AGENDA
PUBLIC SAFETY COMMITTEE
REGULAR MEETING
WEDNESDAY, APRIL 2, 2025 – 10:30 AM
ADMINISTRATION CENTER - ROOM A-200
121 W. MAIN STREET, PORT WASHINGTON, WI 53074

The public can access the meeting by viewing the live stream at the link which will be opened five minutes before the call to order:

Public Safety Committee Live Stream

The public can submit comments here: Public Comment Form
Public Comment Policy & Instructions for Submitting Public Comments Online

1. **CALL TO ORDER**
2. **PROPER NOTICE**
3. **PUBLIC COMMENTS, CORRESPONDENCE, COMMUNICATIONS**
4. **APPROVAL OF MINUTES**

   March 18, 2025
5. **MEDICAL EXAMINER**
   - ***a. Management/Financial/Informational Reports:***
6. **DISTRICT ATTORNEY**
   - ***a. Action Items:***
     1. Digital Evidence/Discovery
   - ***b. Management/Financial/Informational Reports***
     1. DA Financials
7. **CLERK OF COURTS**
   - ***a. Management/Financial/Informational Reports:***
8. **SHERIFF'S DEPARTMENT**
   - ***a. Action Items:***
     1. Review/Approve Dispatch Center Electrical Bid
   - ***b. Management/Financial/Informational Reports:***
     1. Management/Financial Reports
   - ***c. Closed Session:***

     Pursuant to Section 19.85 (1)(b) of the WI Statute: Personnel Discipline
   - ***d. Open Session: Action Item***
     1. Consideration of Sheriff's Recommendation of Disciplinary Action
9. **NEXT MEETING DATE**

   May 20, 2025
10. **ADJOURNMENT**

A quorum of members of committees or the full County Board of Ozaukee County may be in attendance at this meeting for purposes related to committee or board duties, however, no formal action will be taken by these committees or the board at this meeting.

Persons with disabilities requiring accommodations for attendance at this meeting should contact the County Clerk's Office at 262-284-8110, twenty-four (24) hours in advance of the meeting.

Updated 3/28/2025 11:55 AM

Public Safety Committee

AGENDA INFORMATION SHEET

AGENDA DATE: **April 2, 2025**
DEPARTMENT: **County Clerk**
DIRECTOR: **Kellie Kretlow**
PREPARER: **Kellie Kretlow**

Agenda Summary March 18, 2025

https://www.ozaukeecounty.gov/AgendaCenter/ViewFile/Minutes/_03182025-3551

PUBLIC SAFETY COMMITTEE

Public Safety Committee

AGENDA INFORMATION SHEET

AGENDA DATE: April 2, 2025
DEPARTMENT: District Attorney
DIRECTOR: Benjamin Lindsay
PREPARER: June Marx

Agenda Summary Digital Evidence/Discovery

Background Information:

As Sheriff's Department and Wisconsin State Patrol transition to Axon, every law enforcement agency in Ozaukee County will be utilizing Axon with the exception of Saukville Police Department. In order to effectively manage data received from the sheriff's office and other law enforcement partners, the District Attorney's Office is seeking to implement Axon Justice to manage all discovery. While Axon has free prosecutor access as part of each law enforcement agencies contract, that does not allow us to create discovery case files or enable us to share that data with defense attorneys.

Analysis:

Axon justice will result in workload reduction for both the sheriff's office and district attorney's office. Currently records management staff in both offices have to manually upload and download files using Box.com, a separate file-sharing service. For larger files this can take hours to accomplish. Further, we cannot review discovery that is stored in Box and have to again download the files to our local server in order to review digital media. Further, Axon Justice allows for a discovery auditing in the event that there is a dispute about what items have been turned over to the defendant.

The attached executive summary outlines the services offered with an Axon Justice subscription. Additional quotes were not solicited given that Axon has already been selected by the sheriff's office and other law enforcement agencies.

Fiscal Impact

Axon Justice pricing is based upon number of FTE in the district attorney's office. The attached five-year budgetary estimate provided by Axon was:

May 2025: **$15,310.42**

May 2026: **$15,922.84**

May 2027: **$16,559.76**

May 2028: **$17,222.15**

May 2029: **$17,911.03**

Funding Source:

It is anticipated that the cost of Axon Justice can be recuperated through upcoming changes to district attorney billing practices. The district attorney's office currently bills a flat rate of $10.00 per case for access to digital discovery. Many other counties have shifted to a per MB fee structure for digital discovery. I anticipate that the district attorney's office would charge a $5.00 administrative fee and then $0.03 per 5 MB of data. This will likely bring in sufficient funds to cover the costs of the Axon Justice subscription.

Recommended Motion:

Approve the contract with Axon Justice in the amount provided in the budgetary estimate.

Committee Approval: Yes ___ No ____

Committee Vote: _____

Members Voting For: _____

Members Voting Against: _____

ATTACHMENTS:

- Executive Summary - ozaukee county wi (PDF)
- Q-678168-45733.733KD (PDF)

PUBLIC SAFETY COMMITTEE

AXON ENTERPRISE, INC.

DIGITAL EVIDENCE MANAGEMENT EXECUTIVE SUMMARY

Ozaukee County District Attorney

Axon Enterprise, Inc. (Corporate Headquarters)
17800 North 85th Street
Scottsdale, AZ 85255

Attachment: Executive Summary - ozaukee county wi (Digital Evidence/Discovery-Axon)

Executive Summary:

To give context to the current request, a recent national prosecutor survey indicates that over 90% of all cases contain video evidence. When we expand that scope to all digital evidence, including photos, PDFs and audio recordings, we see this number grow to over 95% of all cases. The consequences of exponentially growing digital evidence trends include rising costs around storage, difficulties obtaining, reviewing, organizing all digital evidence, and challenges around disclosing all evidence to the defense with real danger of losing evidence or committing Brady violations. Due to the rising evidence trends, one recent study indicated that a staggering 30-50% of attorney time is spent on clerical work around digital evidence.

To combat this wasted time, while expediting justice workflows for the Office, the Ozaukee County District Attorney's Office is requesting Axon's Justice offering to greatly improve workflow efficiencies and reduce wasted time and energy. The agencies in the County will benefit from a unified management system of digital evidence by expediting discovery timelines and due process for defendants.

The system is built around simplifying the three pillars of evidence management:

1. Ingesting all evidence from all possible sources,
2. Reviewing every piece of evidence efficiently, and
3. Discovering that evidence easily to defense.

The Ozaukee County District Attorney's Office would benefit from the Axon Justice package for the following high-level reasons:

- Axon Justice offers unlimited storage. This would be able to replace storage costs for the Prosecutor's Office currently incurred on hard drives, CDs, Box.com and physical server space.
- Current digital evidence storage is fragmented across multiple locations including thumb drives, and download links. This means that it is a timely and manual process, which increases the risk of damaged or lost evidence.
- Disclosure portals will facilitate seamless discovery with defense counsel through a cloud-based platform. This includes comprehensive audit trails, advanced agency analytics, and usage reports as well as disclosure logs to easily document discovery in court.
- Axon Auto-Transcribe transforms evidence review by quickly and accurately generating transcripts. With the ability to scan transcripts and search keywords

Attachment: Executive Summary - ozaukee county wi (Digital Evidence/Discovery-Axon)

across multiple files, Auto-Transcribe enhances efficiency, eliminating the need to watch every second of digital evidence.

- Ingestion portals and trusted users will allow non-Axon partners to upload digital evidence into a single secure cloud for review. This would allow the Office to accumulate all forms of evidence (ie non-Axon body or fleet cameras, jail calls, 3rd party surveillance, citizen videos, etc) from a variety of sources in any given case to one simple source of truth: the case file in Justice Premier.
- Types of digital evidence include PDFs, photos, body worn camera footage, surveillance videos, third-party video footage, cell phone records, audio/video interviews, social media messages/posts, jail calls, etc.
- AI Redaction tools are included and will provide our Office with the ability to easily redact PDFs, audio, and video clips as mandated by the Court. Object tracking and audio redaction are also simple feature that will have immediate impact on plea bargains and court-ready exhibits.
- Multi-cam video playback: review up to 4 Axon video streams simultaneously ensures faster reviewing of stops with multiple camera views.
- Third-Party Playback will allow the Office to review third-party video (such as Walmart surveillance tape or Ring doorbell footage) all within the program, so the Office will not need to waste time downloading a player or request assistance from IT around video playback.
- Investigate is a video review and playback tool included in the offering that will allow all videos to be exported into MP4s for simple court playback without compromising original evidence. It allows for multiple clips to be synced, as well as video enhancement and stitching of clips in an efficient, forensically sound manner.

Attachment: Executive Summary - ozaukee county wi (Digital Evidence/Discovery-Axon)

Shipping Locations

Location Number	Street	City	State	Zip	Country
1	1201 S Spring St Rm 212	Port Washington	WI	53074-2491	USA

Payment Details

May 2025

Invoice Plan	Item	Description	Qty	Subtotal	Tax	Total
Year 1	100490	AXON JUSTICE - PSO - FAST PASS	1	$923.14	$0.00	$923.14
Year 1	S00015	BUNDLE - JUSTICE PREMIER	11	$14,387.28	$0.00	$14,387.28
Total				**$15,310.42**	**$0.00**	**$15,310.42**

May 2026

Invoice Plan	Item	Description	Qty	Subtotal	Tax	Total
Year 2	100490	AXON JUSTICE - PSO - FAST PASS	1	$960.06	$0.00	$960.06
Year 2	S00015	BUNDLE - JUSTICE PREMIER	11	$14,962.78	$0.00	$14,962.78
Total				**$15,922.84**	**$0.00**	**$15,922.84**

May 2027

Invoice Plan	Item	Description	Qty	Subtotal	Tax	Total
Year 3	100490	AXON JUSTICE - PSO - FAST PASS	1	$998.46	$0.00	$998.46
Year 3	S00015	BUNDLE - JUSTICE PREMIER	11	$15,561.30	$0.00	$15,561.30
Total				**$16,559.76**	**$0.00**	**$16,559.76**

May 2028

Invoice Plan	Item	Description	Qty	Subtotal	Tax	Total
Year 4	100490	AXON JUSTICE - PSO - FAST PASS	1	$1,038.40	$0.00	$1,038.40
Year 4	S00015	BUNDLE - JUSTICE PREMIER	11	$16,183.75	$0.00	$16,183.75
Total				**$17,222.15**	**$0.00**	**$17,222.15**

May 2029

Invoice Plan	Item	Description	Qty	Subtotal	Tax	Total
Year 5	100490	AXON JUSTICE - PSO - FAST PASS	1	$1,079.94	$0.00	$1,079.94
Year 5	S00015	BUNDLE - JUSTICE PREMIER	11	$16,831.09	$0.00	$16,831.09
Total				**$17,911.03**	**$0.00**	**$17,911.03**

Attachment: Q-678168-45733.733KD (Digital Evidence/Discovery-Axon)

Public Safety Committee

AGENDA INFORMATION SHEET

AGENDA DATE: **April 2, 2025**
DEPARTMENT: **District Attorney**
DIRECTOR: **Benjamin Lindsay**
PREPARER: **June Marx**

Agenda Summary DA Financials

ATTACHMENTS:

- DA March 24th Financials (PDF)
- VW March 24th Financials (PDF)

PUBLIC SAFETY COMMITTEE

Ozaukee County Committee Report

General Fund District Attorney

For the Three Months Ending Monday, March 31, 2025

Profit and Loss Statement ACTUAL TO AMENDED BUDGET

	Current Month Actual	2025 YTD Actual	2025 Amended Budget	Budget Balance	% Budget YTD
Revenues					
Public Charges for Services	$650	$3,475	$15,000	$11,525	23.17%
Total Revenues	**$650**	**$3,475**	**$15,000**	**$11,525**	**23.17%**
Expenditures					
Salaries	$15,364	$73,675	$424,495	$350,820	17.36%
Fringe Benefits	$7,012	$35,256	$186,208	$150,952	18.93%
Travel/Training	-	-	$5,000	$5,000	0.00%
Supplies	$44	$103	$9,385	$9,282	1.10%
Purchased Services	$1,026	$7,171	$18,605	$11,434	38.54%
Interdepartment Charges	$129	$549	$16,185	$15,636	3.39%
Total Operating Expenditures	**$23,575**	**$116,754**	**$659,878**	**$543,124**	**17.69%**
Capital Outlay					
Total Expenditures	**$23,575**	**$116,754**	**$659,878**	**$543,124**	**17.69%**
Net Increase (Decrease)	**($22,925)**	**($113,279)**	**($644,878)**	**($531,599)**	**17.57%**

Equity:

Attachment: DA March 24th Financials (DA Financials)

Ozaukee County Committee Report

General Fund District Attorney Victim Witness

For the Three Months Ending Monday, March 31, 2025

Profit and Loss Statement ACTUAL TO AMENDED BUDGET

	Current Month Actual	2025 YTD Actual	2025 Amended Budget	Budget Balance	% Budget YTD
Revenues					
Intergovernmental Revenues	$47,925	$47,925	$55,000	$7,075	87.14%
Total Revenues	**$47,925**	**$47,925**	**$55,000**	**$7,075**	**87.14%**
Expenditures					
Salaries	$4,652	$22,086	$125,587	$103,501	17.59%
Fringe Benefits	$1,165	$5,798	$38,728	$32,930	14.97%
Travel/Training	-	-	$975	$975	0.00%
Supplies	-	$167	$150	($17)	111.33%
Purchased Services	-	$41	$450	$409	9.11%
Interdepartment Charges	-	$163	$1,540	$1,377	10.58%
Total Operating Expenditures	**$5,817**	**$28,255**	**$167,430**	**$139,175**	**16.88%**
Capital Outlay					
Total Expenditures	**$5,817**	**$28,255**	**$167,430**	**$139,175**	**16.88%**
Net Increase (Decrease)	**$42,108**	**$19,670**	**($112,430)**	**($132,100)**	**-17.50%**

Equity:

Attachment: VW March 24th Financials (DA Financials)

Public Safety Committee

AGENDA INFORMATION SHEET

AGENDA DATE: April 2, 2025
DEPARTMENT: Administrator
DIRECTOR: Jason Dzwinel
PREPARER: Jason Wittek

Agenda Summary Review/Approve Dispatch Center Electrical Bid

BACKGROUND INFORMATION: The Sheriff's Office is in the process of renovating a space in the Justice Center to accommodate a larger and updated Dispatch Center. $1.3M in ARPA funds were set aside for the renovation. The Sheriff's Office and Facilities Management have been working with an Architect. The first bid to be released was for the electrical for the renovation of the Dispatch Center.

