiber cabling shall be power tested at the 1310 and 1550 wavelengths in both directions. OTDR traces shall be performed in both directions at 1310 and 1550 wavelengths. End face termination/connector captures shall be performed on each connector with a passing result.

5. Test set-up and performance shall be conducted in accordance with ANSI/568-C.0 standard, Method B.

6. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. Only basic link-loss testing with a power meter is required. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above.

7. The values for calculating loss shall be those defined in the ANSI/TIA 568-C.3 Standard. If the link loss requirements defined within the standard conflict with those referenced in the project documentation, Contractor shall immediately bring this to the attention of Information Technologies for resolution.

D. System Documentation

1. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to Wilco for approval. Documentation shall include the items detailed in the sub-sections below.

2. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

3. Contractor shall submit with drawings a diagram of each telecommunications room with indicating which cabling drops will terminate in which rooms (classrooms). This is both to give an idea of contractor cable plant design, as well as to facilitate future troubleshooting.

4. At the request of the Information Technologies Engineer, the telecommunications contractor shall provide copies of the original test results in tester native format, not spreadsheet.

5. Information Technologies may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by Information Technologies, including a 100% re-test. This re-test shall be at no additional cost to the Williamson County.

E. Test Results

1. Documentation shall be provided in electronic format within three weeks after the completion of the project. The media shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year).

2. The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). Documentation shall also include test equipment name, manufacturer, model number, serial number, software version and last factory calibration date.

3. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation.

4. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

5. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form.

6. The media shall contain the electronic equivalent of the test results as defined by the specification along with the software necessary to view and evaluate the test reports.

7. When repairs and re-tests are performed, the problem found and effective action taken shall be noted, and both the failed and passed test data shall be documented.

8. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations.

9. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. Williamson County will provide floor plans in paper and electronic (DWG, AutoCAD) formats on which as-built construction information can be added.

10. These documents will be modified accordingly by the Telecommunications Contractor to denote as-built information as defined above and returned to the Williamson County.

11. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD) form.

<END OF DOCUMENT>

Appendix A – Wilco Contractor/Vendor Rules and Regulations

Wilco Contractor/Vendor Rules and Regulations

Williamson County maintains specific rules and regulations that apply to all contractors and vendors who perform work or provide services. It is the responsibility of the contractor or vendor to ensure that all rules and regulations are always adhered to. Any employee of the contractor or vendor who does not adhere to the rules and regulations will be asked to leave the property and will not be permitted to return. Poor conduct will not be tolerated.

You or your company may not perform any work or services in the building or on the grounds until the following mandatory requirements are met:

1. A certificate of liability insurance for your company must be filed with the Facilities department. The certificate must be current and must meet building insurance requirements for coverage and indemnification.
2. All subcontractors must be approved by Technology Services or Facilities.
3. Each worker, whether employed by your company or by a subcontractor, must possess an understanding of building safety procedures.
4. All permits must be displayed, and a copy must be on file with Facilities.

The following general rules apply to all vendors, contractors and subcontractors:

1. **ALL Facilities are Smoke Free**. No smoking in any area of the buildings, roof or loading docks.
2. All workers are expected to behave professionally. Please remember the importance of your appearance and professionalism in and around our buildings.
3. All contractors must wear proper attire while on the premises. Shirts or hats with profanity are not permitted on the property. All contractor employees must have identification with their company's name on it.
4. All combustible and flammable materials or liquids must be stored properly, and the Facilities Department must be notified of the presence of such materials.
5. Please check in at the Construction site or Facilities department for building access and/or prior to starting any work, unless otherwise specified.

General Requirements:

1) All construction and construction related activities will conform to all State, Local, Federal & OSHA laws
2) Contractor shall ensure that the construction site and adjoining areas including hallways and access ways are always kept clean. Areas not under construction but affected by or used during construction are to be protected from damage. Floors and carpets are to be covered with protective materials.
3) Contractor shall be responsible for the repair of all damages caused by them or their subcontractors.
4) Construction signs and/or barriers visible to tenants and guests of the building must be approved by Facilities prior to installation.
5) Physical or verbal abuse or harassment of any individual is prohibited.
6) Workers will be allowed in area where construction is taking place. All work which requires entering other tenant areas or common areas will be coordinated with Facilities.
7) Work being done outside of the hours of 8:00 am – 5:00 pm must be coordinated with Facilities or Technology Services departments.

Cleaning

1) It is expected that all areas outside of the work area will be kept clean to include but not limited to:
   a) Common areas
   b) Elevator/Loading dock routes
   c) Exterior areas
2) Work areas must always be kept clean. Each contractor is responsible for removing any trash or debris associated with their work activities. It is the contractor's responsibility to vacuum and dust common areas if work activities create excessive dust and trash
3) It is expected that walk off mats will be used at all areas of entry and exit of the space. The mats should be changed frequently to keep a tidy appearance and upon request of Facilities or Technology Services.
4) It is expected that if construction deliveries coming from the loading docks cause excessive dirt and damage to the existing finish of the common area floors as deemed by Facilities, the contractor will be expected to reimburse the facility for stripping and waxing or cleaning of the carpet. If this policy is not adhered to, the building will take appropriate action and charge back the contractor all costs associated with the activity.
5) If damage does not clean or is unable to be repaired the contractor will be responsible for the replacement of the goods.
6) Utility sinks are to be cleaned if used. No construction waste, paint thinner or other obstructing or hazardous materials are to be poured done the drain or left to clog the sinks
7) Carpets and flooring within the work area as well as the common areas must always be maintained in a clean and undamaged condition. Contractor shall be responsible for any damage and should report any preexisting conditions prior to the commencement of work.
8) Fire Exit doors and/or evacuation pathways must be open at all time and free of debris or clutter
9) There will be a mandatory post work inspection completed. This will consist of a representative from Facilities, along with a representative from the company completing the work. This will be to inspect the work completed, as well as the cleanliness of the area at the finish of the project. The associated post inspection form must be completed and signed by both representatives. Any requests made from the facilities department during this time must be met prior to receiving payment for work. If contractor does not comply with post work inspection, they will be back charged for any costs associated to with the issues.

Construction

1) All Air Handling Returns must be sealed during construction. Contractors must notify Facilities prior to using any products that could generate dust or odors that may migrate into the buildings HVAC system or other tenant spaces. Off hour restrictions may be required.
2) All construction related trash must be properly disposed of in a construction dumpster by contractor. Facilities will approve location.
3) A representative of the Facilities department will attend all weekly job meetings.
4) The owner reserves the right of first refusal on all demo'd materials
5) All Wilco buildings are smoke free
6) Any unused materials such as conduit, wiring, building materials must be disposed of by the contractor
7) Prevailing wage rates must be posted at the worksite in accordance with M.G.L. ch.149 sec.27. It is the responsibility of the contractor to maintain all state and local postings
8) Hot Works- will be coordinated and permitted through the Facilities Department. Prior to any welding, soldering or metal cutting, contractors must present the Facilities Department with a fire plan and proof of fire watch and permit.

- All Fire alarm wiring must be installed in conduit clearly labeled every 10'

Roof Access

1) Roof access must be coordinated with the Facilities Department
2) There is no smoking on the roof

3) Clean up all debris including loose screws
4) Any damage to the roof will be the responsibility of the Contractor to repair

Shut Down coordination

1) All shut down's must be coordinated with the Facilities Department. If the building systems are shut down for any reason, the contractor must first coordinate through Facilities such activities allowing time to notify all appropriate parties. At any time, the contractor accidentally causes a building system to fail, the contractor will be responsible for all costs associated with that failure.
2) All shutdowns must be back online by the end of the day. Shutdowns are NOT permitted overnight.
3) Facilities or Technology Services must approve that services are back online to their satisfaction BEFORE the contractor leaves the property.

Noise coordination

1) All noise will be contained. Please keep all doors closed to help to contain sound as well as dust. No radio music will be allowed
2) County occupied space will be handled with the utmost respect.
3) Complaints of excess noise will be handled immediately. Management reserves the right to stop all work if the work causes complaints from other tenants. Any charges, fees and/or other costs associated with scheduled or non-scheduled work stoppage is the responsibility of the contractor doing the work.
4) All floor and wall penetrations must be fire stopped.

Core Drilling

1) Core Drilling or any other work causing noise disruption must be coordinated with the Facilities Department. Absolutely no work will be permitted that in any way disrupts daily activities during class times or normal working hours unless prior authorization from Facilities is granted

Elevator Use

1) The elevators will be used according to their proper designation and weight capacity. Freight Elevator will be used for all construction related materials and or utility carts
2) Priority use must be given to staff use. Please do not enter an elevator with construction equipment with staff.
3) Floor and wall protection must always be used

Loading dock

1) Use must be coordinated with Facilities.
2) Deliveries must be coordinated with Facilities.
3) Loading docks will be kept clean and free of construction materials. Storage is not allowed on or around the loading dock
4) Floor protection must be used when entering the common areas from the loading dock
5) No Smoking on or around the loading dock area

Security

1) A contact lists must be provided to the Facilities department of all Trades, to include emergency contact information
2) The list will be given to the Project Manager
3) Absolutely no smoking in project area or within any building on site.
4) No alcohol is allowed in any project areas.
5) Entry to other non-project related spaces or unauthorized areas are strictly prohibited.

Parking

1) Vehicles will be allowed access on site for unloading and loading purposes only identification. Any Vehicle parked in unauthorized areas will be towed at the owners' expense.
2) Overnight parking is not permitted
3) Parking of Trailers must have prior authorization from the Facilities department

Insurance:

The Contractor shall purchase and maintain in a company or companies licensed to do business in the state in which the contract services are to be performed, insurance as set forth below which will protect the Contractor, Owner, and the Agent, and their respective employees, agents, successors and assigns, from claims which may arise out of or resulting from Contractor's operations under the Agreement, whether such operations be performed by the Contractor, its subcontractors, or by anyone directly or indirectly employed by any of them for whose acts the they may be liable. The Contractor must bring the insurance certificate to the Facilities Department prior to any work commencing.

We require Certificate of Liability Insurance from each vendor we contract with. The following information should be included:

a. General Liability- minimum coverage $1,000,000.
b. Automobile Liability- minimum coverage $1,000,000.
c. Workers Comp& Employee Liability
d. Description of Operations must be filled out. Please include "It is hereby agreed that S.T.C.C. is additionally insured and will be held harmless for all damages you create"
e. Certificate Holder

Life Safety Procedures

1) In the event of a medical emergency, fire or life-threatening emergency, workers should call 911

2) Facilities must be notified of any injuries that occur on the property.

Life Safety Systems

1) If there is a possibility that the life safety equipment has been compromised, Facilities Department must be notified immediately.
   a) Facilities Department (512) 943-1666
2) No propping open fire doors.
3) Contractors must maintain the proper equipment to manage water from a broken sprinkler pipe

<END OF APPENDIX>

Appendix B – Wilco Cabling Policies and Procedures

Williamson County (Wilco)

POLICY & PROCEDURE CONCERNING ALL ELECTRICAL, TELECOMMUNICATIONS AND NETWORKING INSTALLATIONS AND/OR MODIFICATIONS

I. Policy

Permits are required for all Electrical, Telecommunication and Network wiring modifications within Wilco buildings PRIOR to commencing work. By requiring prior authorization and pre and post implementation inspections, Wilco will better maintain the integrity and safety of the telecommunications system, alarms, cameras, elevator, fire alarms and electrical wiring. The goal of instituting this policy is to maintain strict control over the wiring and facilities to significantly reduce the probability of system issues, prevent damage to the facilities and maintain compliance with building and fire codes.
It is therefore, the policy of Wilco that existing telecommunications wiring, including electrical, voice, data, and video, as well as telecommunications facilities located in various buildings may not be altered in any way except by written permission from the Facilities Project Manager or Technology Services Systems Engineer.

II. Procedure for Wiring (Telecommunications and Computer)

1. Existing telecommunications and/or computer wiring, and cables may not be altered by anyone except an IT contractor, vendor or Wilco Electrician and must include permission from the Facilities Project Manager or Technology Services Systems Engineer.

2. Wilco System Engineer or Facilities Project Manager shall review and approve the telecommunications and computer wiring and for new and existing buildings.

3. Electrical Inspector shall inspect all telecommunications wiring in new and renovated buildings and projects to ensure proper installation.

4. Any unauthorized wiring found in telecommunication, electrical spaces or within buildings & grounds will be removed immediately at the cost of the department.

5. Any unauthorized wiring which interfaces with telecommunications, wiring or health and safety will be reported to Facilities Department for review. Working with Technology Services, if the wiring is found to be either a safety hazard; or not in conformance with applicable codes; or detrimental to the functioning of the telecommunications system; it shall be removed by the vendor authorized representative, at the expense of the vendor/contractor's or department that installed or authorized it.

6. All telecommunication will be marked identifying their terminal ends and owner.

III. Telecommunications Manholes and Closets

1. Any manholes or closets containing telecommunications conduit or electrical wiring shall be under the exclusive control of the Facilities Department.

2. No equipment or storage may be placed in these areas without the Facilities department knowledge and consent. All confined spaces regulations will be complied with for manhole applications including those persons entering the manholes.

IV. Electrical Wiring

1. All electrical wiring will be installed and marked according to National, State and City codes. Only approved licensed and insured vendors/contractors will be approved for such work.

2. Abandoned or discontinued electrical wiring will be properly removed and circuitry identified of such discontinuance.

3. Wilco will review and approve plans for additional wiring before the vendors/contractors performs work.

4. Any unauthorized wiring will be removed at vendor/contractor/departments expense.

Summary of Policy and Procedure

A. Permits for all wiring will be required. NO EXCEPTIONS

B. Telecom or electrical wiring will be run in conduit, independently of all other conduit unless the conduit is specifically designated for that particular wiring. Wiring is never to be hung from or connected to HVAC piping or ducts or fire suppression equipment and piping.

C. All telecommunication and electrical closets are designated areas for Telecom and network equipment. Closets will be organized and free of clutter. Wiring closets are not to be used for storage and will be readily accessible at all times.

D. All telecom and electrical wiring will be marked with project name and location name and demarcation points. Ends will be clearly marked with destination location.

E. All work will be completed with the approval of the Facilities Project Manager or Technology Services Systems Engineer.

F. All holes drilled through walls, ceilings and floors etc. will be fire stopped and labeled. Temporary use or construction means, and methods still must be approved by Facilities and Technology Services

G. All contractors must sign in at the Construction office daily. Appropriate permits must be posted at the work area. Contractors must submit all hot works permits to Facilities at least 72 hours prior to work. Hot works permits are approved by the Facilities Department. Work

may not be done without approval. Contract must arrange with the Facilities Department to be able to take the fire alarm offline with prior to any work being performed

H. Hours for drilling or any other work that will create noise/vibrations during the academic year will only be allowed between 11 p.m. to 7 a.m. unless exceptions are made by the Facilities Project Manager. Any work creating noise done outside those hours will be shut down by the Facilities department.

I. Intervals of labeling of conduits and wiring will be left to the discretion of the Technology services Systems Engineer or designee and wiring code, however a minimum of every 8-10' is required. Labels should be clearly placed and the beginning and end of each run.

K. No employees of Wilco will run, pull, manipulate or extend power, terminated Ethernet or fiber (electrical and computer, phone etc.) except for the Wilco Electrician or Technology Services Systems Engineer for Telecom.

L. Any work on or to power, Ethernet or fiber in any of 's buildings or grounds must be done by a Facilities Approved Vendor**. Technology Services REQUIRES Notification by all vendors working on any of wiring or cabling, new or existing. Notification should include identifying the means and methods of routes.** It is expected that all wires and cables will be run according to State and Federal codes and laws without exception. Any work done that does not meet these requirements will be the responsibility of the contractor.

Requests should be submitted to the Facilities department at least 2 weeks prior to any work being done. In an emergency, the Facilities Project Manager or Technology Services Systems Engineer should be contacted before any work is done.

M. Technology Services (Infrastructure) will coordinate vendor work with the Facilities Department. All bid documents (RFP, RFI etc.) will include these Technology Services policy, procedure, requirements and expectations.

N. All Contractors must provide necessary insurance and certificates to include but limited to, Terms and Conditions, Certificate of Liability Insurance, W9, etc.

<END OF APPENDIX>

Appendix C – Materials List

Manufacturer	Part Number	Description
		COPPER DISTRIBUTION
Panduit	**PUP6004xx-UY**	Blue Category 6 UTP cable.
Panduit	**CPPKL6ATGxxWBL**	Mini-Com 24/48-port category 6-RJ45 patch panel in black, (1/2 RU).
Panduit	**CJ688TGxx**	Category 6, RJ45, 8-position, 8-wire universal module. Color PN: Blue-BU, Yellow-YL, White-WH, Black-BL, Red-RD
Panduit	**UTP28SP*xx**	Category 6 Performance, 28 AWG UTP patch cord with TX6™ Modular Plugs on each end. Get Length and color from Wilco ITS.
Panduit	**CFPL*IWY**	Mini-Com Classic series single gang vertical faceplate.
Panduit	**FPUD6X88MTG**	TX6A™ Category 6A UTP Field Term Angled RJ45 Plug.
Panduit	**HLS-15R0**	Tak-Ty ® Hook & Loop Cable Ties, 15' Continuous Rolls
		FIBER DISTRIBUTION SYSTEMS
Panduit	**FLCS2/9SOCU9BU**	OptiCam Fusion Splice-On Connectors. Fiber LC-UPC Splice-On Connector for 250/900um Fiber, 9um Singlemode
Panduit	**FLCS2/9SOCA9AG**	OptiCam Fusion Splice-On Connectors. Fiber LC-APC Splice-On Connector for 250/900um Fiber, 9um Singlemode
Panduit	**FSPP9**Y**	Fiber OS2 singlemode plenum rated indoor interlocking aluminum armored cable. For intrabuilding use between telecom rooms in the same building.
Panduit	**FSNP9**Y**	Fiber OS2 singlemode plenum rated indoor/outdoor stranded cable. For use for between building fiber backbone.
Panduit	**FCE2U**	Opticom® QuickNet™ Rack Mount Fiber Enclosures, holds up to eight QuickNet™ Cassettes, FAP adapter panels, or FOSM splice modules. Dimensions : 3.48"H x 17.60"W x 16.30"D (88.4mm x 447.0mm x 414.0mm).
Panduit	**FCE4U**	Opticom® QuickNet™ Rack Mount Fiber Enclosures, holds up to twelve QuickNet™ Cassettes, FAP adapter panels, or FOSM splice modules. Dimensions : 6.98"H x 17.60"W x 16.30"D (177.0mm x 447.0mm x 414.0mm)
Panduit	**FAP*WBUDLCZ**	LC FAP loaded with 6/12 LC duplex singlemode fiber optic adapters (Blue) with zirconia ceramic split sleeves.
Panduit	**NKFP91BN1NNM001**	LC to Pigtail – OS1/OS2 Singlemode Simplex Pigtails – 900µm Buffered Fiber LC to pigtail singlemode simplex pigtail, 900µm buffered fiber (one LC connector on one end and open on the other end) – 9/125µm.
Panduit	**FAPB**	Blank fiber adapter panel – reserves space for future use.
Panduit	**FOSMF**	Fiber optic splice module holds and protects up to 24 fusion splices. Self-stacking modules with integral cable management and fiber slacking/spooling features. Black plastic base and clear plastic hinged cover. For use with Panduit Opticom ® FCE*U, FRME*U, and FMT series enclosures. Dimensions : 0.30"H x 14.03"W x 5.28"D (7.6mm x 356.4mm x 134.1mm).
Panduit	**FOSMH2U**	Fiber optic splice module handler, 2 RU. Holds up to eight FOSM splice modules. For use with FCE2U fiber cassette enclosure. Dimensions: 2.91"H x 0.72"W x 2.61"D (74.0mm x 18.3mm x 66.4mm).
Panduit	**FOSMH4U**	Fiber optic splice module holder, 4 RU. Holds up to twelve FOSM splice modules. For use with FCE4U fiber cassette enclosure. Dimensions: 5.50"H x10.42"W x 5.41"D (139.7mm x 264.7mm x 137.4mm)
		RACKS, ZONE ENCLOSURES AND CABLE MANAGERS
Panduit	**PZAEWM3**	PanZone Active Wall Mount Enclosures
Panduit	**R2P**	19" EIA 2-post rack, aluminum. Dimensions: 84.0"H x 20.3"W x 3.0"D (2134mm x 514mm x 76mm).
Panduit	**PR2VWF**	Waterfall Trough for 2/4 Post Rack. FOR TOP-OF-RACK INTERBAY ROUTING.

Panduit	R4P	4 post EIA rack with #12-24 threaded rails. Dimensions : 84.0"H x 20.3"W x 23.0"D (2134mm x 515mm x 584mm). 45 RU.
Panduit	**PR2VD0***	6”/8” Patchrunner® 2 Vertical Cable Manager Dimensions: 83.88"H x 6"W x 20.0"D
Panduit	**CMLT19**	4 RU lower trough with 1.3" bend radius mounts to the bottom of a standard 19" EIA rack. Dimensions: 8.0"H x 19.0"W x 4.5"D (203mm x 483mm x 114mm). FOR BOTTOM-OF-RACK INTERBAY PATHWAY. LARGER OPTION THAN CMUT19 IF NEEDED.
		CABLE PATHWAYS
Panduit	**J-Pro J-Hook system**	Panduit J-Pro System. Plenum rated composite J-hooks with hardware available for various hardware applications. See www.panduit.com for variations.
Panduit	**CBXQ2WH-A**	Single gang one-piece outlet box with adhesive backing. Box accepts Pan-Way ® Screw-On Faceplates or any NEMA standard single gang faceplate. For use with Pan-Way ® LD profile raceway. 5.09"L x 3.34"W x 1.75"H (129.4mm x 85.0mm x 44.4mm). Breakouts for 1/2", 3/4", or 1" diameter conduit.
Panduit	**WG12BL10**	Wyr-Grid 12" wide x 10' long pathway section used to carry cables horizontally throughout the system. Snap-on sidewalls attach for job specific height requirements. Uses splice connector WGSPL1218BL to connect straight sections and intersection splice WGINTSPLBL to connect pathways at an intersection. For fittings and accessories see www.panduit.com.
Panduit	**WGSW*BL**	2”/4”/6” Snap-on Sidewalls
Panduit	**CFPL*IWY**	2/4 Port Mini-Com Classic series single gang vertical faceplate.
Panduit	**WG18BL10**	Wyr-Grid 18" wide x 10' long pathway section used to carry cables horizontally throughout the system. Snap-on sidewalls attach for job specific height requirements. Uses splice connector WGSPL1218BL to connect straight sections and intersection splice WGINTSPLBL to connect pathways at an intersection. For fittings and accessories see www.panduit.com.
		BONDING AND GROUNDING
Panduit	**ACG24K**	#6 AWG (16mm2) jumper for armored cable diameter up to 0.84" (21.3mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two-hole copper compression lug and the other end with grounding terminal; provided with two each #12-24 and M6 thread-forming screws and a black polypropylene terminal cover.
Panduit	**LCC series**	Panduit two-hole compressing lugs for code conductors in BICSI hole spacing.
Panduit	**HTCT series**	Panduit HTAPs. Must be selected according AWG size of run and tap conductors.
Panduit	**CLRCVR series**	Panduit clear covers for HTAPs. Must be selected according to HTAP being covered.
Panduit	**RGS134-1Y**	Grounding strip (vertical busbar) for newly installed racks or cabinets with screw rails. 78.65" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.
Panduit	**RGCBNJ660P22**	Jumper kit for bonding individual racks or cabinets into grounding backbone. #6 AWG (16mm²) jumper; 60" (1.52m) length; 45° bent lug on grounding strip side; provided with .16 oz. (5cc) of antioxidant, two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread forming screws and a copper compression HTAP* for connecting to a #6 to #2 awg sized bonding backbone.
Panduit	**GJ672UH**	Rack jumper (and cabinet) kits for smaller TR (5 bays or less) to bond individual rack or cabinet directly back to wall mounted busbar. One 72" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre-terminated on one end

		with LCC6-14JAWH-L and the other end with LCC6-14JAW-L. This rack grounding jumper is 72" long. For other lengths replace the "72" in the part number. Available lengths are 72, 96, 120, 144, 168, 192, 216, 240, 264 and 288 inches.
Panduit	**RGESD2-1**	Two-hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, and two each #12-24 x 1/2" and M6 x 12mm thread-forming screws. LOCATE ONE WITHIN REACH OF ALL EQUIPMENT. WORKS WITH WRIST STRAP RGESDWS.
Panduit	**RGESDWS**	Adjustable fabric ESD wrist strap with 6' coil cord, banana plug, 1 megaohm resistor and 4mm snap. LOCATE ONE WITHIN REACH OF ALL EQUIPMENT. WORKS WITH ESD PORT RGESD2-1.
Panduit	**RGTBSG-C**	Green thread-forming bonding screws for use to mount equipment that does not have a built-in grounding pad (terminal).
Panduit	**RGEJ1024PHY**	24" long pre-terminated equipment grounding jumper #10 AWG (6mm²) jumper; bent lug on grounding strip side to straight lug on equipment; provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws. FOR EQUIPMENT LIKE CHASSIS SWITCHES WITH BUILT-IN GROUNDING PAD (TERMINAL).
Panduit	**RGEJ1036PFY**	36" long pre-terminated equipment grounding jumper#10 AWG (6mm²) jumper; bent lug on grounding strip side to straight lug on equipment; provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws. FOR EQUIPMENT LIKE CHASSIS SWITCHES WITH BUILT-IN GROUNDING PAD (TERMINAL).
Panduit	**GB2B0306TPI-1**	Wall mounted telecommunications busbar suitable for small telecom room. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 2" x 12" in size.
Panduit	**GB2B0514TPI-1**	Wall mounted telecommunications busbar suitable for med telecom room. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 2" x 24" in size.
Panduit	**GB4B0624TPI-1**	Wall mounted telecommunications busbar suitable for main grounding busbar in medium sized facility. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 4" x 20" in size.
Panduit	**LTYK**	Wall mounted busbar label kit. Label kit includes printed tag and one flame retardant cable tie.
		NETWORK LABELING SOFTWARE – FOR INK JET/LASER PRINTER
Panduit	**PROG-EM2GO**	Easy-Mark Labeling Software for PC supplied on USB Flash Drive. For preprinting communications labels on laser/inkjet printer.
Panduit	**S100X150YAJ**	Self-laminating cable labels for Category 6 cable for use with Easy-Mark software and laser/ink jet printer.
Panduit	**C261X035Y1J**	Patch Panel labels for use with Easy-Mark software and laser/ink jet printer.
Panduit	**C195X040Y1J**	Faceplate labels for single gang stainless or sloped plastic - use with Easy-Mark software and laser/ink jet printer.
Panduit	**C288X040Y1J**	Faceplate labels for double gang stainless - use with Easy-Mark software and laser/ink jet printer.
Panduit	**S100X650YAJ**	Cable label for indoor/outdoor tight-buffered armored fiber optic cable. For use with Easy-Mark software and ink jet printer.
Panduit	**S100X160YAJ and NWSLC-3Y**	Label and turn-tell sleeve for labeling fiber jumpers. For use with Easy-Mark software and ink jet printer.
Panduit	**C200X100FJJ**	1" high, white, vinyl tape labels for labeling grounding busbars, racks, cabinets and pathways. For use with laser/ink jet printer.
		NETWORK LABELING – HANDHELD LABELER
Panduit	**LS8EQ-KIT-ACS**	Panduit PanTher hand-held label printing system in kit. Includes LS8EQ printer with QWERTY keypad, one cassette of S100X150VAC self-laminating labels, six AA alkaline batteries, LS8E-ACS, LS8-CASE, LS8-PCKIT, LS8-IB, LS8-WS, quick reference card and operator's manual. USE FOR LABELS THAT MUST BE PRINTED ON THE JOB SITE.

Panduit	**S100X150VAC**	Self-laminating cable labels for Category 6 cable for use with PanTher LS8E hand-held printer.
Panduit	**C261X035Y1C**	Handheld printer labels for modular faceplate patch panels.
Panduit	**C195X040Y1C**	Faceplate labels for single gang stainless - use with PanTher handheld labeler.
Panduit	**C288X040Y1C**	Faceplate labels for double gang stainless - use with PanTher handheld labeler.
Panduit	**S100X650VAC**	Cable label for indoor/outdoor tight-buffered armored fiber optic cable. For use with handheld labeler.
Panduit	**S100X160VAC and NWSLC-3Y**	Label and turn-tell sleeve for labeling fiber jumpers. For use with hand-held labeler.
Panduit	**T100X000VPC-BK**	1" high, continuous black on white, vinyl tape labels for labeling racks, cabinets and pathways with PanTher LS8E handheld labeler.
		PHYSICAL SECURITY LOCKING DEVICES
Panduit	**PSL-DCJB-C**	Package of 100 RJ45 jack blockout devices and one removal tool. Color red.
Panduit	**PSL-USBA-L**	Package of 50 USB Type ‘A’ blockout devices and one removal tool. Color red.
Panduit	**PSL-USBB**	Package of 50 USB Type ‘B’ blockout devices and one removal tool. Color red.
Panduit	**PSL-DCPLX-BL-C**	Package of 100 RJ45 plug lock-in devices compatible with flush mount jacks, and one installation/removal tool. Color black.
Panduit	**PSL-DCPLRX-BL-C**	Package of 100 RJ45 plug lock-in devices compatible with recessed jacks, and one installation/removal tool. Color black.
		CABLE TIES – HOOK AND LOOP
Panduit	**TTR-35RX0**	.75” wide, continuous roll Hook and Loop Cable Ties, black. 35 ft. roll. Carton qty 10 rolls.
Panduit	**HLSP1.5S-X12**	Plenum rated hook and loop cable ties for air return spaces. Maroon color, perforated at 6” length.
Panduit	**HLSP3S-X12**	Plenum rated hook and loop cable ties for air return spaces. Maroon color, perforated at 6” length.

<END OF DOCUMENT>

Standard – LT101

Williamson County Lighting Standard

Originated by: Approved by: Revision No. 1	Date Originated: 9/25/2023 Date Approved: Revision Date:

1.0 Purpose

Standardize scope of work for installation of new and replacement light fixtures.

2.0 Scope

All retro-fit and new of light fixtures installation and replacements in occupied or unoccupied Williamson County buildings.

3.0 Standard Installation Requirements:

3.1 One whip per fixture.

3.2 Only saddle type connectors shall be used for MC cable connectors.

3.3 MC Cable wiring insulation color shall match the corelating branch circuit color respectfully feeding the power to the light fixture.

3.4 Fixture whips will be supported by hangers above the acoustic ceiling within two feet of the fixture and within six feet afterwards.

3.5 Push pin wire connectors shall only be used within the light fixture junction box wiring harness and supplied by light fixture manufacturer.

3.6 All junction boxes knock outs shall be sealed and covered and junction box covers will be labeled with panelboard name, branch circuit, and voltage.

3.7 If more than three penetrations are made in one junction box, a minimum 4 and 11 square junction shall be used.

3.8 If more than six penetrations are made in one junction box, a minimum 12” X 12” by 4” junction box shall be used.

3.9 Two ceiling grid hanger wires shall be installed per light, for support. Exception: One ceiling light grid wire per exit light/emergency light.

3.10 Emergency lighting shall be stand alone light fixtures (per listed standard).

3.11 No dimming capability will be added other than what is manually operated by moving dip switches on the fixtures themselves.

3.12 Exterior fixtures, attached to the building, shall be sealed on the top and sides of the fixture from water intrusion between the building and the fixture.

