Connected Real Estate

Master Technology Planning Process

Review for

Owners, Architects, & Engineers

100: Overview
200: Master Technology Planning Process Review
300: Technology Spaces and Requirements Review
400: Environmental Series Guideline Review
500: Technology Equipment Series Review
600: Challenges & Resolutions
700: Notes and Summary

Revisions

Rev#	Description	Date

Project Description

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MTP Review - Owners, Architects, & Engineers

Author: Craig Getchell; Getchell Consulting

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Cover

100: Overview

The “information Age” has driven several changes in society. One of these changes is that property owners are striving to keep up with new demands of an ever evolving and increasingly technology focused tenant base. As a result traditional construction team members (architects, mechanical- electrical-plumbing engineers, general contractors etc..) are being tasked to adopt unfamiliar technologies by owners. Unfortunately, no clear direction has been provided to the construction team members as to what changes or additional efforts would be required to adopt these technologies.

While the impact and benefit of technology solutions that expand the capabilities of “core and shell” systems have proven that they have a a profoundly positive impact on the tenant experience, the reality is that technology only represents a small amount of the cost associated with a construction project, typically less than 5%. As a result the traditional construction teams have been slow to embrace this 5% and expand their core competencies to include various technologies.

Fortunately everything we need to create a technology enhanced facility is already in place; the technology design consultants and implementation engineers that support the commercial enterprise are ready and available. In addition we have a long standing process (the contractor – subcontractor relationship) within the construction vertical that brings disparate design and engineering firms together to accomplish a common goal.

Unfortunately the technology design consultants and implementation engineers are unfamiliar with the construction process and work on short timeframes (usually 60-120 days) and the construction team members are unfamiliar with the required technologies and work over longer periods of time (typically 18 months to several years).

The dissimilar cultures of the two vertical has projects being delivered as “one off” opportunities that have created a disproportionate amount of effort to bring technology to fruition within a construction project. Projects are executed in a haphazard, reactive fashion and experience once gained is rarely documented and leveraged in future efforts.

Despite these inefficiencies; the realized and potential benefit of the technology solutions, is prompting both sides to expend the necessary effort to provide the functionality associated with “intelligent buildings”.

So while enterprise technology resources and construction team members are engaging to complete projects, what is needed is a process that will bridge the gaps that are keeping technology team members and construction team members from working together efficiently.

The Connected Real Estate (CRE) Master Technology Planning process review document was created to familiarize the traditional construction team with what to expect from technology design and implementation resources they will be engaging on a Intelligent building project. This document outlines new roles and responsibilities and some of the activities that augment the strengths of; and leverages what is comfortable for both verticals. **This is not a process outline document, it is only meant to familiarize a traditional construction teams with the activities associated with a CRE Master Technology Planning process.**

The CRE Master Technology Planning process does not focuses on trying to make both groups attempt to become experts in each others core competencies. The process instead focuses on making modifications to the established construction process to better engage the available enterprise technology resources and include them in the project. This approach allows the construction team members to embrace these resources as primary and sub-contractors and set the appropriate expectations. In addition this approach allows traditional construction teams with little or no technology experience to leverage resources and bring technology related skill sets to projects immediately with no “learning curve”, eliminating the need for them to become proficient in IP technologies.

This document will provide guidance for owners, architects, engineers and other members of the construction team as they adopt technologies that are part of a ***CRE Intelligent Building*** solutions, during a traditional construction effort.

Connected Real Estate (CRE) has provided the content of this document as a guide to outline the additional research, discovery and effort required to support the adoption of a ***CRE Master Technology Planning Methodology*** during the entire construction process.

CRE Intelligent Buildings have the same mission critical systems as facilities designed and built during a typical construction effort, along with several new systems, however these systems leverage the facilities infrastructure (rooms, pathways, power. cooling etc..) differently.

These differences require that the processes governing the creation of the construction documents & specifications, bidding & procurement effort, construction administration, construction schedules, commissioning and sustained operations all be augmented

Note: None of the effort required during the traditional construction process are displaced by the execution of the CRE Master Technology Planning process outlined in this document.

The process referenced within this document will define and detail the activities required to efficiently bring technology into a traditional construction process with minimal impact on that process.

“Core and Shell” drawings and specifications will be altered (not replaced) to ensure that selected solutions provide the IP (Internet Protocol) support required to meet the operational objectives of the property.

While several options are available, there are several systems that are common to most multi-unit dwellings regardless of the planned application (residential, commercial, hospitality, entertainment, healthcare, manufacturing, etc..), these are the systems we will be referencing though out this document and they are:

HVAC Controls
Door Access
Video Surveillance
IP Networks
Internet Access
Telecommunications (phone, intercom, public address etc..)
Lighting Controls
Digital Signage
TV Broadcast
Management and Administration Software (Building Operations Center)
Fire/Life/Safety
Elevator

The adoption of IP enabled technology will not require any changes to the planned documentation format (traditional, MasterFormat, OmniFormat, custom etc..) as the effort defined within a *Master Technology Planning* process provides content only, not structure. This approach provides maximum flexibility and results in content which enhances the existing format.

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100: Overview

Why Internet Protocol (IP)

Internet Protocol provides a common point of integration for both base building systems and the tenant facing systems most commonly utilized (computers, mobile devices, phones, etc..) making IP the protocol with the most commonality between the facility and the tenants that exist within it.

IP has become the global interoperability standard and offers, capacity, reliability, resiliency, scalability and extensibility not available in other protocols (i.e. BackNet, LonTalk, Modbus, ect..)

Terminology

The CRE MTP Review - Owners, Architects, & Engineers will make frequent references to a traditional or typical construction team and a traditional or typical construction process. While there are several variations of these teams and processes, in order to narrow the discussion and cover what is most common practice within the construction vertical, the following definitions will apply for the purposes of this document.

Traditional/Typical Construction Team:

Lead Architect – Responsible for the architectural drawings and specifications, In addition will be responsible for assembling the entire bid specifications and combined drawings for use during the bid process.

Mechanical/Electrical/Plumbing Engineers – one or many firms responsible for the development of the Mechanical/Electrical/Plumbing drawings and specifications required for the construction effort

LEED/GREEN Consultant/Architect/Engineer – responsible for the creating of the process and documentation required to gain certification for the construction effort to achieve the desired accreditation.

Civil Engineer – Responsible for the drawings and specifications associated with outside plant/site design

General Contractor – Chosen during bid process and responsible as the single source for completing the construction process. For the purposes of this document references to the General Contractor will include the equipment, material and efforts of all of the subsequent sub-contractors

Traditional/Typical Construction Process:

Concept and Design – When ownership and design engineers/consultants conceptualize a project and created the documentation and drawings required to coordinated a construction effort.

Bid Process – when the General Contractor and subsequent sub-contractors are selected to proceed with a construction effort.

Construction/Implementation – the actual execution of the construction effort

Commissioning – The activities associated with finalizing construction and preparing the facility for operations

Operations – Building is complete and transitioning to day to day operations, ready for occupancy

Note; the purpose of this section is not to define construction activities, it is just to provide a frame of reference for the content provide in this document. The processes referenced on the following pages was developed in such a way is to provide flexibility and support to several established roles and processes in practice within the construction vertical.

“Enhanced” Specification

This is another term frequently referenced with this document. It refers to a combined specification that encompasses all of the traditional areas and the new content/detail that is need to support a CRE Intelligent Building solution.

Samples

The samples provided in this document were created by a Cisco EcoSystems Partner; Getchell Consulting and contains actual content that was utilized on several projects that have been completed utilizing the process outlined in this document and leveraging Cisco equipment to create an “Intelligent Building”. These samples are provided to represent some of the content contained in the various documents provided as part of this process. They are not complete representation of these deliverables and should not be duplicated for that purpose.

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200: Master Technology Planning Process

This process brings new detail to a project, detail that surrounds the new technologies being introduced. For the purposes of this document they are being defined as deliverables being provided by the Technology Design Consultant. These dliverables have a very specific purposes: to provide the modifications and additions that must be included in the drawings and specifications to support the technology planed for a project. The deliverables are as follows:

Technology Spaces and Requirements Document (TSR) – Provides the content/detail to be added to the existing drawings and specifications that address the new and existing technology spaces and pathways within the facility

Environmental Series Guidelines (ESG) – Provides the content/detail to be added to the existing drawings and specifications that address the controls and equipment that require modification to support an CRE Intelligent Building. This equipment is common to a typical construction project and will be procured, installed and furnished within the traditional construction effort.

Technology Equipment Specifications (TES) – Provides drawings and specification on the equipment , software, and effort that is outside of a typical construction project and requires untraditional approaches. This documents defines what will be procured, furnished, and installed outside if the traditional construction effort.

Descriptions and samples of from these deliverables are provided within this document.

In addition, the Master Technology Planning process introduces two new roles into a typical construction effort, the Technology Design Consultant and the Primary Technology Equipment Contractor. To better facilitate the construction process and limit the amount of cultural change required by enterprise technology resources, these roles are introduced during different phases of a typical construction effort and are contracted by the appropriate member of a traditional construction team.

New Roles and Responsibilities

Technology Design Consultant (TDC)

The *CRE Master Technology Planning* process requires ownership to include a Technology Design Consultant (TDC) early in a project during the *Concept and Design* phases. Ownership and the TDC will work together to set the proper expectations surrounding the technologies being planed as a critical part of the “core and shell”. The Technology Design Consultant should be contracted to ownership directly or to the firm that has the responsibility of delivering the bid specifications and drawings.

The TDC is responsible for program management of the Master Technology Planning process. While the TDC is involved thought out the construction effort, the most critical activities are during the Concept and Design effort. The Technology Design Consultant is responsible for delivering the three (3) critical documents defined above, that support the Master Technology Planning process and ensure that the bid specifications and drawings that are utilized to support the bid process are modified to include the equipment, material and effort required for the technology solutions.

The creation of the TSR, ESG, and TES requires activities that are more consistent with the implementation of a commercial enterprise solution and will be owned by the TDC firm. As in any construction project the TDC is contracted to provide certain deliverables within a specified timeframe. And just as the lead architect will let a electrical engineering firm design electrical systems in a building they will task the TDC firm to identify and design the technologies required.

Similar to the traditional relationships within a construction effort the TDC is responsible for working through the challenges and providing important content and detail to modify the design effort to account for the technology elements. The Technology Design Consultant should be treated as any other contracted resource that is expected to provide a specific set of solutions and augment the documentation accordingly.