ANALYSIS: Facilities Management released an Invitation for Bids on 2/27/25. Three bids were received for the work on 3/25/25. The lowest responsive and responsible bidder was Miller Electric at $164,770. They also submitted the required bid bond, along with their bid proposal. When the contract is executed, a payment and performance bond will be required as well.

Miller Electric - $164,770

Steiner Electric - $182,197

Kohl Electric Services - $202,744

FISCAL IMPACT:

Balance Current Year: $164,770

Next Year's Estimated Cost: $0

FUNDING SOURCE:

County Levy:$0

Non-County Levy: $164,770

Indicate source: ARPA

RECOMMENDED MOTION: Approve Bid of $164,770 from Miller Electric to contract for the Dispatch Center Electrical.

ATTACHMENTS:

- Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (PDF)
- Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (PDF)

PUBLIC SAFETY COMMITTEE

Invitation for Bid for Dispatch Center Electrical

For
Ozaukee County

BID PROPOSAL

TO: Ozaukee County Sheriff's Office
1201 S. Spring St
Port Washington, WI 53074-0994

The undersigned having become familiar with the local conditions effecting the cost of the work and with the Project Documents including the form of Proposal, Form of Contract, Special Provisions, Specifications, and Addenda and Exhibits issued and attached to the Official Contract Document on file in the office of the Ozaukee County, hereby proposes to perform everything required to be performed and to provide and furnish all of the labor, materials, necessary tools, equipment, expendable and otherwise and all utility and transportation services necessary to perform and complete in a workmanlike manner all of the work required for and the work described in the following Bid Schedule, in accordance with the following specifications as prepared by Ozaukee County including Addenda Nos. ___,___,___, and ___, issued thereto for the sums set forth in the following Proposal Schedule.

I. BID LUMP SUM

State the amount to provide construction and development of the Electrical System for the Dispatch Center Located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems. Including all labor and material to design, furnish and install and the related work of other trades described herein.

BID LUMP SUM $ **164,770.00**

Total Bid Price (in dollars written) **One hundred sixty four thousand seven hundred seventy dollars**

Attachment: Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (Review/Approve Dispatch Center Electrical Bid)

II. BID CONDITIONS:

(1) TOTAL BID PRICE:

The Undersigned has carefully checked the above Bid Price Schedule against the provisions of the Request for Proposal and Project Documents before preparing this Bid and accepts as correctly listing the complete work to be done in accordance with the Request for Proposal, Project Documents.

(2) BID SECURITY

Accompanying this Bid is a (Certified Check) (Bank Draft) (Bid Bond) in the amount of $ **5% of bid amount** DOLLARS ($_____) payable to (which protects) the Owner, and which it is agreed, will be retained by the Owner as liquidated damages if the undersigned fails to execute the Contract in conformance with the form of Contract incorporated in the Project Documents, and furnish a Performance Bond as specified within ten (10) days from the notification of the award of the Contract to the undersigned.

In submitting this Bid, it is understood and agreed by the undersigned, that the right is reserved by the Owner to reject any or all Bids. It is further understood and agreed that this Proposal may not be withdrawn for a period of sixty (60) days from the opening thereof.

(3) STARTING AND COMPLETION

If awarded a contract under this proposal, the undersigned agrees to commence work on the project within ten (10) days after receipt of formal notice to proceed from Ozaukee County. Ozaukee County anticipates awarding this contract **April 2, 2025**, and anticipates issuing the formal notice to proceed after **April 9, 2025.** Construction to start on or about **May 1, 2025 and Conclude Dec 31, 2025.**

Attachment: Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (Review/Approve Dispatch Center Electrical Bid)

(4) SUBCONTRACTOR LISTING

The undersigned proposes to employ the following listed subcontractors for the following enumerated classes of work and not to alter or add to such a list without the written consent of the owner.

Class of Work	Subcontractor/Supplier Name	Percent (%) Value of Total Proposal Price
1.		
2.		
3.		
4.		
5.		

I hereby certify that all statements are made on behalf of **J. Miller Electric, Inc.**
Name of Co. Submitting Bid

_____, State of **Wisconsin**, that I have examined and carefully prepared this proposal from the specification and have checked the same in detail before submission; that I have full authority to make such statements and proposal in (its, their, my) behalf, and that said statements are true and correct.

Signed By: _____ Date: **3/25/2025**

Title: **Vice President**

Company: **J. Miller Electric, Inc.**

Attachment: Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (Review/Approve Dispatch Center Electrical Bid)

Bid Bond

AIA Document A310™ – 2010

Bid Bond No. FED06641

CONTRACTOR:
(Name, legal status and address)
J. MILLER ELECTRIC, INC.
512 S Park Street
Port Washington, WI 53074

SURETY:
(Name, legal status and principal place of business)
GRANITE RE, INC.
14001 Quailbrook Drive
Oklahoma City, OK 73134

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

OWNER:
(Name, legal status and address)
Ozaukee County
121 W Main St
Port Washington, WI 53074

BOND AMOUNT: Five Percent of the Bid Amount (5.00% of Bid Amount)

PROJECT:
(Name, location or address, and Project number, if any)
Dispatch Center Electrical

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 3rd day of March, 2025

(Witness)

(Witness) Karla Heffron

J. MILLER ELECTRIC, INC.
(Principal) *(Seal)*

(Title)

GRANITE RE, INC.
(Surety) *(Seal)*

(Title) Samuel Duchow, Attorney-in-Fact

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061113

Attachment: Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (Review/Approve Dispatch Center Electrical Bid)

GRANITE RE, INC.

GENERAL POWER OF ATTORNEY

Know all Men by these Presents:

That GRANITE RE, INC., a corporation organized and existing under the laws of the State of MINNESOTA and having its principal office at the City of OKLAHOMA CITY in the State of OKLAHOMA does hereby constitute and appoint:

MICHAEL J. DOUGLAS; CHRIS STEINAGEL; CHRISTOPHER M. KEMP; KARLA HEFFRON; SAMUEL DUCHOW; ROBERT DOWNEY; JULIA DOUGLAS; CONNIE SMITH; KORY MORTEL; ELIOT MOTU its true and lawful Attorney-in-Fact(s) for the following purposes, to wit:

To sign its name as surety to, and to execute, seal and acknowledge any and all bonds, and to respectively do and perform any and all acts and things set forth in the resolution of the Board of Directors of the said GRANITE RE, INC. a certified copy of which is hereto annexed and made a part of this Power of Attorney; and the said GRANITE RE, INC. through us, its Board of Directors, hereby ratifies and confirms all and whatsoever the said:

MICHAEL J. DOUGLAS; CHRIS STEINAGEL; CHRISTOPHER M. KEMP; KARLA HEFFRON; SAMUEL DUCHOW; ROBERT DOWNEY; JULIA DOUGLAS; CONNIE SMITH; KORY MORTEL; ELIOT MOTU may lawfully do in the premises by virtue of these presents.

In Witness Whereof, the said GRANITE RE, INC. has caused this instrument to be sealed with its corporate seal, duly attested by the signatures of its President and Assistant Secretary, this 31st day of July, 2023.

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

Kenneth D. Whittington, President

Kyle P. McDonald, Assistant Secretary

STATE OF OKLAHOMA)
) SS:
COUNTY OF OKLAHOMA)

On this 31st day of July, 2023, before me personally came Kenneth D. Whittington, President of the GRANITE RE, INC. Company and Kyle P. McDonald, Assistant Secretary of said Company, with both of whom I am personally acquainted, who being by me severally duly sworn, said, that they, the said Kenneth D. Whittington and Kyle P. McDonald were respectively the President and the Assistant Secretary of GRANITE RE, INC., the corporation described in and which executed the foregoing Power of Attorney; that they each knew the seal of said corporation; that the seal affixed to said Power of Attorney was such corporate seal, that it was so fixed by order of the Board of Directors of said corporation, and that they signed their name thereto by like order as President and Assistant Secretary, respectively, of the Company.

My Commission Expires:
April 21, 2027
Commission #: 11003620

BETHANY J. ALFRED NOTARY PUBLIC STATE OF OKLAHOMA

Notary Public

GRANITE RE, INC.

Certificate

THE UNDERSIGNED, being the duly elected and acting Assistant Secretary of Granite Re, Inc., a Minnesota Corporation, HEREBY CERTIFIES that the following resolution is a true and correct excerpt from the July 15, 1987, minutes of the meeting of the Board of Directors of Granite Re, Inc. and that said Power of Attorney has not been revoked and is now in full force and effect.

"RESOLVED, that the President, any Vice President, the Assistant Secretary, and any Assistant Vice President shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the Company in the course of its business. On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the Company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

IN WITNESS WHEREOF, the undersigned has subscribed this Certificate and affixed the corporate seal of the Corporation this 3 day of March, 2025.

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

Kyle P. McDonald, Assistant Secretary

GR0800-1

Attachment: Miller Electric Bid Proposal_3-25-25_Justice Dispatch Electrical (Review/Approve Dispatch Center Electrical Bid)

ADVERTISEMENT FOR BIDS
OZAUKEE COUNTY

Invitation for Bid for Dispatch Center Electrical

Sealed bids will be received by Ozaukee County until 10:00 AM (local time) on **Tuesday, March 25th**, **2025** at the Ozaukee County Justice Center, 1201 S Spring St, Port Washington, WI, for the **Dispatch Center Electrical** located at the Justice Center, 1201 S Spring St, Port Washington, WI 53074. At that time, all bids will be publicly opened and read aloud.

The County seeks a qualified Contractor for the construction project for **Dispatch Center Electrical** located at Justice Center, 1201 S Spring St, Port Washington, WI 53074. The proposed renovation is for the electrical work for the Newly Renovated Dispatch Center. The project includes the installation of an Uninterruptable Power Supply to power critical dispatch systems within the Dispatch Center.

Prequalification of Bidders will not be required. A pre-submittal conference will be held on Thursday, March 6th at 10am at Justice Center, 1201 S Spring St, Port Washington, WI 53074.

Bidding Documents, including Drawings and Specifications, may be obtained via email by contacting Ryan Tackes, at rtackes@ozaukeecounty.gov or by calling (262) 284-8399. Copies may also be obtained at the Ozaukee County Justice Center located at 1201 S Spring St, Port Washington, Wisconsin.

A certified check or bond payable without condition to Ozaukee County in an amount not less than five percent (5%) of the total amount bid shall be submitted with each bid as a guarantee that if the contract is awarded, a proper contract and bond will be executed and filed within ten (10) days after the acceptance of the bid. If the Contractor fails to execute and file such contract and bond, the amount of the check or bond shall be forfeited as liquidated damages.

No bid shall be withdrawn after the bid opening without the consent of Ozaukee County for a period of sixty (60) days after the time of opening. Each Contractor agrees upon submission of a proposal that if the same be accepted within said time period, contractor shall be bound by the terms of acceptance hereinafter contained.

Ozaukee County reserves the right to reject any or all bids, to waive any technicality, and to accept any bid deemed to be in the best interest of Ozaukee County. The successful Contractor will be required to furnish a satisfactory performance bond in the sum of the full amount of the contract.

All bids must be prepared on the forms included in the Contract Documents and must be sealed and addressed to Ozaukee County Dispatch Center Electrical Bid, and submitted to the Office of the Sheriff, Ozaukee County Justice Center located at 1201 S Spring St, Port Washington, WI, 53074**.** There shall appear on the envelope of each proposal, the name and address of the Contractor and purpose for which the proposal is intended.

Published 2/27 & 3/6

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

PROJECT DOCUMENTS FOR

Invitation for Bid for Dispatch Center Electrical

For
Ozaukee County
Justice Center
1201 Spring Street
Port Washington, Wisconsin

Instructions to Prospective Bidders	**2**
Bid Proposal	**7**
Special Provisions	**10**
Contract	**12**
Payment and Performance Bond	**16**
General Conditions	**20**

Attachments: Electrical Drawings & Specifications

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Invitation for Bid for Dispatch Center Electrical
For
Ozaukee County

INSTRUCTIONS TO PROSPECTIVE BIDDERS

III. Scope of Work:

A. The Work under these Project Documents includes development of the Electrical System for the Dispatch Center Located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems. The successful prospective contractor shall furnish all labor, materials, and equipment necessary to complete the work.