3.13 Exterior fixtures shall not be fed by MC cable. ½” flexible metal conduit, ½” EMT minimum.

3.14 Installations shall meet or exceed the most recently adopted NEC and IBC code books corelating to the city the installation is in.

CONTRACTOR SELECT™

LITHONIA LIGHTING

Catalog Number	
Notes	
Type	

Contractor Select™

CPX™

LED Panel

CPX™ from Lithonia lighting is the perfect choice for a quality LED panel at an affordable price. The smooth, even lens projects a crisp and clean aesthetic. CPX is the perfect choice for budget-conscious school, commercial office, or small retail footprint projects.

FEATURES:

- Industry standard wattages
- Long-life LEDs maintain greater than 70% of their lumen output at 50,000 hours
- 0-10V dimming driver, dims to 10%

WEIGHT:

2x2
Unit: 6.39lbs
Unit Carton: 7.72lbs
Master Carton: 30.42lbs

2x4
Unit: 11.02lbs
Unit Carton: 13.89lbs
Master Carton: 27.78lbs

DLC LISTED · NSF · NOM · SWITCHABLE WHITE 3500K 4000K 5000K · ISO Class 5-9 · Switchable Lumens · IC RATED · IP RATED · LED

Catalog Number	UPC	Description	Lumens	Input Watts	CCT	CRI	Voltage	Pallet qty.
CPX 2X2 3200LM 35K M4	191848338537	2x2 LED Panel	3555	31.5	3500K	80	120-277V	40
CPX 2X2 3200LM 40K M4	191848338650	2x2 LED Panel	3659	31.5	4000K	80	120-277V	40
CPX 2X2 3200LM 50K M4	193048313642	2x2 LED Panel	3737	31.5	5000K	80	120-277V	40
CPX 2X4 4000LM 35K M2	191848338490	2x4 LED Panel	4543	38.9	3500K	80	120-277V	20
CPX 2x4 4000LM 40K M2	191848338506	2x4 LED Panel	4692	38.9	4000K	80	120-277V	20
CPX 2X4 4000LM 50K M2	193048313680	2x4 LED Panel	4766	38.9	5000K	80	120-277V	20
CPX 1X4 ALO7 SWW7 M4	194994568063	1X4 Switchable Panel	See Switchable Table	See Switchable Table	3500K/4000K/5000K	>80	120-277V	40
CPX 2X2 ALO7 SWW7 M4	193048542806	2X2 Switchable Panel	See Switchable Table	See Switchable Table	3500K/4000K/5000K	>80	120-277V	40
CPX 2X4 ALO8 SWW7 M2	193048542844	2X4 Switchable Panel	See Switchable Table	See Switchable Table	3500K/4000K/5000K	>80	120-277V	20

NOTES

1. ILBLP CP10 HE SD A remote mounted only. See ILBLP CP10 HE SD B spec sheet and ELA-PSMK-PSMKSD-PSDMT-PSRME remote mounting enclosure spec sheet here.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING

Accessories: *Order as separate catalog number.*

ILBLP CP10 HE SD A	IOTA 10 Watt Constant Power, High Efficiency LED Emergency Driver for CA Title 20 [1]
DGA14	Drywall grid adapter for 1X4 recessed fixture.
DGA22	Drywall grid adapter for 2x2 recessed fixture.
DGA24	Drywall grid adapter for 2x4 recessed fixture.
1X4SMKSH	Multi-Use Surface Mount Kit 1X4, Shallow Depth
2X2SMKSH	Multi-Use Surface Mount Kit 2x2, Shallow Depth
2X4SMKSH	Multi-Use Surface Mount Kit 2x4, Shallow Depth
1X4SMKSHP PAF	Multi-Use Surface Mount Kit 1X4 Post-Paint
2X2SMKSHP PAF	Multi-Use Surface Mount Kit 2X2 Post-Paint
2X4SMKSHP PAF	Multi-Use Surface Mount Kit 2X4 Post-Paint
PAC 2DNF 36	Panel Air Craft Kit, 2 cables with Y splitter, No Power Feed, 36 inches. Recommended for 1X4 or 2X2 Panel Fixtures only.
PAC 2DF 36	Panel Air Craft Kit, 2 cables with Y splitter, with Power Feed, 36 inches. Recommended for 1X4 or 2X2 Panel Fixtures only. [1]
PAC 4DNF 36	Panel Air Craft Kit, 4 cables, No Power Feed, 36 inches. Recommended for 2X4, 1X4 or 2X2 Panel Fixtures.
PAC 4DF 36	Panel Air Craft Kit, 4 cables, with Power Feed, 36 inches. Recommended for 2X4, 1X4 or 2X2 Panel Fixtures. [1]
PAC 2DNF 72	Panel Air Craft Kit, 2 cables with Y splitter, No Power Feed 72 inches. Recommended for 1X4 or 2X2 Panel Fixtures only.
PAC 2DF 72	Panel Air Craft Kit, 2 cables with Y splitter, with Power Feed, 72 inches. Recommended for 1X4 or 2X2 Panel Fixtures only. [1]
PAC 4DNF 72	Panel Air Craft Kit, 4 cables, No Power Feed, 72 inches. Recommended for 2X4, 1X4 or 2X2 Panel Fixtures.
PAC 4DF 72	Panel Air Craft Kit, 4 cables, with Power Feed, 72 inches. Recommended for 2X4, 1X4 or 2X2 Panel Fixtures. [1]
RK8BDP 2P U	Disconnect Plug (BDP), 2 Pole, Package of 1
RK8BDP 3P U	Disconnect Plug (BDP), 3 Pole, Package of 1
RK8BDP 2P J10	Disconnect Plug (BDP), 2 Pole, Package of 10
RK8BDP 2P J40	Disconnect Plug (BDP), 2 Pole, Package of 40

Switchable Table

Size(ft)	Nomenclature	Lumen Package	CCT	Lumen	Wattage	Efficacy
1x4	CPX 1X4 AL07 SWW7 M4	Low Lumen	3500K	2430	19.7	123.4
			4000K	2594	19.7	131.7
			5000K	2483	19.5	127.3
		Med Lumen	3500K	3289	28.4	115.8
			4000K	3583	27.2	131.7
			5000K	3369	28.2	119.5
		High Lumen	3500K	3914	35.7	109.6
			4000K	4280	33.7	127
			5000K	4009	35.5	112.9
2x2	CPX 2X2 AL07 SWW7 M4	Low Lumen	3500K	2399	19.1	125.6
			4000K	2570	18.5	138.9
			5000K	2456	19.1	128.6
		Med Lumen	3500K	3356	28.7	116.9
			4000K	3649	27.5	132.7
			5000K	3427	28.5	120.2
		High Lumen	3500K	4131	37.5	110.2
			4000K	4564	35.8	127.5
			5000K	4212	37.3	112.9
2x4	CPX 2X4 AL08 SWW7 M2	Low Lumen	3500K	3813	28.94	131.8
			4000K	4033	28.1	143.5
			5000K	3938	28.86	136.5
		Med Lumen	3500K	4677	36.8	127.1
			4000K	5009	35.55	140.9
			5000K	4834	36.65	131.9
		High Lumen	3500K	6048	50.56	119.6
			4000K	6563	48.53	135.2
			5000K	6241	50.24	124.2

NOTES

1. For MVOLT only, not available with 347V.

CONTRACTOR SELECT™

LITHONIA LIGHTING

Specifications

INTENDED USE:

CPX is a low-glare panel featuring an external driver. This cost-effective, reliable panel is visually comfortable and can be recessed mounted. Suitable for many applications such as schools, offices, retail, convenience stores and other commercial spaces. **Certain airborne contaminants can diminish integrity of acrylic. Click here for Acrylic Environmental Compatibility table for suitable uses.** Adjustable Lumen (ALO7, ALO8) and Switchable White (SWW7) configurations available. **U.S. Patent No. 10,681,784.**

CONSTRUCTION:

The extruded aluminum frame with satin white lens provides excellent shielding and uniform luminance. The low-profile design of CPX provides increased installation flexibility especially in restricted plenum spaces. The backplate includes integral T-bar clips for installation into T-grid ceilings.

ELECTRICAL:

Long-life LEDs, coupled with a high-efficiency driver, provide superior illumination for extended service life. Greater than 70% LED lumen maintenance at 50,000 hours (L70>50,000). 0-10V dimming driver, dims to 10% and contains non-isolated dimming leads.

LISTINGS:

CSA certified to meet US and Canadian standards. Damp location listed. IC rated. IP5X Rated. DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified. Rated for NSF/ANSI Standard 2 - Light Fixture for Splash Zone and Non Food Zone. NOM Certified.

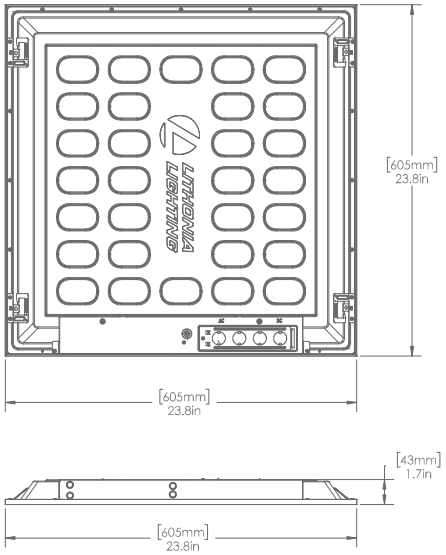
WARRANTY:

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

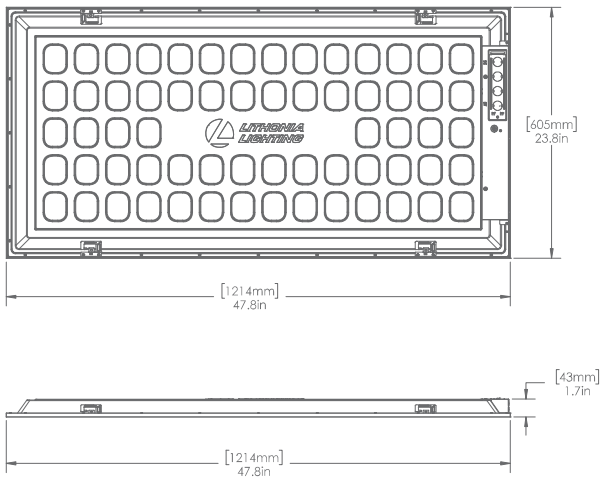
Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Dimensions

2'x2'



2'x4'



All dimensions are inches (millimeters) unless otherwise indicated.

CONTRACTOR SELECT™

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

Contractor Select™

ECRG

Lithonia Lighting Basics™ Emergency Light/Exit Combo

The Lithonia Lighting® ECRG, is a combination of exit and emergency lighting. The ECRG is ideal for safely illuminating the path of egress above-the-door in small spaces at lower mounting heights while providing 90 minutes of emergency power. Available in red and green letters.

FEATURES:

- Internal toggle switch for red or green exit
- Test switch and status indicator
- UL indoor damp location 50°F to 104°F (10°C to 40°C) listed standard
- ECRG RD: multi-voltage 120-277V, 50/60Hz
- ECRG SQ: dual-voltage 120/277, 60Hz

CERTIFIED IN TITLE 20 †

UL CERTIFIED

FC

† Exit Signs Certified in the CA Title 20 Appliance Efficiency Database.

Catalog Number	UPC	Description	Supply Voltage	Input Wattage		Input Amps		Pallet Qty	Carton Qty
				120	277	120	277		
ECRG RD M6	00194994900412	Red/Green LED Exit/Unit Combo, Round Lamp Heads	120-277V	2W	2W	.03	.02	360	6
ECRG HO RD M6	00194994900429	Red/Green LED Exit/Unit Combo with remote capacity, Round Lamp Heads	120-277V	2.8W	2.8W	.05	.03	360	6
ECRG SQ M6	00194994900467	Red/Green LED Exit/Unit Combo, Square Lamp Heads	120/277V	3.5W	3.5W	.03	.02	360	6
ECRG HO SQ M6	00194994900504	Red/Green LED Exit/Unit Combo with remote capacity, Square Lamp Heads	120/277	4W	4W	.03	.02	360	6

Battery Capacity and Loading (HO only)

Battery	Total Capacity	Maximum# Remote Lamp Heads*
3.6V	2W (ECRG RD)	2 - ERE W SGL RD M24
		1 - ERE W T RD M24
		2 - ERE GY SGL WP RD M12
		1 - ERE GY T WP RD M12
	3W (ECRG SQ)	3 - ERE GY SGL WP SQ M12
		1 - ERE GY T WP SQ M12

* Remotes are in addition to the lamp heads on the product.

Accessories: *Order as separate catalog number.*

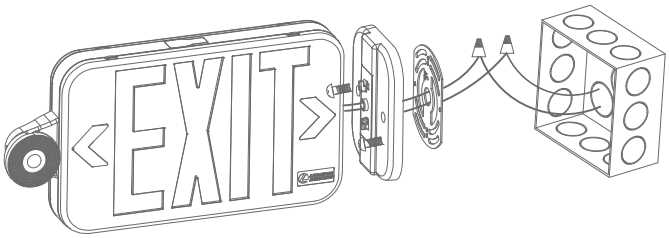
ERE W SGL RD	Single, LED indoor remote head, round, ivory white, .75W, 3.6V input. See spec sheet ERE.[1]
ERE W T RD	Twin, LED indoor remote head, round, ivory white, 1.5W, 3.6V input. See spec sheet ERE.[1]
ERE GY SGL WP RD	Single, LED weather-proof head, round, gray,0.75W, 3.6V input. See spec sheet ERE.[1]
ERE GY T WP RD	Twin, LED weather-proof head, round, gray, 1.5W, 3.6V input. See spec sheet ERE.[1]
ERE GY SGL WP SQ	Single, LED weather-proof remote head, square, gray, 1W, 3.6V-12V voltage sensing. See spec sheet ERE.[1]
ERE GY T WP SQ	Twin, weather-proof, remote head, square, gray, 2W, 3.6V-12V voltage sensing. See spec sheet ERE.[1]
ELA WG3	Wireguard (back mount), 30 5/8"W x 13 3/4"H x 6"D. See spec sheet ELA-WG.

1 Only available with HO option.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING®

ECRG side/end mount example



Dimensions

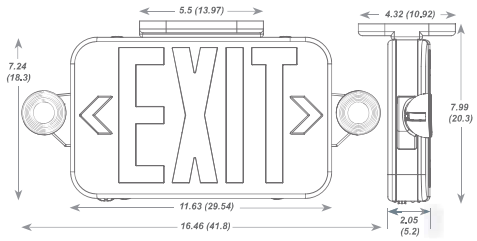
ECRG RD

Length:
16.46 (41.8)

Depth:
2.05 (5.2)

Height:
7.24 (18.3)

Weight:
RD - 1.9 (0.86kgs)
HO RD - 1.95 (0.88kgs)



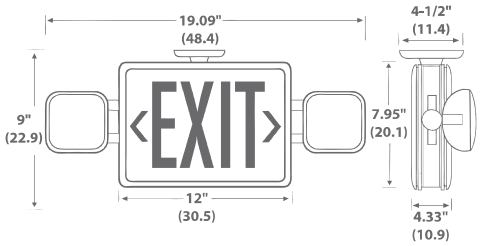
ECRG SQ

Length:
19.09 (48.4)

Depth:
4.33 (10.9)

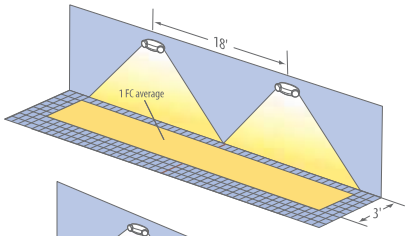
Height:
7.95 (20.1)

Weight:
SQ - 3.09 lbs. (1.40kgs)
HO SQ - 3.25 lbs (1.47kgs)

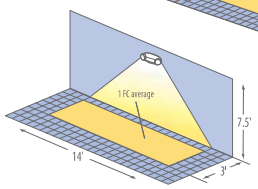


All dimensions are inches (centimeters) unless otherwise indicated.

ECRG RD

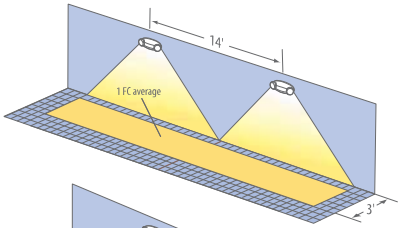


Example of multiple ECRG RD luminaires illuminating a 3' path of egress.

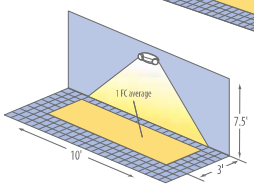


Example of single ECRG RD illuminating a 3' path of egress.

ECRG SQ



Example of multiple ECRG SQ luminaires illuminating a 3' path of egress.



Example of single ECRG SQ illuminating a 3' path of egress.

Spacing guidelines

Maximum Spacing Guidelines[1]							
Series	Mounting Height	Illumination Level	Single Luminaire		Multiple Luminaires		Application Notes
			3' Path of Egress	6' Path of Egress	3' Path of Egress	6' Path of Egress	
ECRG RD	7.5'	1FC Avg	14'	10'	18'	14'	"100' Corridor 8' wide, and 9' high with 80/50/20 reflectances"
ECRG SQ	7.5'	1FC Avg	10'	6'	14'	11'	

Notes:
1. Also meets the additional illumination requirements of NFPA 101: 1FC minimum and max/min ratio of 40:1.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING®

Specifications

INTENDED USE:
Provides a minimum of 90 minutes illumination for the rated wattage upon loss of AC power to meet code required emergency lighting. Ideal for applications requiring low profile, emergency unit for lower mounting heights. The ECRG has an internal switch that ships standard as a red emergency light/exit combo and can be switched in the field to green. It is also packaged standard with an extra faceplate along with red and green inserts.

CONSTRUCTION:
The housing is a standard white thermoplastic with a compact and low-profile design with all-inclusive lamp, reflector and lens assembly. It is 5VA flame rated and impact-resistant.

OPTICS:
The typical life of the LED is 10 years.

ECRG is 0.75W white LED per lamp head

ECRG SQ is 1W LED per lamp head.

CRI: RD 80CRI
SQ 75CRI

CCT: RD 6200K
SQ 6200K

Lumen: RD 85 lumens
SQ 113 lumens

ELECTRICAL:
ECRG RD: multi-voltage 120-277V, 50/60Hz.

ECRG SQ: dual-voltage 120/277, 60Hz.

Bi-color LED status indicator for battery condition. (Green-normal, Red-check battery).

ECRG HO RD has 2W of remote capacity and ECRG HO SQ has 3W of remote capacity.

BATTERY: 3.6V maintenance-free, rechargeable, Nickel metal hydride.

INSTALLATION:
ECRG RD: Top, end and back mount.

ECRG SQ: Top, end and back mount.

Mounting pattern on canopy (top and side mount) and back plate (back mount) fits most standard size junction boxes.

LISTINGS:
UL Listed. Meets all applicable requirements for UL 924, NFPA 101 (current Life Safety Code), NFPA 70 (NEC), FCC Title 47, Part 15, Subpart B and OSHA.

Indoor damp location 50°F to 104°F (10°C to 40°C) listed.

WARRANTY:
2-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

CONTRACTOR SELECT™

LITHONIA LIGHTING

Catalog Number	
Notes	
Type	

Contractor Select™

EXRG

Lithonia Lighting Basics™ LED Exit

The Lithonia Lighting Basics™ EXRG Exit Sign is suitable for emergency signage applications such as stairways and hallways. This fully assembled single-face exit with extra faceplate is available in red and green letters. It's low profile makes it ideal for safely illuminated the path of egress in small spaces and can be wall or ceiling mounted. The emergency power provides 90 minutes of illumination in the event of a power loss.

FEATURES:

- Internal toggle switch for red or green letter color selection
- Test switch and status indicator for low maintenance (EL emergency models only)
- UL indoor damp location 50° to 104°F (10°C to 40°C) listed standard
- For use with Dual voltage 120/277VAC
- Internal switch for color selection

CERTIFIED IN TITLE 20 †

† Exit Signs Certified in the CA Title 20 Appliance Efficiency Database.

Catalog Number	UPC	Description	Supply Voltage	Input Wattage		Input Amps		Pallet Qty	Carton Qty
				120	277	120	277		
EXRG M6	00194994900658	Red/Green Exit, AC Only	120/277	1W	1W	0.09	0.09	360	6
EXRG EL M6	00194994900696	Red/Green Exit with Ni-MH backup battery	120/277	1W	1W	0.09	0.09	360	6

Accessories[1]: *Order as separate catalog number.*	
ELA WG1	Wireguard (back mount only, 13 3/4"H x 15 1/4"W x 6"D)

NOTES

1. See spec sheet ELA-WG for more information.

CONTRACTOR SELECT™

LITHONIA LIGHTING®

Specifications

INTENDED USE:
LED lighted exit signs for marking the means of egress in accordance with Life Safety Code NFPA 101. The EXRG has an internal switch that ships standard as a red exit and can be switched in the field to green. It is also packaged standard with an extra faceplate along with red and green inserts.

CONSTRUCTION:
Injection-molded, flame-retardant, high-impact, thermoplastic housing with snap-fit design components for easy installation. Universal J-box pattern. Universal chevrons are easily removed for directional indication.

Fully assembled single face with extra faceplate for easy field-conversion to double face.

Letters 6" high with 3/4" stroke, with 100 ft viewing distance rating, based on UL924 standards.

OPTICS:
The typical life of the LED lamp is 10 years.

ELECTRICAL:
Dual-voltage input 120V or 277V AC. Non-emergency (AC only without battery) or Emergency exit with battery. The emergency model includes the test switch, status indicator and rechargeable battery.

Battery: (EL models) maintenance-free Nickel metal hydride battery provides 90 minutes of emergency power.

INSTALLATION:
Top, back or end mounting capability (canopy included).

LISTINGS:
UL Listed. Meets UL 924, NFPA 101 (current Life Safety Code) , NFPA 70-NEC, FCC Title 47, Part 15, Subpart B and OSHA illumination standards. Indoor damp location 50° to 104°F (10°C to 40°C) listed standard.

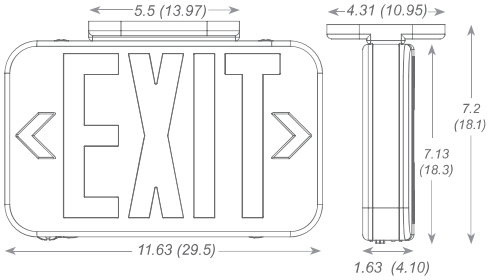
WARRANTY:
2-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at:
www.acuitybrands.com/support/warranty/terms-and-conditions

All life safety equipment, including emergency lighting for path of egress must be maintained, serviced, and tested in accordance with all National Fire Protection Association (NFPA) and local codes. Failure to perform the required maintenance, service, or testing could jeopardize the safety of occupants and will void all warranties.

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Dimensions

Length: 11.63 (29.5)
Depth: 1.63 (4.1)
Height: 7.2 (18.3)
Weight: EL: 1.6 LB
AC: 1.59 LB



All dimensions are inches (centimeters) unless otherwise indicated.

CONTRACTOR SELECT™

LITHONIA LIGHTING

Catalog Number	
Notes	
Type	

Contractor Select™

ELM2L

Quantum® Contemporary Commercial LED Emergency Light

The Lithonia Lighting® Quantum® ELM2L Emergency Light is suitable for emergency lighting for applications such as stairways and hallways. Its high performance LED lamp heads makes the ELM2L ideal for safely illuminating the path of egress for applications requiring attractive LED unit equipment with quick installation and unparalleled performance for lower mounting heights. It can be wall or ceiling mounted and will provide 90 minutes of emergency power in the case of power loss.

UL LISTED

FEATURES:

- Test switch and status indicator
- UL indoor damp location 50°F to 104°F (10°C to 40°C) listed standard

† Small Battery Chargers Certified in the CA Title 20 Appliance Efficiency Database.

Catalog Number	UPC	Description	Supply Voltage	Input Wattage		Input Amps		Pallet Qty	Carton Qty
				120	277	120	277		
ELM2L M12	191848091920	Quantum® LED Adjustable Optics 220 Lumens, 2.4W, Emergency Light, White housing, Nickel-cadmium battery	120/277V, 60hz	1.09	1.09	0.018	0.018	432	12
ELM2L UVOLT LTP M12	191848078112	Quantum® LED Adjustable Optics 220 Lumens, 2.4W, Emergency Light, White housing, Lithium Iron Phosphate Battery, Remote capacity	120-347V, 50/60Hz	1.35	1.35	0.022	0.022	432	12

Battery Capacity and Loading (ELM2L UVOLT LTP M12 Only)

Battery	Total Capacity	Maximum# Remote Lamp Heads*
9.6V	4.8W	2- ELMRE LP220L SGL M12
		1- ELMRE LP220L T M12
		1 - ELMRE LP220L FXO
		2 - ERE GY SGL WP SQ M12
		1 - ELA QWP L0309
		1 - ERE GY T WP SQ M12

* Remotes are in addition to the lamp heads on the product.

Accessories: *Order as separate catalog number.*

ELA WG1	Wireguard 15-1/4" W x 13-3/4" H x 6" D (back mount only). See spec sheet ELA-WG.
WPVS SML W	Wet protective vandal shield (must be used for wet location applications)

CONTRACTOR SELECT™

LITHONIA LIGHTING®

Specifications

INTENDED USE:
Provides a minimum of 90 minutes illumination for the rated wattage upon loss of AC power to meet and exceed code required emergency lighting. Ideal for applications requiring attractive LED unit equipment with quick installation and unparalleled performance for lower mounting heights.

CONSTRUCTION:
The housing is a standard white thermoplastic with a compact and low-profile contemporary design. It is 5VA flame rated, impact-resistant, scratch-resistant and corrosion proof. The UV-stable resin resists discoloration from natural and man-made light sources. The back-plate contains a universal j-box mounting pattern to facilitate ease of installation on a wide variety of j-boxes and the front housing allows tool-less access for ease of maintenance.

OPTICS:
The typical life of the LED is 10 years. Two 1.2W LED Lamps.

ELECTRICAL:
Orderable in multiple voltages. Emergency unit provided with test switch, status indicator and rechargeable battery. Sealed, maintenance-free nickel-cadmium or Lithium Iron Phosphate battery provides at least 90 minutes of emergency power.

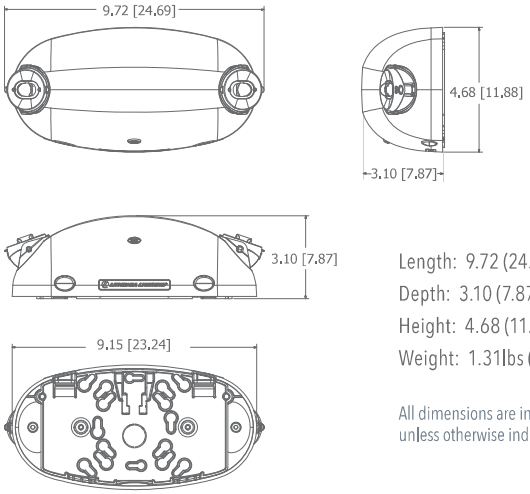
INSTALLATION:
Wall and ceiling mount. Tool-less removal of front cover from back-plate for ease of installation and maintenance.

LISTINGS:
UL damp location listed standard and wet location listed when used with the WPVS accessory, all at 50-104°F (10-40°C). Meets or exceeds all applicable requirements for UL 924, NFPA 101 (current Life Safety Code), NFPA 70 (NEC), NOM (Norma Oficial Mexicana), California Energy Commission Title 20 section 1605.3 (W)(4), FCC Title 47, Part 15, Subpart B and OSHA. List and labeled to comply with Canadian Standards C22.2 No. 141-10.

WARRANTY:
5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at:
www.acuitybrands.com/support/customer-support/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Dimensions



Length: 9.72 (24.69)
Depth: 3.10 (7.87)
Height: 4.68 (11.88)
Weight: 1.31lbs (0.59kg)

All dimensions are inches (centimeters) unless otherwise indicated.

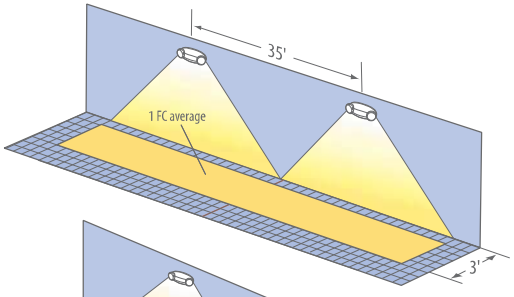
Spacing guidelines

Maximum Spacing Guidelines — ELM2L

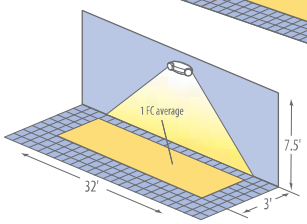
Mounting Height	Illumination Level	Single Luminaire Coverage		Multiple Luminaire Spacing		Application Notes
		3' Path of Egress	6' Path of Egress	3' Path of Egress	6' Path of Egress	
7.5'	1FC Avg [1]	32'	24'	35'	28'	100' Corridor, 8' wide, and 12' high with 80/50/20 reflectances
10'	1FC Avg [1]	20'	14'	27'	23'	

Notes:
1. Also meets the additional illumination requirements of NFPA 101: 1FC minimum and max/min ratio of 40:1.

*Note: To see complete photometric report or download the .ies file for this product, visit Lithonia Lighting ELM2L home page.



Example of multiple ELM2L luminaires illuminating a 3' path of egress.



Example of single ELM2L illuminating a 3' path of egress.

* Application image examples are using LP220L lamp.

Performance Downlight
Field-Adjustable

RAB

6"

FIELD ADJUSTABLE

9W/12W | 14W/18W | 7W/10W/18W

8"

FIELD ADJUSTABLE

9.5"

FIELD ADJUSTABLE

CLASSIFIED UL | AIRTIGHT HOUSING | ENERGY STAR | FC

UL LISTED | WET RATED | IC RATED | 2016 TITLE 24 PART 6

Project:	Type:
Prepared by:	Date:

Features

- High Performance LEDs for commercial applications
- Replacement for traditional Compact Fluorescent recessed downlights
- Compatible with new construction or retrofit installations
- UL wet and Energy Star rated
- Meets air-tight requirements
- Lumen and CCT Selectable
- Matte white smooth trim finish
- Available in 3 CCTs: 3000K, 3500K, 4000K
- 0-10V dimmable
- Spring loaded retention clips
- 5-Year, No-Compromise Warranty

Technical Specifications

CCT and Lumen Selectable:
Choose lumen output and color temperature before installation with integrated switch

UL Listed & UL Classified
Suitable for wet locations

Energy Star V2.2:
This product is Energy Star® Version 2.2 Certified.