In addition the TDC has responsibilities to manage the *Master Technology Planning* process until the building is commissioned and operating. These additional activities will be addressed in this documents, they include.:

-Coordination with architects and design engineers to create clear delineation concerning procurement and installation tasks
-Define required commissioning and close-out documentation
-Outline operational (day 2) support and maintenance schedule
-Identifying and outlining technology impacts on LEED/GREEN certifications
-Assisting the design team to augment bid the process
-Assisting the General Contractor in identifying and selecting Primary Technology Equipment Contractors
-Overseeing communications planning and project coordination between Primary Technology Equipment Contractor and traditional contractors
-Attending and overseeing construction and technology meetings as needed

Primary Technology Equipment Contractor (PTEC)

The building plans and specifications created in Concept and Design phase will produce a “enhanced” specification that will include the technologies required for a CRE Intelligent Building. This “enhanced’ specification will require that the General Contractor evaluate and contract a Primary Technology Equipment Contractor (PTEC) to provide a complete bid response. The Primary Technology Equipment Contractor is responsible for the following:

1. Acting as a single source provider and furnishing and Installing the equipment as called for in the Technology Equipment Specification
2. Managing the integration efforts for IP enabled equipment outlined in the Environmental Series Guidelines
3. Providing communication planning to ensure coordination between the PTEC and the traditional contractors
4. Coordinating the construction schedule and the technology deployment schedule
5. Assembling and provide the commissioning documentation outlined in the TES
6. Creating a schedule and host technology meetings
7. Attending construction meetings as needed
8. Doing onsite check to ensure installation of supporting infrastructure

The PTEC’s content and costs are to be included in the bid response . The PTEC is responsible for the actual delivery of the IP infrastructure that will be leveraged by the rest of the sub-contractors to complete construction and commission the facility.

Maintaining proper synchronization with the other constriction activities is critical and is the responsibility of the PTEC. The technology implementation is only a small portion of the General Contractors concerns in delivering a project on time and on budget. However he now relies on the IP infrastructure to commission several base building systems (HVAC, security etc..) that are needed to obtain a certificate of occupancy . The PTEC will provide constant updates to ensure that the General Contractor is aware of the progress of the IP systems and obstacles or deficiencies that may exist and the impact they have on the construction process.

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200: Master Technology Planning Process

The purpose of this section is to outline the Master Technology Planning process from the perspective of the traditional construction team. This view will set the expectations that the typical construction team should have concerning the actions of the Technology Design Consultant (TDC) and the Primary Technology Equipment Contractor (PTEC). While these tasks are listed in a certain order they will often overlap and be performed simultaneously thought the construction process.

While each action referenced below will have different detailed tasks depending on the application of the planned project, this section should be leveraged by the construction team to begin to identify what activities (meetings, information collection, research etc..) they may be required to perform to support this process. In addition this section can be utilized as a general check list to ensure that needed action is being taken.

Technology Design Consultant is contracted and introduced to the design team

TDC determines which traditional systems require IP enabling and any new technologies required.

TDC engages Lead architect to define and place technology spaces and pathways

TDC engages M.E.P. firm(s) and determines power and cooling requirements for the technology elements

TDC Engages Civil Engineer and ensures delivery and availability of communications services from property lines to to the facility

TDC produces Technology Spaces and Requirements Document (TSR)

Lead architect distributes TSR and instructs design team to include TSR content in all documentation (specification, construction drawings etc..)

TDC reviews revised documents and verifies that TSR content is included

TDC engages mechanical/electrical/plumbing engineers to determine best options for IP enabling the base building systems that require it

TDC Engages LEED/GREEN team and gathers requirements to meet certification requirements and adjusts technologies accordingly

TDC creates and delivers the Environmental Series Guidelines (ESG)

TDC creates and delivers content to support LEED/GREEN accreditation

Lead architect distributes ESG and instructs design team to include ESG content in all documentation (specification, construction drawings etc..)

TDC reviews revised documents and verifies that ESG content is included

TDC creates and delivers the Technology Equipment Specifications

Lead architect engages TDC and reviews and reformats the TES if necessary

TDC prepares introduction/summary letter outlining new roles and technologies to be included in bid responses

Lead architect assembles all specifications and drawings and prepares bid documentation

Ownership and Design team identify potential bidders (general contractors) and deliver bid packages

TDC engages potential bidders (general contractors) and offers support in selecting Primary Technology Equipment Contractors

TDC works with design team to review the technology sections within the bid responses and and ensure they include the enhancements, equipment, and effort required to ensure a successful *CRE Intelligent Building* implementation

TDC attends initial construction meeting, introduces Primary Technology Equipment Contractor, explains the role of the PTEC and sets expectations

TDC outlines timelines and participation for technology focused meetings that include appropriate members of the general contractors team.

PTEC host technology meetings and TDC attends as necessary

PTEC creates and delivers a technology delivery schedule to the general contractor

PTEC and general contractor work together to coordinate the construction schedule and technology delivery schedule

General Contractor will include required milestones from the technology delivery schedule on the construction schedule.

PTEC will review construction schedule as needed and identify challenges and obstacles to technology delivery schedule

PTEC and general contractor will coordinate to ensure that construction tasks are completed, leaving the necessary time to implement the base building network.

PTEC will install core IP systems

PTEC will oversee integration and connectivity of IP enabled systems installed and furnish by general contractors team

PTEC will work this general contractor to ensure connectivity as they test and commission IP enabled base building systems

PTEC and TDC will review commissioning documentation the IP native and IP enabled systems and deliver to general contractor

General Contractor will include commissioning documentation delivered by PTEC finial deliverables for commissioning

TDC will prepare a “day 2” support and maintenance outline for systems that are new to the property management staff

PTEC and TDC will conduct training for property management and building staff on non-traditional systems

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300: Technology Spaces and Requirements Document

The Technology Design Consultant will produce a **Technology Space and Requirements (TSR)** document.

Dedicated spaces and pathways must be created to support the planned technology. The base building will be designed to operate as a small enterprise network that will support most of the critical systems within the facility. The network will be leveraged by the property management team, building staff and tenants as end users. This infrastructure requires secure, environmentally controlled, dedicated space to house this effort. All of these requirements will be outlined in the TSR.

This TSR is a list of changes and additional requirements to prepare the facility to accept equipment in support of an CRE Intelligent Building methodology. **This document is not a biddable document and is not meant to replace any of the deliverables produced by the traditional construction process.** The Technology Space Requirements (TSR) document provides information, direction and content, which is meant to be absorbed into the existing construction documentation. **The TSR was not created to be a stand alone document and cannot be attached as an addendum.**

This document has been created to alleviate the challenges associated with adopting new process and technologies. The TSR is filling a gap that exists between what the owner is trying to provide within a technology enhanced tenant environment and what had been standard practice and normal activity within the construction vertical.

Construction team members are to review this document and make sure that all requirements are met and the appropriate systems are included in the specifications and reflected on the drawings that they would typically create and are utilized to support the bid process.

As to not create confusion and unnecessarily complicate the bidding and procurement process, it is critical that that the content of the TSR be reviewed, modified and absorbed into the traditional construction documentation.

There are typically 3 different **dedicated** spaces required within a CRE Intelligent Building; they include, but are not limited to:

Main Equipment Room (Data Center)
Service Provider Room
Distribution Room (Data/Telephone Closets)

In addition primary and secondary pathways and conduit to support structure cabling (fiber & copper) are typical.

While the size and quantities of these spaces and pathways will differ based on the planned application of the building the process taken by the TDC to determine what is required is constant.

Note: Drawings and specifications will be adjusted to support technology, however all material and effort is bid, procured and installed within a typical construction effort.

Technology Design Consultant:

- Produces TSR document
- Works with ownership and construction team to define required technology spaces and pathways.
- Creates logical diagrams for pathways and conduit system
- Determines types of spaces and sizes required
- Coordinates with architect to place technology spaces.
- Creates elevations of technology spaces including, but not limited to the following
    * location of doors and windows
    * cooling requirements
    * power circuits size and location
    * lighting requirements
    * conduit placement
    * plywood
    * electrical grounding
    * Emergency Power Off (EPO Switch)
    * Fire Suppression Requirements

Architect

-Reviews TSR Document and ensures that all content is modified and absorbed into the planned documents in the correct format

- Ensures that technology spaces are properly displayed on the architecture drawings prior to release for bid.

Mechanical/Electrical Engineers

-Reviews TSR Document and ensures that all content is modified and absorbed into the planned documents in the correct format

- Reviews logical diagrams for pathways and conduit and places pathways and conduit on the mechanical and electrical drawings and ensure that all material and effort is part of the bid specifications
- Reviews elevations and spaces requirements and ensure that the following are reflected in all drawings and detailed in the specifications:

All electrical circuits are provided
Cooling requirements are met
Circuit and/or cooling are placed on emergency distribution panel if required
Light fixtures are provided and places appropriately
EPO is provided
Plywood
Conduit system
Grounding Systems

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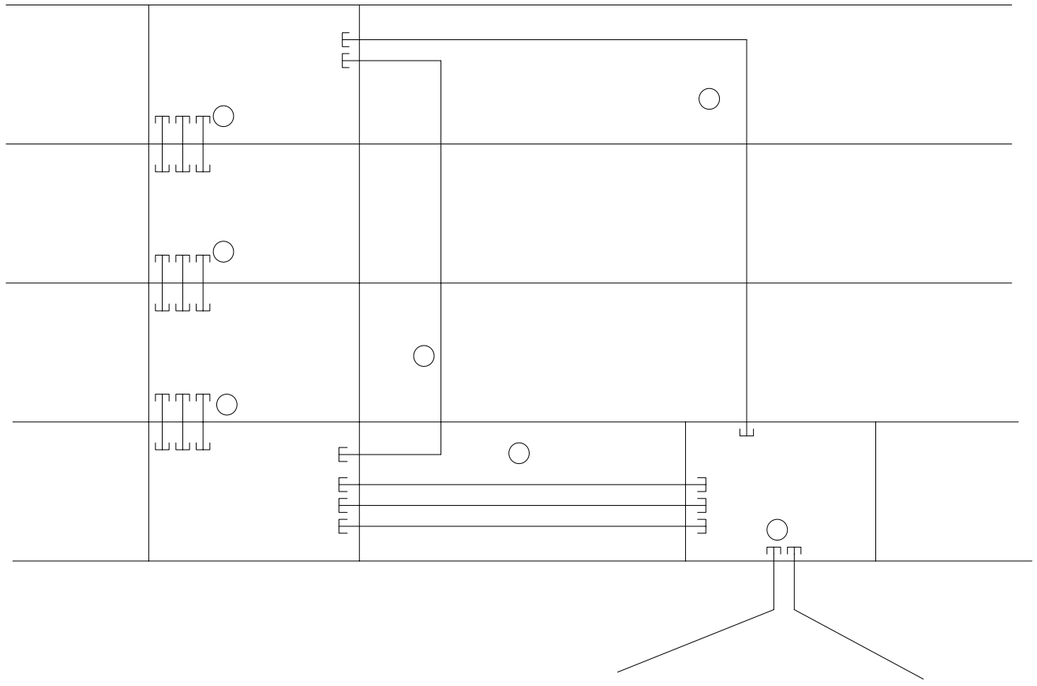
301