B. Unless otherwise specified herein, the prospective contractor shall supply all things required (including tools, materials, consumable supplies, labor and insurance) to complete the work shown, described, or intended in this contract. It is the prospective contractor's responsibility to request any clarifications or substitutions. Any errors or omissions that would impact the project will be borne by the prospective contractor.

C. All general proposal questions and requests to inspect the site should be directed to Ryan Tackes, Justice Center Building Superintendent, Ozaukee County at rtackes@ozaukeecounty.gov or (262) 284-8399.

2. Preparation of Proposal:

Bid proposal shall be firmly sealed in a proposal envelope labeled **"Dispatch Center Electrical Bid Proposal"** and delivered to the office designated in the Advertisement for Proposals.

All proposals are to be made out in accordance with the Instructions and on the Bid Proposal Forms furnished by the Owner and included in this document.

Only Bid Proposals which are made out upon the regular Bid Forms included in this document will be considered. THE PROPOSAL FORMS **MUST NOT BE SEPARATED** FROM THIS DOCUMENT.

3. Bid Security:

No Bid will be considered unless accompanied by a certified check, bank draft, or bonds, as defined in the Request for Proposals, payable to the Owner as a guarantee that if the bid is accepted the Contractor will execute and file the proposed Contract and Performance Bond (and Labor and Materials Bond, if required) within ten (10) days from the date of the award

of the contract. On failure of the Contractor to execute the Contract and required Bonds, he will forfeit the deposit as agreed liquidated damages, and the acceptance of the Bid will be contingent upon the Contractor agreeing to this provision.

The bid security of the Contractors will be held until a Contract is executed and approved and then the balance of the proposal securities submitted will be returned within ten (10) days after the opening of proposals.

4. Examination of Site and Specifications:

(a) Contractors shall inform themselves of all the conditions under which the work is to be performed concerning the site of the work, the structure of the ground, the obstacles which may be encountered, whether shown on the plans or not, and all other relevant matters concerning the work to be performed.

The Contractor to whom a Contract is awarded will not be allowed any extra compensation by reason of any such matters or things concerning which the Contractor did not inform himself prior to submitting a proposal. The successful Contractor must employ, as far as possible, such methods and means in the carrying out of his work as will not cause any interruption or interference with the operation of the facility or with any other Contractors.

(b) The Contractor is expected to base bid pricing on materials and equipment complying fully with the Contract Specifications, and in the event, he names or includes in his bid materials or equipment which do not conform, he will, if awarded a contract, be responsible for furnishing materials and equipment which fully conform at no change in the Contractor's contact price.

(c) Contractor must satisfy themselves by personal examination of the locations of the proposed work and by such other means as they may prefer as to the correctness of any quantities listed in the Bid, and shall not, after submission of their Bid, dispute or complain of such estimate, nor assert that there was any misunderstanding in regard to the nature or amount of work to be done.

(d) Before submitting a Bid, each Contractor should read the complete Project Documents, Instructions to Bidders, the Form of Contract, all of which contain provisions applicable not only to the successful Contractor, but also to any of the Contractor's subcontractors.

5. Interpretation of Proposed Project Documents:

If any person contemplating submitting a bid for any contract on this project is in doubt as to the true meaning of any part of the Contract Specifications, or other sections of the Contract Document, they may submit to the Owner a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery.

Any interpretation of the Project Document will be made only by addendum duly issued or delivered to each person receiving a set of such documents. The Owner will not be

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

responsible for any other explanations or interpretations of the Project Documents or Contract.

6. Bid Requirements:

(a) Each Contractor shall submit only one Bid.

(b) Each Contractor must submit with his Bid, special data, if any, in respect to items of equipment, alternates, or other items which any section of the Contract Document requires to be submitted with each Bid.

7. Conditions in Contractor's Bid:

A Contractor shall not stipulate in the Bid any conditions not contained in the Form of Bid contained in the Project Documents.

8. "Or Equal" Clause:

Whenever in any section of the Project Documents any article, material, or equipment is defined by describing a proprietary product by using the name of a manufacturer or vender, the term "or equal," if not inserted shall be implied. The specific article, material, or equipment mentioned shall be understood as indicating the type, function, minimum standard of design, efficiency, and quality desired and shall not be construed in such a manner as to exclude manufacturer's products of comparable quality, design and efficiency, as approved by the Owner.

If any Contractor proposes to furnish an item or material which he claims to be of equal value, utility, or merit to a named product or material in the specification, the Contractor, supplier, or manufacturer shall submit a written statement to Ozaukee County 5 days prior to the proposal opening. The statement shall name and describe the item or material claimed to be equal and shall include supporting data along with a request for approval.

9. Standard Manufacturer:

Whenever the terms "standard," "recognized," or "reputable" manufacturer are used, they shall be construed as meaning manufacturers who have been engaged in the business of fabricating materials, equipment or suppliers of the nature called for by the Specifications for a reasonable period of time prior to the date set for opening of proposals, and who can demonstrate to the satisfaction of the Owner that said manufacturer has successfully installed equipment, materials or supplies of the type proposed to be furnished in at least three instances and that the performance of such materials, equipment or supplies has been satisfactory.

Manufacturers who have been engaged in the business of manufacturing said materials, equipment or supplies for a period of over twelve months prior to the date fixed for opening

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

bids shall, unless a longer period of time is specifically stated in the Specifications, prima facie be deemed to have been engaged in such business for a reasonable length of time.

10. Withdrawal of Bid:

Any Contractor may withdraw their bid at any time prior to the scheduled closing time for the receipt of proposals, but no proposal may be withdrawn after the scheduled closing time for the receipt of proposals within the period of time stated in the Advertisement for Bids.

11. Signing of Bid:

(a) Bids which are not signed by individuals making them shall have attached thereto a power of attorney evidencing authority to sign the proposal in the name of the person to whom it is signed.

(b) Bids which are signed for a co-partnership shall be signed by all of the co-partners or by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the proposal a power of attorney, evidencing authority to sign the proposal.

(c) Proposals which are signed for a corporation shall have the correct corporate name thereof signed in handwriting or in typewriting, and the signature of the president or other authorized officer of the corporation should be manually written below the written or typewritten corporate name following the word "BY_____."

(d) For any legal entity, the authority of the person signing for such legal entity shall be attached to the Proposal.

12. Definition of Award:

The contract shall be deemed to have been awarded when formal notice of award has been duly served upon an intended awardee (i.e., the Contractor to whom the Owner contemplated awarding a contract) by some officer or agent whom the Owner duly authorized to give such notice.

13. Execution of Contracts and Bonds:

Each contract must be executed in four (4) original counterparts and no more, and there shall be executed original counterparts of the Contractor's Performance Bond (and Labor and Materials Bond, if required) in equal number to the executed original counterpart of the Contract. Three copies of such executed documents will be retained by the Owner, the other one will be delivered to the Contractor. The successful Contractor must provide

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

compensation insurance and public liability as outlined in the General Conditions of the Contract. The costs of executing the bonds and contract insurance, including all notary fees and expenses are to be paid by the Contractor to whom the contract is awarded.

14. Commencement and Completion of Work:

Upon award of a Contract, the Owner shall determine the date on which the Contractor shall commence work. This date will not be prior to the time stated in the Proposal Form. Attention to all prospective Contractors is also directed to the number of calendar days stated in the Bid Form for completion of the work to the point of final acceptance by the Owner.

15. Make-up of Contract Document:

The attention of Contractors is directed to the make-up of this Contract Document. The specifications governing work to be performed on this project and included in this document are composed of Project Specifications, Special Provisions, and Bid Forms.

16. Payment:

Contractors will be paid at intervals stated in the Contract.

17. Award of Contract:

It is the intent of the OWNER to award the Contract to a responsible prospective contractor or prospective contractors provided the bid has been submitted in accordance with the requirements of the Project Documents and does not exceed the funds available.

The right is reserved by the OWNER to reject any or all proposals; to accept an alternate proposal; to waive technicalities; to re-advertise for proposals; and to accept the proposal which in its judgment, is deemed most advantageous for the OWNER.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Invitation for Bid for Dispatch Center Electrical

For
Ozaukee County

BID PROPOSAL

TO: Ozaukee County Sheriff's Office
1201 S. Spring St
Port Washington, WI 53074-0994

The undersigned having become familiar with the local conditions effecting the cost of the work and with the Project Documents including the form of Proposal, Form of Contract, Special Provisions, Specifications, and Addenda and Exhibits issued and attached to the Official Contract Document on file in the office of the Ozaukee County, hereby proposes to perform everything required to be performed and to provide and furnish all of the labor, materials, necessary tools, equipment, expendable and otherwise and all utility and transportation services necessary to perform and complete in a workmanlike manner all of the work required for and the work described in the following Bid Schedule, in accordance with the following specifications as prepared by Ozaukee County including Addenda Nos. ___,___,___, and ___, issued thereto for the sums set forth in the following Proposal Schedule.

I. BID LUMP SUM

State the amount to provide construction and development of the Electrical System for the Dispatch Center Located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems. Including all labor and material to design, furnish and install and the related work of other trades described herein.

BID LUMP SUM $_____

Total Bid Price (in dollars written)_____

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

II. BID CONDITIONS:

(1) TOTAL BID PRICE:

The Undersigned has carefully checked the above Bid Price Schedule against the provisions of the Request for Proposal and Project Documents before preparing this Bid and accepts as correctly listing the complete work to be done in accordance with the Request for Proposal, Project Documents.

(2) BID SECURITY

Accompanying this Bid is a (Certified Check) (Bank Draft) (Bid Bond) in the amount

of $_____DOLLARS ($_____) payable to (which protects) the Owner, and which it is agreed, will be retained by the Owner as liquidated damages if the undersigned fails to execute the Contract in conformance with the form of Contract incorporated in the Project Documents, and furnish a Performance Bond as specified within ten (10) days from the notification of the award of the Contract to the undersigned.

In submitting this Bid, it is understood and agreed by the undersigned, that the right is reserved by the Owner to reject any or all Bids. It is further understood and agreed that this Proposal may not be withdrawn for a period of sixty (60) days from the opening thereof.

(3) STARTING AND COMPLETION

If awarded a contract under this proposal, the undersigned agrees to commence work on the project within ten (10) days after receipt of formal notice to proceed from Ozaukee County. Ozaukee County anticipates awarding this contract **April 2, 2025**, and anticipates issuing the formal notice to proceed after **April 9, 2025.** Construction to start on or about **May 1, 2025 and Conclude Dec 31, 2025.**

(4) SUBCONTRACTOR LISTING

The undersigned proposes to employ the following listed subcontractors for the following enumerated classes of work and not to alter or add to such a list without the written consent of the owner.

Class of Work	Subcontractor/Supplier Name	Percent (%) Value of Total Proposal Price
1.		
2.		
3.		
4.		
5.		

I hereby certify that all statements are made on behalf of _____
Name of Co. Submitting Bid

_____, State of _____, that I have examined and carefully prepared this proposal from the specification and have checked the same in detail before submission; that I have full authority to make such statements and proposal in (its, their, my) behalf, and that said statements are true and correct.

Signed By:_____ Date:_____

Title:_____

Company:_____

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Invitation for Bid for Dispatch Center Electrical

For
Ozaukee County

SPECIAL PROVISIONS

1. INSURANCE AND LIABILITY

The Contractor and the Surety will be held responsible for and shall save the Owner (Ozaukee County,) harmless from all liability for damages occasioned by the digging up, use or occupancy of the street, alley, highway, public grounds and private grounds or which may result therefrom, or which may result in any way from the negligence or carelessness of the Contractor, his agents, employees or workmen; or by reason of the elements, unforeseen or unusual difficulties, obstructions, or obstacles encountered in the prosecution of the work; and they shall indemnify the Owner for and save it harmless from all claims and liabilities, actions and causes of action, and liens for materials furnished or labor performed in the construction or execution of the work, and from all costs, charges and expenses incurred in defending such suits or actions, and from and against all claims and liabilities for injury or damage to persons or property emanating from defective or careless work methods, or from and against all claims or liabilities for royalties, license fees, actions, suits, charges and expenses or damage from infringement for reason of the use of any invention or improvement in tools, equipment or plant or any process, device or combination of devices used in the construction of the work.

The Contractor shall not commence work under a Contract until obtaining all insurance required under this paragraph and has filed certificates thereof with the Owner, nor shall the Contractor allow a Subcontractor to commence work until all similar insurance required has been so obtained and filed.

A. Workmen's Compensation

Statutory coverages as required by chapter 102 of the Revised Statutes of the State of Wisconsin for the year 1967 and all acts amendatory thereof and supplementary thereto, for all employees of the contractor. All subcontractors shall furnish to the Contractor and to Ozaukee County, evidence of similar insurance for all of their respective employees unless such employees are covered by the protection afforded by the contractor.

B. Comprehensive General Liability and Property Damage Insurance

Coverage to include operations; contractor's protective insurance, products coverage and completed operations; contractual coverage; underground coverage; blasting, explosion and collapse; all subject to the following limits:

Bodily Injury	$1,000,000 Per Person $2,000,000 Aggregate

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Property Damage	$500,000 Per Occurrence $500,000 Aggregate

C. Comprehensive Automobile Liability and Property Damage

Operation of owned, hired and non-owned motor vehicles:

Bodily Injury	$1,000,000 Per Person $1,000,000 Per Occurrence
Property Damage	$1,000,000 Per Occurrence

2. PERMITS

All State and Local permits which may be required for the construction development of the Electrical System for the Dispatch Center located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems work shall be obtained, filed, and paid for by the Contractor.