California Title 24:
Can be used to conform with the requirements of California Title 24 Part 6

Dimming Driver:
Driver includes dimming control wiring for 0-10V dimming systems. Requires seperate 0-10V DC dimming circuit. Dims as low as 10%

Input Voltage:
120V through 277V

Operating Frequency:
50/60Hz

Lifespan:
50,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations

LEDs:
Long-life, high-efficacy surface-mount LEDs

R9 Value:
High color performance with R9 greater than or equal to 50

Flicker:
Silent and flicker free operations of less than 30%

IC Rated:
Suitable for direct contact with insulation

Air Tight:
Housing certified Air Tight as per ASTM E283

Trim:
Smooth Trim

Housing:
Constructed from durable steel sheet metal

Maximum Ambient Temperature:
Suitable for use in 40˚C (104˚F)

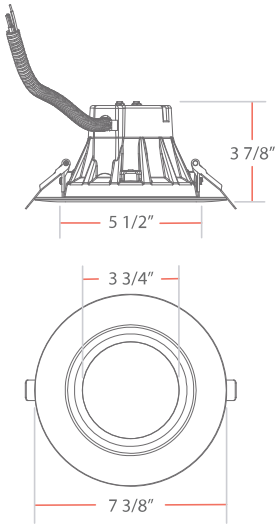
Finish:
Matte White

Dimensions

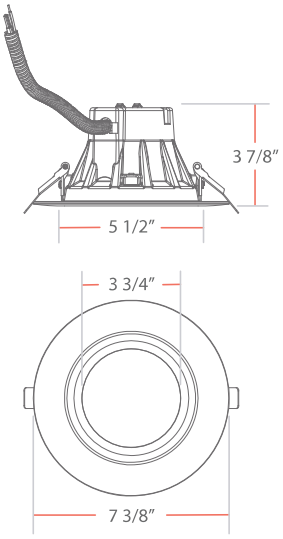
RAB

6"

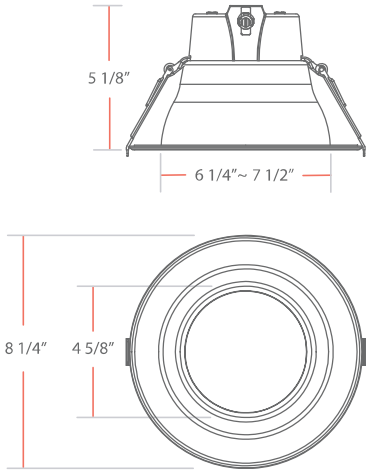
9/12W



14/18W

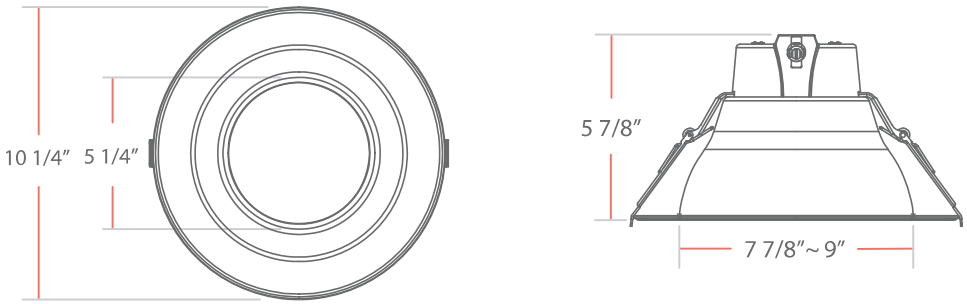


7/10/18W



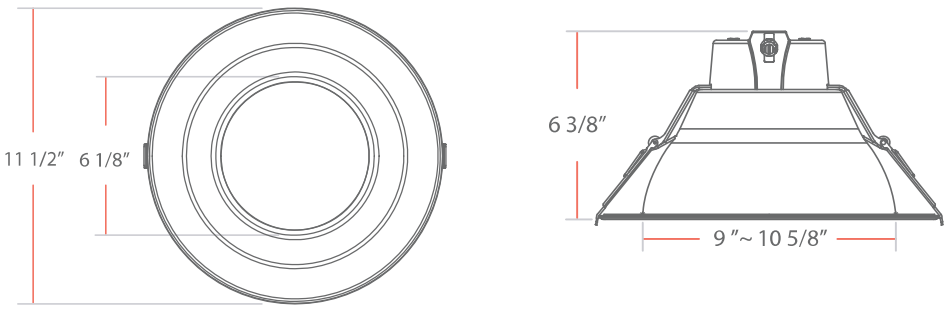
8"

10/15/22W



9.5"

10/15/22W



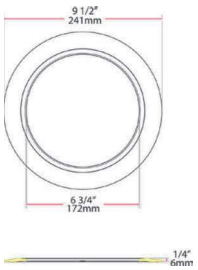
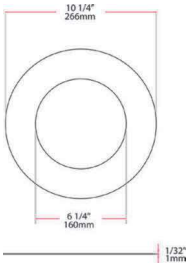
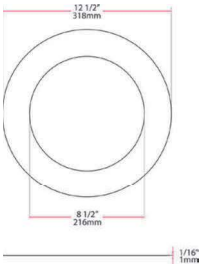
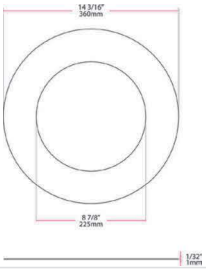
Performance

RAB

2 Lumen Output	Size	Wattage	Lumens	Efficacy (lm/W)	Color Accuracy (CRI)
C6R9/129FAUNVW 3000K 3500K 4000K	6"	9/12	700 lm 900 lm	78	90
C6R14/189FAUNVW 3000K 3500K 4000K	6"	14/18	1200 lm 1500 lm	86	90
3 Lumen Output	**Size**	**Wattage**	**Lumens**	**Efficacy (lm/W)**	**Color Accuracy (CRI)**
C6R7/10/189FAUNVW 3000K 3500K 4000K	6"	7/10/18	700 lm 1000 lm 1500 lm	100	90
C8R10/15/229FAUNVW 3000K 3500K 4000K	8"	10/15/22	1000 lm 1500 lm 2000 lm	100	90
C9.5R20/25/329FAUNVW 3000K 3500K 4000K	9.5"	20/25/32	2000 lm 2500 lm 3000 lm	100	90

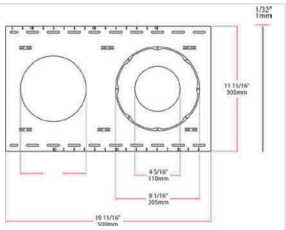
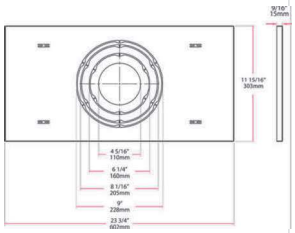
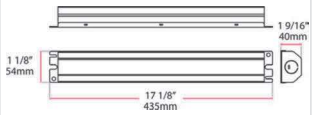
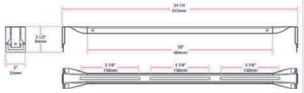
Accessories

RAB

Images	SKU Number	Description	Construction	Dimensions	Case Qty
Goof Rings - Plastic					
	**DL6-8GOOF/R/P**	6" Goof Ring for 6" Downlight - 2 Lumen Output Models	Robust Polycarbonate construction. Matte White Finish		
Goof Rings - Metal					
	**DL8-10GOOF/R/M**	10" Goof Ring for 8" Downlight - 3 Lumen Output Model	High-quality steel construction White powder coat finish		
	**DL10-12GOOF/R/M**	12" Goof Ring for 9.5" Downlight - 3 Lumen Output Model	High-quality steel construction White powder coat finish		
	**DL12-14GOOF/R/M**	12" Goof Ring for 9.5" Downlight - 3 Lumen Output Model	High-quality steel construction White powder coat finish		

Accessories

RAB

Mounting Plates					
	**DLPLATE/SJ**	New Construction Plate for Stud/ Joist mounting for use with 4", 6" smooth and baffle models	Sturdy galvanized steel construction		10
	**DLPLATE/T**	New Construction or Remodel Plate for T-Grid ceilings for use with 4", 6" smooth and baffle models	Sturdy galvanized steel construction		10
Emergency Driver					
	**DRI-25-EMGR-DC**	Emergency Driver	Sturdy galvanized steel construction		4
	**BRACKET_TG_DRI**	T-Grid bracket for Emergency Driver	Sturdy galvanized steel construction		12

Ordering Matrix

RAB

Product	Size	Shape	Wattage	CRI/Color Temp	Voltage	Finish
C		R		9FA	UNV	W
	6 6" **8** 8" **9.5** 9.5"	**R** Round	**700lm-1500lm** 7/10/18 **700lm-900lm** 9/12 **1000lm-2000lm** 10/15/22 **1200lm-1500lm** 14/18 **2000lm-3000lm** 20/25/32	9FA **90 CRI, Field Adjustable**	**120-277V** UNV	**W** White

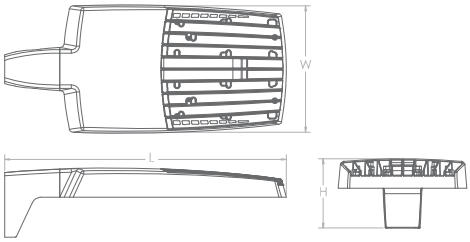
RSX2 LED
Area Luminaire

Catalog Number	RSX2 LED P6 40K SPA FAO DDBXD
Notes	
Type	

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

EPA (ft²@0°):	0.69 ft² (0.06 m²)
Length:	29.3" (74.4 cm) (SPA mount)
Width:	13.4" (34.0 cm)
Height:	3.0" (7.6 cm) Main Body 7.2" (18.3 cm) Arm
Weight: (SPA mount)	30.0 lbs (13.6 kg)



Introduction

The new RSX LED Area family delivers maximum value by providing significant energy savings, long life and outstanding photometric performance at an affordable price. The RSX2 delivers 11,000 to 31,000 lumens allowing it to replace 250W to 1000W HID luminaires.

The RSX features an integral universal mounting mechanism that allows the luminaire to be mounted on most existing drill hole patterns. This "no-drill" solution provides significant labor savings. An easy-access door on the bottom of mounting arm allows for wiring without opening the electrical compartment. A mast arm adaptor, adjustable integral slipfitter and other mounting configurations are available.

Ordering Information

EXAMPLE: RSX2 LED P6 40K R3 MVOLT SPA DDBXD

RSX2 LED	P6	40K	R5	MVOLT	SPA
Series	**Performance Package**	**Color Temperature**	**Distribution**	**Voltage**	**Mounting**
RSX2 LED	P1	30K 3000K	R2 Type 2 Wide	MVOLT (120V-277V) [2]	SPA Square pole mounting (3.0" min. SQ pole for 1 at 90°, 3.5" min. SQ pole for 2, 3, 4 at 90°)
	P2	40K 4000K	R3 Type 3 Wide	HVOLT (347V-480V) [3]	RPA Round pole mounting (3.2" min. dia. RND pole for 2, 3, 4 at 90°, 3.0" min. dia. RND pole for 1 at 90°, 2 at 180°, 3 at 120°)
	P3	50K 5000K	R3S Type 3 Short	XVOLT (277V-480V) [4]	MA Mast arm adaptor (fits 2-3/8" OD horizontal tenon)
	P4		R4 Type 4 Wide	**(use specific voltage for options as noted)**	IS Adjustable slipfitter (fits 2-3/8" OD tenon) [6]
	P5		R4S Type 4 Short	120 [3] 277 [5]	WBA Wall bracket [1]
	P6		R5 Type 5 Wide [1]	208 [3] 347 [5]	WBASC Wall bracket with surface conduit box
			R5S Type 5 Short [1]	240 [3] 480 [5]	AASP Adjustable tilt arm square pole mounting [6]
			AFR Automotive Front Row		AARP Adjustable tilt arm round pole mounting [6]
			AFRR90 Automotive Front Row Right Rotated		AAWB Adjustable tilt arm with wall bracket [6]
			AFRL90 Automotive Front Row Left Rotated		AAWSC Adjustable tilt arm wall bracket and surface conduit box [6]

FAO

Options

Shipped Installed

HS	House-side shield [7]
PE	Photocontrol, button style [8,9]
PEX	Photocontrol external threaded, adjustable [9,10]
PER7	Seven-wire twist-lock receptacle only (no controls) [9,11,12,13]
CE34	Conduit entry 3/4" NPT (Qty 2)
SF	Single fuse (120, 277, 347) [5]
DF	Double fuse (208, 240, 480) [5]
SPD20KV	20KV Surge pack (10KV standard)
FAO	Field adjustable output [9,13]
DMG	0-10V dimming extend out back of housing for external control (control ordered separate) [9,13]
DS	Dual switching [9,14]

Shipped Installed

***Standalone and Networked Sensors/Controls (factory default settings, see table page 9)**

NLTAIR2	nLight AIR generation 2 [13,15,16]
PIRHN	Networked, Bi-Level motion/ambient sensor (for use with NLTAIR2) [13,14,17]

*Note: PIRHN with nLight Air can be used as a standalone dimming sensor with out-of-box settings or as a wireless networked solution. See factory default settings table. Sensor coverage pattern is affected when luminaire is tilted.

Shipped Separately (requires some field assembly)

EGS	External glare shield [6]
EGFV	External glare full visor (360° around light aperture) [7]
BS	Bird spikes [18]

DDBXD

Finish

DDBXD	Dark Bronze
DBLXD	Black
DNAXD	Natural Aluminum
DWHXD	White
DDBTXD	Textured Dark Bronze
DBLBXD	Textured Black
DNATXD	Textured Natural Aluminum
DWHGXD	Textured White

Ordering Information

Accessories

Ordered and shipped separately.

RSX2HS	RSX2 House side shield (includes 2 shields)
RSX2EGS (FINISH) U	External glare shield (specify finish)
RSX2HSAFRR (FINISH) U	RSX2 House side shields for AFR rotated optics (includes 2 shields)
RSX2EGFV (FINISH) U	External glare full visor (specify finish)
RSXRPA (FINISH) U	RSX Universal round pole adaptor plate (specify finish)
RSXWBA (FINISH) U	RSX WBA wall bracket (specify finish) [1]
RSXSCB (FINISH) U	RSX Surface conduit box (specify finish, for use with WBA, WBA not included)
DLL127F 1.5 JU	Photocell -SSL twist-lock (120-277V) [19]
DLL347F 1.5 CUL JU	Photocell -SSL twist-lock (347V) [19]
DLL480F 1.5 CUL JU	Photocell -SSL twist-lock (480V) [19]
DSHORT SBK U	Shorting cap [19]

NOTES

1. Any Type 5 distribution, is not available with WBA.
2. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
3. HVOLT driver operates on any line voltage from 347-480V (50/60 Hz).
4. XVOLT driver not available with P1. XVOLT driver operates on any line voltage from 277V-480V (50/60 Hz). XVOLT not available with fusing (SF or DF) and not available with PE or PEX.
5. Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V.
6. Maximum tilt is 90° above horizontal.
7. It may be ordered as an accessory.
8. Requires MVOLT or 347V.
9. Not available in combination with other light sensing control options (following options cannot be combined: PE, PEX, PER7, FAO, DMG, DS, PIRHN).
10. Requires 120V, 208V, 240V, or 277V.
11. Twistlock photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Shorting Cap included. Dimming leads capped for future use.
12. For units with option PER7, the mounting must be restricted to +/- 45° from horizontal aim per ANSI C136.10-2010.
13. Two or more of the following options cannot be combined including DMG, DS, PER7, FAO and PIRHN.
14. DS only available on performance package P5 and P6.
15. Must be ordered with PIRHN.
16. Requires MVOLT or HVOLT.
17. Must be ordered with NLTAIR2. For additional information on PIRHN visit here.
18. Must be ordered with fixture for factory pre-drilling.
19. Requires luminaire to be specified with PER7 option. Ordered and shipped as a separate line item from Acuity Brands Controls.

External Shields

House Side Shield

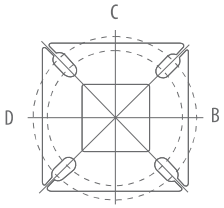
External Glare Shield

External 360 Full Visor

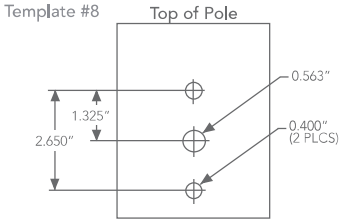
Pole/Mounting Informatiion

Accessories including bullhorns, cross arms and other adpaters are available under the accessories tab at Lithonia's Outdoor Poles and Arms product page. Click here to visit Accessories.

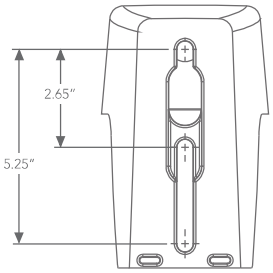
HANDHOLE ORIENTATION



RSX POLE DRILLING



RSX STANDARD ARM & ADJUSTABLE ARM



Round Tenon Mount - Pole Top Slipfitters

Tenon O.D.	RSX Mounting	Single	2 at 180°	2 at 90°	3 at 120°	3 at 90°	4 at 90°
2-3/8"	RPA, AARP	AS3-5 190	AS3-5 280	AS3-5 290	AS3-5 320	AS3-5 390	AS3-5 490
2-7/8"	RPA, AARP	AST25-190	AST25-280	AST25-290	AST25-320	AST25-390	AST25-490
4"	RPA, AARP	AST35-190	AST35-280	AST35-290	AST35-320	AST35-390	AST35-490

Drill/Side Location by Configuration Type

Drilling Template	Mounting Option	Single	2 @ 180	2 @ 90	3 @ 120	3 @ 90	4 @ 90
	Head Location	Side B	Side B & D	Side B & C	Round Pole Only	Side B, C & D	Side A, B, C & D
#8	Drill Nomenclature	DM19AS	DM28AS	DM29AS	DM32AS	DM39AS	DM49AS

RSX2 - Luminaire EPA

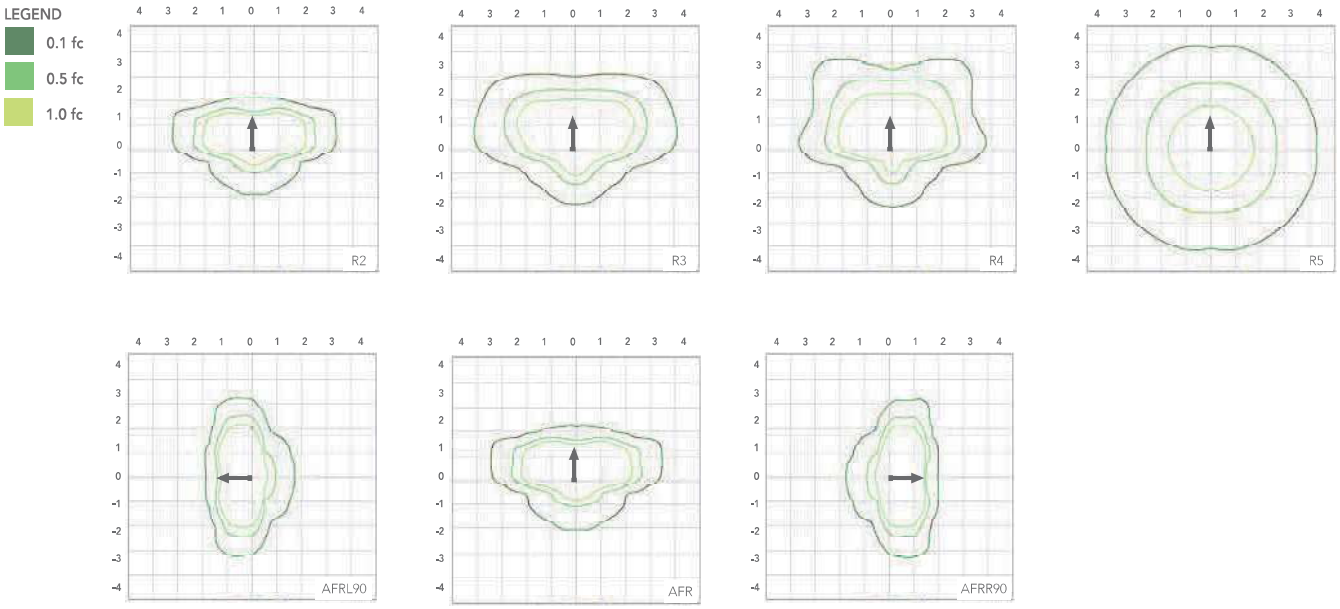
*Includes luminaire and integral mounting arm. Other tenons, arms, brackets or other accessories are not included in this EPA data.

Fixture Quantity & Mounting Configuration		Single	2 @ 90	2 @ 180	3 @ 90	3 @ 120	4 @ 90	2 Side by Side	3 Side by Side	4 Side by Side
Mounting Type	Tilt									
SPA - Square Pole Adaptor	0°	0.69	1.22	1.27	1.8	1.61	2.39	1.37	2.06	2.74
RPA - Round Pole Adaptor		0.74	1.27	1.37	1.9	1.71	2.49	1.42	2.16	2.84
MA - Mast Arm Adaptor		0.61	1.14	1.11	1.64	1.45	2.23	1.29	1.9	2.58
IS - Integral Slipfitter AASP/AARP - Adjustable Arm Square/Round Pole	0°	0.69	1.22	1.27	1.8	1.61	2.39	1.37	2.06	2.74
	10°	0.53	1.06	1.05	1.58	1.37	2.08	1.06	1.59	2.12
	20°	0.52	1.02	1.03	1.52	1.33	2.02	1.03	1.55	2.07
	30°	0.64	1.11	1.18	1.63	1.45	2.21	1.27	1.91	2.54
	40°	0.81	1.21	1.35	1.74	1.65	2.39	1.62	2.43	3.23
	45°	0.91	1.25	1.5	1.81	1.75	2.48	1.82	2.73	3.64
	50°	1.34	1.83	2.17	2.61	2.56	3.62	2.68	4.02	5.36
	60°	2.2	2.97	3.57	4.24	4.17	5.89	4.41	6.61	8.82
	70°	2.86	4.13	4.7	5.89	5.71	8.21	5.71	8.57	11.42
	80°	3.4	5.13	5.67	7.34	7.09	10.21	6.79	10.19	13.59
	90°	3.85	5.96	6.55	8.58	8.31	11.88	7.70	11.56	15.41

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's RSX Area homepage.

Isofootcandle plots for the RSX2 LED P6 40K. Distances are in units of mounting height (30').



Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-50°C (32-122°F).

Ambient	Ambient	Lumen Multiplier
0°C	32°F	1.05
5°C	41°F	1.04
10°C	50°F	1.03
15°C	59°F	1.02
20°C	68°F	1.01
25°C	77°F	1.00
30°C	86°F	0.99
35°C	95°F	0.98
40°C	104°F	0.97
45°C	113°F	0.96
50°C	122°F	0.95

Electrical Load

		Current (A)					
Performance Package	System Watts (W)	120V	208V	240V	277V	347V	480V
P1	71W	0.59	0.34	0.30	0.26	0.20	0.15
P2	111W	0.93	0.53	0.46	0.40	0.32	0.23
P3	147W	1.23	0.70	0.61	0.53	0.42	0.31
P4	187W	1.55	0.90	0.78	0.68	0.53	0.38
P5	210W	1.75	1.01	0.87	0.76	0.60	0.44
P6	244W	2.03	1.17	1.01	0.88	0.70	0.51

Projected LED Lumen Maintenance

Operating Hours	50,000	75,000	100,000
Lumen Maintenance Factor	>0.97	>0.95	>0.92

Values calculated according to IESNA TM-21-11 methodology and valid up to 40°C.

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

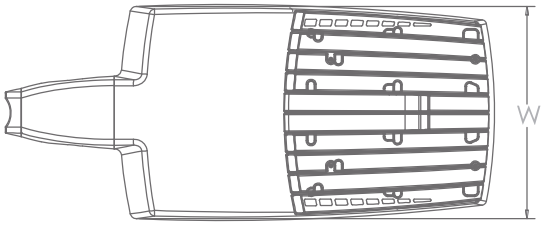
Performance Package	System Watts	Distribution. Type	30K (3000K, 70 CRI)					40K (4000K, 70 CRI)					50K (5000K, 70 CRI)				
			Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
P1	71W	R2	10,040	2	0	1	139	11,031	2	0	1	153	11,031	2	0	1	153
		R3	10,005	2	0	2	141	10,992	2	0	2	155	10,992	2	0	2	155
		R3S	10,271	2	0	2	143	11,285	2	0	2	157	11,285	2	0	2	157
		R4	10,136	2	0	2	143	11,136	2	0	2	157	11,136	2	0	2	157
		R4S	9,779	2	0	2	138	10,744	2	0	2	151	10,744	2	0	2	151
		R5	10,271	4	0	2	145	11,285	4	0	2	159	11,285	4	0	2	159
		R5S	10,544	3	0	1	149	11,585	3	0	2	163	11,585	3	0	2	163
		AFR	10,026	2	0	1	141	11,016	2	0	1	155	11,016	2	0	1	155
		AFRR90	10,122	3	0	2	140	11,121	3	0	2	154	11,121	3	0	2	154
		AFRL90	10,164	3	0	2	141	11,167	3	0	2	155	11,167	3	0	2	155
P2	111W	R2	15,712	2	0	2	138	17,263	2	0	2	151	17,263	2	0	2	151
		R3	15,657	2	0	3	141	17,202	3	0	3	155	17,202	3	0	3	155
		R3S	16,075	2	0	2	141	17,661	2	0	2	155	17,661	2	0	2	155
		R4	15,862	2	0	3	143	17,427	2	0	3	157	17,427	2	0	3	157
		R4S	15,304	2	0	2	138	16,815	2	0	2	151	16,815	2	0	2	151
		R5	16,075	4	0	2	145	17,661	5	0	3	159	17,661	5	0	3	159
		R5S	16,502	4	0	2	149	18,130	4	0	2	163	18,130	4	0	2	163
		AFR	15,691	2	0	2	141	17,240	2	0	2	155	17,240	2	0	2	155
		AFRR90	15,841	3	0	3	139	17,404	4	0	3	153	17,404	4	0	3	153
		AFRL90	15,907	3	0	3	139	17,477	4	0	3	153	17,477	4	0	3	153
P3	147W	R2	19,855	3	0	2	132	21,814	3	0	2	145	21,814	3	0	2	145
		R3	19,785	3	0	3	135	21,737	3	0	4	148	21,737	3	0	4	148
		R3S	20,312	3	0	3	135	22,317	3	0	3	149	22,317	3	0	3	149
		R4	20,044	3	0	3	136	22,022	3	0	4	150	22,022	3	0	4	150
		R4S	19,339	3	0	3	132	21,247	3	0	3	145	21,247	3	0	3	145
		R5	20,313	5	0	3	138	22,317	5	0	3	152	22,317	5	0	3	152
		R5S	20,852	4	0	2	142	22,910	4	0	2	156	22,910	4	0	2	156
		AFR	19,828	3	0	2	135	21,785	3	0	2	148	21,785	3	0	2	148
		AFRR90	20,017	4	0	3	133	21,992	4	0	3	147	21,992	4	0	3	147
		AFRL90	20,101	4	0	3	134	22,084	4	0	3	147	22,084	4	0	3	147
P4	187W	R2	22,836	3	0	2	120	25,090	3	0	2	132	25,090	3	0	2	132
		R3	22,756	3	0	4	122	25,002	3	0	4	134	25,002	3	0	4	134
		R3S	23,363	3	0	3	123	25,668	3	0	3	135	25,668	3	0	3	135
		R4	23,054	3	0	4	123	25,329	3	0	4	135	25,329	3	0	4	135
		R4S	22,243	3	0	3	119	25,059	3	0	3	134	25,059	3	0	3	134
		R5	23,363	5	0	3	125	25,669	5	0	4	137	25,669	5	0	4	137
		R5S	23,983	4	0	2	128	26,350	4	0	2	141	26,350	4	0	2	141
		AFR	22,806	3	0	2	122	25,056	3	0	2	134	25,056	3	0	2	134
		AFRR90	23,023	4	0	3	121	25,295	4	0	3	133	25,295	4	0	3	133
		AFRL90	23,120	4	0	3	122	25,401	4	0	3	134	25,401	4	0	3	134
P5	210W	R2	26,141	3	0	2	122	28,721	3	0	2	135	28,721	3	0	2	135
		R3	26,049	3	0	4	124	28,620	3	0	4	136	28,620	3	0	4	136
		R3S	26,744	3	0	3	125	29,383	3	0	4	138	29,383	3	0	4	138
		R4	26,390	3	0	4	126	28,994	3	0	4	138	28,994	3	0	4	138
		R4S	25,462	3	0	3	121	27,974	3	0	3	133	27,974	3	0	3	133
		R5	26,744	5	0	4	127	29,383	5	0	4	140	29,383	5	0	4	140
		R5S	27,454	4	0	2	131	30,163	4	0	2	144	30,163	4	0	2	144
		AFR	26,106	3	0	2	124	28,682	3	0	2	137	28,682	3	0	2	137
		AFRR90	26,354	4	0	3	123	28,955	5	0	3	136	28,955	5	0	3	136
		AFRL90	26,465	4	0	3	124	29,077	5	0	3	136	29,077	5	0	3	136
P6	244W	R2	27,646	3	0	2	112	30,374	3	0	2	123	30,374	3	0	2	123
		R3	27,549	3	0	4	113	30,267	3	0	4	124	30,267	3	0	4	124
		R3S	28,283	3	0	3	115	31,075	3	0	4	126	31,075	3	0	4	126
		R4	27,909	3	0	4	114	30,663	3	0	4	126	30,663	3	0	4	126
		R4S	26,928	3	0	3	110	29,585	3	0	3	121	29,585	3	0	3	121
		R5	28,284	5	0	4	116	31,075	5	0	4	127	31,075	5	0	4	127
		R5S	29,035	4	0	2	119	31,900	5	0	3	131	31,900	5	0	3	131
		AFR	27,608	3	0	2	112	30,332	3	0	2	123	30,332	3	0	2	123
		AFRR90	27,872	4	0	3	113	30,622	5	0	3	124	30,622	5	0	3	124
		AFRL90	27,989	4	0	3	113	30,751	5	0	3	125	30,751	5	0	3	125

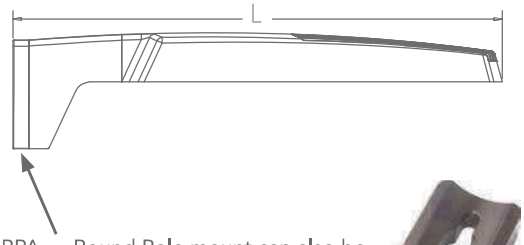
Dimensions & Weights

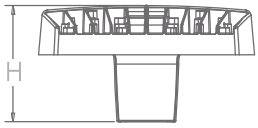
Luminaire Weight by Mounting Type

Mounting Configuration	Total Luminaire Weight
SPA	30 lbs
RPA	32 lbs
MA	30 lbs
WBA	33 lbs
WBASC	36 lbs
IS	33 lbs
AASP	33 lbs
AARP	35 lbs
AAWB	36 lbs
AAWSC	39 lbs

RSX2 with Round Pole Adapter (RPA)



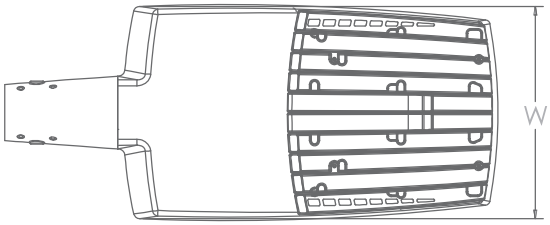


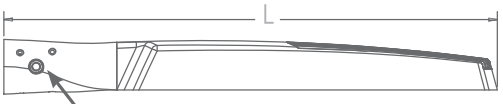


Length: 30.3" (77.0 cm)
Width: 13.4" (34.0 cm)
Height: 3.0" (7.6 cm) Main Body
7.2" (18.3 cm) Arm

Note: RPA — Round Pole mount can also be used to mount on square poles by omitting the round pole adapter plate shown here.