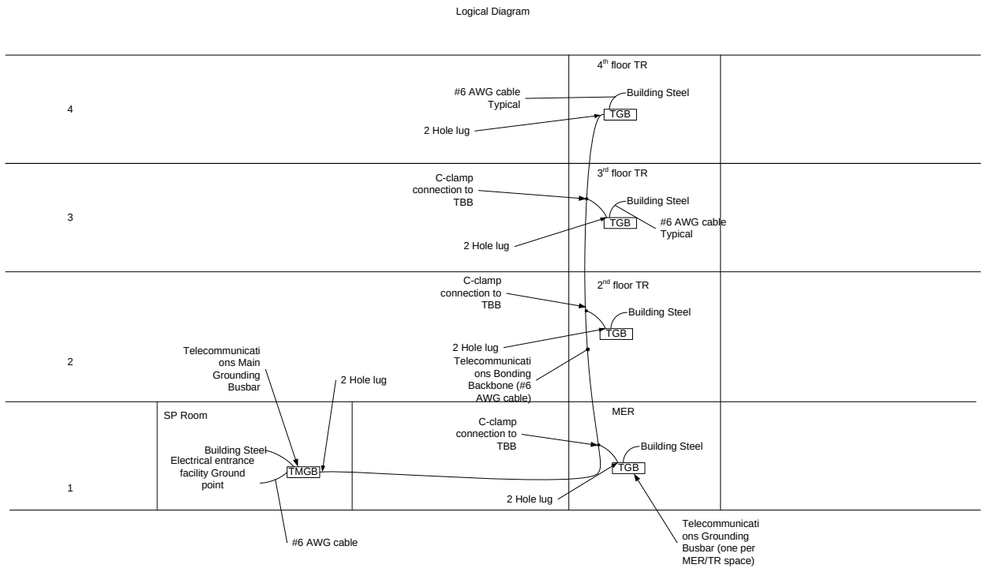
300: Technology Spaces and Requirements Document

Sample: content Conduit Layout and Telecommunications Grounding Backbones



Telecommunications Grounding Backbone

Logical Diagram



TMGB shall be Chatsworth # 40158-012 or equal.
TGB shall be Chatsworth # 40156-012 or equal.
C-type compression tap (#6AWG to #6AWG cable) shall be Chatsworth # 40163-001 or equal)
Two hole compression lugs are recommended for all bonding connections.

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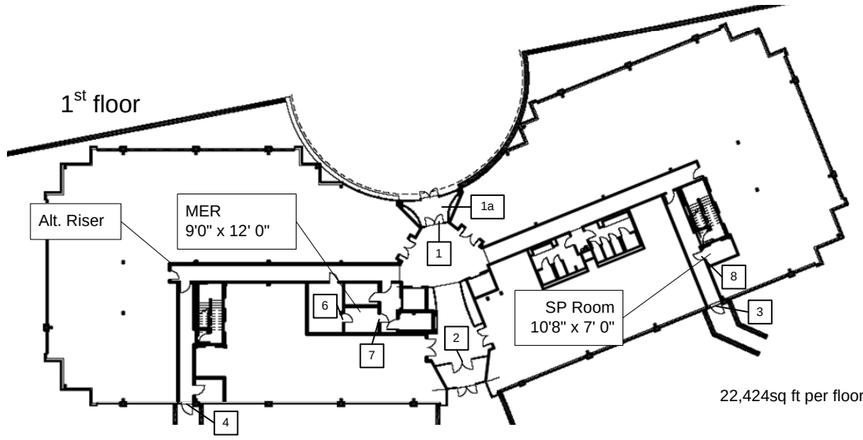
300: Technology Spaces and Requirements Document

Sample: content room, secure doors, circuits and cooling requirements. The result of collaborative work initiated by the TDC and reviewed with the owner, architect and engineers.

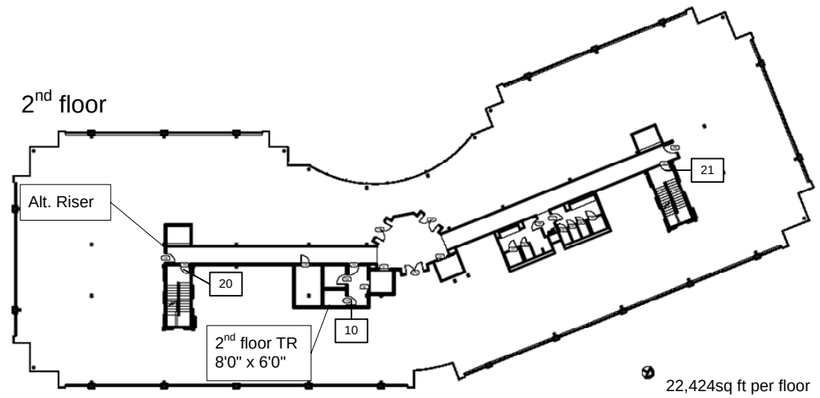
Spaces Dedicated for Telecommunications



22,424sq ft per floor

NOTES for 1st floor Telecommunications Spaces:

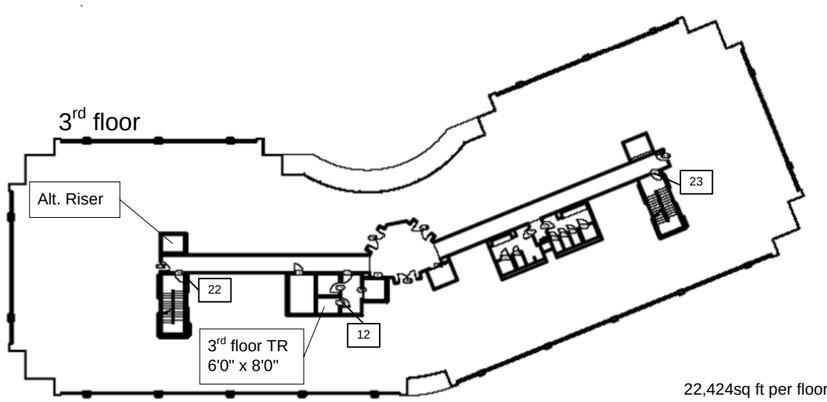
Room Identification	Electrical Requirements	HVAC Requirements
Service Provider Room (SP Room)	3 ea. – NEMA 5-20 circuits. NEMA 5-15 Convenience outlets as required by local codes	15,000 BTU/h Maximum load.
Main Equipment Room (MER)	1 ea. –208v, single phase feed to UPS with 50amp breaker. Conduit and electrical wire sized to handle 208v, 100amp feed for future expansion. NEMA 5-15 Convenience outlets as required by local codes	43,700 BTU/h Maximum load.



22,424sq ft per floor

NOTES for 2nd floor Telecommunications Spaces:

Room Identification	Electrical Requirements	HVAC Requirements
2nd Floor TR	1 ea. – NEMA L5-30 circuit. NEMA 5-15 Convenience outlets as required by local codes	12,000 BTU/h Maximum load.

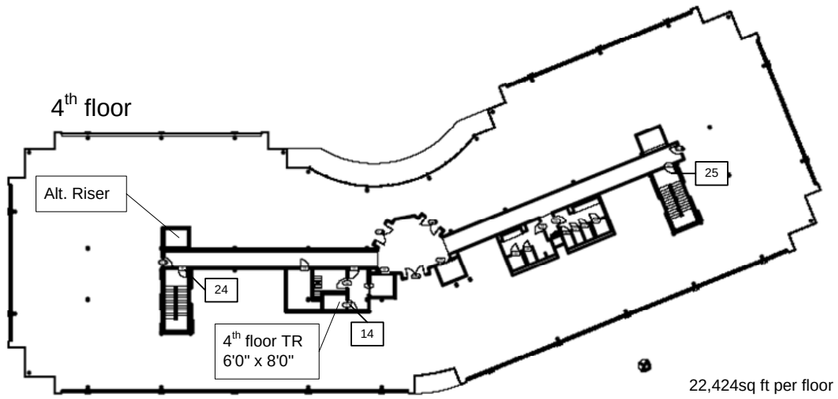


22,424sq ft per floor

NOTES for 3rd floor Telecommunications Spaces:

Room Identification	Electrical Requirements	HVAC Requirements
3rd Floor TR	1 ea. – NEMA L5-30 circuit. NEMA 5-15 Convenience outlets as required by local codes	12,000 BTU/h Maximum load.

Relocate entry door into 3rd floor TR as indicated on TSR-108.



22,424sq ft per floor

NOTES for 4th floor Telecommunications Spaces:

Room Identification	Electrical Requirements	HVAC Requirements
4th Floor TR	1 ea. – NEMA L5-30 circuit. NEMA 5-15 Convenience outlets as required by local codes	12,000 BTU/h Maximum load.