3. PAYMENT AND PERFORMANCE BOND – WAIVERS OF LIEN

The Contractor shall be required to furnish a Payment and Performance Bond, including labor and materials, in the amount of the total amount of the Contract. Said Bond shall name the Owner and be delivered to the Owner at the time of execution of the Contract. The Contractor shall be required to file waivers of lien from all suppliers, subcontractors, etc., with the Owner prior to receiving payment on the project.

4. SITE RESTORATION

Unless otherwise noted, site restoration shall include restoration of all disturbed site improvements, including but not limited to, protective barriers, asphalt pavement, concrete curb and gutter, concrete pavement, landscaping materials and building facilities, unless noted otherwise on the plans.

5. SITE SAFETY

The Contractor shall exercise extreme safety precautions while working under this contract. The Contractor will be required to shield all open excavations from pedestrian and vehicular traffic during and at the end of each working day.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

CONTRACT

Invitation for Bid for Dispatch Center Electrical

For
Ozaukee County

CONTRACT

THIS CONTRACT made on the _____day of_____, 2025 by and between.

Hereinafter called the 'CONTRACTOR' and Ozaukee County, Wisconsin, hereinafter called the "OWNER"

WITNESSES that the Contractor, and the Owner of the consideration stated herein agree as follows:

ARTICLE I. SCOPE OF WORK

D. The Contractor shall perform everything required under these Project Documents, which includes development of the Electrical System for the Dispatch Center Located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems. Invitation for Bids including any and all addenda prepared by Ozaukee County are made part of the Contract, and in strict compliance with the Contractor's Proposal and the other sections of the Project Documents.

ARTICLE II. THE CONTRACT PRICE

The Owner shall pay to the Contractor for the performance of this Contract, subject to any additions or deductions provided herein, in current funds, the contract price as follows:

Total Lump Sum Price___$_____

One Lump Sum price for all labor and material for construction of the electrical for the dispatch center located at the Ozaukee County Justice Center. The project includes an Uninterruptable Power Supply that supplies power to critical dispatch systems. Price includes all labor and material to construct, furnish and install and the related work of other trades described herein, including the related work of other trades such as General Construction and Electrical as specified in the Project Documents, for a single Lump Sum.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

The foregoing Total Bid Price shall be the basis for establishing the amount of Payment and Performance Bond. It is understood and agreed that payment shall be made on the basis of the lump sum bid amount for the work.

ARTICLE III. SPECIAL CONTRACT REQUIREMENTS

1. Component Parts of the Contract

Each Contract consists of the following component parts, all of which are as fully a part of this Contract as if herein set out verbatim, or, if not attached, as if attached hereto:

1. This Instrument
2. Addenda Nos. __ and ___.
3. Special Provisions of the contract
4. General Conditions
5. Instructions to Prospective Contractors
6. Advertisement for Proposals
7. Contractor's Bid Proposal
8. County's Request for Proposal

In the event that any provision in any of the above component parts of this Contract conflicts with any provision in any other of the component parts, the provision in the component part first enumerated above shall govern over any other component part which follows it numerically, except as may be otherwise specifically stated.

This Contract is intended to conform in all respects to applicable statues of the State of Wisconsin, and if any part or provision of this Contract conflicts therewith, the said statute shall govern.

2. Starting and Completion

If awarded this contract, the undersigned agrees to commence work on the project within ten (10) days after receipt of formal notice to proceed from Ozaukee County.
Ozaukee County anticipates awarding this contract on or about **April 2, 2025** and anticipates issuing the formal notice to proceed on or about **April 9, 2025.**

All work on this Contract, shall be substantially completed by **Dec 31, 2025** and fully completed to the satisfaction of Ozaukee County.

3. Liquidated Damages for Delay

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

The Contractor guarantees that he can and will complete the work within the time limit stated in the Contract Documents, or within the time as authorized and extended by the Owner. Inasmuch as the damage and loss to Ozaukee County which will result from the failure of Contractor to complete the work within the stipulated time, will be most difficult or impossible of accurate assessment, the damages to Ozaukee County for such delay and failure on the part of the Contractor shall be liquidated in the sum of Five Hundred Dollars ($500.00) for each calendar day, Sundays and Holidays included, by which the Contractor shall fail to complete the work or any part thereof in accordance with the provisions hereof, and such liquidated damages shall not be considered as a penalty. If the Owner can, with certainty, establish actual damage and loss to the Owner caused by the Contractor's failure to complete the project on time, and that amount is higher than the liquidated damages provided for herein, then at its option Owner may charge against the contract monies due said actual damages rather than liquidated damages.

IN WITNESS THEREOF, the parties hereto have caused this instrument to be executed in three original counterparts, the day and year first written above.

CONTRACTOR:

Company Name: _____

_____

_____

Seal:

_____ _____ _____

Authorized Agent Title Date

_____ _____

Attest Date

OZAUKEE COUNTY

Seal:

_____ _____

Jason Dzwinel, County Administrator Date

_____ _____

Kellie Kretlow, County Clerk Date

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

PAYMENT AND PERFORMANCE BOND

INSTRUCTIONS FOR EXECUTION OF PAYMENT BOND AND EXECUTION OF PERFORMANCE BOND

The penal amount of the Payment and Performance Bond for a unit price Contract shall be the summation of the correct and checked extension of the unit prices with the estimated number of units.

The form of bonds attached hereto shall be used for each Contract. This form contemplates one corporate surety only. In case co-sureties will be furnished, proper forms therefrom shall be obtained.

If the principal is an individual, his full legal name, and residence shall be inserted in the body thereof, and he shall sign the bond with his usual signature on the line opposite the scroll seal.

If the principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it.

If the principal is a corporation, the name of the State in which incorporated shall be inserted in the appropriate place in the body of the bond. Said instrument shall be executed and attested under the corporate seal as indicated in the form. If the corporation has no corporate seal, the fact shall be stated, in which case a scroll or adhesive seal shall appear following the corporate name. This also applies to execution by the surety.

If persons other than the President and Secretary are executing the Contract, then a copy of the Corporate Resolution adopted by the Board of Directors authorizing the parties to bind the corporation to this Contract must be attached to this Contract.

The date of the bond must not be prior to the date of the Contract for which it is given.

A Power of Attorney authorizing the execution of the bond by an attorney-in-fact, or Agent, shall be attached to the executed counterpart of the bond. If the bond is executed by an out-of-state agent, the executed counterpart of the bond shall be countersigned by a licensed resident agent.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

PAYMENT AND PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that_____ as Principal, and _____ as Surety, are held and firmly bound unto_____ _____ in the full and just sum of _____ Dollars ($_____) lawful money of the UNITED STATES OF AMERICA for the payment of which sum of money well and truly to be made, we bind ourselves, heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS: The Principal has entered into a certain written Contract, dated the _____ day of _____, 20____, with the _____ _____ for_____ complete, as described in the foregoing Contract and Article of Agreement.

NOW THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that if the said Principal shall in all respects well and truly keep and perform the said contract, and shall pay all sums of money due or become due, for any labor, materials, apparatus, fixtures or equipment furnished for the purpose of constructing the work provided in said Contract, and shall defend, indemnify and save harmless said _____ against any and all liens, encumbrances, damages, claims demands expenses, costs and charges of every kind except as otherwise provided in said specifications and other Project Documents, arising out of or in relations to the performance of said work and the provisions of said Contract, and shall remove and replace any defects in workmanship or materials which may be apparent or may develop within a period of one (1) year from the date of final acceptance, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

And said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder or the specifications accompanying the same shall in anyway affect its obligation on this bond, and it does hereby waive notice of any such change, extenuation of time, alteration or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20_____

_____(SEAL)

WITNESS: _____(SEAL)

_____

_____(SEAL)
(IF INDIVIDUAL OR FIRM)

_____(SEAL)

ATTEST:

(IF CORPORATION)

ATTEST:

_____

_____(SEAL)
SURETY

APPROVED_____, 20_____ _____
SURETY

TITLE

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

GENERAL CONDITIONS

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

GENERAL CONDITIONS TO THE CONTRACT

DEFINITIONS

The following terms used in these Contract Documents are respectively defined as follows:

(a) "Project"
The entire improvement proposed by the Owner to be constructed in whole or in part pursuant to the within Contract or Contracts.

(b) "Owner"
The contracting party initiating the project as set forth in the Contract acting through its authorized representative in accordance with specific duties delegated to such representative.

(c) "Contractor"
The person, persons, firm or corporation to whom the within Contract is awarded by the Owner, and who is subject to the terms of said Contract. Also the agents, employees, workmen, or assignees of the Contractor.

(d) "Subcontractor"
A person, firm or corporation, other than the Contractor, supplying labor and materials or labor only, on work at the site of the project.

(e) "Work"
All materials, labor, supervision, use of tools, and equipment necessary to complete the project in full compliance with the terms of the Contract.

(f) "Engineer"
Engineer(s) appointed by the Owner for the supervision of construction of the project.

(g) "Bidder"
The term "Bidder" shall refer to a firm who submits a response to this specification.

(h) "Surety"
The person, firm or corporation that has executed as Surety the Contractor's Performance Bond, securing the performance of the within Contract. Also, the person, firm or corporation that has executed as Surety the Contractor's payment bond which guarantees payment to all persons supplying labor and material utilized in the prosecution of the work included in the Contract.

(i) "Notice"
Where in any section of the Contract Document there is any provision in respect to the giving of any notice, such notice shall be deemed to have been given (as to the Owner) when written notice shall be delivered to the Owner, or shall have been placed in the United States mails, addressed to the Highway Commissioner or County Clerk of the Owner, at the place where the bids or proposals for the Contract were

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

opened; (as to the Contractor) when a written notice shall be delivered to the Chief Representative of the Contractor at the site of the project to be constructed under the Contract, or when such written notice shall have been placed in the United States mails, addressed to the Contractor at the place stated in the Proposal as the address of his permanent place of business; (as to the Surety) on the Performance Bond when a written notice is placed in the United States mails, addressed to the Surety at the home office of such Surety, and when two (2) copies of such notice shall have been filed with the Owner

INTENT OF CONTRACT DOCUMENTS

The Sections of the Contract Document are complementary and what is called for by any one shall be binding as if called for by all. The intention of the Contract Document is to include in the contract price the cost of all labor and materials, water, fuel, tools, plants, equipment, light, transportation, and all other expenses as may be necessary for the proper execution and completion of the work included in the Contract.

In interpreting the Contract Documents, words describing materials which have a well-known technical or trade meaning unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with such well known meanings recognized by Consultants, Engineers, and the trade.

EXISTING UTILITIES AND PIPING

It shall be the responsibility of the Contractor to make all necessary arrangements with the utility companies to locate their facilities including service laterals in the field during construction operations and to relocate any portions of their facilities as required to permit the installation of work included in these Contracts.

SHOP DRAWINGS

The Contractor, as soon as possible, after the approval of the source and purchase of items of materials and equipment, shall submit to the Owner, shop or setting drawings and schedules for every item of equipment or material to be incorporated in the work which is fabricated or manufactured off the site, including but not limited to those pertaining to structural and reinforcing steel, electrical, plumbing, carpentry, heating and ventilation. The Contractor shall make any corrections in the drawings required by the Owner or the Consultant and re-submit same without delay, together with drawings first submitted. Six (6) final copies of all corrected and approved shop or setting drawings shall be submitted to the Owner or Consultant who, after checking, will retain three (3) copies and return three (3) copies to the Contractor.

The Owner or Consultant’s approval of shop drawings of equipment and materials shall extend only to determining the conformity of such equipment and materials with the general features of the Contract. It shall be the responsibility of the Contractor to determine the correctness of all dimensions and minor details of such equipment and materials so they will fit into the completed work, and so that when incorporated in the work, correct operation will result.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

SCHEDULE OF EQUIPMENT ITEMS

As soon as possible after the execution of the contract on all contracts incorporating manufactured items, the contractor shall submit to the Owner for approval, the name of the manufacturer of each item proposed to be purchased, together with a complete description of the item and catalog cuts. No final purchase of major equipment shall be made until the written approval of the Owner is obtained, and no deviation from the selected manufacturers as stated in the Contract will be accepted.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

INSPECTION

The Owner and their representative shall at all times have access to the work wherever and whenever it is located in performance or progress, and the Contractor shall provide proper facilities for such access and inspection.

The Owner or Consultant shall have the right to reject materials and workmanship which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected, and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such condemned work and remove rejected materials within a reasonable time fixed by written notice, the Owner may remove them and charge the expense to the Contractor.

Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work, or at any other time, to make an examination of work already completed by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any material respect due to fault of the Contractor or their subcontractors, the Contractor shall bear all the expense of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and materials necessarily involved in the examination and replacement, plus 15% will be allowed the Contractor.

All materials to be incorporated in the work, all labor performed, all tools, appliances and methods used shall be subject to the inspection and approval or rejection of the Owner.

If any authorized agent of the Owner shall point out to the Contractor, Contractor foreman or agent, any neglect or disregard of the contract provisions, such neglect or disregard shall be remedied and further defective work be at once discontinued, but the right of final acceptance or rejection of the work will not be waived by reason thereof, not by any other act of the Owner or its agents.