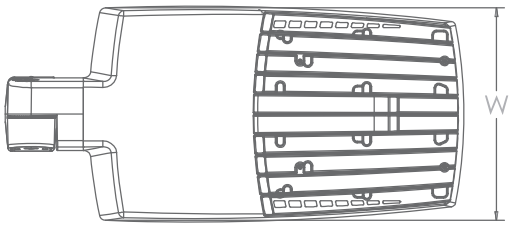
RSX2 with Mast Arm Adapter (MA)

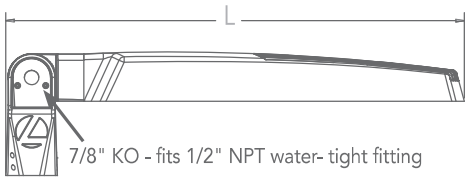


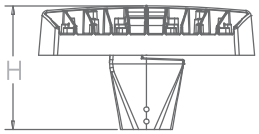


Length: 30.6" (77.7 cm)
Width: 13.4" (34.0 cm)
Height: 3.0" (7.6 cm) Main Body
3.5" (8.9 cm) Arm

RSX2 with Adjustable Slipfitter (IS)



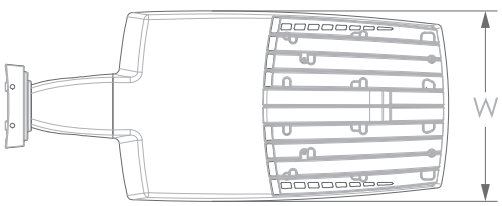


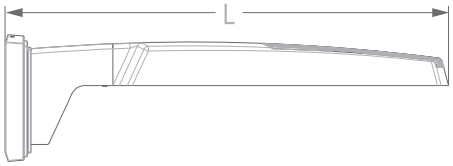


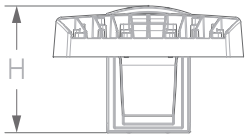
Length: 28.3" (71.9 cm)
Width: 13.4" (34.0 cm)
Height: 3.0" (7.6 cm) Main Body
7.6" (19.3 cm) Arm

Dimensions

RSX2 with Wall Bracket (WBA)

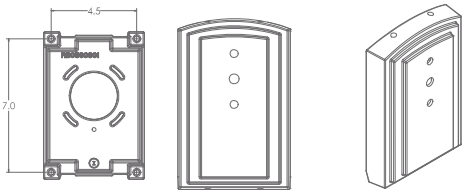




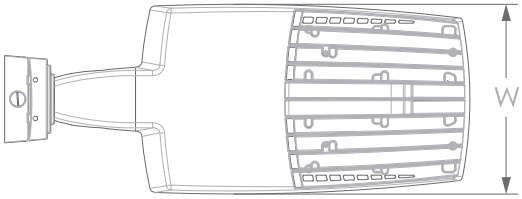


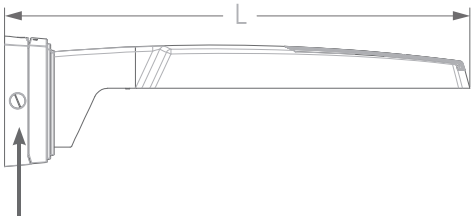
Length: 31.2" (79.2 cm)
Width: 13.4" (41.7 cm)
Height: 3.0" (7.6 cm) Main Body
8.9" (22.6 cm) Arm

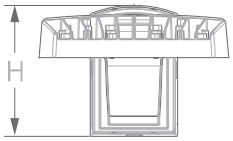
Wall Bracket (WBA) Mounting Detail



RSX2 with Wall Bracket with Surface Conduit Box (WBASC)

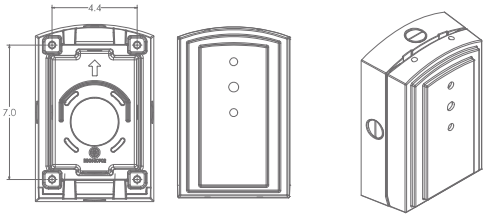






3/4" NPT taps with plugs - Qty (4) provided

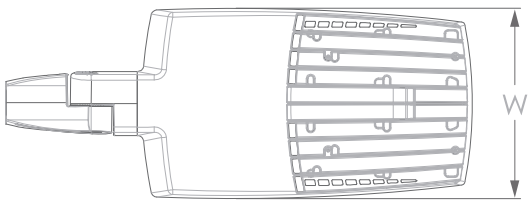
Surface Conduit Box (SCB) Mounting Detail

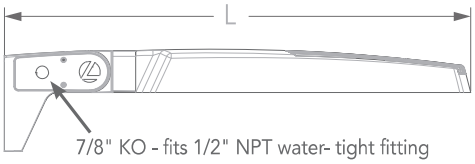


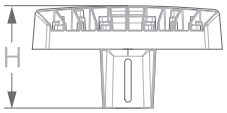
Length: 32.8" (83.3 cm)
Width: 13.4" (41.7 cm)
Height: 3.0" (7.6 cm) Main Body
9.2" (23.4 cm) Arm

Dimensions

RSX2 with Adjustable Tilt Arm - Square or Round Pole (AASP or AARP)





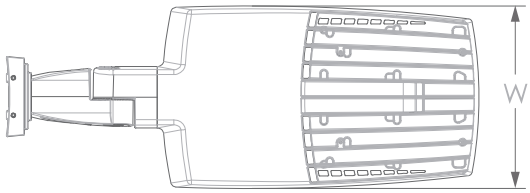


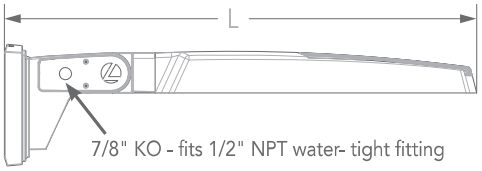
Length: 32.8" (83.3 cm) **AASP**
33.8" (85.9 cm) **AARP**
Width: 13.4" (34.0 cm)
Height: 3.0" (7.6 cm) Main Body
7.2" (18.2 cm) Arm

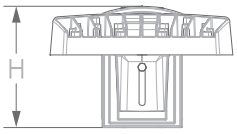
NOTE:
RPA - Round Pole mount can also be used to mount on square poles by omitting the round pole adapter plate shown here.

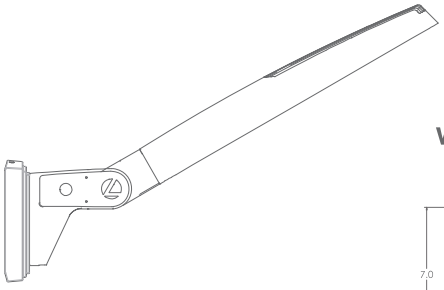
Notes
AASP: Requires 3.0" min. square pole for 1 at 90°. Requires 3.5" min. square pole for mounting 2, 3, 4 at 90°.
AARP: Requires 3.2" min. dia. round pole for 2, 3, 4 at 90°. Requires 3.0" min. dia. round pole for mounting 1 at 90°, 2 at 180°, 3 at 120°.

RSX2 with Adjustable Tilt Arm with Wall Bracket (AAWB)



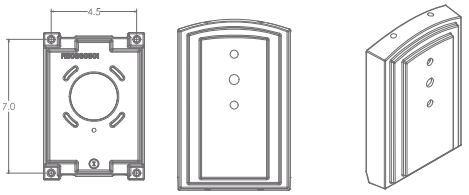






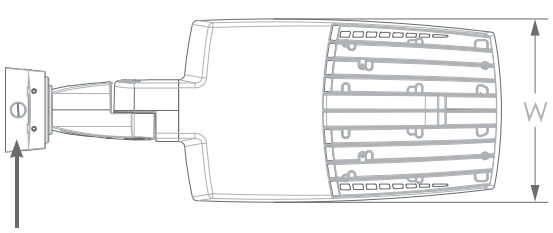
Length: 34.7" (88.0 cm)
Width: 13.4" (34.0 cm)
Height: 3.0" (7.6 cm) Main Body
8.9" (22.6 cm) Arm

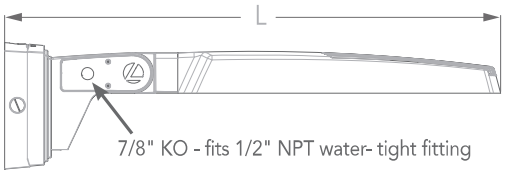
Wall Bracket (WBA) Mounting Detail

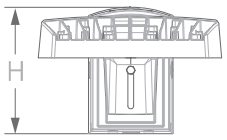


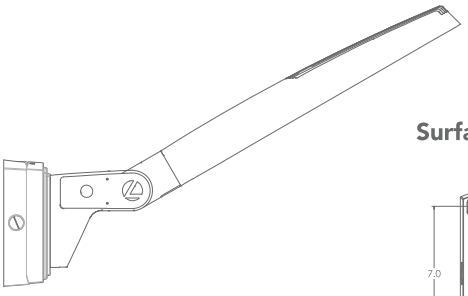
Dimensions

RSX2 with Adjustable Tilt Arm with Wall Bracket and Surface Conduit Box (AAWSC)



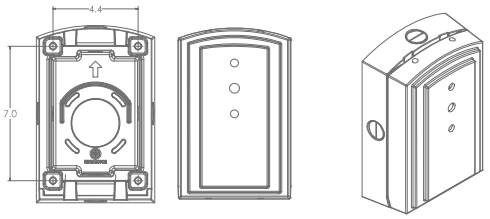




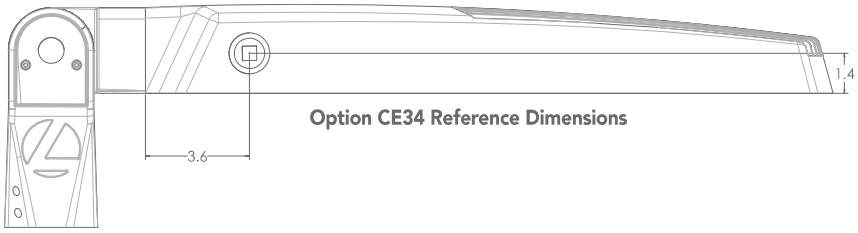


Length: 36.2" (91.9 cm)
Width: 13.4" (40.0 cm)
Height: 3.0" (7.6 cm) Main Body
9.2" (23.4 cm) Arm

Surface Conduit Box (SCB) Mounting Detail

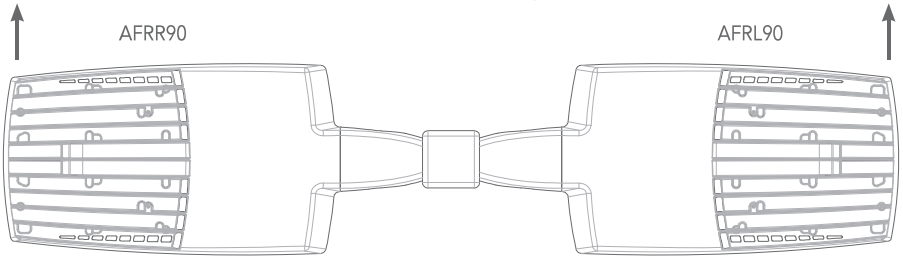


Additional Reference Drawings



Option CE34 Reference Dimensions

Automotive Front Row - Rotated Optics (AFRL90/R90)

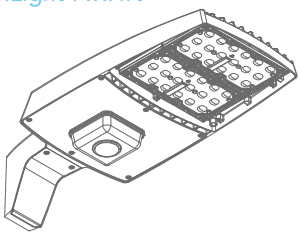


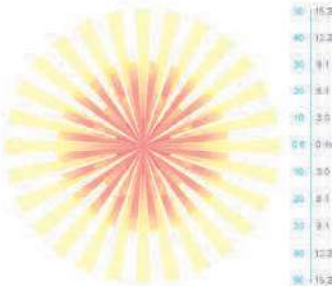
(Example: 2@180 - arrows indicate direction of light exiting the luminaire)

nLight Control - Sensor Coverage and Settings

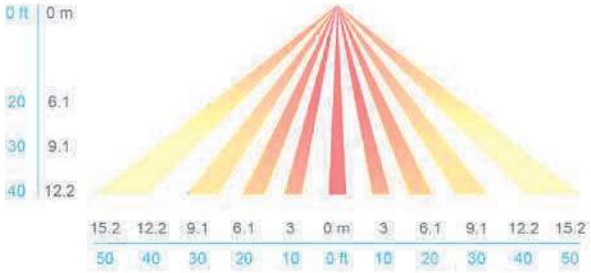
NLTAIR2 PIRHN nLight Sensor Coverage Pattern

nLight PIRHN





Top



Side

Motion Sensor Default Settings - Option PIRHN						
Option	Dimmed State (unoccupied)	High Level (when occupied)	Photocell Operation	Dwell Time (occupancy time delay)	Ramp-up Time (from unoccupied to occupied)	Ramp-down Time (from occupied to unoccupied)
NLTAIR2 PIRHN	Approx. 30% Output	100% Output	Enabled @ 1.5FC	7.5 minutes	3 seconds	5 minutes

*Note: NLTAIR2 PIRHN default settings including photocell set-point, high/low dim rates, and occupancy sensor time delay are all configurable using the Clairity Pro App. Sensor coverage pattern shown with luminaire at 0°. Sensor coverage pattern is affected when luminaire is tilted.

FEATURES & SPECIFICATIONS

INTENDED USE
The RSX LED area family is designed to provide a long-lasting, energy-efficient solution for the one-for-one replacement of existing metal halide or high pressure sodium lighting. The RSX2 delivers 11,000 to 31,000 lumens and is ideal for replacing 250W to 1000W HID pole-mounted luminaires in parking lots and other area lighting applications.

CONSTRUCTION AND DESIGN
The RSX LED area luminaire features a rugged die-cast aluminum main body that uses heat-dissipating fins and flow-through venting to provide optimal thermal management that both enhances LED performance and extends component life. Integral "no drill" mounting arm allows the luminaire to be mounted on existing pole drillings, greatly reducing installation labor. The light engines and housing are sealed against moisture and environmental contaminants to IP66. The low-profile design results in a low EPA, allowing pole optimization. Vibration rated per ANSI C136.31: 3G Mountings: Include SPA, RPA, MA, IS, AASP, AARP rated for 3G vibration. 1.5G Mountings: Include WBA, WBASC, AAWB and AAWSC rated for 1.5G vibration.

FINISH
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures superior adhesion as well as a minimum finish thickness of 3 mils. The result is a high-quality finish that is warrantied not to crack or peel.

OPTICS
Precision acrylic refractive lenses are engineered for superior application efficiency, distributing the light to where it is needed most. Available in short and wide pattern distributions including Type 2, Type 3, Type 3S, Type 4, Type 4S, Type 5, Type 5S, AFR (Automotive Front Row) and AFR rotated AFRR90 and ARFL90.

ELECTRICAL
Light engine(s) configurations consist of high-efficacy LEDs mounted on metal-core circuit boards and aluminum heat sinks to maximize heat dissipation. Light engines are IP66 rated. LED lumen maintenance is >L92/100,000 hours. CCT's of 3000K, 4000K and 5000K (minimum 70 CRI) are available. Class 1 electronic drivers ensure system power factor >90% and THD <20%. Easily serviceable 10kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

STANDARD CONTROLS
The RSX LED area luminaire has a wide assortment of control options. Dusk to dawn controls include MVOLT and 347V button-type photocells and NEMA twist-lock photocell receptacles.

nLIGHT AIR CONTROLS
The RSX LED area luminaire is also available with nLight® AIR for the ultimate in wireless control. This powerful controls platform provides out-of-the-box basic motion sensing with photocontrol functionality and is suitable for mounting heights up to 40 feet. No commissioning is required when using factory default settings that provide basic stand-alone motion occupancy dimming that is switched on and off with a built-in photocell. See chart above for motion sensor default out-of-box settings. For more advanced wireless functionality, such as group dimming, nLight AIR can be commissioned using a smartphone and the easy-to-use CLAIRITY app. nLight AIR equipped luminaries can be grouped, resulting in motion sensor and photocell group response without the need for additional equipment. Scheduled dimming with motion sensor over-ride can be achieved when used with the nLight Eclypse. Additional information about nLight Air can be found here.

INSTALLATION
Integral "no-drill" mounting arm allows for fast, easy mounting using existing pole drillings. Select the "SPA" option for square poles and the "RPA" option to mount to round poles. Note, the RPA mount can also be used for mounting to square poles by omitting the RPA adapter plate. Select the "MA" option to attach the luminaire to a 2 3/8" horizontal mast arm or the "IS" option for an adjustable slipfitter that mounts on a 2 3/8" OD tenon. The adjustable slipfitter has an integral junction box and offers easy installation. Can be tilted up to 90° above horizontal. Additional mountings are available including a wall bracket, adjustable tilt arm for direct-to-pole and wall and a surface conduit box for wall mount applications.

LISTINGS
CSA Certified to meet U.S. and Canadian standards. Suitable for wet locations. Rated for -40°C minimum ambient. DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY
5-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/support/customer-support/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING

Catalog Number	
Notes	
Type	

Contractor Select™

COMPACT PRO™

LED Round High Bay

The Compact Pro High Bay (CPRB) is a budget-oriented high bay designed specifically with the contractor in mind. Its compact design makes it easier and quicker to install. Compact Pro is built with quality to last and performance to meet the needs of the job, making it the best choice for affordable and reliable light-duty industrial applications like warehouses, gymnasiums, and multiple purpose rooms.

FEATURES:

- Compact design saves time and money during installation.
- Patent pending innovative control lens.
- Robust 6kV surge protection per ANSI standards for Industrial environments.
- Operates up to 55°C ambient.
- Standard with permanently attached die-cast aluminum hook with safety latch. Patent pending. Also includes 7' safety chain.
- 0-10V dimming driver standard for 10% to 100% dimming capabilities.

DLC LISTED · DLC LISTED PREMIUM · NOM · DAMP LOCATION™ · SA® C US · DIMMABLE LED

Catalog number	UPC	Description	Lumens	Input watts	Color temperature	Color rendering	Voltage	Distribution	Pallet Qty.
CPRB 18LM MVOLT 40K 80CRI DWH	00196182615429	LED Round High Bay	18,000	132	4000K	80	120-277	Medium	132
CPRB 24LM MVOLT 40K 80CRI DWH	00196182615498	LED Round High Bay	24,000	175	4000K	80	120-277	Medium	66
CPRB AL013 UVOLT SWW9 80CRI DWH	00196182615023	LED Round High Bay	12000/15000/18000	83/106/132	4000/5000K	80	120-347	Medium	132
CPRB AL013 UVOLT SWW9 80CRI DBL	00196182615054	LED Round High Bay	12000/15000/18000	83/106/132	4000/5000K	80	120-347	Medium	132
CPRB AL014 UVOLT SWW9 80CRI DWH	00196182615061	LED Round High Bay	21000/24000/27000	148/175/195	4000/5000K	80	120-347	Medium	66
CPRB AL014 UVOLT SWW9 80CRI DBL	00196182615078	LED Round High Bay	21000/24000/27000	148/175/195	4000/5000K	80	120-347	Medium	66

Accessories: *Order as separate catalog number.*

Mounting:

CPRBSMB	Surface mount bracket (galvanized)
JEBLMTG ADAPTER M12	3/4" reducer
LPM	Loop, male, damp location
JCBLSC120	10' safety cable
JCBLSC240	20' safety cable

CS CONTRACTOR SELECT™

LITHONIA LIGHTING®

Specifications

INTENDED USE:
Ideal one-for-one replacement of conventional lighting systems such as HID and fluorescent. For use in light Industrial applications such as, warehousing, gymnasiums, multi-purpose rooms, and other large indoor spaces. **Certain airborne contaminants can diminish integrity of acrylic and/or polycarbonate. Click here for Acrylic-Polycarbonate Compatibility table for suitable uses.**
Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.

CONSTRUCTION:
Cast driver housing gives superior thermal performance. Patent pending polycarbonate lens diffuses light source and reduces glare while protecting LEDs and providing medium distribution. Available in two sizes with optional switchable lumens (12000/15000/18000 or 21000/24000/27000) and color temperatures (4000K/5000K). Static lumen and color temperature versions also available. Field installable sensors available.

FINISH:
Black and white finishes available on switchable units and static available in white only.

ELECTRICAL:
70% lumen maintenance at > 54,000 hours. Thermally protected driver standard with 0-10V dimming allowing for 10% to 100% dimming capability. Fixture comes standard with 6' power cord and 6' low voltage dimming cord. Luminaire surge protection level: designed to withstand up to 6kV/3kA per ANSI C82.77-5-2015 Multi-volt driver, 120-277V standard for static versions. UVOLT driver, 120-347V standard with switchable versions.

INSTALLATION:
Compact Pro™ package includes patent pending permanently attached hook with safety latch safety hook and 7' galvanized safety cable. 3/4" reducer available for stem or hook mounting. Optional surface mount bracket also available.

LISTINGS:
CSA listed. Damp location listed. IP54 rated. Designed for use in ambient temperatures ranging from -40°C to 55°C when suspended 18" off ceiling; with the exception of ALO14 which has a -37° C starting temperature.

DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY:
5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Dimensions

Lumens package	Length	Width	Depth	Weight
	Dimensions shown in inches (centimeters)			Shown in pounds (kg)
18LM	12.98	12.98	3.16	5
24LM	15.14	15.14	3.35	6.1
ALO13	12.98	12.98	3.16	5
ALO14	15.14	15.14	3.35	6.1

Field installable sensors*	Utilizes sensor
CPRBSNSR MSD7 0V DWH KIT	MSD 7 WH 0V
CPRBSNSR MSD7 5V DWH KIT	MSD 7 WH 5V
CPRBSNSR MSD7 ADC 0V DWH KIT	MSD 7 ADC WH 0V
CPRBSNSR MSD7 ADC 5V DWH KIT	MSD 7 ADC WH 5V
CPRBSNSR MSD ADC 0V DWH KIT	MSD ADC WH 0V
CPRBSNSR MSD ADC 5V DWH KIT	MSD ADC WH 5V
CPRBSNSR MSD7 0V DBL KIT	MSD 7 WH 0V
CPRBSNSR MSD7 5V DBL KIT	MSD 7 WH 5V
CPRBSNSR MSD7 ADC 0V DBL KIT	MSD 7 ADC WH 0V
CPRBSNSR MSD7 ADC 5V DBL KIT	MSD 7 ADC WH 5V
CPRBSNSR MSD ADC 0V DBL KIT	MSD ADC WH 0V
CPRBSNSR MSD ADC 5V DBL KIT	MSD ADC WH 5V
CPRBSNSR RMSOD7 DWH KIT	RMSOD 7 ZT EXTDB 90D 50FC G2 J100
CPRBSNSR RMSOD7 DBL KIT	RMSOD 7 BW ZT EXTDB 90D 50FC G2 J100
CPRBSNSR RMSOD45 DWH KIT	RMSOD 45 ZT EXTDB 90D 50FC G2 J100
CPRBSNSR RMSOD45 DBL KIT	RMSOD 45 BW ZT EXTDB 90D 50FC G2 J100
CPRBSNSR RMSOD45A DWH KIT	RMSOD 45A ZT EXTDB 90D 50FC G2 J100
CPRBSNSR RMSOD45A DBL KIT	RMSOD 45A BW ZT EXTDB 90D 50FC G2 J100

* All sensor kits include sensor mounting plate in white (DWH) or black(DBL) to match your fixture.

ACCESSORIES

LPM

3/4" mounting adapter

CPRBSMB

CONTRACTOR SELECT™

LITHONIA LIGHTING

Catalog Number	
Notes	
Type	

Contractor Select™

COMPACT PRO™

LED High Bay

The Compact Pro High Bay (CPHB) is a budget-oriented high bay designed specifically with the contractor in mind. Its compact design makes it easier and quicker to install. Compact Pro is built with quality to last and performance to meet the needs of the job, making it the best choice for affordable and reliable light-duty industrial applications like warehouses.

FEATURES:

- Compact design saves time and money during installation
- Innovative Glare Control lens meets new DLC 5.1 standards
- Robust 6kV surge protection standard per ANSI standards for Industrial environments
- Operates up to 55°C ambient
- Includes mounting hardware (V-hook & 36" hanger chain)

NOM DLC LISTED PREMIUM DAMP LOCATION™ SA C US DIMMABLE LED

Catalog Number	UPC	Description	Lumens	Input Watts	Color Temperature	Color Rendering	Voltage	Distribution	Pallet Qty.
CPHB 12LM MVOLT 40K	00194994608325	14" LED High Bay	12,261	88	4000 K	80 CRI	120-277V	Medium	204
CPHB 12LM MVOLT 50K	00194994429548	14" LED High Bay	12,342	88	5000 K	80 CRI	120-277V	Medium	204
CPHB 15LM MVOLT 40K	00194994429562	14" LED High Bay	14,857	104	4000 K	80 CRI	120-277V	Medium	204
CPHB 15LM MVOLT 50K	00194994429593	14" LED High Bay	14,955	104	5000 K	80 CRI	120-277V	Medium	204
CPHB 18LM MVOLT 40K	00194994608295	14" LED High Bay	18,364	134	4000 K	80 CRI	120-277V	Medium	204
CPHB 18LM MVOLT 50K	00194994429630	14" LED High Bay	18,485	134	5000 K	80 CRI	120-277V	Medium	204
CPHB 24LM MVOLT 40K	00194994429685	22" LED High Bay	24,890	174	4000 K	80 CRI	120-277V	Medium	102
CPHB 24LM MVOLT 50K	00194994429753	22" LED High Bay	25,054	174	5000 K	80 CRI	120-277V	Medium	102
CPHB 30LM MVOLT 40K	00194994429746	22" LED High Bay	30,298	214	4000 K	80 CRI	120-277V	Medium	102
CPHB 30LM MVOLT 50K	00194994429784	22" LED High Bay	30,498	214	5000 K	80 CRI	120-277V	Medium	102
CPHB ALO13 MVOLT SWW9 80CRI DWH	00196183428561	14" LED High Bay	12000/15000/18000	89/115/140	4000K/5000K	80CRI	120-277V	Medium	204
CPHB ALO16 MVOLT SWW9 80CRI DWH	00196183428578	22" LED High Bay	24000/27000/30000	177/205/222	4000K/5000K	80CRI	120-277V	Medium	102

More configurations are available. Click here or visit www.acuitybrands.com and search for CPHB.

Accessories: *Order as separate catalog number.*

Mounting:

IBAC120 M100	Aircraft cable 10' with hook (one pair)
IBAC240 M75	Aircraft cable 20' with hook (one pair)
IBHMP	Hook monopoint
CPHBPMPSM	Pendant Monopoint splice box with 3/4" hub (for 12LM - 18LM) ‡
CPHBPMPMD	Pendant Monopoint splice box with 3/4" hub (for 24LM - 30LM) ‡
ZACVH	Aircraft 10' V hanger (one pair)
THUN J2	Surface mount bracket ‡

Wire guards:

WGCPHBSM	Wire guard for CPHB (12LM - 18LM)
WGCPHBMD	Wire guard for CPHB (24LM - 30LM)

‡ Option Value Ordering Restrictions

Option value	Restriction
CPHBPMPSM/MD	Pendant monopoint splice boxes will require wiring from access plate to splice box KO if power is being dropped through pendant conduit. Fixture does not have a KO in center to pull power out of driver channel through splice box
THUN J2	Order quantity required in multiples of 2. 12LM - 18LM requires one per fixture, 24LM - 30LM require two per fixture.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING®

Specifications

INTENDED USE:

Ideal one-for-one replacement of conventional lighting systems such as HID and fluorescent. For use in light Industrial applications such as warehousing and other large indoor spaces with mounting heights ranging from 10' – permitted. **Certain airborne contaminants can diminish integrity of acrylic and/or polycarbonate. Click here for Acrylic-Polycarbonate Compatibility table for suitable uses. Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.**

CONSTRUCTION:

Extruded aluminum channels enable superior thermal performance.

Glare Control Lens diffuses light source and reduces glare while protecting LEDs.

Lens meets DLC 5.1 standards for UGR (Unified Glare Rating)

Available in two sizes with optional switchable lumens (12000/15000/18000 or 24000/27000/30000) and color temperatures (4000K/5000K).

ELECTRICAL:

70% lumen maintenance at > 100,000 hours.

Thermally protected driver standard with 0-10V dimming.

Luminaire surge protection level: designed to withstand up to 6kV/3kA per ANSI C82.77-5-2015.

Multi-volt driver, 120-277V standard.

INSTALLATION:

Fixture package includes V-hanger hardware kit with 2- V-hanger brackets and 2- 36" chain lengths.

Fixture is suitable for mounting by chain, cable, surface-mount bracket, or hook monopoint. Surface mounting available using optional THUN surface mount bracket (order separately). Designed for use in ambient temperatures ranging from -40°C to 55°C when suspended 18" off ceiling. Max operating temperature of 45°C when surface mounted.

LISTINGS:

CSA listed. Damp location listed.

DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

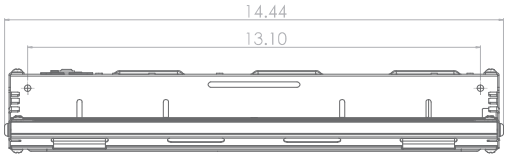
WARRANTY:

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

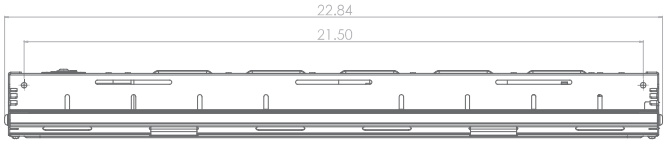
Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Dimensions

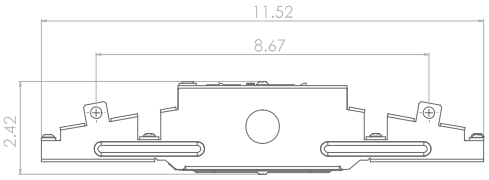
All dimensions are inches (centimeters) unless otherwise indicated.



Side View: CPHB 12LM, 15LM, 18LM, ALO13



Side View: CPHB 24LM, 30LM, ALO16



End View: CPHB 12LM, 15LM, 18LM, 24LM, 30LM, ALO13, ALO16

Lumen package	Length	Width	Depth	Weight
	Dimensions shown in inches (centimeters)			Shown in pounds (kg)
12000LM	14.4 (36.6)	11.5 (29.2)	2.3 (5.8)	5 (2.2)
15000LM	14.4 (36.6)	11.5 (29.2)	2.3 (5.8)	5 (2.2)
18000LM	14.4 (36.6)	11.5 (29.2)	2.3 (5.8)	6.5 (2.9)
24000LM	22.8 (57.9)	11.5 (29.2)	2.3 (5.8)	8 (3.6)
30000LM	22.8 (57.9)	11.5 (29.2)	2.3 (5.8)	8 (3.6)
ALO13	14.4 (36.6)	11.5 (29.2)	2.3 (5.8)	6.6 (3.0)
ALO16	22.8 (57.9)	11.5 (29.2)	2.3 (5.8)	8.1 (3.7)

Nomenclature	Lumen Package	CCT	Lumens	Wattage	Efficacy
CPHB ALO13 MVOLT SWW9 80CRI DWH	12000LM	4000K	12272	89	138
		5000K	12465	89	140
	15000LM	4000K	15117	112	135
		5000K	15248	112	136
	18000LM	4000K	18265	138	132
		5000K	18395	138	133
CPHB ALO16 MVOLT SWW9 80CRI DWH	24000LM	4000K	24193	176	138
		5000K	24415	177	138
	27000LM	4000K	27345	202	135
		5000K	27679	204	136
	30000LM	4000K	29578	221	134
		5000K	29755	222	134

Classic Series
Medium Wall Light

PROJECT INFORMATION	
JOB NAME	
FIXTURE TYPE	Medium Wall Light
CATALOG NUMBER	
APPROVED BY	

SPECIFICATIONS

Construction:
Rugged traditional aluminum die cast housing provides proven environmental protection for LED modules. Traditional fixture designs provide a familiar look and standard installation requirements. Retaining this look allows the ability to upgrade fixtures gradually, while retaining the same overall fixture appearance throughout a facility.