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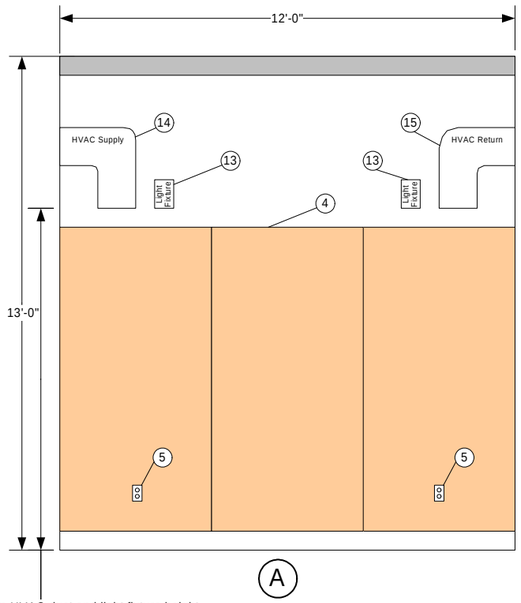
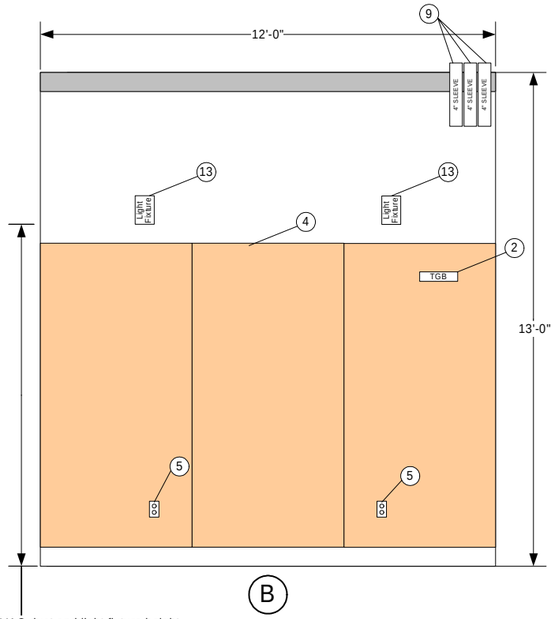
300: Technology Spaces and Requirements Document

Sample: content Main Equipment Room elevations provided by Technology Design Consultant to Architect, Electrical and Mechanical Engineers



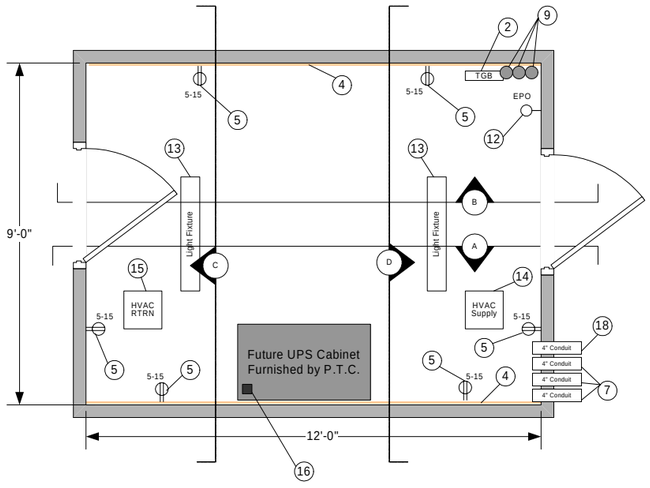
A

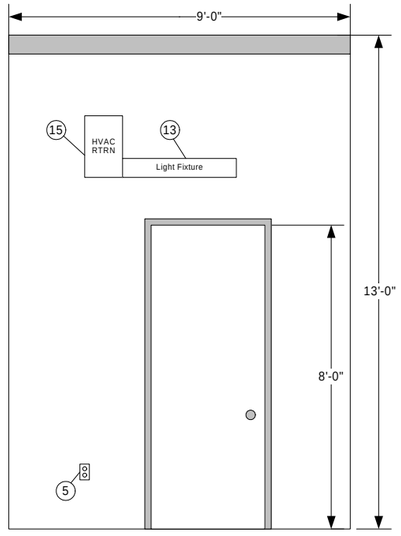
9'-0" - Minimum HVAC duct and light fixture height



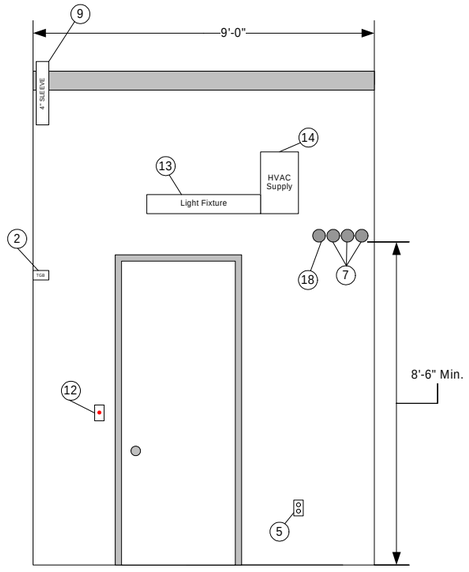
B

9'-0" - Minimum HVAC duct and light fixture height





C



D

Items to be furnished and installed by the General Contractor/Owner.

1. TMGB
2. TGB
3. TBB (not shown)
4. Plywood backboard

Items that require field coordination. Exact location is not yet determined

5. Convenience Outlet (NEMA 5-15)
6. NEMA 5-20 circuit for service providers – Fed from Emergency Generator circuit.
7. 3 - 4" Conduits SP Room to M.E.R.
8. 1 - 4" Conduits SP Room to 4th floor T.R.
9. 4" sleeves to floor above
10. 4" sleeves to floor below
11. Incoming conduits for service providers.
12. Emergency Power Off Switch (EPO)
13. Light Fixture
14. HVAC Supply duct
15. HVAC Return duct
16. 208v, single phase 50Amp circuit (1ph-N-1ph-G) for UPS input. Wire sized to handle future installation of 100Amp breaker. Coordinate installation with Primary Technology Contractor. – Fed from Emergency Generator circuit.
17. NEMA L5-30 Outlet for UPS – Fed from Emergency Generator Circuit.
18. 1 - 4" EMT conduit to M.E.R. via alternate, diverse riser path.

NOTES:

All lights, conduit entry points and HVAC ducts shall be mounted a minimum of 9' A.F.F. unless codes require a lower installation height.

UPS input circuit (208v, 50amp, 4 wire hardwired connection) shall be connected to an Emergency Generator Circuit.

Conduit connections as shown on the Conduit Layout.

Plywood – Fire Rated, A/C grade ¾" plywood installed on walls of the room as indicated.

Door should swing outwards to preserve usable space in the room.

HVAC cooling required 24/365 from building system.

Provide 43,700 BTU/Hour cooling capacity in this room. Room should maintain a positive air pressure relative to the surrounding spaces. Duct height and final placement to the determined by MEP

EPO shall be a Normally Open, Push button switch for future connection to service provider equipment.

Items shown for informational purposes, exact placement to be determined by the appropriate design group.

Convenience electrical outlets, Lights and HVAC ducts - MEP

Revisions

Rev#	Description	Date

Project Description

Connected Real Estate

MTP Review - Owners, Architects, & Engineers

Author: Craig Getchell; Getchell Consulting

Details

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304

400: Environmental Series Guidelines

Base Building control, monitoring, and measuring solutions that require additional functionality and IP integration and will still be procured though the traditional construction effort are identified and addressed in the **Environmental Series Guidelines (ESG)** document.

The goal is to combine the ESG and engineering documentations to create a single set of drawings and specifications that address the environmental requirements of a CRE Intelligent Building.

The ESG document provides content to ensure that control and measurement equipment is modified as needed. The combination of the specifications and drawings created by the mechanical and electrical engineers and content provided by the ESG document will result in an “enhanced” specification that will ensure the following are supported:

Operational requirements of the facility
Planned energy model
Scalability and extensibility as required
Tenant/end-user requirements for environment control and interaction
IP connectivity
Configuration and Administration software is a full functioning “element” manager
Configuration and Administration software is open source for easy integration
LEED/GREEN requirements (if applicable)
Near “real time” reporting/commissioning of the environment

The ESG is not created to be a stand alone document.

This ESG document is not to be send to contractors/bidders. This document is not to be attached as an addendum to existing construction documents.

As to not create confusion and unnecessarily complicate the bidding and procurement process, it is critical that that the ESG document be absorbed into the existing deliverables.

Note: Drawings and specifications will be adjusted to support technology, however all material and effort is bid, furnished and installed within a typical construction effort.

Technology Design Consultant:

- Produces ESG document
- Works with ownership and construction team to define the additional functionality required for controls, monitoring, configuration, measurement etc..
- Works with Mechanical/Electrical engineers to identify and approve appropriate equipment manufactures.
- Creates content within the ESG that specifies the additional functionality (IP connectivity, software requirements. reporting needs etc…) to be absorbed into the drawings and specifications.

Design/LEED/GREEN Engineers

-Creates Energy/Operating model that includes requirements for cooling, energy utilization, water management, waste handling etc…
-Communicates requirements to entire team, including Technology Design Consultant.
-Sets expectation and determines activities associated with LEED/GREEN certification.
-Reviews and approves ESG content.

Mechanical/Electrical Engineers

-Reviews ESG Document and ensures that all content is modified and absorbed into the planned documents in the correct format

- Coordinates with Technology Design Consultant and LEED/GREEN Engineers to ensure that all control and measurement equipment (HVAC, lighting, power metering, water treatment etc..) meet the operational goals of the facility.

- Sizes units, fixtures, meters, and equipment and determines locations and quantities for all systems (This effort is standard in a traditional construction effort and is not displaced by the adoption of a CRE methodology).

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401

400: Environmental Series Guidelines

Sample: Page from Environmental Series Guideline Document based on open controls for HVAC with wireless sensors and integration for power meters.

Environmental Systems Diagram (For design purposes only. NOT TO BE BUILT)

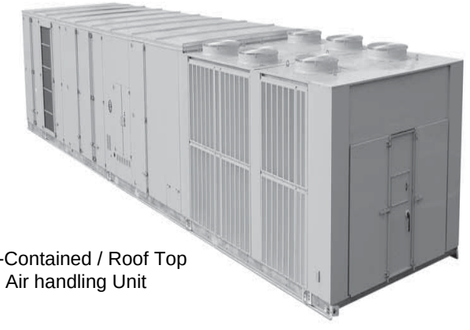
Power Measurement Equipment

Lon RS-485 network by ATC Contractor (124 devices max.)

ModBus

120 VAC BY EC

IP Enabled Control Panel

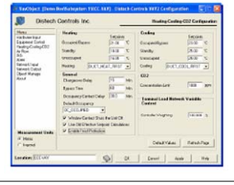


Self-Contained / Roof Top Air handling Unit

VAV box & Wireless controller.
1. Controller factory mounted by VAV manufacture.
2. VAV box by equipment manufacture.

Wireless Sensors

Owner Provided Ethernet Network



Supervisor Software (HVAC)

Revisions

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402

400: Environmental Series Guidelines

Sample: content for software integration, lighting and HVAC software.

Software Requirements

Contractor will supply the command and control software that is required to meet the operational goals of the facility. Software will operate onsite via server (latest minimum requirements) or appliance (latest version).

The Graphical User Interface (GUI) must be accessible via a standard web interface and not require the installation of client software.

This solution must be able to operate in a stand alone fashion as an “element” manager for the provided HVAC and Power management solution.

The “element” manager must be able to profile tenants and building staff and offer/limit access to services and views based on tenant spaces and roles and responsibilities.