The Contractor shall, at times, be executing the work in the presence of the Owner or Consultant or Inspector during the working hours of the day. The presence of the Owner or Consultant or Inspector shall in no way relieve the contractor of the responsibility of his contract, or be any warrant for furnishing of bad material or poor workmanship.

The inspection of the work by the Owner or Consultant is intended to aid the Contractor in applying labor, materials and workmanship in compliance with the contract provisions. Such inspection, however, shall not operate to release the Contractor from any of his contract obligations.

SUPERINTENDENCE

The Contractor will give personal superintendence to the work, or have at the site of the work, at all times, a competent foreman, superintendent, or other representative, satisfactory to the Owner and having the authority to act for the Contractor.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Insofar as is practicable, and excepting in the event of discharge by the Contractor, or in the event of proven incompetence, the individual who has been accepted by the Owner to represent the contractor shall so act, and shall follow without delay instructions of the Engineer in the prosecution of the work in conformity with the contract.

LABOR

The Contractor shall employ none but competent and skilled workmen and foremen in the prosecution of work on this Contract. The Owner shall have the authority to order the removal from the work any Contractor's employee who refuses to or neglects to obey any of its instructions or those of the Consultant or Inspectors, relating to the carrying out of the provisions and intent of the provisions of the Contract, or who is incompetent, unfaithful, abusive, threatening or disorderly in conduct, and any such person shall not again be employed on this project.

PROTECTION OF WORK

The Contractor shall continuously maintain adequate protection of all work from damage, and shall protect the Owner's and adjacent property from injury arising in connection with this Contract.

The Contractor shall be responsible for any and all damage to property, public or private, that may be caused by said Contractor's operations in the performance of the Contract, and the contractor shall defend any suite that may be brought against them and/or the Owner on Account of damage inflicted by the Contractor's operations, and shall pay any judgments awarded to cover such damage.

COST OF SERVICES

The Contractor shall be required to pay the established water rates obtained from the Owner. Large quantities of water for masonry cleaning, repointing, or other operations shall be drawn only at night, or at times specifically authorized by the Owner.

USE OF JOB SITE

The Contractor shall confine equipment, apparatus, the storage of materials and operations of workman to limits indicated by the law, ordinances, permit or directions of the Owner and shall not encumber the premises with Contractor materials.

The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety. The contractor shall observe and enforce the Owner's instructions regarding signs, advertisements, fires and smoke.

USE OF PRIVATE LAND

The Contractor shall not use any vacant lot or private land as a plant site, depository for materials, as a spill site, or for any other purpose without the written authorization of the Owner of the land (or his agent). A copy of written authorization shall be filed with the Owner.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

ACCESS TO PRIVATE PROPERTY AND SCHEDULE OF CONSTRUCTION

Prior to commencement of any work under this Contract, the Contractor shall confer with the Engineer and other representative of the Owner and prepare a detailed schedule of construction operations.

This schedule shall be subject TO THE APPROVAL OF THE Owner, and the Owner reserves the right to subsequently modify the schedule should he deem it necessary.

All construction work shall be prosecuted in a fashion which will cause a minimum of interference with pedestrian and vehicular traffic. Access to alleys and private driveways shall also be provided as soon as possible.

At the close of each day's construction work, at least two lanes of traffic, one in each direction, shall be maintained on all streets.

SUBCONTRACTS

The Contractor shall notify the Owner, in writing, of the names of the subcontractors proposed on the Contract and shall not employ any subcontractors until the Owner's approval in writing has been obtained.

The Contractor agrees to be fully responsible to the Owner for the acts or omissions of their subcontractors and of anyone employed directly or indirectly by them, and this Contract obligation shall be in addition to the liability imposed by law upon the Contractor.

Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractors and the Owner. The Contractor agrees to bind every subcontractor (and every subcontractor of a subcontractor) by the terms of the General and special Provisions of the Contract, as far as applicable to their work, unless specifically noted to the contrary in a subcontract approved in writing as adequate by the Owner.

ASSIGNMENT OF CONTRACT

No assignment by the Contractor of any construction contract, or any part thereof, or of the funds to be received there under by the Contractor, will be recognized, unless such assignment has had the written approval of the Owner and the Surety has been given due notice of such assignment and has furnished written consent thereto. Such written approval by the Owner shall not relieve that Contractor of the obligations incurred under the terms of this Contract. In addition to the usual recitals in assignment contracts, the following language must be set forth:

> "It is agreed that the funds to be paid to the assignee under this assignment are subjected to a prior lien for services rendered or materials supplied for the performance of the work called for in said contract in favor of any persons, firms, or corporations rendering such services or supplying such materials".

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

OTHER CONTRACTS

The Owner may award other contracts for additional work at the site of the project (or other locations) and the Contractor shall fully cooperate with such other Contractors and carefully fit their own work to that provided under other contracts as may be directed by the Owner. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor.

OWNER'S RIGHT TO DO WORK

If the Contractor neglects to prosecute the work to be performed on this Contract properly, or fails to perform any provision of this Contract, the Owner, after three days' written notice to the Contractor and their Surety, may, without prejudice to any other remedy they may have, make good such deficiencies and may deduct the cost thereof from the payment due the Contractor.

TERMINATION FOR BREACH

In the event that any of the provisions of this Contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate this Contract, such notice to contain the reasons for such intention to terminate this Contract, and unless within ten (10) days after the serving of such notice upon the Contractor, such violation shall cease and satisfactory arrangements for correction is made, the Contract shall upon expiration of said ten (10) days cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the contractor, and the surety shall have the right to take over and perform the Contract; provided, however, that if the Surety does not commence performance thereof within thirty (30) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or force account and the expense of the Contractor and their Surety shall be liable to the Owner for any excess cost thereby occasioned the Owner.

In cases where the Contractor has failed to complete minor items of work within the time set for completion of the Contract, but limited to cases where the value of such uncompleted work does not exceed five percent (5%) of the total construction cost of the work, then the Owner shall have the privilege, without terminating this Contract, of completing said items of work and then deducting from the sums due the Contractor under this Contract the total cost which the Owner incurs in completing such minor items of work. In such cases the Owner may complete such minor items of work by force account or by employing some other Contractor to complete such minor items of work. In the event the Owner desires to adopt this procedure, they shall deliver to the Contractor a written statement, enumerating and describing the items not completed, or imperfectly completed, and shall in such statement demand that the Contractor within a time to be fixed in such statement by the Owner, and then if the Contractor refuses to comply, or if they neglects to comply with time stated, the Owner may proceed as in above set forth. The time within which the Contractor shall be required to complete the items set forth in such statement must depend on the amount of time reasonably required for the performance of the work in question, but shall not in any event be less than ten (10) days, nor more than thirty (30) days.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

MATERIALS AND WORKMANSHIP

Unless otherwise stipulated in the Contract, all workmanship, equipment, materials and articles incorporated in the work covered by this Contract shall be new and of the best grade of their respective kinds for the purpose. The Contractor shall furnish to the Owner for their approval the name of manufacturers of machinery, mechanical or other equipment, which contemplate installing together with their performance capacities and other pertinent information.

If not otherwise provided, materials or work called for in this Contract shall be furnished and performed in accordance with well-known established practice and standards recognized by Consultants, Engineers and the trade.

When required by the Contract or when called for by the Owner, the Contractor shall furnish the Owner, for approval, full information concerning the materials or articles which they contemplate incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery equipment, materials and articles installed or used without such approval shall be at the risk of subsequent rejection. All materials and workmanship shall be guaranteed by the Contractor and the Surety for a period of one year from the date of final acceptance, and this guarantee must be covered in the Surety Bond for the Contract.

At any time during the course of construction of this project, when, in the opinion of the Owner, Contract conditions are being violated by the Contractor or their employees, the Owner shall have the right and authority to order all construction to cease or materials to be removed, until arrangements satisfactory to the Owner are made by the Contractor for resumption of the work in compliance with the provisions of the Contract. It shall not be construed as a waiver of defects if the Owner shall not order the work stopped or more material removed, as the case may be.

CUTTING AND PATCHING

The Contractor shall do all cutting, fitting or patching of their work that may be required to make its several parts fit together or to receive work of other Contractors shown upon, or reasonably implied by the Specifications for the completed project.

Any cost caused by defective or ill-timed work shall be borne by the party responsible therefore.

The contractor shall not endanger any work by cutting, digging or otherwise shall not cut or alter the work of any Contractor without the consent of the Owner, or of the Owner's authorized representative.

GUARANTEES

All work to be performed under this Contract shall be constructed in compliance with the contract Specifications and standard construction codes, and must be guaranteed by the Contractor and their Surety for a period of one (1) year from the date of final acceptance by

the Owner against defective workmanship and material of any nature. On all items of equipment to be incorporated in the completed project, the Contractor and their Surety must guarantee that the type, quality, design and performance will fully meet the requirements of the Contract Specifications.

In placing orders for equipment, the contractor shall purchase same only under a written guarantee from the respective manufacturers that the equipment supplied will function satisfactorily as an integral part of the completed project in accordance with the Contract Specifications and that the manufacturer will repair or otherwise make good any defects in workmanship or materials which may develop within a period of one (1) year from the date of final acceptance. Furthermore, the Contractor shall require that the manufacturer agree in writing at the time the order for equipment is placed that he will be responsible for the proper functioning of the equipment in cooperation with the Contractor, and that whenever necessary during the installation period or tuning-up period following the construction period, the manufacturer will cooperate as may be necessary for initial successful operation and will supply, without additional cost to the Owner, such superintendence and mechanical labor as may be necessary to make any adjustments, and to supply additional parts and labor needed to make the equipment function satisfactorily, even if same was not shown on the approved shop drawings. Two (2) copies of each guarantee of agreement shall be furnished to the Owner by the Contractor.

FINAL TESTS

After completion of the work to be performed on this Contract, the Contractor shall make any and all tests required by this project document, Municipal or State regulations, and, where so provided in said regulations, shall furnish the Owner with certificates of inspection by the Municipal or State regulatory bodies. The Contractor shall also make all tests required by the National Board of Fire Underwriters for the purpose of determining insurance rates or other protection of the Owner or the public, and all tests needed to determine complete and faithful compliance with all provisions of the Contract.

CLEANING UP AND FINAL INSPECTION

The Contractor shall at all times keep the site of the work free from accumulation of waste material or rubbish caused by his employees on the construction work, and at the completion of the work he shall remove all their rubbish from and about the work and all their tools, equipment, scaffolding, and surplus materials, and shall leave the competed work clean and ready for use. In case of dispute, the Owner may remove the rubbish and surplus materials and charge the cost to several Contractors, if more than one is employed on the project, in proportion to the amounts as shall be determined by the Owner to be just.

When requested by the Consultant, the Contractor shall, remove sheeting, clean up the area, restore subgrade and/or pavement, replace topsoil, seed areas, etc., for individual sections of the work as they are completed rather than upon completion of the project.

On or before completion of the work the Contractor shall, without charge, tear down and remove all buildings and other structures built by him for facilitating the carrying out of the

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

work, and shall remove all rubbish of all kinds from the grounds which he has occupied and shall leave the work clean and in good condition.

All sewers, conduits, pipes and appurtenances and all tanks, pump wells, chambers, buildings and other structures shall be kept clean during construction and as the work, or any part thereof, approaches completion, the Contractor shall systematically and thoroughly clean and make any needed repairs to them. They shall furnish at their own expense suitable tools and labor for removing all water and clearing out all dirt, mortar and foreign substances. Any undue leakage of water into the structures, such as to make the work, in the opinion of the Consultant, fall short of first class work shall be promptly corrected by the Contractor at their own expense. Cleaning and repairs shall be arranged, as far as practicable, to be completed upon finishing the construction work.

Notice to begin final cleaning and repairing, if such is needed, will be given by the Consultant who, at the time, will make their final inspection of the work. The Consultant will not approve the final payment of any portion of the work until after the final inspection is made and the work found satisfactory.

CONTRACTOR'S INSURANCE

The Contractor shall not commence work under this Contract until they have obtained all insurance required under this paragraph. Certificates of Insurance, together with duplicates of the policies, fully executed by officers of the Insurance Company, shall be filed with the Consultant and Owner for approval. The Contractor shall not allow any subcontractor to commence work on his subcontract until all similar insurance required for the subcontractor has been so obtained and approved. The Contractor shall also submit the original insurance policies for inspection and approval of the Owner before work is commenced. Said policies shall not thereafter be cancelled, permitted to expire, or to be changed without ten (10) days' notice in advance to the Owner and consented to by the Owner, and the policy shall so provide.

(a) Compensation Insurance: Before any work is commenced, the contractor shall take out and maintain during the life of this Contract, Worker's Compensation Insurance for all of his employees employed at the site of the Project. In case any work shall be sublet, the Contractor, shall require the Subcontractor similarly to provide Worker's Compensation Insurance for all of the latter's employees, unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in work under this Contract at the site of the Project is not protected under the Worker's Compensation Statute, the Contractor shall provide Employer's Liability Insurance for the protection of his employees not protected by the Worker's Compensation Statute.