Glare Free:
Positioning of the LED modules within the housing result in light directed to desired locations and eliminates offensive light.

Lens:
Borosilicate glass lens assembly is designed to provide high efficiency and to target the light where needed to satisfy outdoor lighting requirements.

Positioning of the LEDs (along with Patent Pending thermal management system) results in the light being directed to desired locations eliminating glare and offensive light.

Thermal Management:
Atlas' Patent Pending exclusive Thermal Management System™ features a unique internal design that allows for lower operating temperatures which results in a brighter, whiter light, more stable color and longer LED and driver life.

Listings:
Luminaire is certified to UL/cUL Standards for Wet Locations

DesignLights Consortium qualified luminaire, eligible for rebates from DLC member utilities. [2]*See chart on other next page for qualifying products.*

AC Input: 120/208/240/277V 347/480V

Lifespan: 200,000+ hrs.[1]

Driver:
Constant current, Class 2, 120-277 VAC, 50-60 Hz
High Efficiency – min. 88%z
0-10 V Dimming

LEDs:
3000K, 4000K, 4500K, 5000K CCT Fixed |
4000K, 4500K, 5000K CCT Selectable
Epoxy Guard™ protective conformal coated boards
Atlas LEDs provide higher lumen output, greater energy efficiency and more reliable fixture performance.

Testing:
Atlas LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 & LM-80.

Warranty: Five-year limited warranty

Installation:
Fixture retains the same knock-out sizes and positions as previous models, reducing wiring costs.

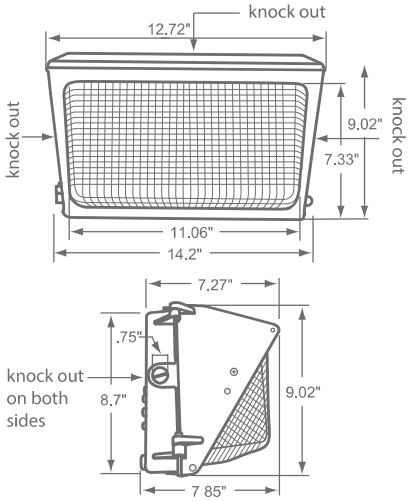
Emergency Back-up: For factory installed Emergency Back-Up add suffix EB to part number.

480 Volt: For 480V add suffix 4 to part number.

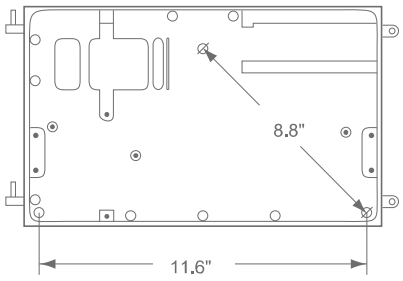
MANUFACTURED & TESTED IN USA | DLC LISTED | c UL us LISTED | 5 YEAR WARRANTY | BUY AMERICAN COMPLIANT*

DIMENSIONS

Weight: 9.25 lbs.



MOUNTING DETAIL



[1]*LED Lifespan Based Upon LM-70 Test Results*

Rebates and Incentives are available in many areas.
Contact an Atlas Representative for more information.

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800-849-8485 | fax: 1-855-847-2794 | www.atlasled.com

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Classic Series
Medium Wall Light

ORDERING INFORMATION

WLM	S	3-9L					
PRODUCT SERIES	SELECTABLE	LUMEN PACKAGE	COLOR TEMP.	CONTROLS	VOLTAGE	FIXTURE COLOR	OPTIONS
WLM = Medium Wall Light	blank = Fixed	43LED = 43 Watts 64LED = 64 Watts 80LED = 80 Watts	Blank = 4500K 3K = 3000K 4K = 4000K 5K = 5000K	Blank = Dimming (0-10V) PC = 120V Photocontrol PM = 120-277V Photocontrol	Blank = 120-277 4 = 347/480* *LP only*	Blank = Bronze WT = White* BK = Black* *optional with adder*	EB = Emergency Back-up SP = Surge Protection
	S = Selectable	3-9L = 2,500, 5,500, 7,500, 9,000 Lumens Selectable	blank = Selectable (4000K, 4500K, 5000K)	blank = 120-277V Photocontrol Installed LP = Less Photocontrol			

PERFORMANCE DATA

FIXED

UNIT	CRI	3000K CCT		4000K CCT		4500K CCT		5000K CCT		WATTS	BUG RATING	REPLACES UP TO
		DELIVERED LUMENS	EFFICACY (LPW)	DELIVERED LUMENS	EFFICACY (LPW)	DELIVERED LUMENS	EFFICACY (LPW)	DELIVERED LUMENS	EFFICACY (LPW)			
43LED	80	3,908	96	5,276	122	5,726	122	5,308	122	44	B1-U3-G3	175W MH
64LED	80	5,699	92	5,699	92	6,793	113	6,793	113	62	B1-U4-G3	400W MH
80LED	80	8,615	109	8,615	109	8,615	109	8,875	113	79	B2-U4-G4	400W MH

SELECTABLE

UNIT	CRI	Selectable 4000K CCT		Selectable 4500K CCT		Selectable 5000K CCT		WATTS	BUG RATING	REPLACES UP TO
		DELIVERED LUMENS	EFFICACY (LPW)	DELIVERED LUMENS	EFFICACY (LPW)	DELIVERED LUMENS	EFFICACY (LPW)			
3L - 9L	80	2,601	120	2,704	125	2,602	121	22	B2-U4-G4	400W MH
	80	5,513	126	5,732	131	5,516	126	44		
	80	7,892	123	8,205	127	7,896	123	64		
	80	9,128	120	9,490	130	9,133	120	76		

DLC PRODUCT INFORMATION

UNIT	3000K CCT		4000K CCT		4500K CCT		5000K CCT	
	DLC PRODUCT ID	CLASSIFICATION	DLC PRODUCT ID	CLASSIFICATION	DLC PRODUCT ID	CLASSIFICATION	DLC PRODUCT ID	CLASSIFICATION
WLM43LED	n/a	n/a	PT0VHUH7	Standard	PDG4N6GHG	Standard	P2LGOBS9	Standard
WLM64LED	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WLM80LED	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

UNIT	DLC PRODUCT ID	CLASSIFICATION
WLMS3-9L	PPJRDDGX	Standard

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Classic Series
Large Wall Light

PROJECT INFORMATION	
JOB NAME	
FIXTURE TYPE	Classic Large Wall Light
CATALOG NUMBER	
APPROVED BY	

SPECIFICATIONS

Construction:
Rugged traditional aluminum die cast housing provides proven environmental protection for LED modules. Traditional fixture designs provide a familiar look and standard installation requirements. Retaining this look allows the ability to upgrade fixtures gradually, while retaining the same overall fixture appearance throughout a facility.

Glare Free:
Positioning of the LED modules within the housing result in light directed to desired locations and eliminates offensive light.

Lens:
Lens assembly is designed to provide high efficiency and to target the light where needed to satisfy outdoor lighting requirements.

Positioning of the LEDs (along with Patent Pending thermal management system) results in the light being directed to desired locations eliminating glare and offensive light.

Listings:
Luminaire is certified to UL/cUL Standards for Wet Locations

DesignLights Consortium qualified luminaire, eligible for rebates from DLC member utilities. [2]*See chart on other next page for qualifying products.*

AC Input: 120/208/240/277V 347/480V

Lifespan: 200,000+ hrs.[1]

Driver:
Constant current, Class 2, 120-277 VAC, 50-60 Hz
High Efficiency – min. 86%

Selectable Lumens and CCT:
Atlas selectable wall lights are quick and easy to select and set up. Selectable lumens range in 4,000 (30W), 7,500 (57W) / 11,000 (86W), 13,000 (102W).

Selectable CCTs: 4000K, 4500K, and 5000K.

LEDs:
Available in 3000K, 4000K, 4500K and 5000K CCT Fixed | 4000K, 4500K, 5000K CCT Selectable
Atlas LEDs provide higher lumen output, greater energy efficiency and more reliable fixture performance.

Reduced Glare:
Positioning of the LED modules within the housing result in light directed to desired locations and reduces offensive light.

Testing:
Atlas LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 & LM-80.

Warranty: Five-year limited warranty

Installation:
Fixture retains the same knock-out sizes and positions as previous models, reducing wiring costs.

Emergency Back-up: For factory installed Emergency Back-Up add suffix EB to part number.

[1]*LED Life Span Based Upon LM-70 Test Results*
[2]*Emergency Back-Up requires larger back housing. Contact Atlas for more details.*

MANUFACTURED & TESTED IN USA

DLC LISTED [2]

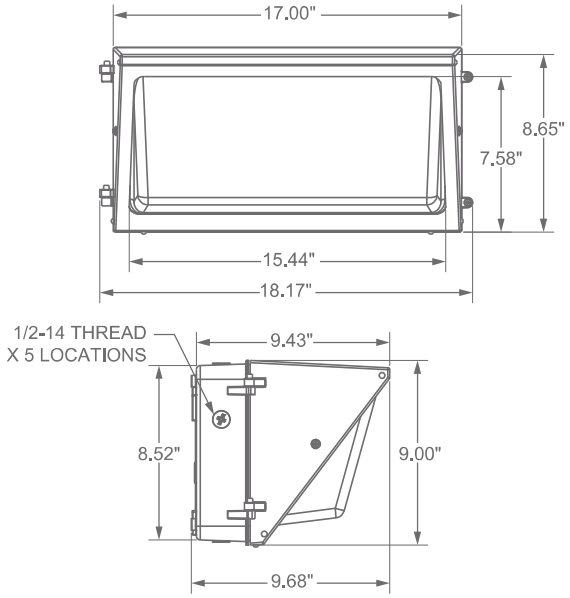
c UL us LISTED

5 YEAR WARRANTY

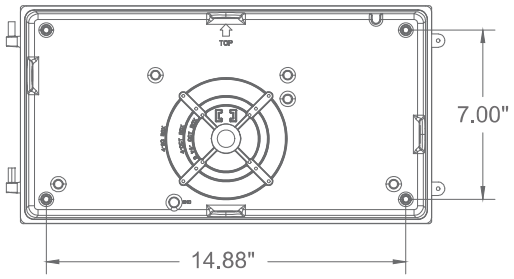
BUY AMERICAN COMPLIANT*

DIMENSIONS

Weight: 9.25 lbs.



MOUNTING DETAIL



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Classic Series
Large Wall Light

ORDERING INFORMATION

WLD	S	4-13L					
PRODUCT SERIES	SELECTABLE	LUMEN PACKAGE	COLOR TEMP.	CONTROLS	VOLTAGE	FIXTURE COLOR	OPTIONS
WLD = Large Wall Light	blank = Fixed	64LED = 64 Watts 86LED = 86 Watts 120LED = 120 Watts	Blank = 4500K 3K = 3000K 4K = 4000K 5K = 5000K	Blank = Dimming (0-10V) PC = 120V Photocontrol PM = 120-277V Photocontrol	Blank = 120-277 4 = 347/480* *LP only	Blank = Bronze WT = White* BK = Black* *optional with adder	EB = Emergency Back-up SP = Surge Protection
	S = Selectable	4-13L = 4,000, 7,500, 11,000 13,000 Lumens Selectable	blank = Selectable (4000K, 4500K, 5000K)	blank = 120-277V Photocontrol Installed LP = Less Photocontrol	Blank = 120-277 4 = 347/480* *LP only		

PERFORMANCE DATA

FIXED

Unit	CRI	3000K CCT		4000K CCT		4500K CCT		5000K CCT		Watts	Replaces up to
		Delivered Lumens	Efficacy (LPW)	Delivered Lumens	Efficacy (LPW)	Delivered Lumens	Efficacy (LPW)	Delivered Lumens	Efficacy (LPW)		
64LED	80	7,168	117	7,168	117	7,168	117	7,662	126	62	400W MH
86LED	80	9,120	109	9,120	109	9,120	109	9,120	109	84	400W MH
120LED	80	12,510	106	13,170	114	13,170	114	13,170	114	118	400W MH

SELECTABLE

Lumen Package	CRI	Selectable 4000K CCT		Selectable 4500K CCT		Selectable 5000K CCT		Watts	Replaces up to
		Delivered Lumens	Efficacy (LPW)	Delivered Lumens	Efficacy (LPW)	Delivered Lumens	Efficacy (LPW)		
4L - 13L	70	3,897	134	4,073	139	3,889	133	29	1000W MH
	70	7,688	135	8,034	141	7,672	134	57	
	70	11,136	130	11,638	136	11,113	130	86	
	70	12,891	126	13,472	138	12,864	126	102	

DLC PRODUCT INFORMATION

Unit	3000K CCT		4000K CCT		4500K CCT		5000K CCT	
	DLC Product ID	Classification	DLC Product ID	Classification	DLC Product ID	Classification	DLC Product ID	Classification
FIXED								
WLD64LED	PLDHU776	Standard	PTKZCYS3	Standard	PATPE48EN	Standard	POLJ214Q	Standard
WLD86LED	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WLD120LED	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

SELECTABLE

Unit	DLC Product ID	Classification
WLDS4-13L	PH9T7MLJ	Standard

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CONTRACTOR SELECT™

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

Contractor Select™

ESXF LED

Floodlights Adjustable+Switchable+Photocell


ESXF1 P0 knuckle mount


ESXF1 knuckle mount


ESXF2 knuckle mount


ESXF3 slipfitter mount


ESXF4 slipfitter mount

The Lithonia Lighting® ESXF LED floodlight is a general-purpose flood that offers a wide selection of options and flexibility. Easy access to adjustable lumen output, color switching, and a selectable photocell turns the ESXF into the fixture you need on the spot. With its wide flood (7x7) distribution and DLC performance, the ESXF is a cost-effective solution, great for illuminating yards, driveways, signage, patios, warehouses, and security applications.

FEATURES:

- Four sizes deliver 1,500 up to 20,000 lumens
- Three power levels of adjustable lumen output. Switchable CCT(30K/40K/50K) offers warm, cool and daylight in a single fixture
- Standard photocell can be turned on or off
- IP66 rated, Die-cast aluminum housing
- Two popular mounting options included
- up to 171 LPW

Adjustable Lumen Output ALO

Switchable CCT SWW2

Dusk-to-Dawn Operation PE

DLC LISTED · IP66 · LED · SP C US · WET LOCATION™ · 5 YEAR warranty

Catalog Number	Adjustable Lumen Output ALO			Switchable CCT SWW2	Dusk-to-Dawn Operation PE	Input Voltage	Included Mounting Options	CRI
ESXF1 P0 SWW2 THK DDB	2500L			Switchable 3000K, 4000K, 5000K	Included Standard, Selectable On/Off	120-277V	Knuckle Only, mounting plate	80CRI
ESXF1 AL0 SWW2 KY DDB	1500L	3000L	5000L			120-277V	Knuckle & Yoke, mounting plate	
ESXF2 AL0 SWW2 KY DDB	3500L	5500L	7500L			120-277V	Knuckle & Yoke, mounting plate	
ESXF3 AL0 SWW2 YS DDB	8500L	10500L	14000L			120-277V	Yoke & SlipFitter	
ESXF3 AL0 SWW2 UVOLT YS DDB						120-347V	Yoke & SlipFitter	
ESXF4 AL0 SWW2 YS DDB	16000L	18000L	20000L			120-277V	Yoke & SlipFitter	
ESXF4 AL0 SWW2 UVOLT YS DDB						120-347V	Yoke & SlipFitter	

More configurations are available. Click here or visit www.acuitybrands.com and search for ESXF LED.

ESXF Stock Configuations

Catalog Number	UPC	Ci Code	Number of fixtures per pallet	Traditional Replacement
ESXF1 P0 SWW2 THK DDB	00196182393051	*276AL6	400	150W Quartz or 75W HID
ESXF1 AL0 SWW2 KY DDB	00196182393204	*276ALH	400	500W Quartz or 150W HID
ESXF2 AL0 SWW2 KY DDB	00196182393242	*276ALU	360	500W Quartz or 175W HID
ESXF3 AL0 SWW2 YS DDB	00196182393266	*276ALW	144	250W HID
ESXF3 AL0 SWW2 UVOLT YS DDB	00196182393273	*276AM0	144	250W HID
ESXF4 AL0 SWW2 YS DDB	00196182393280	*276AM2	144	400W HID
ESXF4 AL0 SWW2 UVOLT YS DDB	00196182393297	*276AM4	144	400W HID

Accessories: *Order as separate catalog number.*

ESXF P0 and ESXF1 yoke mount accessory
*276ARA ESXF1YK DDB
Click here to visit Accessories.

CS CONTRACTOR SELECT™

LITHONIA LIGHTING

Included mounting options by size

ESXF1 P0 knuckle mount (pre-installed)

ESXF1 knuckle mount (pre-installed)

ESXF2 knuckle mount (pre-installed)

ESXF3 slipfitter mount

ESXF4 slipfitter knuckle

ESXF1 yoke mount

ESXF2 yoke mount

ESXF3 yoke mount

ESXF4 yoke mount

Electrical Performance Tables

	Lumen Output	Input Wattage	CCT/80CRI	Delivered Lumens	Lumens Per Watt @ 4000K, 80CRI
ESXF1 P0	2500L	17W	3000K	2,372	151
			4000K	2,522	
			5000K	2,503	
ESXF1	1500L	9W	3000K	1,467	171
			4000K	1,560	
			5000K	1,549	
	3000L	19W	3000K	2,915	162
			4000K	3,099	
			5000K	3,076	
	5000L	34W	3000K	4,748	147
			4000K	5,047	
			5000K	5,010	

	Lumen Output	Input Wattage	CCT/80CRI	Delivered Lumens	Lumens Per Watt @ 4000K, 80CRI
ESXF3	8500L	53W	3000K	8,139	163
			4000K	8,653	
			5000K	8,589	
	10500L	69W	3000K	10,156	156
			4000K	10,797	
			5000K	10,718	
	14000L	100W	3000K	13,609	145
			4000K	14,469	
			5000K	14,362	

	Lumen Output	Input Wattage	CCT/80CRI	Delivered Lumens	Lumens Per Watt @ 4000K, 80CRI
ESXF2	3500L	22W	3000K	3,377	163
			4000K	3,591	
			5000K	3,564	
	5500L	37W	3000K	5,315	151
			4000K	5,651	
			5000K	5,609	
	7500L	56W	3000K	7,223	137
			4000K	7,680	
			5000K	7,623	

	Lumen Output	Input Wattage	CCT/80CRI	Delivered Lumens	Lumens Per Watt @ 4000K, 80CRI
ESXF4	16000L	111W	3000K	15,508	148
			4000K	16,487	
			5000K	16,366	
	18000L	124W	3000K	17,274	148
			4000K	18,365	
			5000K	18,230	
	20000L	150W	3000K	19,583	139
			4000K	20,819	
			5000K	20,666	

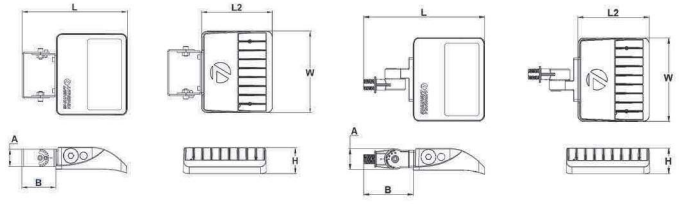
CS CONTRACTOR SELECT™

LITHONIA LIGHTING®

Dimensions

All dimensions are inches (centimeters) unless otherwise indicated.

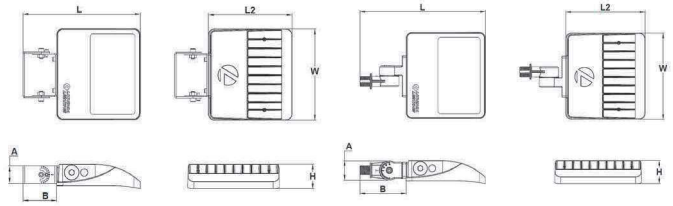
ESXF1



Front View Side View Front View Side View

Luminaire	Length (L)	Width (W)	Height (H)	Yoke/Knuckle		L2	Weight
				A (Height)	B (Length)		
	Dimensions in inches" (centimeters)						Pounds (kg)
ESXF1 SWW2 ALO KY (Yoke)	7.65" (27.8cm)	6.04" (15.4cm)	1.86" (4.7cm)	1.26" (3.2cm)	2.48" (6.3cm)	5.17" (13.2cm)	2.31 lbs (1.048 kg)
ESXF1 SWW2 P0/ALO KY (Knuckle)	8.77" (22.3cm)	6.04" (15.4cm)	1.86" (4.7cm)	1.5" (3.8cm)	3.59" (9.1cm)	5.17" (13.2cm)	2.17 lbs (0.986 kg)

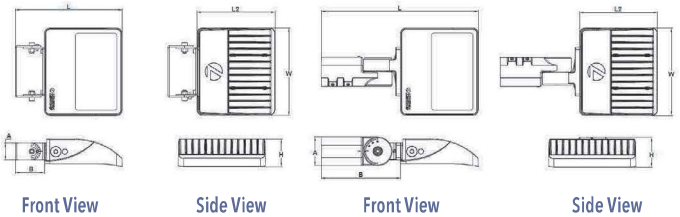
ESXF2



Front View Side View Front View Side View

Luminaire	Length (L)	Width (W)	Height (H)	Yoke/Knuckle		L2	Weight
				A (Height)	B (Length)		
	Dimensions in inches" (centimeters)						Pounds (kg)
ESXF2 SWW2 ALO KY (Yoke)	8.64" (21.9cm)	6.75" (17.1cm)	1.8" (4.6cm)	1.26" (3.2cm)	2.48" (6.3cm)	6.16" (15.6cm)	2.92 lbs (1.324 kg)
ESXF2 SWW2 ALO KY (Knuckle)	9.75" (24.8cm)	6.75" (17.1cm)	1.8" (4.6cm)	1.5" (3.8cm)	3.59" (9.1cm)	6.16" (15.6cm)	2.79 lbs (1.264 kg)

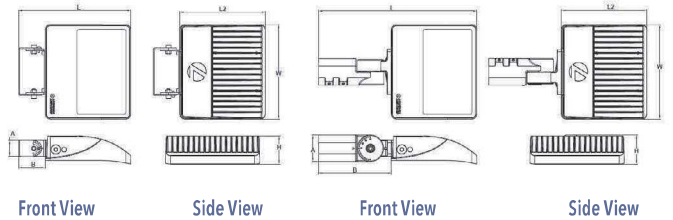
ESXF3



Front View Side View Front View Side View

Luminaire	Length (L)	Width (W)	Height (H)	Yoke/Knuckle		L2	Weight
				A (Height)	B (Length)		
	Dimensions in inches" (centimeters)						Pounds (kg)
ESXF3 SWW2 ALO SY (Yoke)	10.54" (19.4cm)	8.95" (22.7cm)	2.84" (7.2cm)	1.77" (4.5cm)	2.99" (7.6cm)	7.97" (20.2cm)	6.21 lbs (2.818 kg)
ESXF3 SWW2 ALO SY (Slipfitter)	16.07" (40.8cm)	8.95" (22.7cm)	3.04" (7.7cm)	2.95" (7.5cm)	8.11" (7.5cm)	7.97" (20.2cm)	6.48 lbs (2.938 kg)

ESXF4



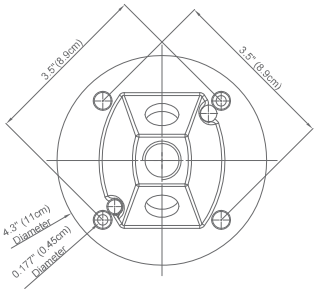
Front View Side View Front View Side View

Luminaire	Length (L)	Width (W)	Height (H)	Yoke/Knuckle		L2	Weight
				A (Height)	B (Length)		
	Dimensions in inches" (centimeters)						Pounds (kg)
ESXF4 SWW2 ALO SY (Yoke)	12.54" (31.8cm)	10.54" (26.8cm)	3.12" (7.9cm)	1.77" (4.5cm)	2.99" (7.6cm)	9.55" (24.3cm)	8.17 lbs (3.706 kg)
ESXF4 SWW2 ALO SY (Slipfitter)	17.66" (44.8cm)	10.54" (26.8cm)	3.22" (8.2cm)	2.95" (7.5cm)	8.11" (20.6cm)	9.55" (24.3cm)	8.43 lbs (3.824 kg)

EPA Data

	Angle of Tilt	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
ESXF1	Project Area(ft^2)	0.078	0.114	0.15	0.183	0.21	0.231	0.246	0.25	0.25	0.25
	EPA(ft^2)	0.0936	0.1368	0.18	0.2196	0.252	0.2772	0.2952	0.3	0.3	0.3
ESXF2	Project Area(ft^2)	0.09	0.133	0.182	0.226	0.263	0.293	0.314	0.325	0.326	0.32
	EPA(ft^2)	0.108	0.1596	0.2184	0.2712	0.3156	0.3516	0.3768	0.39	0.3912	0.384
ESXF3	Project Area(ft^2)	0.23	0.285	0.383	0.471	0.548	0.608	0.65	0.673	0.674	0.66
	EPA(ft^2)	0.276	0.342	0.4596	0.5652	0.6576	0.7296	0.78	0.8076	0.8088	0.792
ESXF4	Project Area(ft^2)	0.23	0.365	0.494	0.609	0.707	0.785	0.84	0.869	0.87	0.81
	EPA(ft^2)	0.276	0.438	0.5928	0.7308	0.8484	0.942	1.008	1.0428	1.044	0.972

*Includes luminaire and integral mounting arm. Other tenons, arms, brackets or other accessories are not included in this EPA data.



Specifications

INTENDED USE:

The ESXF LED floodlight is designed to provide a cost effective, energy-efficient solution for the one-for-one replacement of existing traditional sources ranging from 150W quartz up to 400W metal halide. ESXF is well suited for general illumination of parking lots, signage, yards, walkways, landscaping, and other floodlighting applications. ESXF luminaires deliver a uniform, wide flood 7x7 light distribution.

CONSTRUCTION:

The ESXF LED floodlight features sealed die-cast aluminum body and is IP66 listed to withstand moisture and the elements for years to come.

ELECTRICAL:

ESXF features adjustable lumen output include, low, medium, and high. (ESXF P0 static only). Switchable CCT includes between 3000K(warm), 4000K(neutral) or 5000K(daylight) and a selectable dusk to dawn photocell that automatically turns the fixture on in the evening and off the next morning.

Standard 6kVsurge protection tested in accordance to ANSI/IEEE C62.41.2)Category C. ESXF LED luminaries use MVOLT (120-277V) as well as UVOLT (120-347V) on select models. Adjustable lumen output is achieved with 0-10V continuous dimming capable drivers, ensuring system power factor>90% and THD <20%.

INSTALLATION:

ESXF1 (P0) and ESXF2 ship with ½ NPS threaded knuckle mount factory installed and can be mounted to conduit bodies or to 4" electrical boxes using the provided round mounting plate. Yoke mounts can be easily changed in the field to mount to any solid surfaces (ESXF P0, knuckle mount only).

ESXF3 and ESXF4 include a yoke mounting for solid surface mounting and an integral slipfitter that mates with standard 2 3/8" tenons for pole-top mounting. All models ship standard with 18" SO cord.

LISTINGS:

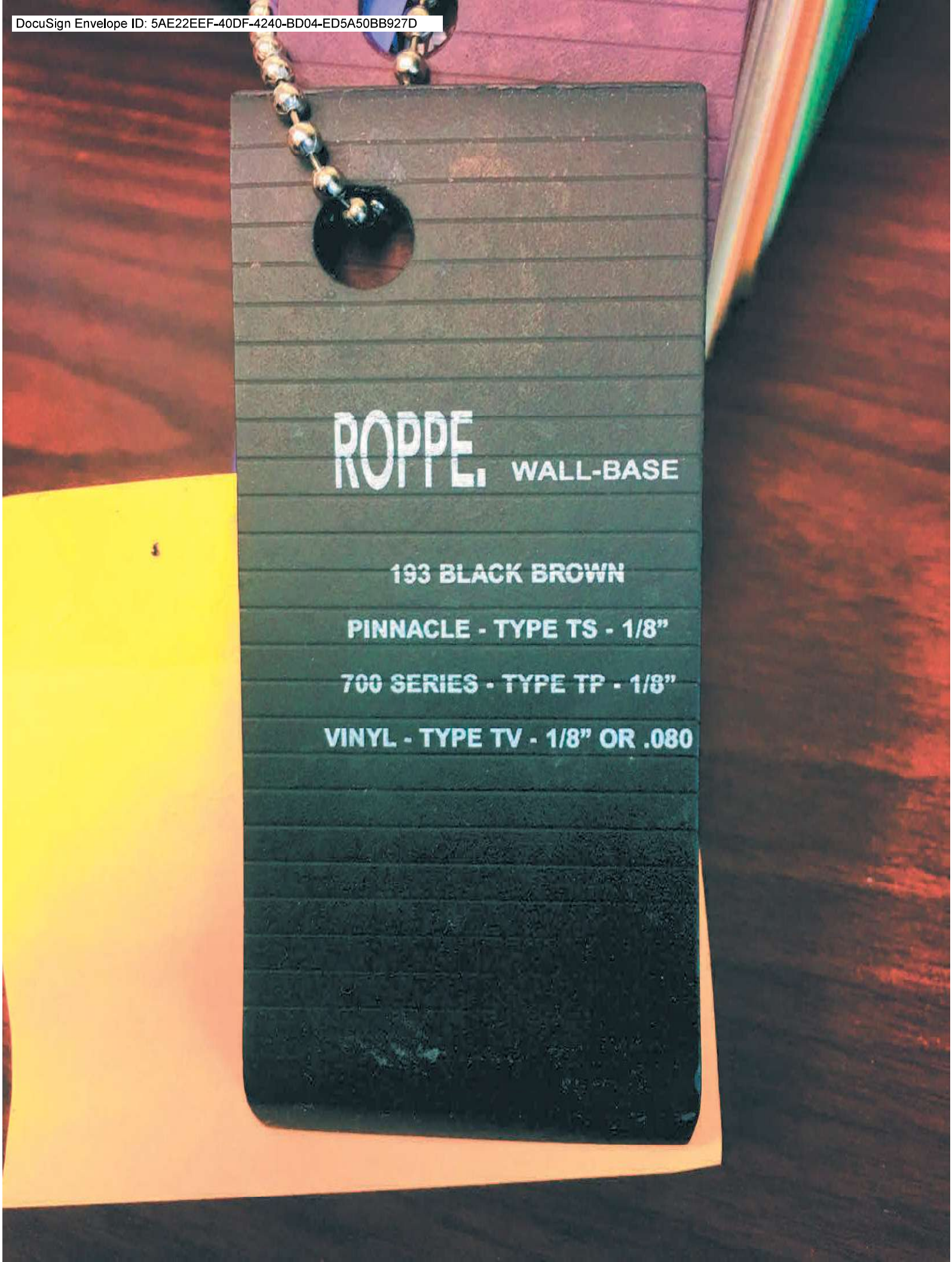
CSA certified to U.S. and Canadian standards. Luminaire is IP66 rated. Rated for -40°C minimum ambient.

WARRANTY:

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Factory settings
Lumen Output: High
CCT: 4000K
Photocell: On



EXCERPT FROM 2015 IECC

SECTION C405
ELECTRICAL POWER AND LIGHTING SYSTEMS

C405.1 General (Mandatory).

This section covers lighting system controls, the maximum lighting power for interior and exterior applications and electrical energy consumption.

Exception: Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5, provided that they comply with Section R404.1.

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.2.15 or C403.2.16.

C405.2 Lighting controls (Mandatory).

Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4 and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.

C405.2.1 Occupant sensor controls.

Occupant sensor *controls* shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges.
5. Employee lunch and break rooms.
6. Private offices.
7. Restrooms.
8. Storage rooms.
9. Janitorial closets.
10. Locker rooms.
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.
12. Warehouses.

C405.2.1.1 Occupant sensor control function.

Occupant sensor controls in spaces other than warehouses specified in Section C405.2.1 shall comply with the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space.
2. Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-c operation would endanger the safety or security of the room or building occupants.
3. Shall incorporate a *manual control* to allow occupants to turn lights off.

C405.2.1.2 Occupant sensor control function in warehouses.

In warehouses, the lighting in aisleways and open areas shall be controlled with occupant sensors that automatically reduce lighting power by not less than 50 percent when the areas are unoccupie The occupant sensors shall control lighting in each aisleway independently and shall not control lighting beyond the aisleway being controlled by the sensor.

C405.2.2 Time-switch controls.

Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with Section C405.2.2.1.

Exception: Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, automatic controls shall not be required for the following:

1. *Sleeping units*.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.
5. Shop and laboratory classrooms.

C405.2.2.1 Time-switch control function.

Each space provided with *time-switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. Time-switch *controls* shall include an overri switching device that complies with the following:

1. Have a minimum 7-day clock.
2. Be capable of being set for seven different day types per week.
3. Incorporate an automatic holiday "shutoff" feature, which turns off all controlled lighting loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program backup capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted.
5. Include an override switch that complies with the following:
   5.1. The override switch shall be a manual control.
   5.2. The override switch, when initiated, shall permit the controlled lighting to remain on for not more than 2 hours.
   5.3. Any individual override switch shall control the lighting for an area not larger than 5,000 square feet (465 m^2).

Exceptions:

1. Within malls, arcades, auditoriums, single-tenant retail spaces, industrial facilities and arenas:
   1.1. The time limit shall be permitted to be greater than 2 hours, provided that the override switch is a captive key device.
   1.2. The area controlled by the override switch is permitted to be greater than 5,000 square feet (465 m^2), but shall not be greater than 20,000 square feet (1860 m^2).
2. Where provided with *manual control*, the following areas are not required to have light reduction control:
   2.1. Spaces that have only one luminaire with a rated power of less than 100 watts.
   2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).
   2.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

C405.2.2.2 Light-reduction controls.

Spaces required to have light-reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 5 percent. Lighting reduction shall be achieved by one of the following or another *approved* method:

1. Controlling all lamps or luminaires.
2. Dual switching of alternate rows of luminaires, alternate luminaires or alternate lamps.
3. Switching the middle lamp luminaires independently of the outer lamps.
4. Switching each luminaire or each lamp.

Exception: Light reduction controls are not required in *daylight zones* with *daylight responsive controls* complying with Section C405.2.3.

C405.2.2.3 Manual controls.

Manual controls for lights shall comply with the following:

1. Shall be readily accessible to occupants.
2. Shall be located where the controlled lights are visible, or shall identify the area served by the lights and indicate their status.

Emergency
Room Number Guidelines

WILLIAMSON COUNTY
1848

These guidelines are intended to standardize wayfinding for emergency response personnel within large multi-wing/ multi-story/ multi-tenant County facilities which undergo routine tenant modifications.

Room Numbering Overview

Emergency room numbers for each enclosed space within a building should be labeled at the head and foot of doorways. These designations will be independent of user-group room names and corresponding placards.

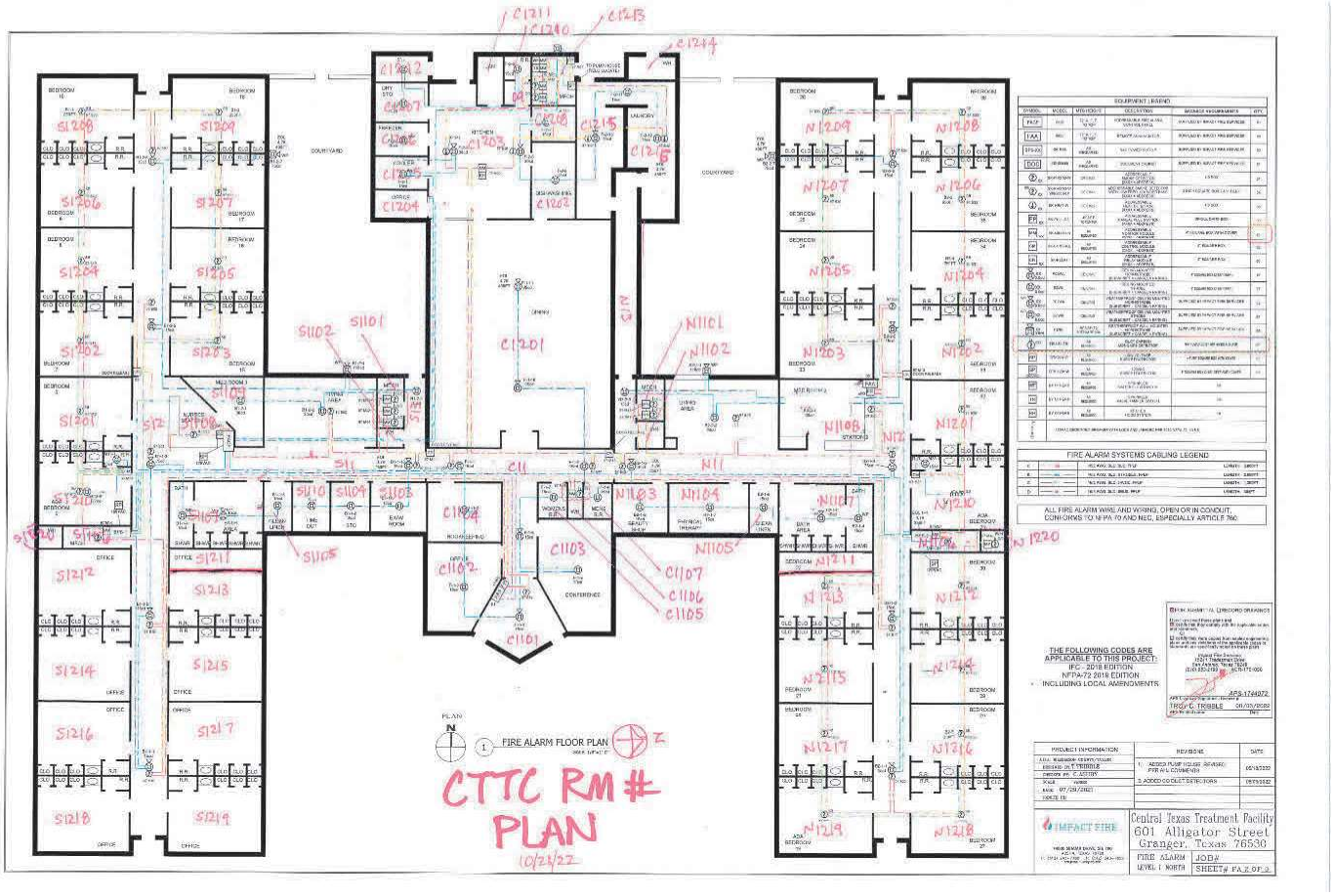
The emergency room number posted at the door frame **header** designates the **room being entered**. The emergency room number posted at the **baseboard** level on the door-handle side of the door designates the **room being occupied**.

Building Organization

To optimize room numbering for emergency wayfinding, assess each facility for:

1. cardinal orientation on a map
2. physical organization of adjacent buildings/ additions/ wings/ floors
3. internal organization of departments or fire partitions/ ratings

The example facility below demonstrates a room numbering system that is based on the cardinal orientation of the facility with north and south wings and different use zones within the central portion of the building.



Room Numbering System

Each room number is composed (5) digits, subdividable into (4) parts:

Digit 1 = Building adjacency/ wing/ addition
(**C**= central, **N**= north, **E**= east, **W**= west, **S**= south)

Digit 2 = Floor number
(**0**= basement, **1**= 1st floor, **2**= 2nd floor, etc.)

Digit 3 = Zone or Department

Digits 4-5 = Sequential Number

W2459

West Wing 2nd Floor Zone 4 Room 59

Circulation Features Numbering

Each corridor/ hallway should be labeled with digits 1, 2 and 3 of the numbering system described above.

Each vertical circulation feature should be labeled with a type followed by digits 1 and 3 separated by a hyphen since vertical circulation can connect a single zone on multiple floors.

STAIR W-4

Circulation Type West Wing Zone 4

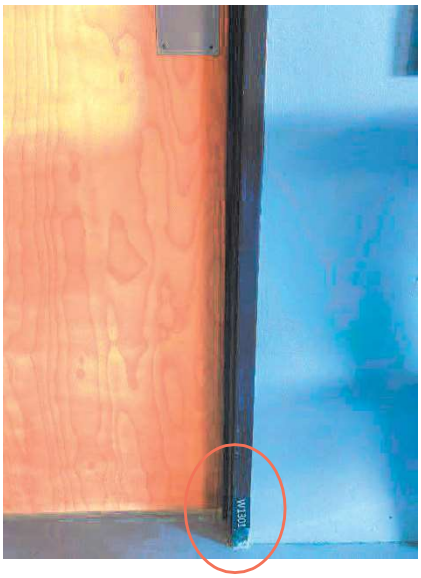
Character and Print Specifications

- Characters = Uppercase
- Font = Arial
- Height = 1-inch
- Spacing = 1/8-inch (min. within a word)
- Print Media = 1-1/4-inch clear adhesive tape
- Ink Color = black or white (select for high contrast from doorframe/ baseboard color)

Black

White

Special Circumstances



For rooms with no baseboard, the room number should be affixed at the base of the door frame on the door-handle side with the text readable in a vertical orientation.

Within a detention facility, room numbers should be stenciled in a permanent high-contrast paint rather than the standard print media described above.

WILCO STANDARD PLACARD SIZES

7”

9”

6”

6”

EXHIBIT B

MINIMUM INSURANCE COVERAGES AND MINIMUM COVERAGE AMOUNTS

Minimum Insurance Requirements

A. Contractor shall carry insurance in the types and amounts indicated below for the duration of the Contract/Agreement, which shall include items owned by Owner in the care, custody and control of Contractor prior to and during construction. Contractor must also complete and file the declaration pages from the insurance policies with Owner whenever a previously identified policy period expires during the term of the Agreement, as proof of continuing coverage. Contractor shall update all expired policies prior to submission of any payment requests hereunder. Failure to update policies shall be reason for payment to be withheld until evidence for renewal is provided to the Owner. If the Contractor fails to obtain, maintain or renew any insurance required by this Contract/Agreement, the Owner may, among other remedies available hereunder or at law, obtain insurance coverage directly and recover the cost of that insurance from the Contractor or declare this Contract/Agreement void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

B. All policies of insurance provided by the Contractor must comply with the requirements set forth herein, the Contract/Agreement and the laws of the State of Texas.

C. The Contractor shall provide and maintain, until the Work covered in the Contract/Agreement is completed and accepted by the Owner, the minimum insurance coverages in the minimum amounts as described below.

	Type of Coverage	Limits of Liability
1.	Worker's Compensation	Statutory
2.	Employer's Liability	
	Bodily Injury by Accident	$500,000 Ea. Accident
	Bodily Injury by Disease	$500,000 Ea. Employee
	Bodily Injury by Disease	$500,000 Policy Limit

3. Commercial general liability including completed operations and contractual liability insurance for bodily injury, death, or property damages in the following amounts:

COVERAGE	PER OCCURRENCE
Commercial General Liability (including premises, completed operations and contractual)	$1,000,000
Aggregate policy limits:	$2,000,000

4. Comprehensive automobile and auto liability insurance (covering owned, hired, leased and non-owned vehicles):

COVERAGE	PER PERSON	PER OCCURRENCE
Bodily injury (including death)	$1,000,000	$1,000,000
Property damage	$1,000,000	$1,000,000
Aggregate policy limits	No aggregate limit	

5. Builder’s Risk Insurance (all-risks)

An all-risk policy, in the amount equal at all times to 100% of the Contract Price or Contract Sum. The policy shall include coverage for loss or damage

caused by certified acts of terrorism as defined in the Terrorism Risk Insurance Act. The policy shall be issued in the name of the Contractor and shall name its Subcontractors as additional insureds. The Owner shall be named as a loss payee on the policy. The builders risk policy shall have endorsements as follow:

a. This insurance shall be specific as to coverage and not considered as contributing insurance with any permanent insurance maintained on the present premises. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

b. For renovation projects and or portions of work contained within an existing structure, the Owner waives subrogation for damage by fire to existing building structure(s), if the Builder's Risk Policy has been endorsed to include coverage for existing building structure(s) in the amount described in the Special Conditions. However, Contractor shall not be required to obtain such an endorsement unless specifically required by the Special Conditions in the Contract Documents. The aforementioned waiver of subrogation shall not be effective unless such endorsement is obtained.

6. Flood insurance when specified in Supplementary General Conditions or Special Conditions.

7. Umbrella coverage in the amount of not less than $5,000,000.

D. Workers' Compensation Insurance Coverage:

1. Definitions:

(a) Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Texas Workers' Compensation Commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the Project.
(b) Duration of the Project - includes the time from the beginning of the work on the Project until the Contractor's/person's work on the Project has been completed and accepted by the Owner.

(c) Coverage – Workers' compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).

(d) Persons providing services on the Project ("subcontractor") - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the Project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

2. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, §401.011(44) for all employees of the Contractor providing services on the Project, for the duration of the Project.
3. The Contractor must provide a certificate of coverage prior to execution of the Agreement/Contract, and in no event later than ten (10) days from Notice of Award. Failure to provide the insurance in a timely fashion may result in loss of Contractor's bid bond.
4. If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the Project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the Owner showing that coverage has been extended.
5. The Contractor shall obtain from each person providing services on a project, and provide to the Owner:

   (a.) a certificate of coverage, prior to that person beginning work on the Project, so the Owner will have on file certificates of coverage showing coverage for all persons providing services on the Project; and

   (b.) no later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

6. The Contractor shall retain all required certificates of coverage for the duration of the Project and for one year thereafter.
7. The Contractor shall notify the Owner in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.
8. The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

9. The Contractor shall contractually require each person with who it contracts to provide services on a project, to:

   (a) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas labor Code, Section 401.011(44) for all of its employees providing services on the Project, for the duration of the Project;
   (b) provide to the Contractor, prior to that person beginning work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the duration of the Project;
   (c) provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;
   (d) obtain from each other person with whom it contracts, and provide to the Contractor:

      i. a certificate of coverage, prior to the other person beginning work on the Project; and
      ii. a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

   (e) retain all required certificate of coverage on file for the duration of the Project and for one year thereafter;

(f) notify the Owner in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and

(g) contractually require each person with whom it contracts, to perform as required by paragraphs (a)-(g), with the certificates of coverage to be provided to the person for whom they are providing services.

10. By signing the Agreement/Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the Commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

11. The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the Owner to declare the Agreement/Contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the Owner.

E. If insurance policies are not written for the amounts specified herein, Contractor shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of primary coverage.

F. Insurance coverage required hereunder shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A- or better by A.M. Best Company, or otherwise acceptable to Owner.

G. The Owner ("Williamson County, Texas"), its officials, employees and volunteers shall be named as an additional insured on all required policies. These insurance policies shall contain the appropriate additional insured endorsement signed by a person authorized by that insurer to bind coverage on its behalf.

H. The furnishing of the above listed insurance coverage, as may be modified by the Contract Documents, must be tendered prior to execution of the Agreement/Contract,

and in no event later than ten (10) days from Notice of Award. Failure to provide the insurance in a timely fashion may result in loss of Contractor's bid bond.

I. Owner reserves the right to review the insurance requirements set forth herein during the Contract/Agreement and to make reasonable adjustments to the insurance coverage and their limits when deemed necessary and prudent by the Owner based upon changes in statutory law, court decisions, or the claims history of the industry as well as the Contractor.

J. Owner shall be entitled, upon request, and without expense, to receive complete copies of the policies with all endorsements and may make any reasonable requests for deletion, or revision or modification of particular policy terms, conditions, limitations, or exclusions, except where policy provisions are established by law or regulation binding upon the Parties or the underwriter of any of such polices. Damages caused by the Contractor and not covered by insurance shall be paid by the Contractor.

K. Contractor shall be responsible for payment of premiums for all of the insurance coverages required hereunder. Contractor further agrees that for each claim, suit or action made against insurance provided hereunder, with respect to all matters for which the Contractor is responsible hereunder, Contractor shall be solely responsible for all deductibles and self-insured retentions. Any deductibles or self-insured retentions over $75,000 in the Contractor's insurance must be declared and approved in writing by Owner in advance.

L. Contractor shall contractually require each person or entity with whom it contracts to provide services in relation to the Work, to comply with every insurance requirement that Contractor must comply with hereunder. More specifically, each person or entity with whom Contractor contracts to provide services on the in relation to the Work must comply with each insurance requirement hereunder just as if such person or entity was the Contractor. Thus, every reference to Contractor under each insurance requirement hereunder shall mean and include each person or entity with whom Contractor contracts to provide services in relation to the Work. If any such person or entity with whom Contractor contracts to provide services in relation to the Work fails to obtain, maintain or renew any insurance required by this Contract/Agreement, Owner may, among other remedies available hereunder or at law, obtain insurance coverage directly and recover the cost of that insurance from the Contractor or declare this Contract/Agreement void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

EXHIBIT C

Williamson County
Vendor Reimbursement Policy

The purpose of this Williamson County Vendor Reimbursement Policy ("Policy") is to provide clear guidelines to vendors on Williamson County's expectations and requirements regarding allowable reimbursable expenditures and required backup. The Policy will also minimize conflicts related to invoice payments and define non-reimbursable items. This Policy is considered a guideline and is not a contract.

This Policy may be altered, deleted or amended, at any time and without prior notice to vendors, by action of the Williamson County Commissioners Court. Unenforceable provisions of this Policy, as imposed by applicable law, regulations, or judicial decisions, shall be deemed to be deleted. Any revisions to this Policy will be distributed to all current vendors doing business with the County.

1. Invoices and Affidavits

1.1 Invoices must adequately describe the goods or services provided to County and include all required backup (i.e. reimbursable expenses, mileage log, timesheets, receipts detailing expenses incurred etc.) that is in a form acceptable to the Williamson County Auditor. Invoices that do not adequately describe the goods or services provided to County or contain backup that is satisfactory to the Williamson County Auditor will be returned to vendor for revisions and the provision above relating to invoice errors resolved in favor of the County shall control as to the required actions of vendor and when such invoice must be paid by the County.

1.2 In the event an invoice includes charges based upon hourly billing rates for services or any other rates based upon the amount of time worked by an individual or individuals in performing services, whether the charges are being billed directly to the County or whether they are the basis of invoices from subcontractors for which the vendor seeks reimbursement from the County, the charges shall be accompanied by an affidavit signed by an officer or principal of the vendor certifying that the work was performed, it was authorized by the County and that all information contained in the invoice that is being submitted is true and correct.

1.3 Upon County's request, vendor must submit all bills paid affidavits wherein vendor must swear and affirm that vendor has paid each of its subcontractors, laborers, suppliers and material in full for all labor and materials provided to vendor for or in connection with services and work performed for County and, further, vendor must swear and affirm that vendor is not aware of any unpaid bills, claims, demands, or causes of action by any of its subcontractors, laborers, suppliers, or material for or in connection with the furnishing of labor or materials, or both, for services and work performed for County.

2. Travel Reimbursement

2.1 The County will only cover costs associated with travel for vendors outside a 45-mile radius from the Williamson County Courthouse, 710 Main Street, Georgetown, Texas 78626.

2.2 The County will only cover costs associated with travel as documented work for County. If a vendor is also doing business for another client, the travel costs must be split in proportion to the amount of work actually performed for the County and the other client. The only allowable travel expense will be for the specific days worked for Williamson County.

2.3 No advance payments will be made to vendor for travel expenditures. The travel expenditure may only be reimbursed after the expenditure/trip has already occurred and vendor has provided the Williamson County Auditor with all necessary and required backup.

2.4 Vendors must submit all travel reimbursement requests on each employee in full. Specifically, a travel reimbursement request must include all related travel reimbursement expenses relating to a particular trip for which vendor seeks reimbursement. Partial travel reimbursement requests will not be accepted (i.e. vendor should not submit hotel and mileage one month then the next month submit rental car and airfare). If the travel reimbursement appears incomplete, the invoice will be sent back to the vendor to be submitted when all information is ready to submit in full.

2.5 Reimbursement for transportation costs will be at the most reasonable means of transportation (i.e.: airline costs will be reimbursed for coach rate, rental car costs will only be reimbursed if rental car travel was most reasonable means of travel as compared to travel by air).

2.6 The County will not be responsible for, nor will the County reimburse additional charges due to personal preference or personal convenience of individual traveling.

2.7 The County will not reimburse airfare costs if airfare costs were higher than costs of mileage reimbursement.

2.8 Additional expenses associated with travel that is extended to save costs (i.e. Saturday night stay) may be reimbursed if costs of airfare would be less than the cost of additional expenses (lodging, meals, car rental, mileage) if the trip had not been extended. Documentation satisfactory to the Williamson County Auditor will be required to justify expenditure.

2.9 County will only reimburse travel expense to necessary personnel of the vendor (i.e. no spouse, friends or family members).

2.10 Except as otherwise set forth herein, a vendor must provide a paid receipt for all expenses. If a receipt cannot be obtained, a written sworn statement of the expense from the vendor may be substituted for the receipt.

2.11 Sales tax for meals and hotel stays are the only sales taxes that will be reimbursed. Sales tax on goods purchased will not be reimbursed. A sales tax exemption form is available from the Williamson County Auditor's Office upon request.

2.12 The County will not pay for any late charges on reimbursable items. It is the responsibility of the vendor to pay the invoice first and seek reimbursement from the County.

3. Meals

3.1 Meal reimbursements are limited to a maximum of $59.00 per day on overnight travel. On day travel (travel that does not require an overnight stay), meal reimbursements are limited to a maximum of $25.00 per day. The travel must be outside the Williamson County Courthouse, 710 Main Street, Georgetown, Texas 78626 by a 45-mile radius.

3.2 Receipts are required on meal reimbursement amounts up to the maximum per day amount stated for overnight or day travel. If receipts are not presented, the vendor can request per diem (per diem limits refer to 3.2). However, a vendor cannot combine per diem and meal receipts. Only one method shall be allowed.

3.3 Meals are reimbursable only to vendors who do not have necessary personnel located within a 45-mile radius of the Williamson County Courthouse, 710 Main Street, Georgetown, Texas 78626, who are capable of carrying the vendor's obligations to the County. Meals will not be reimbursed to vendors who are located within a 45-mile radius of the Williamson County Courthouse.

3.4 County will not reimburse for alcoholic beverages.

3.5 Tips are reimbursable but must be reasonable to limitation of meal allowance

3.6 No meals purchased for entertainment purposes will be allowed.

3.7 Meal reimbursement must be substantiated with a hotel receipt.

4. Lodging

4.1 Hotel accommodations require an itemized hotel folio as a receipt. The lodging receipt should include name of the motel/hotel, number of occupant(s), goods or services for each individual charge (room rental, food, tax, etc.) and the name of the occupant(s). Credit card receipts or any other form of receipt are not acceptable.

4.2 Vendors will be reimbursed for a single room rate charge plus any applicable tax. If a single room is not available, the vendor must provide documentation to prove that a single room was not available in order to justify the expense over and above the single room rate. A vendor may also be required to provide additional documentation if a particular room rate appears to be excessive.

4.3 Personal telephone charges, whether local or long distance, will not be reimbursed.

5. Airfare

5.1 The County will only reimburse up to a coach price fare for air travel.

5.2 The County will exclude any additional charges due to personal preference or personal convenience of the individual traveling (i.e. seat preference charges, airline upgrades, etc. will not be an allowable reimbursement)

5.3 Air travel expenses must be supported with receipt copy of an airline ticket or an itinerary with actual ticket price paid. If tickets are purchased through a website, vendor must submit a copy of the webpage showing the ticket price if no paper ticket was issued.

5.4 Cancellation and/or change flight fees may be reimbursed by the County but vendor must provide the Williamson County Auditor with documentation in writing from a County department head providing authorization for the change.

5.5 The County will not reimburse vendor for tickets purchased with frequent flyer miles.

6. Car Rental

6.1 Vendors that must travel may rent a car at their destination when it is less expensive than other transportation such as taxis, airport shuttles or public transportation such as buses or subways.

6.2 Cars rented must be economy or mid-size. Luxury vehicle rentals will not be reimbursed. Any rental costs over and above the cost of a mid-size rental will be adjusted.

6.3 Vendors will be reimbursed for rental cars if the rental car cost would have been less than the mileage reimbursement cost (based on the distance from vendor's point of origin to Williamson County, Texas) had the vendor driven vendor's car.

6.4 Vendors must return a car rental with appropriate fuel levels as required by rental agreement to avoid the car rental company from adding fuel charges.

6.5 Rental agreement and credit card receipt must be provided to County as back up for the request for reimbursement.

6.6 Insurance purchased when renting vehicle may also be reimbursed.

6.7 Car Rental optional extras such as GPS, roadside assistance, and administrative fees on Tolls will not be reimbursed.

7. Personal Car Usage

7.1 Personal vehicle usage will be reimbursed in an amount equal to the standard mileage rate allowed by the IRS.

7.2 Per code of Federal Regulations, Title 26, Subtitle A, Chapter 1, Subchapter B, Part IX, Section 274(d), all expense reimbursement requests must include the following:

7.2.1.1 Date

7.2.1.2 Destination

7.2.1.3 Purpose

7.2.1.4 Name of traveler(s)
7.2.1.5 Correspondence that verifies business purpose of the expense

7.3 The mileage for a personal vehicle must document the date, location of travel to/from, number of miles traveled and purpose of trip.

7.4 Mileage will be reimbursed on the basis of the most commonly used route.

7.5 Reimbursement for mileage shall not exceed the cost of a round trip coach airfare.

7.6 Reimbursement for mileage shall be prohibited between place of residence and usual place of work.

7.7 Mileage should be calculated from employee's regular place of work or their residence, whichever is the shorter distance when traveling to a meeting or traveling to Williamson County, Texas for vendors who are located outside of the Williamson County Courthouse, 710 Main Street, Georgetown, Texas 78626 by at least a 45-mile radius.

7.8 When more than one person travels in same vehicle, only one person may claim mileage reimbursement.

7.9 Tolls, if reasonable, are reimbursable. Receipts are required for reimbursement. If a receipt is not obtainable, then written documentation of expense must be submitted for reimbursement (administrative fees on Tolls will not be reimbursed).

7.10 Parking fees, if reasonable are reimbursable for meetings and hotel stays. For vendors who contract with a third party for visitor parking at vendor's place of business, Williamson County will not reimburse a vendor based on a percentage of its contracted visitor parking fees. Rather, Williamson County will reimburse Vendor for visitor parking on an individual basis for each time a visitor uses Vendor's visitor parking. Receipts are required for reimbursement. If a receipt is not obtainable, then written documentation of expense must be submitted for reimbursement.

7.11 Operating and maintenance expenses as well as other personal expenses, such as parking tickets, traffic violations, and car repairs and collision damage are not reimbursable.

8. Other Expenses

8.1 Taxi fare, bus tickets, conference registrations, parking, etc. must have a proper original receipt.

9. Repayment of Non-reimbursable Expense.

Vendors must, upon demand, immediately repay County for all inappropriately reimbursed expenses whenever an audit or subsequent review of any expense reimbursement documentation finds that such expense was reimbursed contrary to these guidelines and this Policy. Williamson County reserves the right to retain any amounts that are due or that become due to a vendor in order to collect any inappropriately reimbursed expenses that a vendor was paid.

10. Non-Reimbursable Expenses

In addition to the non-reimbursable items set forth above in this Policy, the following is a non-exhaustive list of expenses that will not be reimbursed by Williamson County:

10.1 Alcoholic beverages/tobacco products
10.2 Personal phone calls
10.3 Laundry service
10.4 Valet service (excludes hotel valet)
10.5 Movie rentals
10.6 Damage to personal items
10.7 Flowers/plants

10.8 Greeting cards
10.9 Fines and/or penalties
10.10 Entertainment, personal clothing, personal sundries and services
10.11 Transportation/mileage to places of entertainment or similar personal activities
10.12 Upgrades to airfare, hotel and/or car rental
10.13 Airport parking above the most affordable rate available
10.14 Excessive weight baggage fees or cost associated with more than two airline bags
10.15 Auto repairs
10.16 Babysitter fees, kennel costs, pet or house-sitting fees
10.17 Saunas, massages or exercise facilities
10.18 Credit card delinquency fees or service fees
10.19 Doctor bills, prescription and other medical services
10.20 Hand tools
10.21 Safety Equipment (hard hats, safety vests, etc.)
10.22 Office Supplies
10.23 Lifetime memberships to any association
10.24 Donations to other entities
10.25 Any items that could be construed as campaigning
10.26 Technology Fees
10.27 Sales tax on goods purchased
10.28 Any other expenses which Williamson County deems, in its sole discretion, to be inappropriate or unnecessary expenditures.

EXHIBIT D

UNIFORM GENERAL CONDITIONS

TABLE OF ARTICLES

ARTICLE 1
GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 CONTRACT DOCUMENTS

Contract Documents are enumerated in the Contract between the Owner and Contractor (hereinafter the Contract) and consist of the Contract, Conditions of the Contract as revised, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Contract and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Owner or the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

1.1.2 CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor.

1.1.3 WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

1.1.8 KNOWLEDGE

The terms "knowledge," "recognize," and "discover," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising the care, skill, and diligence required of the Contractor by the Contract Documents.

1.1.9 PRODUCT

Materials, systems, and equipment incorporated or to be incorporated in the Work.

1.1.10 PROVIDE

Furnish and install and shall include, without limitation, labor, materials, equipment, transportation, services, and other items required to complete the referenced tasks.

1.1.11 FURNISH

Pay for, deliver (or receive), unload, inspect, and store products, materials, equipment, and accessories as specified while retaining care, custody and control until received for installation based on a signed receipt.

1.1.12 INSTALL

Receive, unload, inspect, and store as specified while retaining care, custody and control; set or place in position, make required connections; and adjust and test as specified in the Contract Documents for satisfactory performance and operation.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1

The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary,

and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement; either or both in accordance with the Owner or the Architect's interpretation. The terms and conditions of this **Paragraph 1.2.1**, however, shall not relieve the Contractor of any of the obligations set forth in the Contract Documents.

1.2.2

Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.2.3

Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

.1 Whenever a product is specified in accordance with a Federal Specification, an ASTM Standard, an American National Standards Institute Specification, or other Association Standard, the Contractor, if required by the Specifications or if requested by the Owner, shall present evidence from the manufacture, certifying the product complies with the particular Standard or Specification. When required by the Contract Documents, supporting data shall be submitted to substantiate compliance.

.2 Whenever a product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names, or similar reference, no substitutions may be made unless accepted in strict accordance with the Substitution requirements stated in the Specifications or, if no Substitution requirements are stated in the Specifications, in accordance with the requirements stated elsewhere in the Contract Documents. Where two or more products are shown or specified, the Contractor has the option to use either of those shown or specified.

1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article

is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

1.5 USE OF DRAWINGS AND OTHER INSTRUMENTS OF SERVICE

1.5.1

The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights, except as provided in the Owner-Architect Agreement. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

1.5.2

The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall establish the necessary protocols governing such transmissions in writing, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2
OWNER

2.1 GENERAL

The Owner means Williamson County acting through any duly authorized representative as provided in the Contract, and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization ("Owner's Designated Representative"). The term "Owner" means the Owner or the Owner's authorized representative.