Selected contractor must provide the necessary effort and knowledge required to integrate the “element” manager into the centralized Building Operations Center software. Integration requires that all relevant events and data will be migrated to the Building Operations Center (BOC) software via the supplied protocols. In addition the BOC will be able to utilize URL “hooks” to open the GUI and launch any of the functionality available within the element manager. The BOC supports the following protocols within its API (Application Programmer's Interface):

- SNMP (Simple Network Management Protocol)
- SMTP (Simple Mail Transfer Protocol)
- XML (eXtensible Markup Language)
- JAVA
- SOAP (Simple Object Access Protocol)
- ODBC (Open Database Communications)

Software Requirements

Contractor will supply the command and control software for the lighting systems that is required to meet the operational goals of the facility. Software will operate onsite via server (latest minimum requirements) or appliance (latest version).

The Graphical User Interface (GUI) must be accessible via a standard web interface and not require the installation of client software.

This solution must be able to operate in a stand alone fashion as an “element” manager for the provided lighting controls solution.

The “element” manager must be able to profile tenants and building staff and offer/limit access to services and views based on tenant spaces and roles and responsibilities.

Selected contractor must provide the necessary effort and knowledge required to integrate the “element” manager into the centralized Building Operations Center (BOC) software. Integration requires that all relevant events and data will be migrated to the BOC via the supplied protocols. In addition the BOC will be able to utilize URL “hooks” to open the GUI and launch any of the functionality available within the element manager. The BOC supports the following protocols within its API (Application Programmer's Interface):

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- JAVA
- SOAP (Simple Object Access Protocol)
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403

400: Environmental Series Guidelines

Sample: content Lighting controls schedule jointly created by Design Engineers, Ownership, Technology Design Consultants. Content provided in ESG to Electrical Engineers

Lighting Control Schedule (Building 1)

Area	Floor	Ckt	VAC	Dwg	Coord	Luminaire	Luminaire Qty	Load (kVA)	Control Equipment
Elevator Mechanical 102	1	HH3-4	277	E-301	C/11-12	H	1	0.1	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Electrical 103		HH3-11	277	"	E/10-11	H	5	2.0	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Water Services 104				"			1		Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Lobby 101	1	Not Defined - To be fed from Dimmer Panel located in Electrical 103	277	E-301	A-B/11-12	CC-103	10	0.1	**Dimmer Panel w/ Local Scene Based Station and Photocell for Daylight Harvesting** (Designations DP-1,LCS-1, PC-1) CC-103 controlled by Relay Module (no dimming)
						CC-101	4		CC-101 controlled by Relay Module (No dimming)
						CC-102	5		CC-102 controlled by HDF Dimmer Module [alternate - EB dimmer module for Mark 10 ballast]
						CC-104	6		CC-104 controlled by HDF Dimmer Module [alternate - EB dimmer module for Mark 10 ballast]
							7		
						CC-105	4		CC-105 controlled by HDF Dimmer Module [alternate - EB dimmer module for Mark 10 ballast]
							3		
Service Provider Room	1	Not defined	277	"	tba	Not defined	Not defined	Not defined	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Telephone Room	2	Not defined	277	"	tba	Not defined	Not defined	Not defined	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Main Equipment Room	2	Not defined	277	"	tba	Not defined	Not defined	Not defined	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch
Stair B - B101	1	HH3-15	277	E-301	E/11-12	J	2	0.3	n/a
	2			E-302			2		
Stair C - C101	1	HH3-17	277	E-301	E-D/4	J	2	0.3	n/a
	2			E-302			2		
Egress Corridor 203	2	Not Defined	277	E-302	C-E/4-12	Not Defined	Not Defined	Not Defined	Ceiling Mtd Occ Sensor w/ Power Pack
Recycle Room 208	2	HH3-14	277	E-302	D/4	H	1	0.2	Ceiling Mtd Occ Sensor w/ Power Pack & Wall Mtd Switch

Building 1 Exterior

Area	Floor	Ckt	VAC	Dwg	Coord	Luminaire	Luminaire Qty	Load (kVA)	Control Equipment
Exterior	Parking Lot Signs	HL-1	120	E-100		Not Defined	Not Defined	1.2	**24 Circuit Relay Panel** (Designation LR0) w/ Photoelectric
		HL-3	"	"		"	"	1.2	
		HL-5	"	"		"	"	1.2	
		HL-7	"	"		"	"	1.2	
		HL-9	"	"		"	"	1.2	
		HL-11	"	"		"	"	1.2	
	Parking Lot Lights	HH3-1	277	E-100		Not Defined	Not Defined	3.6	
		HH3-5	"	"		"	"	3.6	
		HH3-7	"	"		"	"	3.6	
		HH3-9	"	"		"	"	4.1	

Power Pack Schedule Building 1

As part of a Class 2 lighting system separate rooms that have the same operational requirements can share a multi-relay power pack to save costs

The attached spreadsheet defines what rooms will be managed on power packs, the following rooms combine and share a multi-relay power pack:

Power Pack 1
Water Services Room (104) and Service Provider Room (103A)

Power Pack 2
Recycle Room (208) and Main Equipment Room (208A)

Power Pack 3
Electrical Closet (202) and Janitor Room (205)

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404

400: Environmental Series Guidelines

Sample: content: product detail page from ESG provided to Mechanical Engineer

Distech Controls ECC-VAV-W / ECC-VVT-W
or equivalent
www.distech-controls.com

Built-in Wireless Receiver
- Integrated wireless RF technology for communication with a full suite of wireless sensors and wireless light switches.

Hardware
- Built-in brushless constant torque damper actuator with improved life expectancy
- Integrated position feedback to eliminate the need for periodic re-initialization of the damper
- Accurate on-board air flow sensor for pressure independent single duct VAV applications
- Factory Calibrated Air flow sensor zero pressure value
- 4 universal inputs (software configurable)
- 4 triac outputs (digital, PWM or floating)
- 2 universal outputs
- Built-in occupancy output contact for the room sensor LED
- Controller only (no actuator) VAV model
available to drive an external air damper actuator
- Service pin positioned for easy commissioning

Software Plug-in
- LNS plug-in for customization of hardware I/O, control sequences and communication schemes
- Configurable Features; including:
- Input and output types and properties
- Heating and cooling stages
- Control variable air flow
- PID control loops
- Additional built-in features:
- Flow calibration
- Alarms
- Changeable network variable types
- Control of 2 rooms simultaneously
- Various input types supported:
- Space temperature
- Setpoint adjustment
- Duct temperature
- Occupancy, bypass or window contacts
- CO2 concentration
- Must be able to utilize spare I/O points to be linked
to other controllers on the network

Power	
Voltage	24VAC; ±15%, 50/60Hz, Class 2
Protection	3A removable fuse for triac when using the internal power supply
Typical Consumption	5VA
Maximum Consumption	10VA (normal), or up to 50VA if internal power supply is used for triac (special application)
Environmental	
Operating Temperature	0°C to 70°C; 32°F to 158°F
Storage Temperature	-20°C to 70°C; -4°F to 158°F
Relative Humidity	0 to 90% Non-condensing
General	
Standard	LONMARK Functional Profile: SCC-VAV Controller #8502
Processor	Neuron® 3150®; 8 bits; 10MHz
Memory	Non-volatile Flash 64K (APB application & configuration)
Communication	LonTalk® Protocol
Transceiver	FTX-1
Channel	TP/FT-10; 78Kbps
Wireless Receiver	EnOcean® RCM120, 868.3 MHz[1]
Wireless Reception Range	10-30m in buildings, ~300m in free propagation
Enclosure	
Material	FR/ABS
Color	Black & blue casing & grey connectors
Dimension w/ Screws	4.9" x 8.9" x 2.5" (124mm x 226 x 63mm)
Shipping Weight	2.30lbs (1.05kg)
Electromagnetic Compatibility	
CE -Emission	EN55022:1998 class B
-Immunity	EN61000-4-2: 1995, level 3 in air EN61000-4-2: 1995, level 2 by contact EN61000-4-3: 1996, level 2 EN61000-4-4: 1995, level 2 EN61000-4-6: 1996, level 2 ENV 50204 : 1995, level 2
FCC	This device complies with FCC rules part 15, subpart B, class B
Agency Approvals	
UL Listed (CDN & US)	UL6EA7 Energy management equipment
Material[1]	UL94-5VA
LONMARK	LONMARK certified

Inputs	
Quantity	4
Input Types:	Universal (software configurable)
-Voltage	0-10VDC, Accuracy ±0.5%
-Current	4-20mA with 249Ω external resistor (wired in parallel), Accuracy ±0.5%
-Digital	Dry contact
-Resistor	
Thermistor	Type 2, 3 10KΩ Range: -40°C to 120°C; -40°F to 248°F Accuracy: ±0.5°C; ±0.9°F
Platinum	RTD 1KΩ Range: -40°C to 120°C; -40°F to 248°F Accuracy: ±1.0°C; ±1.8°F PT100 100Ω Range: -40°C to 120°C; -40°F to 248°F Accuracy: ±1.0°C; ±1.8°F
Potentiometer	Translation table configurable on several points, Accuracy ±0.5%
Differential Pressure Sensor (VAV model only)	Range: 0-250Pa (0-1 in. W.C.) Resolution: 0.04 milli-inches W.C. Accuracy: ±3% full scale
Input Resolution	16-bit analog / digital converter
Hardware Outputs	
Quantity	6
4 Digital	Each (1) Triac Max 1A @ 24VAC Max. Oper. Temp: 40°C; 104°F @ 1A Total (4) Triac Max 3A @ 24VAC External or internal power supply
2 Universal (Analog/Digital)	0-10VDC linear, digital 0-12VDC or PWM Max: 20mA Maximum load 600Ω
Output Resolution	10-bit digital / analog converter
Network Outputs	
Quantity	6 (software configurable) The network outputs are used by binding them to the free physical outputs of controllers on the network.
Damper Actuator	
Motor	Belimo LMZS-H (Brushless)
Torque	35 in-lb, 4Nm
Angle of Rotation	95° adjustable
Fits Shaft Diameter	5/16-3/4"; 8.5-18.2mm
Power Supply	From controller

Revisions

Rev#	Description	Date

Project Description: **Connected Real Estate**

MTP Review - Owners, Architects, & Engineers

Author: Craig Getchell; Getchell Consulting

Details

Scale:	
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Date:	

Dwg Name

Dwg #: 405

500: Technology Equipment Specifications

The **Technology Equipment Specification (TES)** is a biddable document which outlines the equipment which will be procured and implemented outside of typical construction effort. The TES outlines the equipment, material, and effort that is the responsibility of the Primary Technology Equipment Contractor (PTEC).

Unlike the TSR and ESG documents that the Technology Design Consultant has provided, that focused on augmenting the equipment, materials and effort that will be furnished and installed in a traditional manner, the TES includes the equipment, material, and effort which is outside a typical construction effort.