(b) Public Liability and Property Damage Insurance: The Contractor shall take out and maintain during the life of this Contract such Comprehensive Public Liability and Property Damage Insurance as shall protect them, the Owner, and any subcontractor during the performance or work covered by this Contract from claims or damages for personal injury, including death, as well as for claims for property damages, which may arise from operation under

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

this Contract, whether such operations be by the Contractor or by any Subcontractor, or by anyone directly or indirectly employed by either of them, or in such a manner as to impose liability on the Owner, and the amounts of such insurance shall name the Owner as insured along with the Contractor, and shall hold harmless the Owner against all suits and claims arising from or as the result of the operations of the Contractor or his Subcontractors. In absence of specific regulations, the amount of coverage shall be as follows:

Comprehensive Public Liability Insurance in an amount not less than $1,000,000 for injuries, including accidental death to any one person, and subject to the same limit for each person in an amount not less than $3,000,000 on account of one accident, and Property Damage Insurance in an amount not less than $500,000. In addition to the above, the Contractor's Liability and Property Damage Insurance shall be endorsed to provide contractual liability coverage for the Owner.

(c) Insurance covering Special Hazards: Special hazards as determined by the Owner, shall be covered by rider or riders in the Comprehensive Public Liability and/or Property Damage Insurance policy or Policies herein elsewhere required to be furnished by the Contractor, or by separate policies of insurance in the amounts as defined in the Special Provisions of the Contract, included herewith.

(d) Automobile Insurance: The Contractor shall take out and maintain during the life of the Contract, Automobile Public Liability Insurance in amounts not less than $1,000,000 and Property Damage Liability Insurance in an amount not less than $1,000,000 if any teams or motor vehicles are engaged in operating within the terms of this Contract on the site of the work to perform thereunder. Such insurance shall cover the use of all such teams and motor vehicles engaged in operating within the terms of this Contract on the site of the work to be performed thereunder, unless such coverage is included in the insurance specified in Paragraph (b) above.

(e) Subcontractor's Insurance: The Contractor shall require Subcontractors, if any, not protected under the Contractor's insurance policies to take out and maintain insurance of the same nature and in the same amounts as required of the Contractor for Comprehensive Public Liability and Property Damage.

(f) Fire Insurance: The Contractor shall take out and maintain a fire, extended coverage, vandalism and malicious mischief insurance policy protecting the Contractor and the Owner up to the date of final acceptance of the completed work performed under this Contract, in an amount equal to the value of the work completed.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

PROOF OF CARRYING INSURANCE

The Contractor shall furnish to the Owner satisfactory proof of carriage of the insurance required in a reliable company or companies before commencing any work. Such proof shall consist of certificates executed by the respective insurance companies and filed with the Owner. The Contractor shall also submit the original insurance policies for inspection and approval of the Owner before work is commenced. Said policies shall not thereafter be cancelled, permitted to expire, or be changed without notice of ten (10) days' in advance to the Owner and consented to by the Owner.

If the Contractor does not furnish evidence of insurance coverage required for fire, extended coverage, vandalism and malicious mischief insurance as required under Paragraph 27 (f) above, he shall be deemed to be self-insured for these insurance requirements.

CONTRACT SECURITY

The Contractor shall furnish a Surety Bond, or Bonds (form attached) in an amount at least equal to 100 percent (100%) of the contract price as security for the faithful performance of the Contract. The Performance Bond must contain a separate binding provision that the Surety will guarantee the payment of all persons performing labor and furnishing materials in connection with this Contract.

DAMAGE CLAIMS TO BE PAID BY CONTRACTOR – OWNER TO BE HELD HARMLESS

The Contractor in the performance of this Contract, shall put up and maintain barriers and lights as will effectively prevent the happening of any accident in consequence of any depressions, holes or the accumulation of any obstruction or hazards of any nature whatsoever made or suffered upon premises, public sidewalks, highways, or areas within the immediate vicinity of said construction; and shall hold the Owner safe and harmless for the happening of any accident claimed or alleged to be the result of any negligence which is the proximate result of the doing or performing any work or service in connection with the immediate vicinity; and Contractor and his Surety or liability carrier will assume such liabilities and will pay on demand any and all damage or damages occasioned as herein specified.

The Contractor shall well and truly save and indemnify and keep harmless the Owner against all liability, judgments, costs and expenses which may in any way come against the Owner in consequence of the granting of this Contract to said Contractor, or which may in any way result from the carelessness or neglect of the said Contractor, or the agents, employees, or workmen of said Contractor in any respect whatsoever.

CLAIMS AND PAYMENT FOR LABOR, MATERIAL OR WORK

The Contractor shall save the Owner (Ozaukee County) harmless from all claims or demands of any Subcontractor employed by the Contractor or from any claims or demands of any person, firm or corporation furnishing any material, apparatus, fixtures, services, machinery or labor to the Contractor herein for the doing of the work referred to herein, and it is expressly understood and agreed that the liability of whatsoever kind or nature, including

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

those referred to and established by Sec. 779.16 and 289.53 of the Wisconsin Statutes of 1955 and acts supplementary thereto.

Further, the Contractor shall pay all claims for work and labor performed and materials furnished in or about the work herein referred to, and Surety shall undertake that the Contractor will pay all claims for work or labor performed and materials furnished, and that the said Contractor shall pay to each and every person or party entitled thereto all claims for work or labor performed and materials furnished for on, in, or about said construction or under this Contract.

DEFENSE OF CLAIMS OR SUITS BY REASON OF PATENT INFRINGEMENT

The Contractor shall pay for all royalties and patents for any patented product used by them or incorporated in the work, and shall defend all claims or suits for infringement of any patent right brought against the Contractor or the Owner, and shall save the Owner harmless from loss on account thereof; the Contractor shall indemnify and save harmless the Owner and its officers and agents from all damages, judgments, claims and expenses arising from the infringement of any letters patent, or patent right, or because of any royalty, fee or license for the use, arrangement or operation of any tools, machinery, appliances, devices, or materials which may be used by the Contractor or furnished by them in fulfillment of the requirements of this Contract. In the event of any claim or action at law on account of such patents or fees, it is agreed that the Owner may retain out of the monies which are or which may become due the Contractor under this Contract, a sum of money sufficient to protect itself against loss, and to retain the same until said claims are paid or satisfactorily adjusted.

PERMITS, SURVEYS AND COMPLIANCE WITH LAWS

The Contractor shall procure and pay for all permits, licenses, and bonds necessary for the prosecution of the work and/or required by Municipal, State and Federal Regulations and Laws, unless specifically provided otherwise in the Special Provisions of the Contract, and/or in the Contract Specifications.

The Contractor shall give all notices, pay all fees, and comply with all Federal, State and Municipal Laws, Ordinances, Rules and Regulations, and Building and Construction Codes bearing on the conduct of the work. This contract, as to all matters not particularly referred to and defined therein, shall notwithstanding be subject to the provisions of all pertinent ordinances of the Municipality within whose limits the work is constructed which ordinances are hereby made a part hereof with the same force and effect as if specifically set out herein.

ACCIDENT PREVENTION

Precautions shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall be responsible for protection of all machinery equipment and all hazards shall be guarded (or hazards eliminated) in accordance with the safety provisions of the manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

The Contractor shall put up and maintain such barriers and supply such watchmen as will effectively prevent accidents and, in addition, during night hours he shall put up and maintain sufficient lights and flares to warn and safeguard the public against accidents. The Contractor in executing the work on this project shall not unnecessarily impede or interfere with traffic on public highways or streets, and the Owner is to be the sole judge as to what constitutes unnecessary interference with traffic, or as to what constitutes a hazard in traffic. The Contractor shall confer with the Owner and keep local Police and Fire Departments fully informed as to streets or alleys which are to be closed to traffic for construction purposes.

NOTICE TO START WORK

The Contractor shall notify the Owner or Consultant in writing one week (7 days) before starting work at the site of this Contract of intent to do so. In case of a temporary suspension of work, similar notice shall be given before resuming work.

OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION

The Owner may withhold from payments to the Contractor, in addition to retained percentage, such an amount or amounts as may be necessary to cover:

(a) Payments that may be earned or due for just claims for labor or materials furnished in and about the work.

(b) For defective work not remedied.

(c) For failure of the contractor to make proper payments to the Subcontractors.

(d) Reasonable doubt that this Contract can be completed for the balance then unpaid.

(e) Evidence of damage to another Contractor.

(f) Liquidated damages due to failure to meet contract completion dates.

The Owner will disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the part or parties who are entitled to payment therefrom. The Owner will render to the Contractor a proper accounting of all such funds disbursed in behalf of the Contractor.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

The Owner also reserves the right, even after full completion and acceptance of the work, to refuse payment of the final ten percent (10%) due the contractor until it is satisfied that all Subcontractors, material suppliers and employees of the Contractor have been paid in full.

CHANGES – PAYMENT

The Owner may, upon proper action of its Common Council, authorize changes in the work to be performed or the materials to be furnished under the provisions of this Contract.

Adjustment, if any, in the amounts to be paid to the Contractor by reason of any such changes shall be determined by one or more of the following methods:

(a) By unit prices contained in the Contractor's original bid and incorporated in his construction contract.

(b) By a supplemental schedule of prices contained in the Contractor's original bid and incorporated in this construction contract.

(c) By an acceptable lump sum or unit price proposal by the Contractor.

(d) On a cost-plus limited basis not to exceed a specified limit (defined as the cost of labor, materials and insurance) plus a specified percentage of the cost of such labor, materials and insurance provided the specified percentage does not exceed fifteen percent (15%) of the aggregate of the cost of such labor, materials and insurance, and shall in no event exceed a specified limit.

No claim for an addition to the contract price will be valid unless authorized as aforesaid.

In cases where a lump sum proposal is submitted by the Contractor in excess of Five Hundred Dollars ($500.00) and the Owner considers the proposal so submitted is excessive or unreasonable for the changes or added work contemplated, the Owner reserves the right to request a proposal for the same changed items from other Contractors. If a proposal for such added work is obtained from other Contractors at a lesser amount, the Owner reserves the right to make an award of such work to another Contractor, unless the Contractor on this Contract agrees to do the added work or changed work for the price named by the other Contractor.

It shall be expressly understood and hereby agreed to by the Contractor that no claim for extra work will be recognized by the Owner unless same has been ordered, in writing, by the Owner, or unless claim for such added work has been filed by the Contractor within five (5) days after the end of the calendar month in which such alleged work was performed.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Inspectors and Resident Engineers are not authorized to act for the Owner in giving orders for the Owner for extra or additional work, either in writing or verbally.

DEDUCTION FOR UNCORRECTED WORK

If the Owner deems it expedient to accept work damaged or not done in accordance with the Contract, an equitable adjustment will be made with a proper deduction from the contract price for unsatisfactory work.

FINAL ACCEPTANCE OF THE WORK

The Contract shall be deemed as having been finally accepted by the Owner when its governing body, by formal resolution, accepts the work.

CORRECTION OF WORK AFTER FINAL PAYMENT

Neither the final payment on this Contract by the Owner nor any provision in these Contract Documents shall relieve the Contractor or Surety of the responsibility for negligence in the furnishing and installation of faulty materials or for faulty workmanship which shows up within the extent of the period provided by law nor of the responsibility of remedying such faulty workmanship and materials.

OWNER'S RIGHT TO USE UNCOMPLETED WORK

The Owner shall have the right to take possession of and use portions of the work prior to final acceptance without waiving rights against the Contractor or their Surety for defects in the work or failure to complete same in its entirety.

PAYMENTS

Pay estimate periods shall close on the last day of each calendar month so that completed estimates can be computed for processing. On each partial payment during the progress of the project, the Owner will retain an amount in accordance with Chapter 66.29 Wisconsin Statutes. The value of work installed will be computed by deducting the estimated cost of street surfacing and site restoration work on those portions of the work installed from the unit bid price extensions for the various items of work. No payment will be made for material stored at the job site.

SITE RESTORATION

The Contractor shall restore the entire site and adjacent properties to the same condition it was prior to the start of work by the Contractor. All items including but not limited to alleys, parking lots, gravel shoulders, driveways, water pipes and laterals, storm sewers, retaining walls, fences, ditches, stone rip-rap, sanitary sewers and laterals, gas mains, culverts, utility poles, signs, mail boxes, walks, sod, shrubs, trees, asphalt walks, etc., shall be protected by the Contractor, and such items as the Contractor finds it impossible to protect from damage or removal shall be replaced in kind by the Contractor.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DELAYS

If the work of the Contractor is delayed because of any acts or omissions of any other Contractor, the Contractor shall have no claim against the Owner on that account other than an extension of time.