2.2 OWNER

2.2.1 Appropriation of Funds by Owner

Owner believes it has sufficient funds currently available and authorized for expenditure to finance the costs of the Agreement between Owner and Contractor. Contractor understands and agrees that the Owner's payment of amounts under the Agreement between Owner and Contractor is contingent on the Owner receiving appropriations or other expenditure authority sufficient to allow the Owner, in the exercise of reasonable administrative discretion, to continue to make payments under the Agreement.

2.2.2

Unless specifically stated otherwise in the Contract Documents, Contractor shall secure and pay for necessary permits, approvals, assessments, and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

2.2.3

The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Except for surveys or grade information, the Contractor shall compare the information furnished by the Owner, including, but not limited to, soil tests, with visibly observable physical conditions and the Contract Documents and, on the basis of such review, promptly report to the Owner and the Architect any known conflicts, errors or omissions. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

2.2.4

The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

2.2.5

Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions.

2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by **Section 12.2** or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a **ten (10)-calendar day** period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2.5 EXTENT OF OWNER RIGHTS

2.5.1

The rights stated in this **Article 2** and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law, or (3) in equity.

2.5.2

In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

2.6 OWNER'S RIGHT TO RECORDS

2.6.1

The Contractor's records, which shall include but not be limited to accounting records, written policies and procedures, subcontractor files (including proposals of successful bidders), original estimates, estimating work sheets, correspondence, schedules, change order files (including documentation covering negotiated settlements), and any other supporting evidence necessary to substantiate charges related to this contract (all foregoing hereinafter referred to as "records") and shall be open to inspection and subject to audit and/or reproduction, during normal working hours, by Owner's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of any invoices, payments or claims submitted by the Contractor or any of his payees. Such records subject to examination shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs (including overhead allocations) as they may apply to costs associated with this Contract.

2.6.2
For the purpose of such audits, inspections, examinations and evaluations, the Owner's agent, or authorized representatives shall have access to said records from the effective date of this Contract for the duration of Work and until **three (3) years** (or longer if required by law) after the date of final payment by Owner to Contractor.

2.6.3
Owner's agent or its authorized representative shall have access during normal business hours to the Contractor's facilities, shall have access to all necessary records and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this **Section 2.6**. Owner's agent or authorized representative shall give auditees reasonable advance notice of intended audits.

2.6.4
Contractor shall require all subcontractors, insurance agents, and material suppliers (payees) with cost plus contracts, if permitted, and not fixed price contracts to comply with the provisions of this **Article 2** by insertion of the requirements hereof in a written contract agreement between Contractor and payee. Failure to obtain such written contracts which include such provisions shall be reason to exclude some or all of the related payee's costs from amounts payable to the Contractor pursuant to this contract.

ARTICLE 3
CONTRACTOR

3.1 GENERAL

3.1.1
The Contractor is the person or entity identified as such in the Contract and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under the Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative, and if these General Conditions are used in conjunction with the Contract between Owner and Construction Manager-At-Risk, the term "Contractor" shall mean the Construction Manager.

3.1.2
The Contractor shall perform the Work in strict accordance with the Contract Documents.

3.1.3
The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's

administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1

Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Contract, the Contractor and each Subcontractor shall have evaluated and satisfied themselves as to the observable conditions and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in **Section 10.3**, the Contractor and its Subcontractors shall be responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of **this Section 3.2**.

3.2.2

Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to **Paragraph 2.2.3**, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner. The Contractor shall verify the accuracy of elevations, dimensions, locations, and field measurements. In all cases of the interconnection of its Work with existing or other Work, the Contractor shall verify at the site all dimensions relating to such existing or other Work.

.1 All of Contractor's and Subcontractors' work shall conform to the Contract Documents. Contractor shall be responsible for the details of the Work necessary to carry out the intent of the drawings and specifications, or which are customarily performed. When more detailed information is required for performance of the Work or when an interpretation of the Contract Documents is requested, the Contractor shall submit a written request for information to the Architect or Owner (as required), and the Owner or Architect shall furnish such information or interpretation. Where only part of the Work is indicated, similar parts shall be considered repetitive. Where any detail is shown and components thereof are fully described, similar details not fully described shall be considered to incorporate the fully described details and components.

.2 The Contractor has had an opportunity to examine, and has carefully examined, all of the Contract Documents and Project site, and has fully acquainted itself with the scope of work, design, availability of materials, existing facilities, access, general topography, soil structure, subsurface conditions, obstructions, and all other conditions pertaining to the Work, the site of the Work, and its surrounding; that it has made necessary investigations to a full understanding of the difficulties which may be encountered in performing the Work; and that anything in any Contract Documents, or in any representations, statements, or information made or furnished by Owner or its representatives notwithstanding, Contractor will complete the Work for the compensation stated in the Contract. In addition thereto, Contractor represents that it is fully qualified to do the Work in accordance with the terms of the Contract in the time specified.

3.2.3

The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Owner and the Architect any nonconformity discovered by or made known to the Contractor as a request for information.

3.2.4

If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to **Paragraphs 3.2.2 or 3.2.3** above, the Contractor shall make Claims as provided in **Article 15**.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1

The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. Subcontractors are responsible for directing their forces on their portions of the Work. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor and Subcontractors shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

3.3.2

The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

3.3.3

The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

3.3.4

Inspection of the progress, quantity, or quality of the Work done by the Owner, any Owner's representative, any governmental agency, or the Architect, or any inspector, shall not relieve the Contractor of any responsibility for the compliance of the Work with the Contract Documents. The Owner or its approved representative (heretofore referred to as Owner's representative) shall have access to the worksite and all Work. No supervision or inspection by the Owner's representative, nor the authority to act nor any other actions taken by the Owner's representative shall relieve the Contractor of any of its obligations under the Contract Documents nor give rise to any duty on the part of the Owner.

3.4 LABOR AND MATERIALS

3.4.1

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

.1 Duty to Pay Prevailing Wage Rates. The Contractor shall pay not less than the wage scale of the various classes of labor as shown on the "Prevailing Wage Schedule" provided by the Owner. The specified wage rates are minimum rates only, and are not representations that qualified labor adequate to perform the Work is available locally at the prevailing wage rates. The Owner is not bound to pay—and will not consider—any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract Documents. The "Prevailing Wage Schedule" is not a representation that quantities of qualified labor adequate to perform the Work may be found locally at the specified wage rates.

a) For classifications not shown, workers shall not be paid less than the wage indicated for Laborers. The Contractor shall notify each worker commencing work on the Project the worker's job classification and the established minimum wage rate required to be paid, as well as the actual amount being paid. The notice must be delivered to and signed in acknowledgement of receipt by the employee and must list both the monetary wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by Owner, competent evidence of compliance with the Texas Prevailing Wage Law shall be furnished by Contractor.

b) A copy of each worker wage rate notification shall be submitted to the Owner with the Application for Payment for the period during which the worker began on-site activities.

.2 Prevailing Wage Schedule. The "Prevailing Wage Schedule" shall be determined by the Owner in compliance with **Texas Government Code, Chapter 2258**. Should the Contractor at any time become aware that a particular skill or trade not reflected on the Owner's Prevailing Wage Schedule will be or is being employed in the Work, whether by the Contractor or by a subcontractor, the Contractor shall promptly inform the Owner and shall specify a wage rate for that skill or trade, which shall bind the Contractor.

.3 Penalty for Violation. The Contractor and any Subcontractor shall pay to the Owner a penalty of **sixty dollars ($60.00)** for each worker employed for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the Prevailing Wage Schedule or any supplement thereto pursuant to **Paragraph 3.4.1.2** above. The Contractor and each Subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all workers employed in connection with the Work, and showing the actual per diem wages paid to each worker, which records shall be open at all reasonable hours for the inspection by the Owner.

.4 Complaints of Violations of Prevailing Wage Rates. Within **thirty-one (31) days** of receipt of information concerning a violation of **Texas Government Code, Chapter 2258**, the Owner shall make an initial determination as to whether good cause exists to believe a violation occurred. The Owner's decision on the initial determination shall be reduced to writing and sent to the Contractor or Subcontractor against whom the violation was alleged, and to the affected worker. When a good cause finding is made, the Owner shall retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the Prevailing Wage Schedule and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

.5 Arbitration Required if Violation not Resolved. After the Owner makes its initial determination, the affected Contractor or Subcontractor and worker have **fourteen (14) days** in which to resolve the issue of whether a violation occurred, including the amount that should be retained by Owner or paid to the affected worker. If the Contractor or Subcontractor and affected worker reach an agreement concerning the worker's claim, the Contractor shall promptly notify the Owner in a written document signed by the worker. It the Contractor or Subcontractor and affected worker do not agree before the **fifteenth (15th) day** after the Owner's determination, the Contractor or Subcontractor and affected worker must participate in binding arbitration in accordance with the **Texas General Arbitration Act, Chapter 171, Tex. Civ. Prac. & Rem. Code**. The parties to the arbitration have **ten (10) days** after the expiration of the **fifteen (15) days** referred to above, to agree on an arbitrator; if by the **eleventh (11th) day** there is no agreement to an arbitrator, a district court shall appoint an arbitrator on the petition of any of the parties to the arbitration.

.6 Arbitration Award. If an arbitrator determines that a violation has occurred, the arbitrator shall assess and award against the Contractor or Subcontractor the amount of penalty as provided in this **Section 3.4** and the amount owed the worker. The Owner may use any amounts retained hereunder to pay the worker the amount as designated in the arbitration award. If the Owner has not retained enough from the Contractor or Subcontractor to pay the worker in accordance with the arbitration

award, the worker has a right of action against the Contractor and Subcontractor as appropriate, and the surety of either to receive the amount owed, attorneys' fees and court costs. The Contractor shall promptly furnish a copy of the arbitration award to the Owner.

.7 Prevailing Wage Retainage. Money retained pursuant to this **Section 3.4** shall be used to pay the claimant or claimants the difference between the amount the worker received in wages for labor on the Project at the rate paid by the Contractor or Subcontractor and the amount the worker would have received at the general prevailing wage rate as provided by the agreement of the claimant and the Contractor or Subcontractor affected, or in the arbitrator's award. The full statutory penalty of **sixty dollars ($60.00) per day** of violation per worker shall be retained by the Owner to offset its administrative costs, pursuant to **Texas Government Code, §2258.023**. Any retained funds in excess of these amounts shall be paid to the Contractor on the earlier of the next progress payment or final payment. Provided, however, that the Owner shall have no duty to release any funds to either the claimant or the Contractor until it has received the notices of agreement or the arbitration award as provided under **Paragraphs 3.4.2 and 3.4.3**.

.8 No Extension of Time. If the Owner determines that good cause exists to believe a violation has occurred, the Contractor shall not be entitled to an extension of time for any delay arising directly or indirectly from of the procedures set forth in this **Section 3.4**.

3.4.2

Except in the case of minor changes in the Work authorized by the Owner or Architect in accordance with **Paragraphs 3.12.8 or Section 7.4**, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. If the Contractor desires to submit an alternate product or method in lieu of what has been specified or shown in the Contract Documents, the Contractor shall comply with the Substitution requirements listed in the Specifications, or if there are no Substitution requirements listed in the Specifications, then the following provisions apply:

.1 The Contractor must submit to the Architect and the Owner (1) a full explanation of the proposed substitution and submittal of all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution; (2) the adjustment, if any, in the Contract Sum, in the event the substitution is acceptable; (3) the adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable; and (4) a statement indicating Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect.

Proposals for substitutions shall be to the Architect in sufficient time to allow the Architect no less than **ten (10) working days** for review. No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

3.4.3
The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.4.4
The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project.

3.4.5.
In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of such conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive.

3.5 WARRANTY

3.5.1
The Contractor warrants to the Owner: (1) that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise; (2) that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit; (3) that the Work will be done strictly in accordance with the Contract Documents; (4) that all products are installed per the manufacturer's instructions, and in such a way that the manufacturer's warranties are preserved, including the use of a manufacturer-certified installer, if required by the manufacturer; (5) and that the Work, when finally completed, will provide a complete Project that meets the intent of the Contract Documents.

The Contractor represents and warrants to the Owner that its materials and workmanship, including without limitation, construction means, methods, procedures and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are and shall be consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to the Work; (3) requirements of any warranties applicable to the Work subject to **Paragraph 3.2.3**. Work, materials, or equipment not conforming to these requirements shall

be considered defective, and promptly after written notification of non-conformance shall be repaired or replaced by Contractor with Work conforming to this warranty. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

.1 Contractor further warrants that all materials or equipment of a category or classification will be a product of the same manufacturer and such materials or equipment shall be of the same lot, batch or type and that such materials and equipment will be as specified.

3.5.2

The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

3.6 TAXES

State Sales and Use Taxes. Sales, use or similar taxes imposed by a governmental authority that are related to the Work and for which the Contractor is liable; provided, however, Owner is a body corporate and politic under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code Ann. 151.309, as amended, and the services and materials subject of the Contract are being secured for use by Owner. Exemption certificates will be provided to Contractor upon request. As a precondition to the Owner reimbursing Contractor for allowable sales and use taxes, Contractor must, on its own, first attempt to use such tax exemption certificates in order to assert the exemption. In the event Contractor's efforts to use the tax exemption certificate is unsuccessful and provided that under the laws of the State of Texas an exemption from sales and use taxes is allowed. Owner will reimburse Contractor for such sales and use taxes upon Contractor providing sufficient and satisfactory documentation to the Williamson County Auditor.

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

3.7.1

Unless otherwise provided, the Contractor shall secure, pay for, and, as soon as practicable, furnish the Owner with copies or certificates of all permits and fees, licenses, and inspections necessary for the proper execution and completion of the Work, including, without limitation, all building permits. All connection charges, assessments, or inspection fees as may be imposed by any municipal agency or utility company are included in the Contract Sum and shall be the Contractor's responsibility.

3.7.2

The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

3.7.3

If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction and damages resulting therefrom.

3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than **twenty-one (21) calendar days** after first observance of the conditions. The Owner will promptly investigate such conditions and, if the Owner determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will authorize an equitable adjustment in the Contract Sum or Contract Time, or both. If the Owner determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Owner shall promptly notify the Contractor in writing, stating the reasons. If the Contractor disputes the Owner's determination, the Contractor party may assert a Claim as provided in **Article 15**.

3.7.5

If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in **Article 15**.

3.8 ALLOWANCES

3.8.1
The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

3.8.2
Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contractor shall, prior to purchasing any such materials, notify the Owner in writing of the cost and whether such cost will exceed the amount of the allowance. If Owner authorizes Contractor to proceed, after receiving the Contractor's estimate of the total cost, then the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under **Paragraph 3.8.2.1** and (2) changes in Contractor's costs under **Paragraph 3.8.2.2**.

3.9 SUPERINTENDENT

3.9.1
The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent or Contractor's project manager shall be as binding as if given to the Contractor. Important oral communications shall be immediately confirmed in writing.

3.9.2
The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Owner or Architect may reply within **fourteen (14) calendar days** to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Owner and Architect require additional time to review. Failure of the Owner or Architect to reply within the **fourteen (14)-calendar day** period shall constitute notice of no reasonable objection.

3.9.3
The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1
The Contractor, as provided in the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

3.10.2
The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

3.10.3
The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

3.10.4
The construction schedule shall be a detailed precedence-style critical path management ("CPM") schedule in a format satisfactory to the Owner that shall (1) provide a graphic representation of all activities and events that will occur during performance of the Work; (2) identify each phase of construction and occupancy; and (3) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as the "Milestone Date"). Upon review and acceptance by the Owner of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise

the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions as set forth in **Paragraph 3.10.1** or if requested by the Owner. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorize pursuant to a Change Order.

3.10.5

In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reach the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities, and (3) other similar measures. Such measures so continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require such measures is solely for the purpose of ensuring the Contractors compliance with the construction schedule.

3.11 DOCUMENTS AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

3.12 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

3.12.1

Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

3.12.2

Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

3.12.3

Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.12.4
Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of **Paragraph 4.2.7**. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

3.12.5
The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

3.12.6
By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.7
The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals until the respective submittal has been approved by the Architect.

3.12.8
The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by the Architect's approval thereof.

3.12.9

The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

3.12.10

The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this **Paragraph 3.12.10**, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.14 CUTTING AND PATCHING

3.14.1

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly as required by the Contract Documents. All

areas requiring cutting, fitting, and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

3.14.2

The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.15 CLEANING UP

3.15.1

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

3.15.2

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

3.16 ACCESS TO WORK

The Owner and Architect shall, at all times, have access to the Work in preparation and progress wherever located.

3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

3.18 INDEMNIFICATION

3.18.1 INDEMNITY

OTHER THAN EMPLOYEE PERSONAL INJURY CLAIMS. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS OWNER, ITS EMPLOYEES, AND ASSIGNS (THE "INDEMNIFIED PARTIES" OR "INDEMNITEES") FROM AND AGAINST CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, ARISING OUT OF OR ALLEGED TO BE RESULTING FROM THE PERFORMANCE OF THIS CONTRACT, TO THE EXTENT CAUSED BY THE NEGLIGENT OR WILLFUL ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, SUB-SUBCONTRACTORS, OR ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE. CONTRACTOR SHALL NOT BE REQUIRED TO INDEMNIFY, HOLD HARMLESS OR DEFEND THE INDEMNIFIED PARTIES AGAINST A CLAIM CAUSED BY THE NEGLIGENCE OR FAULT, OR THE BREACH OR VIOLATION OF A STATUTE, ORDINANCE, GOVERNMENTAL REGULATION, STANDARD, OR RULE OF THE INDEMNITEE, OR OTHER PARTY OTHER THAN CONTRACTOR OR ITS AGENT, EMPLOYEE, OR SUBCONTRACTOR OF ANY TIER, EXCEPT THAT CONTRACTOR SHALL INDEMNIFY, HOLD HARMLESS AND DEFEND THE INDEMNIFIED PARTIES AGAINST ANY CLAIMS FOR THE BODILY INJURY OR DEATH OF AN EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR IT SUBCONTRACTORS OF ANY TIER.

3.18.2 INDEMNITY – EMPLOYEE PERSONAL INJURY CLAIMS

TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE INDEMNIFIED PARTIES AND SHALL ASSUME ENTIRE RESPONSIBILITY AND LIABILITY (OTHER THAN AS A RESULT OF AN INDEMNIFIED PARTY'S GROSS NEGLIGENCE) FOR ANY CLAIM OR ACTION BASED ON OR ARISING OUT OF THE PERSONAL INJURY, INCLUDING THE DEATH, OF ANY EMPLOYEE OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY SUB-SUBCONTRACTOR, OR OF ANY OTHER ENTITY FOR WHOSE ACTS THEY MAY BE LIABLE, WHICH OCCURRED OR WAS ALLEGED TO HAVE OCCURRED ON THE PROJECT SITE OR IN CONNECTION WITH THE PERFORMANCE OF THE WORK OF THIS CONTRACT. CONTRACTOR HEREBY INDEMNIFIES THE INDEMNIFIED PARTIES EVEN TO THE EXTENT THAT SUCH PERSONAL INJURY WAS CAUSED OR ALLEGED TO HAVE BEEN CAUSED BY THE COMPARATIVE OR CONCURRENT NEGLIGENCE OF THE STRICT LIABILITY OF ANY INDEMNIFIED PARTY. THIS INDEMNIFICATION SHALL NOT BE LIMITED TO DAMAGES, COMPENSATION, OR BENEFITS PAYABLE UNDER INSURANCE POLICIES, WORKERS COMPENSATION ACTS, DISABILITY BENEFITS ACTS, OR OTHER EMPLOYEES BENEFIT ACTS.

3.18.3

THE CONTRACTOR'S INDEMNITY OBLIGATIONS UNDER THIS **SECTION 3.18** SHALL ALSO SPECIFICALLY INCLUDE, WITHOUT LIMITATION, ALL FINES, PENALTIES,

DAMAGES, LIABILITY, COSTS, EXPENSES (INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEYS' FEES) ARISING OUT OF, OR IN CONNECTION WITH, ANY (1) VIOLATION OF OR FAILURE TO COMPLY WITH ANY LAW, STATUTE, ORDINANCE, RULE, REGULATION, CODE OR REQUIREMENT OF A PUBLIC AUTHORITY THAT BEARS UPON THE PERFORMANCE OF THE WORK BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE, (2) MEANS, METHODS, PROCEDURES, TECHNIQUES, OR SEQUENCES OF EXECUTION OR PERFORMANCE OF THE WORK, AND (3) FAILURE TO SECURE AND PAY FOR PERMITS, FEES, APPROVALS, LICENSES, AND INSPECTIONS AS REQUIRED UNDER THE CONTRACT DOCUMENTS, OR ANY VIOLATION OF ANY PERMIT OR OTHER APPROVAL OF A PUBLIC AUTHORITY APPLICABLE TO THE WORK, BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE.

ARTICLE 4
ARCHITECT

4.1 GENERAL

4.1.1
The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Contract and is referred to throughout the Contract Documents as if singular in number.

4.1.2
Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

4.1.3
In the event that Owner has not engaged an architect and an architect is not identified in the Contract, but, rather, engages an engineer for the Project, all references made in these General Conditions to the "Architect" shall mean and include the engineer identified as the "Engineer" in the Contract and all duties, responsibilities and limitations of authority of the Architect, as set forth in the Contract Documents, shall apply to the Engineer.

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1
The Architect will provide administration of the Contract as described in the Owner-Architect Agreement. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

4.2.2

The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in **Paragraph 3.3.1**.

4.2.3

On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

4.2.4 COMMUNICATIONS AND CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to relate relevant communications between Owner and Architect to the Architect. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

4.2.5

If included in Architect's scope of work, the agreement between Owner and Architect, or if requested by the Owner, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts based on the Architect's evaluations of the Contractor's Applications for Payment.

4.2.6

To the extent permitted by the agreement between Owner and Architect, the Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect, in consultation with the Owner,

will have authority to require inspection or testing of the Work in accordance with **Paragraphs 13.5.2 through 13.5.3**, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Owner to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

4.2.7

To the extent provided in the agreement between Owner and Architect, the Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Owner and Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under **Sections 3.3, 3.5, and 3.12**. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.2.8

If requested by Owner, the Architect will prepare Change Orders and Construction Change Directives with the Owner's prior written consent, but the Architect may authorize minor changes in the Work as provided in the agreement between Owner and Architect, or in **Section 7.4**. If requested by Owner, the Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in **Paragraph 3.7.4**.

4.2.9

If requested by Owner, the Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to **Section 9.8**; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to **Section 9.10**; and issue a final Certificate for Payment pursuant to **Section 9.10**.

4.2.10
If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities, and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

4.2.11
If requested by Owner, the Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

4.2.12
Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

4.2.13
The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents, and if approved by Owner.

4.2.14
The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5
SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1
A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

5.1.2
A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is

referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.2 AWARD OF SUBCONTRACTS

5.2.1 FOR CONSTRUCTION MANAGER AT-RISK CONTRACTS

The Construction Manager shall publicly advertise for bids or proposals and receive bids or proposals from trade contractors or Subcontractors for the performance of all major elements of the work other than the minor work that may be included in the general conditions. The Construction Manager may seek to perform portions of the work itself if:

.1 the Construction Manager submits its bid or proposal for those portions of the Work in the same manner as all other trade contractors or Subcontractors; and

.2 the Owner determines that the Construction Manager's bid or proposal provides the best value for the Owner.

.3 Review of Bids or Proposals. Construction Manager shall review all trade contractor or Subcontractor bids or proposals in a manner that does not disclose the contents of the bid or proposal during the selection process to a person not employed by the Construction Manager, Architect, Engineer, or Owner. All bids or proposals shall be made available to the Owner on request and to the public after the later of the award of the Contract or the **seventh (7th) business day** after the date of final selection of bids or proposals. If the Construction Manager reviews, evaluates, and recommends to the Owner a bid or proposal from a trade contractor or subcontractor but the Owner requires another bid or proposal to be accepted, the Owner shall compensate the Construction Manager by a change in the Contract Sum, Contract Time, or Cost of the Work for any additional cost and risk that the Construction manager incurs because of the Owner's requirement that another bid or proposal be accepted.

5.2.2

The Contractor shall not contract with a proposed Subcontractor, person, or entity to whom the Owner has made reasonable objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made a reasonable objection.

5.2.3

If the Owner has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time may be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract

Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4

The Contractor shall not substitute a Subcontractor, person, or entity previously selected if the Owner makes reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.3.2

All subcontracts shall be in writing and, if requested, Contractor shall provide Owner with copies of executed subcontracts.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.4.1

The Contract is for Owner's benefit, its successors and assigns who, as well as Contractor, may directly enforce all rights and warranties, express or implied herein, but Subcontractors shall have recourse only against Contractor and not against Owner. Owner may rely solely upon Contractor for enforcement of all Subcontracts. To effect such purpose, Contractor assigns to Owner all right to bring any actions against subcontractors and material vendors without waiver by Owner of his right against Contractor because of defaults, delays and

effects for which a subcontractor or material vendor may also be liable, said assignment being effective only if:

.1 Contractor is in default under the Contract Documents; or

.2 Owner has terminated the Contract in accordance with the Contract Documents; and

.3 Only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.4 The assignment is subject to the prior rights of the surety, if any, obligated under any bond relating to the Contract.

5.4.2
Upon such assignment, if the Work has been suspended for more than **thirty (30) calendar days**, the Subcontractor's compensation may be equitably adjusted for increases in cost resulting from the suspension.

5.4.3
Upon such assignment to the Owner under this **Section 5.4**, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

5.4.4
The Architect and the Owner shall have the right to request from any Subcontractor at any time during the course of construction, a notarized affidavit stating the amount of monies which have been paid to the Subcontractor as of any certain stipulated date.

ARTICLE 6
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1
The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in **Article 15**.

6.1.2
When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Contract.

6.1.3
The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

6.2 MUTUAL RESPONSIBILITY

6.2.1
The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

6.2.2
If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect and the Owner apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

6.2.3
The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

6.2.4
The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in **Paragraph 10.2.5**.

6.2.5
The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in **Section 3.14**.

6.2.6
All separate contractors shall sign a site access agreement with Contractor setting forth duties, responsibilities, safety, and administrative requirements.

6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and allocate the cost among those responsible.

ARTICLE 7
CHANGES IN THE WORK

7.1 GENERAL

7.1.1
Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this **Article 7** and elsewhere in the Contract Documents.

7.1.2
A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Owner or Architect alone.

7.1.3
Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work. Except as permitted in **Section 7.3** and **Paragraph 9.7.2**, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any Claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

7.2 CHANGE ORDERS

7.2.1
A Change Order is a written instrument signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

7.2.2
Contractor's Change Order shall set forth in clear and precise detail breakdowns of labor and materials for all trades involved and the estimated impact on the dates of Substantial Completion. Contractor shall furnish supporting data as reasonably requested by Owner.

7.2.3
Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1
A Construction Change Directive is a written order signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2
A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3
If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in **Paragraph 7.3.7**.

7.3.4
If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.3.5
Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.6
A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.7
If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Owner shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Contract, or if no such amount is set forth in the Contract, a reasonable amount. In such case, and also under **Paragraph 7.3.3.3**, the Contractor shall keep and present, in such form as the Owner or Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this **Paragraph 7.3.7** shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

7.3.8
The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Owner or the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.9
Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Owner will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Owner determines to be reasonably justified. The Owner's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of Contractor to disagree and assert a Claim in accordance with **Article 15**.

7.3.10
When the Owner and Contractor agree with a determination made concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

7.4 MINOR CHANGES IN THE WORK

If permitted in the agreement between Owner and Architect, the Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents.

ARTICLE 8
TIME

8.1 CONTRACT TIME

TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT. The Contract Time is the time between the dates indicated in the Notice to Proceed for commencement of the Work and for achieving Substantial Completion. The Contract Time can be modified only by Change Order. Failure to achieve Substantial Completion within the Contract Time, as otherwise agreed to in writing, will cause damage to Owner and may subject Contractor to liquidated damages as provided in the Contract. If Contractor fails to achieve Final Completion within **thirty (30) calendar days** after Substantial Completion or a mutually agreed upon longer period of time between Contractor and Owner, Contractor shall be responsible for Owner's additional inspection, project management, and maintenance cost to the extent caused by Contractor's failure to achieve Final Completion.

8.2 NOTICE TO PROCEED

Owner will issue a Notice to Proceed which shall state the dates for beginning the Work and for achieving Substantial Completion of the Work.

8.3 WORK PROGRESS SCHEDULE

Unless indicated otherwise, Contractor shall submit to Owner and Architect the initial Work Progress Schedule for the Work in relation to the entire Project not later than **twenty-one (21) calendar days** after the effective date of the Notice to Proceed. Unless indicated otherwise, the Work Progress Schedule shall be computerized Critical Path Method (CPM) with fully editable logic. This initial schedule shall indicate the dates for starting and completing the various aspects required to complete the Work, including mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents, and acceptance of all the Work of the Contract. When acceptable to Owner, the initially accepted schedule shall be the Baseline Schedule for comparison to actual conditions throughout the Contract duration.

8.3.1 SCHEDULE REQUIREMENTS

Contractor shall submit electronic and paper copy of the initial Work Progress Schedule reflecting accurate and reliable representations of the planned progress of the Work, the Work to date if any, and of Contractor's actual plans for its completion. Contractor shall organize and provide adequate detail, so the schedule is capable of measuring and forecasting the effect of delaying events on completed and uncompleted activities.

.1 Contractor shall resubmit initial schedule as required to address review comments from Architect and Owner until such schedule is accepted as the Baseline Schedule.

.2 Submittal of a schedule, schedule revision or schedule update constitutes Contractor's representation to Owner of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.

8.3.2 SCHEDULE UPDATES

Contractor shall update the Work Progress Schedule and the Submittal Register monthly, as a minimum, to reflect progress to date and current plans for completing the Work, while maintaining original schedule as Baseline Schedule and submit electronic copies of the update to Owner and Architect as directed, but as a minimum with each request for payment. Owner has no duty to make progress payments unless accompanied by the updated Work Progress Schedule. Show the anticipated date of completion reflecting all extensions of time granted through Change Order as of the date of the update. Contractor may revise the Work Progress Schedule when in Contractor's judgment it becomes necessary for the management of the Work. Contractor shall identify all proposed changes to schedule logic to Owner and to Architect via an executive summary accompanying the updated schedule for review prior to final implementation of revisions into a revised Baseline Schedule. Schedule changes that materially impact Owner's operations shall be communicated promptly to Owner and Architect and shall not be incorporated into the revised Baseline Schedule without Owner's consent.

8.3.3

The Work Progress Schedule is for Contractor's use in managing the Work and submittal of the schedule, and successive updates or revisions, is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning the Work. Owner's acceptance of a schedule, schedule update, or revision constitutes Owner's agreement to coordinate its own activities with Contractor's activities as shown on the schedule.

.1 Acceptance of the Work Progress Schedule, or update and/or revision thereto does not indicate any approval of Contractor's proposed sequences and duration.

.2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute Owner's consent, alter the terms of the Contract, or waive either Contractor's responsibility for timely completion or Owner's right to damages for Contractor's failure to do so.

.3 Scheduled dates for completion of any activity or the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the Substantial Completion Date(s) and Contract Time.

8.4 COMPLETION OF WORK

Contractor is accountable for completing the Work within the Contract Time stated in the Contract, or as otherwise amended by Change Order.

8.4.1

If, in the judgment of Owner, the work is behind schedule and the rate of placement of Work is inadequate to regain scheduled progress to ensure timely completion of the entire Work or

a separable portion thereof, Contractor, when so informed by Owner, shall immediately take action to increase the rate of work placement by:

.1 An increase in working forces.