The TES is a biddable document and should be included in the specifications documents and drawings utilized to hire the construction team members.

The TES is comprised of the systems that have been determined to be outside the typical construction process and/or require special attention to ensure that they are integrated with the base building IP network. Some of these systems were often contained within a traditional construction process but because of the IP enabling of these systems and additional enhancements the responsibility of implementing these systems has been moved to subcontractors that support the PTEC. These systems may include:

IP Video Surveillance
IP Door Access
Low Voltage Cabling
IP Video Distribution (Digital Signage)

Systems that are typically outside a constructions effort that are also contained within the Technology Equipment Specifications may include, but are not limited to:

IP Networking Equipment (Switches, Routers, Hubs etc…)
IP Security Equipment (Firewalls, Security Appliances etc..)
IP Wireless Networking
RF (Radio Frequency) Reinforcement Equipment (Distributed Antennas, Leaky Coax etc..)
Uninterruptible Power Supplies
Racks and Cabinets

The TES also outlines the requirements for commissioning documentation to be provided to the General Contractor for delivery to the owner as part of the overall commissioning process

Technology Design Consultant:

Works with Ownership to define the tenant experience and defines required technologies

Creates the Technology Equipment Specifications

Works with construction team members to ensure an understanding of the technologies being implemented

Primary Technology Equipment Contractor

Review the TES document

Sub-contracts the appropriate resources and supplies a single source bid to the General Contractors to include in their bid proposals.

Design Team (Architect & Engineers)

Review TES and familiarize themselves with the technologies being implemented

Work with TDC to reformat TES to fit within planned documentation format (If required)

Revisions

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501

500: Technology Equipment Specifications

Sample: content from network diagram page

TE-200: Network and Related Equipment

Contractor is to provide a 1 (one) gigabit IP backbone with a high availability core, fiber distribution and PoE (Power over Ethernet) enables access layer as defined in this document.

All parts list with quantities are provided as guidelines and sizing only and the contractor is responsible for providing a fully functional system

Contractor is to provide a VoIP (Voice over IP) phone solution

Contractor is to provide a Internet access router

Contractor is to provide a centralized 802.11x Wireless access solution

Contractor is to provide a IP Security Appliance

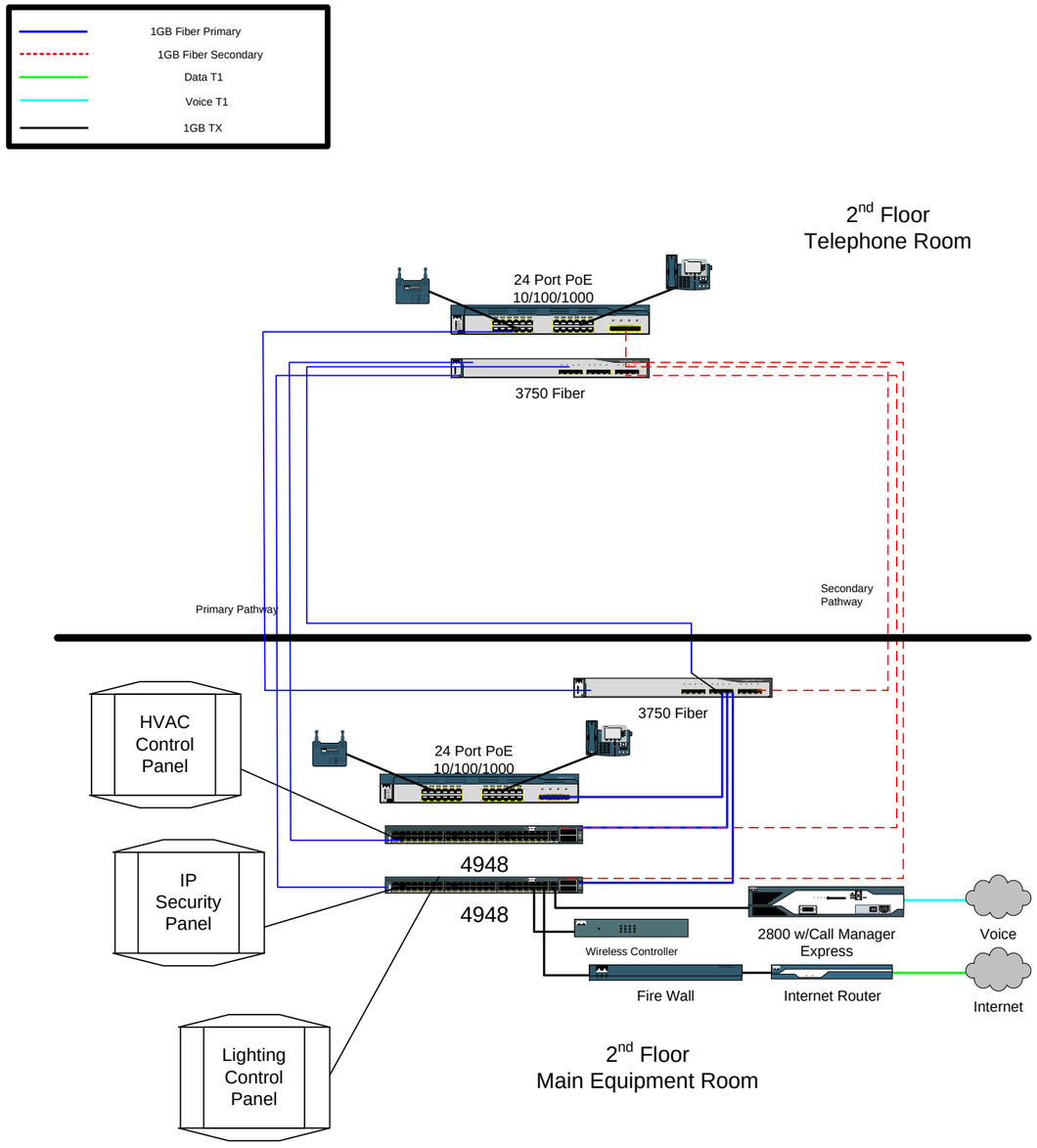
Contractor is responsible for coordinating the connectivity for IP enabled "base building" systems. These systems are to be procured and installed by others, they include:

HVAC Controls	Physical Security Devices
Fire/Life/Safety	Digital Signage

The work detailed in this technical specification is intended to support intelligent building applications. Section Includes: Equipment, materials, labor, and services to provide a
Voice over IP Telephony system, IP based voicemail system, voice gateways, core LAN switches, fiber distribution, and stackable access layer switches, LAN router, firewall and a managed wireless solution including, but not limited to:

- Core Data Switches (layer 3-7)
- Gigabit Ethernet fiber modules
- Redundant Power Supplies
- Layer 2 switching engines
- Layer 3 routing engines
- Fiber Distribution Switches
- Access layer Switches with PoE
- VoIP and Voicemail Routers
- Internet and Voice Gateways
- Wireless equipment requirements
- Wireless access points
- Security platform requirements
- Management platform requirements
- System design specifications
- Component configuration
- System installation
- System testing
- Documentation and submissions
- Localize Finial Connections

Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all aspects of the installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.



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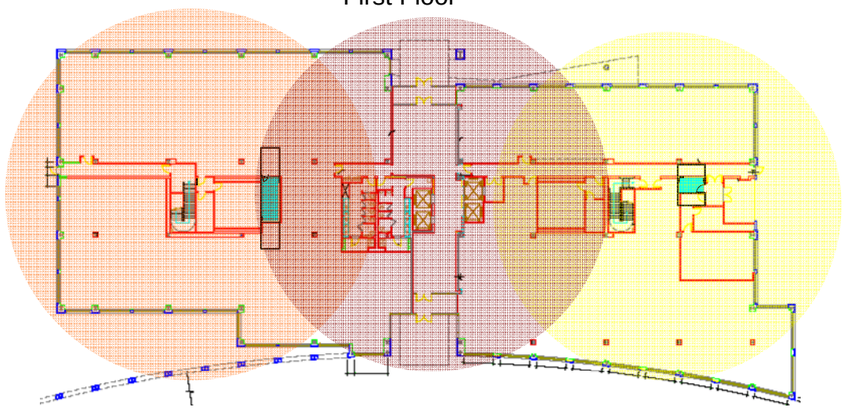
502

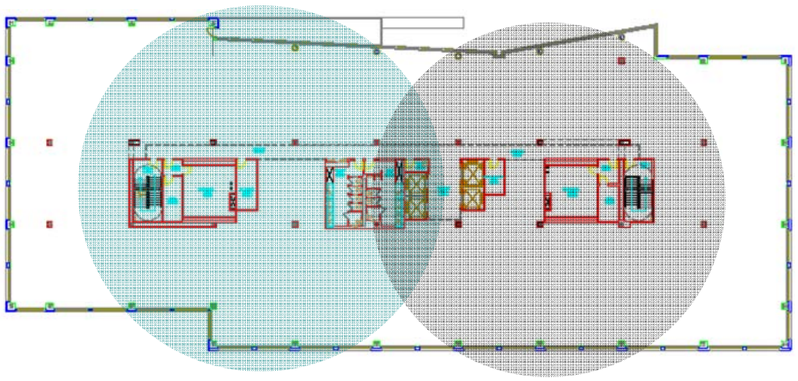
500: Technology Equipment Specifications

Sample: content from IP wireless access page

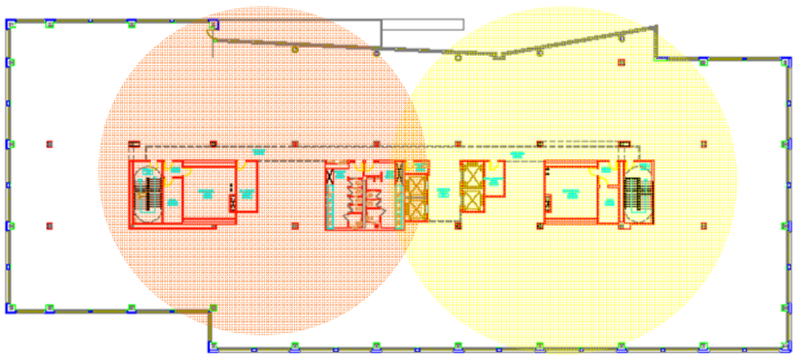
First Floor



Floors 2 and 4



Floors 3 and 5



Wireless Access

Contractor will review building plans and conduct a post installation survey to ensure complete 802.11x coverage of the entire base building areas.

Contractor will furnish and install and configure the wireless for use as both a Internet “Hotspot” and a building operations wireless network.