In case any action in court is brought against the Owner or Consultant, or any officer or agent of either of them, for the failure, omission or neglect of the Contractor, utility company or Owner of other facilities within the project area to perform any of the covenants, acts, matters or things by this Contract undertaken, or for injury or damage caused by the alleged negligence of the Contractor or his subcontractors or his or their agents, or in connection with any claim based on lawful demands of subcontractors, workmen, material men, or suppliers, the Contractor shall indemnify and save harmless the Owner and Consultant and their officers or agents, from all losses, damages, costs, expenses, judgments or decrees arising out of such action.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
	GENERAL NOTE FOR LIGHT FIXTURE SYMBOLS.
	THE MOUNTING TYPE OF LIGHT FIXTURES IS INDICATED IN THE SYMBOLS ON THE DRAWINGS AS FOLLOWS:
	- NO CENTER DOT INDICATES FIXTURE IS RECESSED.
	- FILLED CENTER DOT INDICATES FIXTURE IS SURFACE/PENDANT MOUNTED.
	REFER TO LIGHT FIXTURE SCHEDULE AND LIGHTING PLAN NOTES FOR FURTHER INFORMATION.
	SQUARE/RECTANGULAR LIGHTING FIXTURE
	LINEAR LIGHTING FIXTURE
	ROUND/RING LIGHTING FIXTURE
	WALL WASH LIGHTING FIXTURE
	WALL-MOUNTED FIXTURES
	DIRECTIONAL LIGHT, TRACK, FLOOD
	LIGHT TRACK
	LOW VOLTAGE LINEAR LIGHT
	EMERGENCY LIGHTING UNIT, CEILING-MOUNTED, INTEGRAL BATTERY
	EMERGENCY LIGHTING UNIT, CEILING-MOUNTED, REMOTE BATTERY
	EMERGENCY BATTERY UNIT, WALL-MOUNTED, INTEGRAL BATTERY
	EMERGENCY BATTERY UNIT, WALL-MOUNTED, REMOTE BATTERY
	EXIT LIGHT, CEILING-MOUNTED, SHADING AND ARROWS INDICATE FACES AND DIRECTION
	EXIT LIGHT, WALL-MOUNTED, SHADING AND ARROWS INDICATE FACES AND DIRECTION
	EXIT/EBU COMBO
	POLE/AREA LIGHTS
	POST-TOP AREA LIGHT
	BOLLARD LIGHT
	SOLID HATCH INDICATES LIGHT ON AN LIFE SAFETY/EMERGENCY CIRCUIT
	DIAGONAL HATCH INDICATES LIGHT ON A CRITICAL/OPTIONAL CIRCUIT
	PARTIAL DIAGONAL HATCH INDICATES PART OF LIGHT ON A NORMAL CIRCUITAND PART OF LIGHT ON A CRITICALOPTIONAL CIRCUIT
S	SINGLE POLE SWITCH
S3	3-WAY SWITCH
S4	4-WAY SWITCH
SK	KEYED SWITCH
SPL	SWITCH W/PILOT
SDLS	DUAL LEVEL SWITCH
	DIMMER SWITCH
	SURGICAL LIGHT CONTROL
	DIGITAL DISTRIBUTED IN-ROOM SWITCH
	DIGITAL DISTRIBUTED IN-ROOM DIMMER SWITCH
SO##	REFER TO SEQUENCE OF OPERATIONS IN SPECIFICATIONS 26 09 29 OR SEQUENCE OF OPERATION SCHEDULE
MOS	OCCUPANCY SENSOR W/ MANUAL SWITCH WALL MOUNT
OS	OCCUPANCY SENSOR CEILING MOUNT
MDLS	DAYLIGHT SENSOR WALL MOUNT
DLS	DAYLIGHT SENSOR CEILING MOUNT
HTC	TIME CLOCK - SEE TIME CLOCK SCHEDULE
HTCS	TIME CONTROL STATION
HPC	PHOTO-CELL
HLV	LOW VOLTAGE SWITCH STATION - SEE LOW VOLTAGE SWITCH STATION SCHEDULE
HDLV	DIGITAL DISTRIBUTED LOW VOLTAGE SWITCH STATION - SEE DISTRIBUTED LOW VOLTAGE SWITCH STATION SCHEDULE
HWS	WIRE SWITCH - LINE VOLTAGE SOURCE
HSS	SWITCH STATION - SEE SWITCH STATION SCHEDULE
HC	CONTACTOR - SEE CONTACTOR SCHEDULE
HLC	UL924 EMERGENCY LIGHTING CONTROL DEVICE WALL MOUNT
HLC	UL924 EMERGENCY LIGHTING CONTROL DEVICE CEILING MOUNT
LCP/X	LIGHTING CONTROL PANEL
	INDICATES PANEL NAME - SEE LIGHTING CONTROL PANEL SCHEDULE

SYMBOL	DESCRIPTION
	SINGLE RECEPTACLE
XX	DUPLEX RECEPTACLE
(GFB)	GROUND FAULT BREAKER
(GFI)	GROUND FAULT INTERUPTER
(IG)	ISOLATED GROUND
(TR)	TAMPER RESISTANCE
(USB)	W/ USB CHARGING
(WP)	WEATHERPROOF
XX	DUPLEX RECEPTACLE - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWING OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER BACKSPLASH
	SPLIT DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE ON EMERGENCY CIRCUIT
	FLOOR DUPLEX RECEPTACLE
	CEILING DUPLEX RECEPTACLE
XX	QUADRAPLEX RECEPTACLE
(GFB)	GROUND FAULT BREAKER
(GFI)	GROUND FAULT INTERUPTER
(IG)	ISOLATED GROUND
(TR)	TAMPER RESISTANCE
(USB)	W/ USB CHARGING
(WP)	WEATHERPROOF
	QUADRAPLEX RECEPT. MOUNTED ABOVE COUNTER BACKSPLASH
XX	QUADRAPLEX RECEPTACLE - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWING OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
	FLOOR QUADRAPLEX RECEPTACLE
	CEILING QUADRAPLEX RECEPTACLE
	QUADRAPLEX RECEPTACLE ON EMERGENCY CIRCUIT
	WALL EQUIPMENT CONNECTION - SEE SCHEDULE
	CEILING EQUIPMENT CONNECTION - SEE SCHEDULE
	FLOOR EQUIPMENT CONNECTION - SEE SCHEDULE
	WALL JUNCTION BOX
	FLOOR JUNCTION BOX
	CEILING JUNCTION BOX
	FB - FLOOR BOX PT - POKE THROUGH CT - COUNTER TOP TT - TABLE TOP
FB A 2 2	BOX TYPE FLOOR BOX NUMBER OF DATA OUTLETS NUMBER OF DUPLEX RECEPTACLES
PT A 2 2	POKE THROUGH
MD A 5 5	
	CABLE TRAY
CT 12" 4"	INDICATES DEPTH (IN INCHES) INDICATES WIDTH (IN INCHES)
	UNDERFLOOR DUCT
UF 12 3	INDICATES DEPTH (IN INCHES) INDICATES WIDTH (IN INCHES)
	TRENCH DUCT
T 12 5	INDICATES NUMBER OF COMPARTMENTS INDICATES WIDTH (IN INCHES)
	WALL DUCT
W 12 5	INDICATES NUMBER OF COMPARTMENTS INDICATES WIDTH (IN INCHES)
G/1 G	GENERATOR
M XX-1	MOTOR IDENTITY (SEE SCHEDULE)
	SAFETY DISCONNECT SWITCH (NON-FUSED)
	SAFETY DISCONNECT SWITCH (FUSED)
	PUSH BUTTON
T1	TRANSFORMER
	PANELBOARDS. PANELBOARD DOORS MAY BE SHOWN TO INDICATE OPENING SIDE OF RECESSED PANELBOARDS. SEE PANELBOARD IDENTIFICATION FOR DESIGNATION CODES.
	FLOOR CLEARANCE AREA
P	POWER POLE (OPEN OFFICE STYLE)
XX	STATIC GROUND RECEPTACLE
(GM)	GROUND MODULE
(PG)	POWER GROUND
(RI)	REMOTE INDICATOR

SYMBOL	DESCRIPTION
	SYSTEMS EQUIPMENT CABINET
(AR)	AREA OF REFUGE
(CA)	CABLE TELEVISION
(CB)	CODE BUTTON
(CS)	CLOSED CIRCUIT TELEVISION
(CLK)	CLOCK SYSTEM
(DB)	DOOR BELL
(DV)	DIGITAL TELEVISION
(EC)	EMERGEMCY COMMUNICATION
(FA)	FIRE ALARM
(HP)	HOUSE PAGING
(IC)	INTERCOM
(ID)	INTRUSION DETECTION
(IS)	INFANT SECURITY
(LM)	LOCAL MUSIC
(LP)	LOCAL PAGING
(MA)	MASTER ANTENNAE TELEVISION
(MN)	MASS NOTIFICATION
(MS)	MUSIC SYSTEM
(NC)	NURSE CALL
(P1)	PROCEDURE ROOM -TWO WAY COMMUNICATION
(P2)	PROCEDURE ROOM -MUSIC SYSTEM
(PA)	PUBLIC ADDRESS
(SA)	SECURITY ACCESS
(SC)	SYSTEM CLOCK
(TC)	TELECOMMUNICATIONS
(TV)	TELEVISION
(VD)	VOICE DATA
(WR)	WIRED RADIO
(AN)	ANNUNCIATOR
(BB)	BACKBOARD
(CP)	CONTROL PANEL
(ER)	EQUIPMENT RACK
(TC)	TERMINAL CABINET
(W)	WIRELESS
(NAC)	NOTIFICATION APPLIANCE PANEL
XX	ANTENNA
(BO)	BY OTHERS
(DA)	DISTRIBUTED ANTENNA SYSTEM (DAS)
(DR)	DIRECTIONAL
(FR)	FIRST RESPONDER RADIO
(MD)	MULTIDIRECTIONAL
(OD)	OMNI DIRECTIONAL
XX	FIRE ALARM WALL MOUNT
XX	FIRE ALARM CEILING MOUNT
(CMX)	CONTROL MODULE. X DENOTES SPECIFIC UNIT. SEE CONTROL MODULE SCHEDULE
(CO)	CHIME ONLY
(COD)	CARBON MONOXIDE DETECTOR
(CV1)	CHIME W/ 15 CANDELA STROBE
(CV2)	CHIME W/ 30 CANDELA STROBE
(CV3)	CHIME W/ 75 CANDELA STROBE
(CV4)	CHIME W/ 110 CANDELA STROBE
(DH)	DOOR HOLDER
(DI)	IONIZATION SMOKE DETECTOR (DUCT)
(DP)	PHOTOMETRIC SMOKE DETECTOR (DUCT)
(HC)	HEAT/COMBINATION (RATE OF RISE/FIXED)
(HF)	HEAT DETECTOR (FIXED)
(HO)	HORN ONLY
(HR)	HEAT DETECTOR (RATE OF RISE)
(HV1)	HORN W/ 15 CANDELA STROBE
(HV2)	HORN W/ 30 CANDELA STROBE
(HV3)	HORN W/ 75 CANDELA STROBE
(HV4)	HORN W/ 110 CANDELA STROBE
(MMX)	MONITOR MODULE - SEE MONITOR MODULE SCHEDULE (X-DENOTES SPECIFIC UNIT)
(PS)	PULL STATION
(RE)	RE-ENTRANT HORN
(SB)	SOUNDER BASE
(SI)	IONIZATION SMOKE DETECTOR
(SO)	SPEAKER ONLY
(SP)	PHOTOELECTRIC SMOKE DETECTOR
(MSO)	MASS NOTIFICATION SPEAKER ONLY
(MSV1)	MASS NOTIFICATION SPEAKER W/ 15 CANDELA STROBE
(MSV2)	MASS NOTIFICATION SPEAKER W/ 30 CANDELA STROBE
(MSV3)	MASS NOTIFICATION SPEAKER W/ 75 CANDELA STROBE
(MSV4)	MASS NOTIFICATION SPEAKER W/ 110 CANDELA STROBE
(MV1)	MASS NOTIFICATION DEVICE W/ 15 CANDELA STROBE
(MV2)	MASS NOTIFICATION DEVICE W/ 30 CANDELA STROBE
(MV3)	MASS NOTIFICATION DEVICE W/ 75 CANDELA STROBE
(MV4)	MASS NOTIFICATION DEVICE W/ 110 CANDELA STROBE
(SV1)	SPEAKER W/ 15 CANDELA STROBE
(SV2)	SPEAKER W/ 30 CANDELA STROBE
(SV3)	SPEAKER W/ 75 CANDELA STROBE
(SV4)	SPEAKER W/ 110 CANDELA STROBE
(VO)	VISUAL UNIT ONLY
(VO1)	VISUAL UNIT ONLY, 15 CANDELA STROBE
(VO2)	VISUAL UNIT ONLY, 30 CANDELA STROBE
(VO3)	VISUAL UNIT ONLY, 75 CANDELA STROBE
(VO4)	VISUAL UNIT ONLY, 110 CANDELA STROBE
W	WALL PHONE OUTLET
	TELECOMMINCATIONS OUTLET MOUNTED ABOVE COUNTER BACKSPLASH
XX	TELECOMMINCATIONS OUTLET - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWING OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
#TYPE	TELECOMMINCATIONS OUTLET
	SEE TELECOMMUNICATIONS HORIZONTAL CABLING SCHEDULE FOR ADDITIONAL INFORMATION.
	INDICATES JACK/CABLE QUANTITY
	FLOOR TELECOMMUNICATIONSOUTLET
XX	CEILING TELECOMMUNICATIONS OUTLET
(WAP)	WIRELESS ACCESS POINT
XX	CLOCK SYSTEM
(A1)	12" ANALOG CLOCK, SINGLE FACE
(A2)	9" ANALOG CLOCK, SINGLE FACE
(A3)	12" ANALOG CLOCK, DOUBLE FACE
(A4)	9" ANALOG CLOCK, DOUBLE FACE
(D1)	DIGITAL CLOCK, HR:MIN:SEC
(D2)	DIGITAL CLOCK, HR:MIN
(ET)	DIGITAL CLOCK, ELAPSED TIMER
(EC)	ELAPSED TIMER CONTROL
PLY	PLYWOOD
	DATA RACK
	GROUND BAR