.2 An increase in equipment or tools.

.3 An increase in hours of work or number of shifts.

.4 Expedite delivery of materials.

.5 Other action proposed, if acceptable to Owner.

8.4.2
Within **ten (10) calendar days** after such notice from Owner, Contractor shall notify Owner in writing of the specific measures taken or planned to increase the rate of progress. Contactor shall include an estimate as to the date of scheduled progress recovery and an updated Work Progress Schedule illustrating Contractor's plan for achieving timely completion of the Project. Should Owner deem the plan of action inadequate, Contractor shall take additional steps or make adjustments, as necessary, to its plan of action until it meets with Owner's approval.

8.5 MODIFICATION OF CONTRACT TIME

8.5.1
Delays and extension of time as hereinafter described are valid only if executed in accordance with provisions set forth in **Article 7**.

8.5.2
When a delay defined herein as excusable prevents Contractor from completing the Work within the Contract Time, Contractor is entitled to an extension of time. Owner will make an equitable adjustment and extend the number of days lost because of excusable delay or Weather Days, as measured by Contractor's progress schedule. All extensions of time will be granted in calendar days. In no event, however, will an extension of time be granted for delays that merely extend the duration of non-critical activities without delaying the project Substantial Completion date(s).

.1 A "Weather Day" is a day on which Contractor's current schedule indicates Work is to be done, and on which inclement weather or related site conditions prevent Contractor from performing **seven (7) continuous hours** of Work on the critical path between the hours of 7:00 a.m. and 6:00 p.m.

A. Weather days are excusable delays and, in the event of precipitation, Contractor may claim **one (1) Weather Day** for each day of the duration of the precipitation plus an additional day for each **tenth (1/10th) of an inch** of accumulation as determined by a third-party website agreed upon by Owner and Contractor.

B. At the end of each calendar month, Contractor shall submit to Owner and Architect a list of Weather Days occurring in that month along with documentation of the impact on critical activities. Based on confirmation by Owner, any time extension granted will be issued by Change Order. If Contractor and Owner cannot agree on the time extension, Owner may issue a Construction Change Directive (CCD) for a fair and reasonable time extension.

.2 Excusable Delay. Contractor is entitled to an equitable adjustment of the Contract Time, issued via Change Order, for delays caused by the following:

A. Errors, omissions, and imperfections in design, which Architect corrects by means of changes in the Drawings and Specifications.

B. Unanticipated physical conditions at the Site, which Architect corrects by means of changes to the Drawings and Specifications or for which Owner directs changes in the Work identified in the Contract Documents.

C. Failure of Owner to have secured property, right-of-way, or easements necessary for Work to begin or progress.

D. Changes in the Work that effect activities identified in Contractor's schedule as "critical" to completion of the entire Work, if such changes are ordered by Owner or recommended by Architect and ordered by Owner.

E. Suspension of Work for unexpected natural events, Force Majeure (sometimes called "acts of God"), civil unrest, strikes or other events which are not within the reasonable control of Contractor.

F. Suspension of Work for convenience of Owner, which prevents Contractor from completing the Work within the Contract Time.

G. Administrative delays caused by activities or approval requirements related to an Authority Having Jurisdiction.

8.5.3

Contractor's relief in the event of such delays is the time impact to the critical path as determined by analysis of Contractor's schedule. In the event that Contractor incurs additional direct costs because of the excusable delays other than described in **Subparagraph**

8.5.2.2.D and within the reasonable control of Owner, the Contract Sum and Contract Time are to be equitably adjusted by Owner pursuant to the provisions of **Article 7**.

8.6 NO DAMAGES FOR DELAY

Due to the unique requirements of working within a public facility which may be shared with other user-groups and adjacent to other public facilities, Owner may, at any time, restrict the Work to non-disruptive activities to reduce noise, vibration, air pollution, or any other nuisance, intrusion, or danger affecting adjacent public functions and duties. In each case, Owner will make a good faith effort to provide sufficient advanced notice of restriction to Contractor; and, Contractor shall make a good faith effort to reallocate activities, materials, and forces onsite to avoid delay to the project schedule. Contractor has no claim for monetary damages for delay or hindrances to the Work from any cause, including, without limitation, any act or omission of Owner.

8.7 CONCURRENT DELAY

When the completion of the Work is simultaneously delayed by an excusable delay and a delay arising from a cause not designated as excusable, Contractor may not be entitled to a time extension for the period of concurrent delay.

8.8 OTHER TIME EXTENSION REQUESTS

Time extensions requested in association with changes to the Work directed or requested by Owner shall be included with Contractor's proposed costs for such change. Time extensions requested for inclement weather are covered by **Paragraph 8.5.2.1** above. If Contractor believes that the completion of the Work is delayed by a circumstance other than for changes directed to the Work or weather, they shall give Owner written notice, stating the nature of the delay and the activities potentially affected, within **five (5) calendar days** after the onset of the event or circumstance giving rise to the excusable delay. Contractor shall provide sufficient written evidence to document the delay. In the case of a continuing cause of delay, only one claim is necessary. State claims for extensions of time in numbers of whole or half days.

8.8.1

Within **ten (10) calendar days** after the cessation of the delay, Contractor shall formalize its request for extension of time in writing to include a full analysis of the schedule impact of the delay and substantiation of the excusable nature of the delay. All changes to the Contract Time or made as a result of such claims is by Change Order, as set forth in **Article 7**.

8.8.2

No extension of time releases Contractor or the Surety furnishing a performance or payment bond from any obligations under the Contract or such a bond. Those obligations remain in full force until the discharge of the Contract.

8.8.3 CONTENTS OF TIME EXTENSION REQUESTS

Contractor shall provide with each Time Extension Request a quantitative demonstration of the impact of the delay on project completion time, based on the Work Progress Schedule. Contractor shall include with Time Extension Requests a reasonably detailed narrative setting forth:

.1 The nature of the delay and its cause; the basis of Contractor's claim of entitlement to a time extension.

.2 Documentation of the actual impacts of the claimed delay on the critical path indicated in Contractor's Work Progress Schedule, and any concurrent delays.

.3 Description and documentation of steps taken by Contractor to mitigate the effect of the claimed delay, including, when appropriate, the modification of the Work Progress Schedule.

8.8.4 OWNER'S RESPONSE

Owner will respond to the Time Extension Request by providing to Contractor written notice of the number of days granted, if any, and giving its reason if this number differs from the number of days requested by Contractor.

.1 Owner will not grant time extensions for delays that do not affect the Contract Substantial Completion date.

.2 Owner will respond to each properly submitted Time Extension Request within **fifteen (15) calendar days** following receipt. If Owner cannot reasonably make a determination about Contractor's entitlement to a time extension within that time, Owner will notify Contractor in writing. Unless otherwise agreed by Contractor, Owner has no more than **fifteen (15) additional calendar days** to prepare a final response. If Owner fails to respond within **forty-five (45) calendar days** from the date the Time Extension Request is received, Contractor is entitled to a time extension in the amount requested.

8.9 FAILURE TO COMPLETE WORK WITHIN THE CONTRACT TIME

TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT. Contractor's failure to substantially complete the Work within the Contract Time or to achieve Substantial Completion as required will cause damage to Owner. These damages shall be liquidated by agreement of Contractor and Owner, in the amount per day as set forth in the Contract.

8.10 LIQUIDATED DAMAGES

Owner may collect liquidated damages due from Contractor directly or indirectly by reducing the Contract Sum in the amount of liquidated damages stated in the Contract.

ARTICLE 9
PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

The Contract Sum is stated in the Contract and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price ("GMP"), the Contractor shall submit to the Owner and Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Owner may require. This schedule, unless objected to by the Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1

As provided in the Contract and in the Contract Documents, the Contractor shall submit to the Owner and Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under **Section 9.2**., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

.1 As provided in **Paragraph 7.3.9**, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Owner or the Architect, but not yet included in Change Orders.

.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

.3 If requested by Owner or required elsewhere in the Contract Documents, Each Application for Payment shall be accompanied by the following, all in a form and substance satisfactory to the Owner:

a) With each Application for Payment: a current Sworn Statement from the Contractor setting forth all Subcontractors and all material suppliers with whom the Contractor has subcontracted, the amount of each such subcontract, the amount requested for any Subcontractor or material supplier in the Application for Payment, and the amount to be paid to the Contractor from such progress payment;

b) With each Application for Payment: a duly executed Conditional Waiver and Release on Progress Payment from the Contractor and Subcontractors establishing receipt of payment or satisfaction of the payment requested by the Contractor in the current Application for Payment;

c) Commencing with the second Application for Payment submitted by the Contractor, a duly executed Unconditional Waiver and Release on Progress Payment from Contractor and all Subcontractors, material suppliers and, where appropriate, lower tier subcontractors that have billed more than **five thousand dollars ($5,000)** on a single application of payment, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment;

d) With the Final Application for Payment: Contractor shall submit a Conditional Waiver and Release on Final Payment as required by **Texas Property Code, §53.284**. Upon receipt of final payment, Contractor shall submit an Unconditional Waiver and Release on Final Payment as required by **Texas Property Code, §53.284**; and

e) Such other information, documentation, and materials as the Owner, or the title insurer may require in order to ensure that Owner's property is free of lien claims. Such other documents may include, without limitation, original copies of lien or bond claim releases suitable for filing with the County Clerk in Williamson County, Texas.

9.3.2

Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

9.3.3

The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, bond claims, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

.1 The Contractor further expressly undertakes to defend Owner, at the Contractor's sole expense, against any actions, lawsuits, or proceedings brought against Owner as a result of liens filed against the Work, the site of any of the Work, the Project site and any improvements thereon, or any portion of the property of any of Owner (referred to collectively as "liens" in this **Paragraph 9.3.3**), provide the Owner has paid Contractor pursuant to the requirements of the Contract Documents. The Contractor hereby agrees to indemnify and hold Owner harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits, or proceedings.

.2 The Owner shall release any payments withheld due to a lien or bond claims if the Contractor obtains security acceptable to the Owner, however, the Contractor shall not be relieved of any responsibilities or obligations under this **Paragraph 9.3.3**, including, without limitation, the duty to defend and indemnify Owner.

.3 Retainage. The Owner shall withhold from each progress payment, as retainage, **five percent (5%)** of the total earned amount. Retainage so withheld shall be managed in conformance with **Texas Government Code, Chapter 2252, Subchapter B**. Any request for reduction or release of retainage shall be accompanied by written consent of the Contractor's Surety. No such request shall be made until the Contractor has earned at least **sixty-five percent (65%)** of the total Contract Sum.

.4 For purposes of **Texas Government Code, §2251.021 (a)(2)**, the date the performance of service is completed is the date when the Owner's representative approves the Application for Payment.

9.4 CERTIFICATES FOR PAYMENT

9.4.1

The Architect will, within **seven (7) business days** after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the

Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in **Paragraph 9.5.1**.

9.4.2

The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1

The Owner or Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Owner or Architect's opinion the representations to the Owner required by **Paragraph 9.4.2** cannot be made. If the Owner or Architect is unable to certify payment in the amount of the Application, the Owner or Architect will notify the Contractor. If the Contractor and Architect, or Contractor and Owner, as the case may be, cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount that can be certified. The Owner or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Owner or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in **Paragraph 3.3.2**, because of

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 failure to maintain the scheduled progress, or reasonable evidence that the Work will not be completed within the Contract Time;

.7 failure to comply with the requirements of **Texas Government Code, Chapter 2258** (Prevailing Wage Law);

.8 failure to include sufficient documentation to support the amount of payment requested for the Project;

.9 failure to obtain, maintain, or renew insurance coverage, payment/performance bonds or warranty bond required by the Contract Documents; or

.10 repeated failure to carry out the Work in accordance with the Contract Documents.

9.5.2
When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.6 PROGRESS PAYMENTS

9.6.1
The Owner shall make payment in the manner and within the time provided in the Contract Documents and in accordance with **Texas Government Code, Chapter 2251**.

9.6.2
The Contractor shall pay each Subcontractor no later than **ten (10) calendar days** after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

9.6.3
The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the

Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within **seven (7) calendar days**, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

9.6.4
Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in **Paragraph 9.6.2**.

9.6.5
A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.7 FAILURE OF PAYMENT

9.7.1
If the Architect is required to issue Certificates for Payment and, through no fault of the Contractor, the Architect fails to timely issue Certificates for Payment in the time permitted in the Contract Documents, or if the Owner does not pay the Contractor by the date established in the Contract Documents, then the Contractor may, upon **twenty-one (21) business days** written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received.

9.7.2
If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to (1) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

9.8 SUBSTANTIAL COMPLETION

9.8.1
Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a

condition precedent to Substantial Completion, the Owner has received all certificates of occupancy and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy of the Project.

9.8.2
When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Owner and Architect a comprehensive list of items to be completed or corrected prior to final payment (punch list). Failure to include an item on the punch list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3
Upon receipt of the Contractor's punch list, the Owner and Architect will examine the Work to determine whether the Work or designated portion thereof is substantially complete. If the Owner and/or Architect's examination discloses any item, whether or not included on the Contractor's punch list, that is not sufficiently complete in accordance with the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Owner or Architect. In such case, the Contractor shall then submit a request for another examination by the Owner or Architect to determine Substantial Completion.

9.8.4
When the Work or designated portion thereof is substantially complete, the Architect, if required by the Contract Documents, or Owner will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Unless otherwise provided, Contractor shall complete all items on the punch list within **thirty (30) calendar days** of Substantial Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

9.8.5
The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1

The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under **Paragraph 11.3.1.5**, the surety, and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under **Paragraph 9.8.2**. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

9.9.2

Immediately prior to partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.9.3

Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1

Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner and Architect will make such inspection and, when the Owner and Architect find the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in **Paragraph 9.10.2** as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Architect as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.

9.10.2
Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner and Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied, within the period of time required by **Texas Government Code, Chapter 2251**, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least **thirty (30) business days** prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety to final payment, (5) a warranty bond in a form acceptable to Owner, and (6) other data establishing payment or satisfaction of obligations, such as receipts, unconditional full and final releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

9.10.3
The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of warranties required by the Contract Documents.

9.10.4
Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS
The Contractor and its Subcontractors shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1
The Contractor and its Subcontractors shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement during construction.

10.2.2
The Contractor and its Subcontractors shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss. Notwithstanding any language to the contrary, the Owner shall not have any responsibility for job site inspections or safety recommendations. Any inspections or observations by the Owner or the Architect are solely for the benefit of the Owner and shall not create any duties or obligations to anyone else.

10.2.3
The Contractor and its Subcontractors shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

10.2.4
When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

10.2.5
The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in **Paragraphs 10.2.1.2 and 10.2.1.3** caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under **Paragraphs 10.2.1.2 and 10.2.1.3**, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of

the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under **Section 3.18**.

10.2.6
The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

10.2.7
The Contractor and its Subcontractors shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

10.2.8 Injury or Damage to Person or Property
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding **twenty-one (21) calendar days** after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

10.2.9
When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all covering and fully protect the Work, as necessary, from injury or damage by any cause.

10.2.10
The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage.

10.3 HAZARDOUS MATERIALS

10.3.1
The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

10.3.2

Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written notice from the Owner.

10.3.3

The Owner shall not be responsible under this **Section 10.3** for materials or substances the Contractor brings to the site unless such materials or substances are expressly required by the Contract Documents. The Owner shall be responsible for materials or substances expressly required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

10.3.4

The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site or negligently handles, or (2) where the Contractor fails to perform its obligations under **Paragraph 10.3.1**, except to the extent that the cost and expense are due to the Owner's fault or negligence.

10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time, if any, claimed by the Contractor on account of an emergency shall be determined as provided in **Article 7** and **Article 15**.

ARTICLE 11
INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1

The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations, which coverage shall be maintained for no less than **four (4) years** following final payment; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under **Section 3.18**.

11.1.2

The insurance required by **Paragraph 11.1.1** shall be written for not less than limits of liability specified in the Contract or the Contract Documents. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

11.1.3

Unless otherwise provided, copies of the insurance policies, in form acceptable to the Owner, shall be provided to Owner within **thirty (30) calendar days** of Owner's request. Except as otherwise provided, all of the policies provided shall name Owner as an additional insured, and such policies shall immediately deliver to Owner copies of all such insurance policies, together with certificates by the insurer evidencing Owner's coverage there under. Each policy of insurance obtained by Contractor pursuant to the Contract Documents shall provide, by endorsement or otherwise (1) that such policy shall not be canceled, endorsed, altered or reissued to effect a change in coverage for any reason or to any extent whatsoever unless the insurer shall have first given Owner and Lender at least **thirty (30) calendar days** prior written notice thereof, and (2) that Owner may, but shall not be obligated to, make premium payments to prevent the cancellation, endorsement, alteration or reissuance of such

policy and such payments shall be accepted by the insurer to prevent the same. Such policies shall provide, by endorsement or otherwise, that Contractor shall be solely responsible for the payment of all premiums under the policies, and that Owner shall have no obligation for the payment thereof, notwithstanding that Owner is named as additional insured under the policy. Any insured loss or claim of loss shall be adjusted to the Owner, and any settlement payments shall be made payable to the Owner as a trustee for the insureds, as their interests may appear. Upon the occurrence of an insured loss or claim of loss, monies received will be held by Owner who shall make distribution in accordance with an agreement to be reached in such event between Owner and Contractor. If the parties are unable to agree between themselves on the settlement of the loss, such dispute shall be resolved in accordance with **Article 15**, below, but the Work of the Project shall nevertheless progress during any such period of dispute without prejudice to the rights of any party to the dispute. The Contractor shall be responsible for any loss within the deductible area of the policy. If Owner is damaged by the failure of Contractor to purchase or maintain such insurance, then Contractor shall bear all costs properly attributable thereto. The Contractor shall affect and maintain similar property insurance on portions of the Work stored off the site or in transit when such portions of the Work are to be included. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until Final Completion of the Project.

11.1.4

The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

11.3 PROPERTY INSURANCE

11.3.1

Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in **Section 9.10** or until no

person or entity other than the Owner has an insurable interest in the property required by this **Section 11.3** to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss as well as coverage for building materials while in transit or building materials suitably stored at a temporary location. Property insurance provided by the Contractor shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment. Any such policy obtained by the Contractor under this **Paragraph 11.3.1** shall include a waiver of subrogation in accordance with the requirements of **Paragraph 11.3.4**.

.2 If the Contractor does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Contractor shall so inform the Owner in writing prior to commencement of the Work. If the Owner is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the Owner in writing, then the Contractor shall bear all reasonable costs properly attributable thereto.

.3 Contractor shall be responsible for any deductibles to the extent that the loss arose out of or was cause by Contractor's negligence or breach of the Contract.

.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

.5 Partial occupancy or use in accordance with **Section 9.9** shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.3.2 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in **Article 6**, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent of actual recovery of any insurance proceeds under any property insurance obtained pursuant to this **Section 11.3** or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance. However, this waiver shall not apply to property insurance purchased by Owner after completion of the Work or Final Payment, whichever comes first. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in **Article 6**, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.3.3

A loss insured under the property insurance shall be adjusted in good faith and made payable to the Owner in good faith for the insureds, as their interests may appear. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

11.4 BONDS

11.4.1

The Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by law. In the event Contractor fails to provide such bonds within the time provided by the Contract, Owner may immediately, upon notice of such failure, or within a reasonable time thereafter, at its sole option and discretion: (1) void this Contract in its entirety; or (2) procure such bonds on behalf of the Contractor, deducting such amounts from the Contract Sum. In the event Owner voids the Contract under this **Section 11.4**, Contractor may forfeit its bid bond.

11.4.2

A Performance Bond is required if the Contract Sum is in excess of **fifty thousand dollars ($50,000)**. The performance bond is solely for the protection of the Owner, in the full amount of the Contract Sum and conditioned on the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Owner.

11.4.3
A Payment Bond is required if the Contract Sum is in excess of **twenty-five thousand dollars ($25,000)**. A payment bond is payable to the Owner, in the full amount of the Contract Sum and solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the Contractor or a supplier of required materials or labor. The form of bond shall be approved by the Owner.

11.4.4 Warranty Bond.
Prior to final final payment, Contractor shall provide Owner with a Warranty Bond in the sum of ten percent (10%) of the Contract Sum or ten percent (10%) of the GMP for Construction Manager At-Risk Contracts for twelve (12) months from Substantial Completion of the Work. The form of bond shall be approved by the Owner.

11.4.5
Corporate sureties authorized to issue bonds shall be qualified and comply with relevant provisions of the Texas Insurance Code.

11.4.6
Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to the Owner. If any bond is for more than **ten percent (10%)** of the surety's capital and surplus, the Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized, accredited, or trusteed to do business in the State. A reinsurer may not reinsure for more than **ten percent (10%)** of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, the Contractor shall within **thirty (30) calendar days** after such loss furnish a replacement bond at no added cost to the Owner.

11.4.7
Each bond shall be accompanied by a valid Power-of-Attorney (issued by the surety company and attached, signed and sealed with the corporate embosses seal, to the bond) authorizing the attorney in fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

11.4.8
The process of requiring and accepting bonds and making claims thereunder shall be conducted in compliance with **Texas Government Code, Chapter 2253**. If for any reason a statutory payment or performance bond is not honored by the surety, the Contractor shall fully indemnify and hold the Owner harmless of and from any costs, losses, obligations or liabilities it incurs as a result.

11.4.9

Owner shall furnish certified copies of a payment bond and the related Contract between Owner and Contractor to any qualified person seeking copies who complies with **Texas Government Code, §2253.026**.

11.4.10 Claims on Payment Bonds.

Claims on payment bonds must be sent directly to the Contractor and its surety in accordance with Texas Government Code, §2253.041. All Payment Bond claimants are cautioned that no lien exists on the funds unpaid to the Contractor on such contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or its surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

11.4.11 Payment Claims when Payment Bond not Required.

When the value of the Contract between Owner and the Contractor is less than twenty-five thousand dollars ($25,000), claimants and their rights are governed by Texas Property Code, §53.231-239. These provisions set out the requirements for filing a valid lien on funds unpaid to the Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claims.

11.4.12

Sureties shall be listed on the **Department of the Treasury's Listing of Approved Sureties** stating companies holding Certificates of Authority as acceptable sureties on Federal Bonds and acceptable reinsuring companies (Department Circular 570).

11.5 GENERAL REQUIREMENTS

11.5.1

Unless otherwise provided in the Contract Documents, all insurance coverage procured by the Contractor shall be provided by insurance companies having policy holder ratings no lower than "A" and financial ratings not lower than "VIII" in the Best's Insurance Guide, the latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents.

11.5.2

If the Owner is damaged by failure of the Contractor to purchase or maintain insurance required under this **Article 11**, then the Contractor shall bear all reasonable costs (including attorneys' fees and court and settlement expenses) properly attributable thereto.

ARTICLE 12
UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1
If a portion of the Work is covered contrary to the Owner or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Owner or Architect, be uncovered for examination and be replaced at the Contractor's expense without change in the Contract Time. If prior to the date of Substantial Completion the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work (other than start-up), including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

12.1.2
If a portion of the Work has been covered that the Owner or Architect has not specifically requested to examine prior to its being covered, the Owner or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2 CORRECTION OF WORK

12.2.1
The Contractor shall promptly correct Work rejected by the Owner or Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

12.2.2 AFTER SUBSTANTIAL COMPLETION

.1 In addition to the Contractor's obligations under **Section 3.5**, if, within **one (1) year** after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under **Paragraph 9.9.1**, or by terms of an applicable special warranty required by the Contract Documents, any

of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so. The Owner shall give such notice promptly after discovery of the condition. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may, without prejudice to any other remedies, correct it in accordance with **Section 2.4** or file a claim with the surety of any applicable warranty bond.

.2 The **one (1)-year** period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

12.2.3

The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

12.2.4

The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

12.2.5

Nothing contained in this **Section 12.2** shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the **one (1)-year** period for correction of Work as described in **Paragraph 12.2.2** relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

The Contract shall be governed by the law of Williamson County, Texas.

13.2 SUCCESSORS AND ASSIGNS

The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in the Contract Documents or by law, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

13.4 RIGHTS AND REMEDIES

13.4.1

Except as expressly provided in the Contract Documents, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

13.4.2

No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

13.5 TESTS AND INSPECTIONS

13.5.1

Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Contractor shall give the Owner and Architect timely notice of when and where tests and inspections are to be made so that the Owner and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals where building

codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

13.5.2

If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under **Paragraph 13.5.1**, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Owner and Architect of when and where tests and inspections are to be made so that the Owner and Architect may be present for such procedures.

13.5.3

If such procedures for testing, inspection or approval under **Paragraphs 13.5.1 and 13.5.2** reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense. The Contractor also agrees the cost of testing services related to remedial operations performed to correct deficiencies in the Work, shall be borne by the Contractor.

13.5.4

Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Owner and Architect.

13.5.5

If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

13.5.6

Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6 INTEREST

The rate of interest that accrues on an overdue payment is the rate in effect on September 1 of the fiscal year in which the payment becomes overdue. The rate in effect on September 1 is equal to the sum of:

13.6.1

one percent (1%); and

13.6.2

the prime rate as published in the Wall Street Journal on the **first (1st) day of July** of the preceding fiscal year that does not fall on a Saturday or Sunday pursuant to **Texas Government Code, §2251.025**.

13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the time limits provided by law. Nothing herein shall be construed as shortening the period of time Owner has for commencing claims to less than what is required by law.

13.8 APPLICATION TO SUBCONTRACTS

Any specific requirement in the Contract that the responsibilities or obligations of Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

13.9 GENERAL PROVISIONS

13.9.1

All personal pronouns used in the Contract, whether used in the masculine, feminine, or neuter gender, shall include all other genders; and the singular shall included the plural and vice versa. Titles of articles, sections, and paragraphs are for convenience only and neither limit nor amplify the provisions of the Contract. The use herein of the word "including," when following any general statement, term, or matter, shall not be construed to limit such statement, term, or matter to the specific items or matters set forth immediately following such word or to similar items or matters, whether or not non-limiting language (such words as "without limitation," or "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement, term, or matter.

13.9.2

Wherever possible, each provision of this Contract shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Contract, or portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Contract or valid portions of such provision, which are hereby deemed servable.

13.10 NO ORAL WAIVER

The Provisions of the Contract Documents shall not be changed, amended, waived, or otherwise modified in any respect except by a writing signed by Owner. No person is authorized on behalf of Owner to orally change, amend, waive, or otherwise modify the terms of the Contract Documents or any of the Contractor's duties or obligations under or arising out of the Contract Documents. Any change, waiver, approval, or consent granted to the Contractor shall be limited to the specific matters stated in the writing signed by Owner, and shall not relieve Contractor of any other of the duties and obligations under the Contract Documents. No "constructive" changes shall be allowed.

13.11 TEXAS PUBLIC INFORMATION ACT

To the extent, if any, that any provision in the Contract Documents is in conflict with Tex. Gov't Code 552.001 et seq., as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood and agreed that Owner, its officers and employees may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any information or data furnished to Owner whether or not the same are available to the public. It is further understood that Owner, its officers and employees shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that Owner, its officers and employees shall have no liability or obligation to Contractor for the disclosure to the public, or to any person or persons, of any software or a part thereof, or other items or data furnished to Owner by Contractor in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

13.12 EQUAL OPPORTUNITY IN EMPLOYMENT

The Contractor agrees that during the performance of the Contract it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Parties will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; termination; rates of pay or other forms of compensation, and selection for training, including apprenticeship.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1

The Contractor may terminate the Contract if the Work is stopped for a period of **ninety (90) consecutive days** through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing

portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in **Paragraph 9.4.1**, or because the Owner has not made payment on an undisputed Certificate for Payment within the time stated in the Contract Documents.

14.1.2
The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in **Section 14.3** constitute in the aggregate more than **one hundred percent (100%)** of the total number of days scheduled for completion, or **one hundred twenty (120) days** in any **three hundred sixty-five (365)-day** period, whichever is less.

14.1.3
If one of the reasons described in **Paragraph 14.1.1 or 14.1.2** exists, the Contractor may, upon **thirty (30) business days** written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1
The Owner may terminate the Contract if the Contractor

.1 fails to commence the Work in accordance with the provisions of the Contract,

.2 fails to prosecute the Work to completion thereof in a diligent, efficient, timely, workmanlike, skillful and careful manner and in strict accordance with the provisions of the Contract,

.3 fails to use an adequate amount or quality of personnel or equipment to complete the Work without undue delay,

.4 fails to perform any of its obligations under the Contract,

.5 fails to make prompt payments when due to its Subcontractors and Suppliers, or as required by **Texas Government Code, Chapter 2251**,

.6 files any petition or other pleading seeking any relief under any provisions of the Federal Bankruptcy Act, as amended, or any other federal or state statute or law providing for reorganization of debts or other relief from creditors, permits a receiver or other person to be appointed on account of its insolvency or financial condition, or becomes insolvent,

.7 creates any situation or state of facts which would authorize or permit an involuntary petition in bankruptcy to be filed against Contractor, or

.8 has not met or in Owner's opinion will not meet the dates of Substantial Completion set forth in the Contract Documents.

14.2.2
When any of the above reasons exist, the Owner, in its sole and absolute discretion, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, **thirty (30) calendar days** written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to **Section 5.4**; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

14.2.3
When the Owner terminates the Contract for one of the reasons stated in **Paragraph 14.2.1**, the Contractor shall not be entitled to receive further payment until the Work is finished. In the event that a final decision under **Article 15**, below, is rendered that sufficient cause did not exist for termination under this **Section 14.2**, then the termination shall be considered a termination for convenience, under **Section 14.4**, below.

14.2.4
If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages and costs incurred by the Owner in finishing the Work and not expressly waived,

such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner.

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

14.3.1
The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

14.3.2
The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in **Paragraph 14.3.1**. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

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

.2 that an equitable adjustment is made or denied under another provision of the Contract.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.1
The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

14.4.2
Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.4.3
Upon such termination, the Contractor shall recover the amounts provided in **Paragraph 12.1.3** of the Contract.

ARTICLE 15
CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

15.1.2 NOTICE OF CLAIMS

Claims for events arising during the performance of the Work by Contractor must be initiated by written notice to the other party with a copy sent to the Owner; provided, however, that the claimant shall use its best efforts to furnish the other party, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such claim is recognized, and shall take steps to mitigate the alleged or potential damages, delay, or other adverse consequences arising out of the condition that is the cause of such a Claim. Claims by Contractor must be initiated within **ten (10) business days** after occurrence of the event giving rise to such Claim or within **ten (10) business days** after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims may also be reserved in writing within the time limits set forth in this **Paragraph 15.1.2**. Any notice of Claim or reservation of Claim must clearly identify the alleged cause and the nature of the Claim and include data and information available to the claimant that will facilitate prompt verification and evaluation of the Claim.

15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in **Section 9.7** and **Article 14**, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the Contract Documents.

15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under **Section 10.4**.

15.1.5 CLAIMS FOR ADDITIONAL TIME

.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

15.2 MEDIATION

15.2.1
Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived shall be subject to mediation as a condition precedent to seeking redress in a court of competent jurisdiction.

15.2.2
The parties shall endeavor to resolve their Claims by mediation, which shall consist of a single mediator who is knowledgeable about the subject matter of the Contract. A request for mediation shall be made in writing, delivered to the other party to the Contract.

15.2.3
The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in Williamson County, Texas. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

15.2.4
All disputes not resolved through mediation shall be decided in litigation in Williamson County, Texas.

15.2.5 NO WAIVER OF IMMUNITY
Nothing in the Contract Documents shall be deemed to waive, modify or amend any legal defense available at law or in equity to Owner, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. Owner does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.