12 Qty **AIR-AP1010-A-K91000** Series 802.11a/b/g AP w/ Int Antennas, FCC config

12 Qty **SWAP1000-VX-K9** Recovery image for 1000 Series APs- Vx Works

1 Qty **AIR-WCS-WB-1.0-K9** Cisco WCS Base v3.0 up to 50 Lightweight AP Win2K/ 2003Server

1 Qty **AIR-WLC4402-25-K94400** Series WLAN Controller for up to 25 Lightweight Aps

1 Qty **AIR-PWR-CORD-NAAIR** Line Cord North America

1 Qty **SWLC4400K9-40** Cisco Unified Wireless Network Software Release 4.0

Wireless Controller

- Frequency 1
- Frequency 2
- Frequency 3
- Frequency 4
- Frequency 5

Revisions

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503

500: Technology Equipment Specifications

Sample: content from IP door access control page

Internet Protocol PoE (Power Over Ethernet) Door Access Controller

s2 Netdoor Controller or equivalent–
www.s2sys.com

Controller must support dual power

Option 1 - powered via IEEE 802.3af Power over Ethernet Standard (power output for 12VDC must be 500 mA or greater)

Or

Option 2 – powered via an external 12VDC (2 A min) power supply (power output for 12VDC must be 1100 mA or greater)

Each controller must support the following:

Card records 20,000

Offline history transactions 27,000

Card readers 2

Alarm points 4

Relays 4

Temperature points (analog) 1

IP address determination DHCP or static

Auxiliary RS485 port for legacy system integration

Wet/dry selection for direct strike/mag lock power

10-year onboard lithium memory and clock backup battery

Fit into a 6 x 6 inch standard electrical “J” box

Proximity Card Reader

Miniprox 5365 or equivalent
www.hidcorp.com

Accepts 5- to 16-volts

Available with Wiegand or Clock-and-data interface.

Mounts directly onto metal with no change in read range performance.

Provides multicolor LED, compatibility with all standard access control systems and internal or host control of LED and beeper.

Suitable for indoor or outdoor use.

Hazardous Location version is UL 1604, Class I & II, Div. 2 and Class III listed.

Read Ranges
ProxCard® II Card - up to 5.5" (14 cm)
ISOProx® II Card - up to 5" (12.7 cm)
DuoProx® II Card - up to 5" (12.7 cm)
Smart ISOProx®/DuoProx® cards - up to 5" (12.7 cm)
Proximity & MIFARE® Card - up to 5" (12.7 cm)
ProxCard Plus® Card - up to 2" (5.1 cm)
ProxKey® II Keyfob - up to 2" (5.1 cm)
MicroProx® Tag - up to 2.5" (6.4 cm)

Current Requirements
12VDC - Must not Exceed 150 mA peak use

Operating Temperature
22° to 150° F (-30° to 65° C)

Operating Humidity
0-95% relative humidity non-condensing

Revisions

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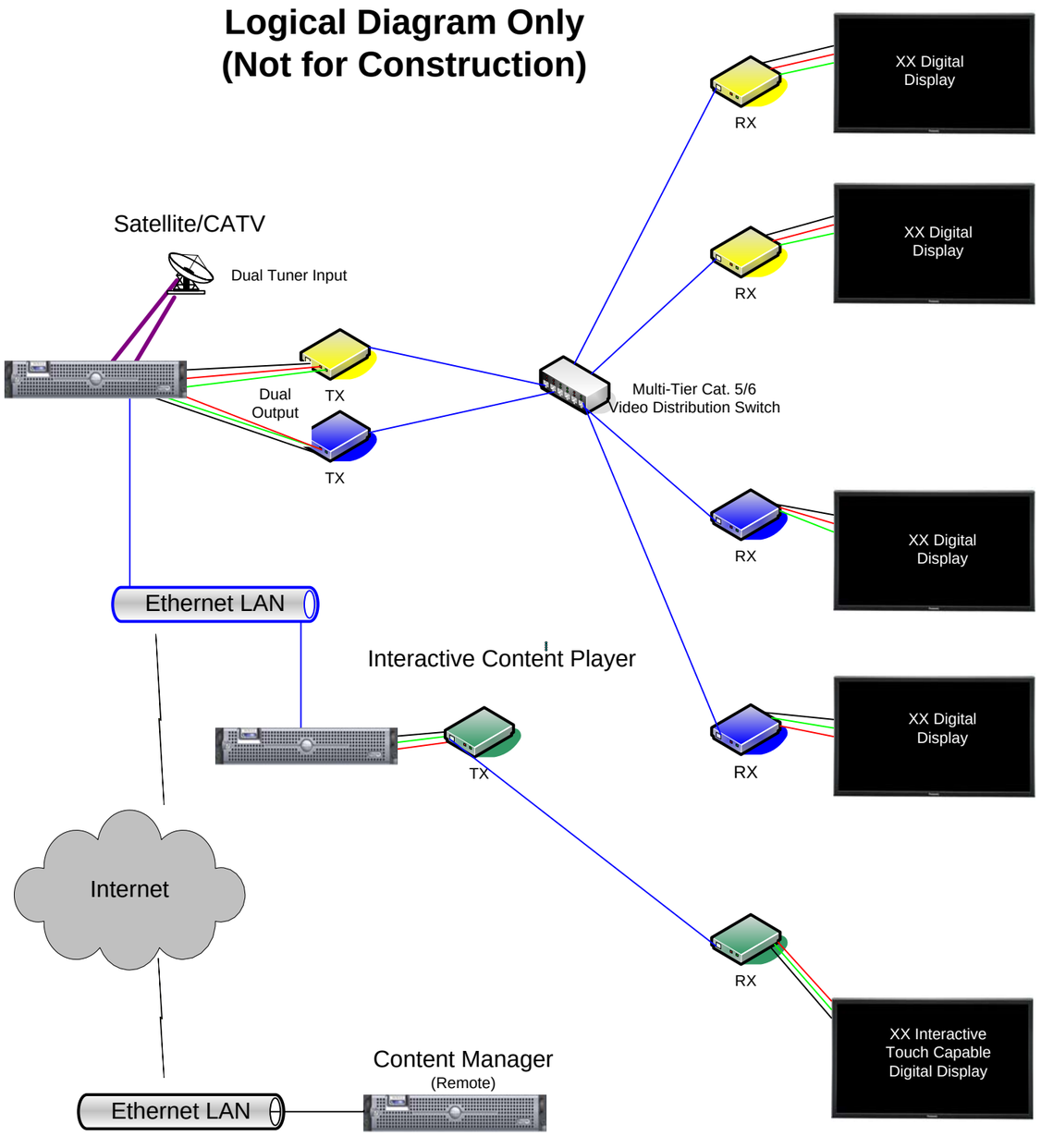
504

500: Technology Equipment Specifications

Sample: content from video distribution page

TE-400: Digital Signage



Overview

Contractor is to provide a content distribution system that will support multiple channels of unique content and interactive displays. The contractor will be responsible for the purchase and installation of all servers, software, transmitter/encoders, receivers/decoders, and video distribution equipment required to provide a fully operational system. For this installation the contractor will support single and multi-tiered video distribution as outlined in the provided Video Content Distribution schedule, over Category 6 UTP. **No other transport layer is acceptable.**
The owner is providing adequate shelf/rack space, UPS power support and Category 6 UTP, will be provided from the MER/Data Center to the screen locations. In addition each screen location will provide at a minimum a duplex NEMA 5-15 outlet on a 10 amp circuit.

Video Distribution

Video distribution will be provided over Category 6 Unshielded Twisted Pair (UTP), **no other transport is acceptable**. Contractor will provide all transmitting, encoding, decoding, receiving, and video distribution devices necessary to deliver the required number of content streams to the required number of digital signs and interactive displays outlined in the Video Content Distribution Schedule provided with this document.

Ownership is providing shelf/rack space, UPS power support within the Main Equipment Room (MER ie..Data Center). In addition ownership will distribute Category 6 UTP cabling from the MER to the locations where displays are to be placed. All additional wiring, power cords, devices, brackets etc. required to provide a working solution are the responsibility of the contractor.

Unique Content
TX-RX

Unique Content
TX/RX

Interactive Content
TX/RX

Cat 5/6 UTP
Video
Stereo Audio
Simplex Serial (RS-232)
SAT/CATV FEED

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Project Description

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600: Challenges & Resolutions

Technology design and implementation firms and the architectural, engineering and construction firms are highly specialized skills that come from completely different backgrounds. As these two cultures converge both sides must allow each vertical to exercise their strengths. Both sides have a responsibility to allow the other to furnish and install in such a way, as to have a minimal impact on the traditional construction process.

To be successful. It must bet acknowledged that both verticals have very different cultures, the reality is that they work on different timeframes, use different terminology and follow processes that are unfamiliar to each other. In addition, it must be to accepted that and despite these differences, both are verticals are being compelled to combine their various skills to meet the requirements of a evolving market. The success of a project is dependant on how well the project team members recognize and work to overcome these differences

This section will touch on some of the areas that have consistently been areas of difficulty on past projects. While some of resolutions provided in this section may seen simplistic and common sense they are the areas where improper setting of expectations and assumptions have created inefficiencies, change requests, unneeded stress and additional costs. Therefore we are reinforcing some of recommendations in these consistently difficult areas and are offering some examples and guidelines on how to best deal with these problem areas.

Design and Specifications

Challenge – Clearly Defining Responsibilities

The TDC must work with the rest of the design team to determine clears lines of delineation within the systems that involve both verticals.

A simple example of this is that it may make sense that the Primary Technology Equipment Contractor provide all of the low-voltage cabling associated with the systems covered in the Technology Equipment Specifications, however this does not make them responsible for every piece of low-voltage cabling in the building. Low-voltage cabling for systems being furnished and installed by the General Contractor (HVAC, Lighting controls etc..) should be furnished by that team.

Another common example:

During projects that have utilized the IP enabled door access controls, there are activities within that system that are typically furnished and installed by the construction contractors (electric strikes, door position switches, power supplies, local wiring, j-boxes, conduit w/pull strings etc…), and there are tasks that are better suited to the IP security firm contracted to the Primary Technology Equipment Contractor (finial connections, configuring software, setting up digital storage, coordinating door events with IP video cameras, installing and configuring card readers etc…).

Neither side should attempt to perform tasks that are outside of their respective “comfort zones” nor should they attempt to push the responsibility for a entire system solely onto the other party. As stated previously a integrated, enhanced complete specification is being developed, what is key is determining where the material, equipment and effort is placed within that specifications (ie. Within the traditional sections or within the Technology Equipment Specifications) to determine which party will be responsible for delivery.

Resolution

During previous projects the TDC has provided simple charts that represent what was negotiated with the rest of the design team to clearly state who was responsible for certain tasks within systems. This type of communication allows for each to to move ahead with a design and have a clear understanding of which tasks will be listed where; giving both sides confidence that the necessary level of detail to ensure complete, working systems are being specified.

Note: requirements for union labor or other regulatory requirements may dictate the need for a union contractor for a specific task (i.e.. cabling..). Past experience has shown is that the PTEC and the GC can either contract separate qualified union contractors or have separate contracts with the same union contractor. What has not worked well is trying to to have PTEC tasks performed under a union shop, contracted to the general contractor.

Example:

Responsibility Matrix

Furnish and Install:	General Contractor	Technology Equipment Contractor
HVAC Controls	x	
Power Measurement	x	
Lighting Controls	x	
Fire/Life/Safety	x	
Security Door Hardware	x	
Security Local Door Wiring (excude card reader wiring)	x	
Door Power Supplies (Non PoE)	x	
6"x 6" J box enclosure for door controllers	x	
Security Door Controllers		x
Card Readers with local wiring		x
Card Reader Wall Box and Conduit with Pull String	x	
UTP Low Voltage Cabling and Termination Components		x
Fiber Optic Cabling and Terminiation Components		x
Conduit	x	
Cisco Base Building Network		x
Power Support Equipment (UPS)		x
Cabinets/Racks/Trays/Raceways		x
Digital Signage		x
Internet Premise Equipment		x
IP Security Equipment		x
Communications Equipment		x
Wireless Networking		x
Grounding Backbone	x	
Electrical Circuits	x	
Stand Alone HVAC (Technology Spaces)	x	
Light Fixtures (Technology Spaces)	x	
Plywood (technology Spaces)	x	
EPO swithces	x	
FireStopping LV Wiring		x
Firestopping of Pathways	x	
Convenience Outlets	x	

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600: Challenges & Resolutions

Design and Specifications (cont.)

Challenge – Combining Drawings and Specifications

As is mentioned in the previous sections it is critical that the TSR (Technology Spaces and Requirements Document) and the ESG (Environmental Series Guidelines) be absorbed into the planned drawings and specifications to create an “enhanced” set of documents. This is done to eliminate conflicting content/detail and eliminate confusion during the bid process.

Resolution

The traditional design team must be made aware of the purpose of these documents. The TSR & ESG provide detail/content only and are designed to be reference documents. They are born out the collaborative efforts of the design team guided by the Technology Design Consultant, who has been tasked with providing this content/detail in such a way as to be understood by the entire design team and the general contractor. They are provided as deliverables for accountability, scoping, coordination, reference, and communication and are designed to be flexible enough to fit within any planned format. As a result the content/detail is relevant but lacks structure.

These documents once completed must be reviewed by the entire design team and content/detail brought into the planned, properly formatted documents.

In addition, any traditional specifications that may be standard language must be reviewed for conflicting requirements. A common example of this is that a mechanical firm that may be use to designing HVAC systems based on a LonTalk technology may have terminology that references a master controller that supports only that protocol. While a the requirements within the ESG may state that the facility requires a IP enabled master controller that supports LonTalk, BacNet, and Modbus etc..

In the past ESG content has either been provided as an addendum or the content has simply been “inserted” without review into the existing documentation. This is to be avoided, as it results in confusion, resulting in inaccurate and unqualified bid responses

Bid Process

Challenge – Supporting the General Contractor

During this time you will be asking the General Contractors to bring resources to the table that may be new to them. As the technology is critical it cannot be excluded, this puts the General Contractor in a very uncomfortable situation. The GC is forced to engage a Primary Technology Equipment Contractor (PTEC) without any way to effectively review the costs and content being provided.

Resolution

Within CRE Master Technology Planning Process certain functions are performed by the Technology Design Consultant to support the General Contractor.

1. A letter of introduction is provided explaining the owners intent as it relates to technology. This letter also provides a description of the Primary Technology Equipment Contractors role and qualifications. In addition, on certain projects it was helpful to offer the contact information for 5 pre-qualified PTEC’s that the General Contractor could engage if they did not wish to attempt and locate resources themselves.

2. The Technology Design Consultant fields the questions from the General Contractor, traditional subcontractors, and the PTEC’s to ensure that the “enhanced” specifications and the Technology Equipment Series is understood by all parties. The General Contractors are not familiar with the technologies and would be forced to pass along all questions, a direct line of communications is preferred.

3. The Technology Design Consultant would also offer to review the proposal documentation provided by the PTEC to General Contractor to help identify any gaps if they existed. As the creator of the Technology Equipment Specification the TDC is well positioned to offer this support.

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600: Challenges & Resolutions

Implementation/Construction

Challenge – Coordination of Schedules

This area provides an interesting challenge for both the traditional construction team, the Technology Design Consultant, and the newly selected Primary Technology Equipment Contractor and that is how to keep the appropriate level of involvement and awareness of the technology focused resources over the course of a construction effort.

The base building technology solutions are reliant on the completion of spaces, electrical circuits, doors, walls, HVAC etc.. These things must be completed before switches, routers, servers, etc.., can be installed, however all of these things must be installed before certain systems can be commissioned as they now rely on the network for communication. The PTEC has to attend periodic construction meetings and the General Contractor has to ensure that the PTEC is aware of critical dates like substantial completion or the Certificate of Occupancy.

They must work together to ensure that technology spaces are complete and that the PTEC has sufficient time to furnish and install IP core systems and allow for interoperability testing with systems installed by other subcontractors. This means a shifting in priorities, where certain spaces like telephone closets and planned pathways may have been finished and made secure near the completion or even after the substantial competitions date, they must now be completed 60 to 120 days prior to that.

Resolution

Create an effective communications plan. Over communications is necessary here, both verticals are new to engaging each other and must strive to make sure that they are both aware of the timeframes and milestones that are critical to the success of each party. While it is not wise to combine the technology and construction schedules as this would lead to both sides having to sift through a tremendous amount of information that neither requires, it is advisable to have key tasks and milestones common to both the technology and the construction schedule.

As examples, areas like, core IP network completed, interoperability testing for HVAC controls, IP video cameras installed etc.., should be included on both schedules.

The TDC must also make sure the General Contractor is made aware of which systems the GC's subcontractors have installed that are dependant on technologies and that the GC adjusts the schedule accordingly.

The GC must work to keep his subcontractors communicating with the PTEC as well. To ensure systems are connected and communicating over the IP network on time.

Challenge – Onsite activities

The GC will build the technology spaces and pathways a specified in the "enhanced" specifications. The GC must communicate that these systems are complete. However as with architecture, mechanical, electrical and plumbing specifications are "interpreted" differently and changes are made in the field. The PTEC must be allowed access to the site to walk through the technology spaces and pathways to ensure that everything is completed as needed.

The PTEC must not be regulated to a secondary role during the initial construction phases, just receiving drawings and specifications and being asked to review them is unacceptable and will lead to them coming on site and finding several gaps in what was planned and what was delivered. In addition these gaps will be identified very close to the substantial competition date of the project forcing everyone into a reactive mode creating unnecessary stress and additional costs.

Resolution

Meetings and communications are critical. The TDC and PTEC must attend periodic construction meeting to see the site and review the planes with the rest of the construction team. How frequently the PTEC must be on site is dependant on the type of project and what stage of construction it is in, but minimally should attend construction meetings with the team once a month.

In addition changes that impact any of the technology spaces or may intrude on technology pathways must be reviewed with and approved by the PTEC to ensure that technology systems have not been negatively impacted.

Commissioning

Challenge – Including all documentation

Operation of a CRE Intellignet building requires that clean the thorough transfer of information be completed during the commissioning process. Of there is not place created or effort given to gathering the documentation as it pertains to the technology systems.

The Technology Design Consultant will provide a complete list of the expected commissioning documents that will need to be included in the finial commissioning documentation deliverable.

Resolution

The TDC is critical in this process. As part of the Technology Equipment Specification he has defined the requirements for commissioning documentation. The General Contractor should review the TES and prepare sections within the final deliverable to include the PTEC's commissioning documents. These areas should be reviewed by the PTEC the General Contractor and the TDC prior to delivery to the owner.

Challenge – Support during commissioning.

Several systems will have been identified as IP enabled or IP native during the construction process and my be required by law to operate in order for a building to be certified for occupancy. They are now reliant on the network and all resources to support that system must be involved in the commissioning process.

Resolution

The GC and PTEC must communicate and coordinate to ensure that the resources that understand the connectivity requirements of the IP enabled systems are available to support the commissioning effort. Just having the HVAC equipment contractor onsite during the commissioning of that system may result in failure if the controllers are not communicating across the network properly. Testing of systems before commissioning must be comprehensive and include the technology partners.

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700: Notes & Summary

Notes

Note: Management Software

While CRE Intelligent buildings can be managed in a traditional fashion with the addition of a few maintenance contracts, it is quite often the goal of ownership to created a product that leverages an automated management strategy. That means the use of a Building Operations Center (BOC) or Managers of Managers (MoM) software platform..

The TDC will be given the addition responsibility of ensuring that the individual systems (HVAC, lighting Controls, power measurement, security, etc..) have “element” managers that are capable of integrating with these software packages. (Examples provided in section 400)

The traditional construction team must be aware that this may create requirements that limit the number and types of manufactures solutions that will meet the specifications as software integration requirements and costs are taken into consideration.

Note: Value Engineering

Quite often during a project there will be a value engineering exercise performed to help control costs associated with a project. The TDC and PTEC must be part of this process to not only offer value changes where possible, but to understand changes being proposed by the rest of the team and to evaluate any impacts on the technology elements associated with the project.

Summary

The *Master Technology Planning* process is a viable option for bringing technology focused resources into a construction process. This approach allows traditional construction teams to immediately begin to meet the demands of owners and their prospective tenants without a long and disruptive learning curve.

Reviewing this document has provided an understanding for the traditional construction team, as to the process that will be undertaken by the technology resources to support the design and construction efforts. The traditional construction team should have an understanding of what to expect from the Technology Design Consultant and the Primary Technology Equipment Contractor, In addition, they should also have a clearer understanding of what will be expected of them to support these resources.

All team members now understand that the core IP network and the IP enabled technologies are now a part of the “core and shell” of a multi-unit dwelling and that they must be given equal consideration with the other base building systems.

The demand for technology solutions within the construction vertical is here today. Cisco Systems is committed to supporting their partners within that vertical by providing the technology solutions, skill sets, and supporting processes required to ensure their success in meeting the needs of the current and future generations of tenants that will occupy their properties.

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