SYMBOL	DESCRIPTION
XX	SECURITY, ACCESS CONTROL AND DOOR MONITORING WALL MOUNT
XX	SECURITY, ACCESS CONTROL AND DOOR MONITORING CEILING MOUNT
(CR)	CARD READER
(CXX)	CLOSED CIRCUIT CAMERA - SEE CAMERA SCHEDULES (XX-DENOTES SPECIFIC UNIT)
(DB)	DURESS BUTTON
(DC)	DOOR CONTACT
(EL)	ELECTRONIC LATCH/LOCK
(ES)	ELECTRIC STRIKE
(GB)	GLASS BREAK DETECTOR
(KE)	KEYLESS ENTRY
(KP)	KEYPAD - SECURITY SYSTEM
(KS)	KEYED SWITCH
(LM)	LATCHBOLT MONITOR
(MD)	MOTION SENSOR - DUAL TECHNOLOGY
(MI)	MOTION SENSOR - INFRARED
(ML)	MAGNETIC LOCK
(MO)	CLOSED CIRCUIT TELEVISION MONITOR
(MU)	MOTION SENSOR - ULTRASONIC
(RC)	CLOSED CIRCUIT TELEVISION REMOTE CAMERA CONTROLS
(RM)	REQUEST FOR EXIT - MOTION
(RP)	REQUEST FOR EXIT PUSH BUTTON
(VC)	VIDEO RECORDER
XX	INTRUSION DETECTION AND DOOR MONITORING WALL MOUNT
XX	INTRUSION DETECTION AND DOOR MONITORING CEILING MOUNT
(DB)	DURESS BUTTON
(DC)	DOOR CONTACT
(GB)	GLASS BREAK DETECTOR
(KP)	KEYPAD - SECURITY SYSTEM
(KS)	KEYED SWITCH
(LM)	LATCHBOLT MONITOR
(MD)	MOTION SENSOR - DUAL TECHNOLOGY
(MI)	MOTION SENSOR - INFRARED
(ML)	MAGNETIC LOCK
(MU)	MOTION SENSOR - ULTRASONIC
(RM)	REQUEST FOR EXIT - MOTION
(RP)	REQUEST FOR EXIT PUSH BUTTON
XX	DOOR HARDWARE - SEE DETAILS, ARCHITECTURAL PLANS AND SPECIFICATIONS. DEVICES FURNISHED BY OTHERS: ROUGH-IN AND WIRING BY EC.
(AA)	AUTODOOR ACTUATOR (PUSH PLATE)
(AM)	AUTODOOR ACTUATOR (MOTION SENSOR)
(AO)	AUTODOOR OPERATOR
(ED)	ELECTRIC EXITING DEVICE
(DE)	DELAYED EGRESS MODULE
(EL)	ELECTRONIC LATCH/LOCK
(ES)	ELECTRIC STRIKE
(KS)	KEY SWITCH
(ML)	MAGNETIC LOCK
(PS)	POWER SUPPLY
(PT)	POWER TRANSFER HINGE
(RL)	RELAY MODULE
(RM)	SEPARATELY MOUNTED REQUEST TO EXIT MOTION SENSOR NOT ASSOCIATED WITH SECURITY SYSTEM
XX	PAGING AND SOUND SYSTEMS RECESSED WALL MOUNT
XX	PAGING AND SOUND SYSTEMS SURFACE WALL MOUNT
XX	PAGING AND SOUND SYSTEMS RECESSED CEILING MOUNT
XX	PAGING AND SOUND SYSTEMS SURFACE CEILING MOUNT
(DB/SP)	DOORBELL SPEAKER
(DP/SP)	DEPARTMENT PAGING SPEAKER
(HP/SP)	HOSPITAL PAGING SPEAKER
(HW/SP)	HOSPITAL WIDE PAGING & WIRED RADIO SPEAKER
(LM/SP)	LOCAL MUSIC SPEAKER
(PC/MP)	PROCEDURE ROOM COMMUNICATIONS CEILING MOUNTED MICROPHONE
(PC/SP)	PROCEDURE ROOM COMMUNICATIONS SPEAKER
(TS/SP)	TELEVISION SYSTEM SPEAKER
(WR/SP)	WIRED RADIO SPEAKER
(PM/SP)	PROCEDURE ROOM MUSIC SPEAKER
(DB/PB)	DOORBELL PUSH BUTTON
(DP/MP)	DEPARTMENT PAGING MICROPHONE OUTLET
(DP/VC)	DEPARTMENT PAGING VOLUME CONTROL
(HP/MP)	HOSPITAL PAGING MICROPHONE OUTLET
(HP/VC)	HOSPITAL PAGING VOLUME CONTROL
(HW/MP)	HOSPITAL PAGING & WIRED RADIO MICROPHONE OUTLET
(HW/VC)	HOSPITAL PAGING & WIRED RADIO VOLUME CONTROL
(HW/VS)	HOSPITAL PAGING & WIRED RADIO VOLUME CONTROL WITH STATION SELECTOR
(LM/VC)	LOCAL MUSIC SYSTEM VOLUME CONTROL
(PC/MP)	PROCEDURE ROOM COMMUNICATIONS MICROPHONE
(TS/VC)	TELEVISION SYSTEM VOLUME CONTROL
(WR/VC)	WIRED RADIO VOLUME CONTROL
(WR/VS)	WIRED RADIO VOLUME CONTROL WITH STATION SELECTOR

SYMBOL	DESCRIPTION
XX	NURSE CALL WALL MOUNT
XX	NURSE CALL CEILING MOUNT
(A1)	AUDIO/VISUAL SINGLE PATIENT STATION W/ CALL CORD
(A2)	AUDIO/VISUAL SINGLE PATIENT STATION W/ PILLOW SPEAKER
(A3)	AUDIO/VISUAL DOUBLE PATIENT STATION W/ CALL CORD
(AA)	AUDIO/VISUAL DOUBLE PATIENT STATION W/ PILLOW SPEAKER
(AS)	AUDIO/VISUAL BUS STATION
(AN)	ANNUNCIATOR
(CB)	CODE BUTTON
(DL)	DOME LIGHT
(DS)	DUTY STATION
(ES)	EMERGENCY STATION
(ESA)	EMERGENCY STATION WITH AUDIO
(EW)	EMERGENCY STATION - WET LOCATION
(MCL)	MINI-CORRIDOR LIGHT
(MS)	MASTER STATION
(NL)	NURSE LOCATOR
(PC)	PULL CORD
(PCA)	PULL CORD WITH AUDIO
(RS)	ROOM STATUS SWITCH
(SA)	STAFF ASSIST
(SB)	STAFF ASSIST/CODE BUTTON
(SC)	SIDE COMMUNICATIONS RECEPTACLE FOR BED CONNECTION
(SS)	STAFF STATION
(ST)	STAFF TERMINAL
(STP)	STAFF TERMINAL PROVISION
(TV)	NURSE CALL TELEVISION INTERFACE
(V1)	VISUAL ONLY SINGLE PATIENT STATION W/ CALL CORD
(V2)	VISUAL ONLY SINGLE PATIENT STATION W/ PILLOW SPEAKER
(V3)	VISUAL ONLY DOUBLE PATIENT STATION W/ CALL CORD
(V4)	VISUAL ONLY DOUBLE PATIENT STATION W/ PILLOW SPEAKER
(V5)	VISUAL ONLY PUSH FOR HELP/PATIENT STATION W/ CALL CORD
(V6)	VISUAL ONLY PUSH FOR HELP/PATIENT STATION W/ PILLOW SPEAKER
(ZL)	ZONE LIGHT

GRAPHICAL REPRESENTATION OF PHASING, TYPICAL FOR ALL SYMBOLS.

EXISTING TO REMAIN — XX-1
RELOCATED — XX-1
DEMOLISHED — XX-1

- EXISTING TO REMAIN
- EXISTING TO BE REMOVED
- NEW
- ITEM TO BE REMOVED
- AREA NOT IN CONTRACT

REVISION NUMBER - SHOWN ON PLANS
NUMBER OF DETAIL ON SHEET
NUMBER OF SHEET WHERE DETAIL APPEARS
KEYED NOTE
Room 6 — ROOM NAME AND NUMBER
INDICATES DETAIL DESIGNATOR
SEE SECTION DETAIL
INDICATES SHEET NUMBER

ELECTRICAL SHEET INDEX

E000	ELECTRICAL SYMBOLS AND SHEET INDEX
E001	ELECTRICAL ABBREVIATIONS, CODES AND DESIGNATORS
E101	OVERALL FIRST FLOOR ELECTRICAL PLAN
E201	FIRST FLOOR ELECTRICAL PLANS
E400	ELECTRICAL DIAGRAMS
E401	ELECTRICAL ONELINE DIAGRAM
E500	ELECTRICAL DETAILS
E600	ELECTRICAL SCHEDULES
E601	ELECTRICAL SCHEDULES

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RD Project Number: 224051.01

Project:

OZAUKEE COUNTY
JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

ELECTRICAL SYMBOLS AND SHEET INDEX

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:
November 8, 2024

Project No.: 240023.00
Set Type: Final Owner Revi

Sheet No.:
E000

Attachment: Project Documents_Invitation for Bid_Justice Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

ELECTRICAL ABBREVIATIONS LIST

1P	1 POLE (2P, 3P, 4P, ETC.)	MAN	MANUAL MOTOR STARTER
A	AMPERE	MAX	MAXIMUM
AC	ABOVE COUNTER	MAG	MAGNETIC STARTER
ACLG	ABOVE CEILING	MC	MOMENTARY CONTACT
ADO	AUTOMATIC DOOR OPENER	MC	MECHANICAL CONTRACTOR
AF	AMP FRAME	MCB	MAIN CIRCUIT BREAKER
AFF	ABOVE FINISHED FLOOR	MCC	MOTOR CONTROL CENTER
AFG	ABOVE FINISHED GRADE	MDC	MAIN DISTRIBUTION CENTER
AFI	ARC FAULT CIRCUIT INTERRUPTER	MDP	MAIN DISTRIBUTION PANEL
		MER	MAIN EQUIPMENT ROOM (AKA "MDF")
AHU	AIR HANDLING UNIT	MFR	MANUFACTURER
AL	ALUMINUM	MFS	MAIN FUSED DISCONNECT SW
ALT	ALTERNATE	MH	MANHOLE
AMP	AMPERE	MIC	MICROPHONE
AMPL	AMPLIFIER	MIN	MINIMUM
ANN	ANNUNCIATOR	MISC	MISCELLANEOUS
APPROX	APPROXIMATELY	MLO	MAIN LUGS ONLY
ARCH	ARCHITECT, ARCHITECTURAL	MOA	MULTIOUTLET ASSEMBLY
AS	AMP SWITCH	MPOE	MAIN POINT OF ENTRANCE
AT	AMP TRIP	MSB	MAIN SWITCHBOARD
ATS	AUTOMATIC TRANSFER SWITCH	MT	MOUNT
AUTO	AUTOMATIC	MTS	MANUAL TRANSFER SWITCH
AUX	AUXILIARY	MTR	MOTOR, MOTORIZED
AV	AUDIO VISUAL	N.C.	NORMALLY CLOSED
AWG	AMERICAN WIRE GAUGE	NEC	NATIONAL ELECTRICAL CODE
BATT	BATTERY	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
BLDG	BUILDING		
BMS	BUILDING MANAGEMENT SYSTEM	NIC	NOT IN CONTRACT
C	CONDUIT	NL	NIGHT LIGHT
CAB	CABINET	N.O.	NORMALLY OPEN
CAT	CATALOG	NPF	NORMAL POWER FACTOR
CATV	CABLE TELEVISION	NTS	NOT TO SCALE
CB	CIRCUIT BREAKER	NU	NEAR UNIT
CCTV	CLOSED CIRCUIT TELEVISION	OH	OVERHEAD
CKT	CIRCUIT	OL	OVERLOADS
CLG	CEILING	OSP	OUTSIDE PLANT
COMB	COMBINATION	OU	OM UNIT
CMPR	COMPRESSOR	PA	PUBLIC ADDRESS
CONN	CONNECTION	PB	PULL BOX OR PUSHBUTTON
CONST	CONSTRUCTION	PC	PLUMBING CONTRACTOR
CONT	CONTINUATION OR CONTINUOUS	PE SW	PNEUMATIC ELECTRIC
CRT	CATHODE-RAY TUBE	PED	PEDESTAL
CP	CONTROL PANEL	PEN	PENDANT
CS	COMBINATION STARTER	PF	POWER FACTOR
CT	CURRENT TRANSFORMER	PH	PHASE
CTR	CENTER	PLBG	PLUMBING
CU	COPPER	PNL	PANEL
DC	DATA CENTER	PP	POWER POLE
DEPT	DEPARTMENT	PR	PAIR
DET	DETAIL	PRI	PRIMARY
DIA	DIAMETER	PROJ	PROJECTION
DISC	DISCONNECT	PRV	POWER ROOF VENTILATOR
DIST	DISTRIBUTION	PT	POTENTIAL TRANSFORMER
DN	DOWN	PVC	POLYVINYL CHLORIDE (CONDUIT)
DS	SAFETY DISCONNECT SWITCH	PWR	POWER
DT	DOUBLE THROW	QUAN	QUANTITY
DWG	DRAWING	R	RELAY
EC	ELECTRICAL CONTRACTOR	RECPT	RECEPTACLE
EF	ENTRANCE FACILITY (LEC)	REQD	REQUIRED
ELEC	ELECTRIC, ELECTRICAL	RM	ROOM
ELEV	ELEVATOR	RTU	ROOF TOP UNIT
EBU	EMERGENCY BATTERY UNIT	RVS	REDUCED VOLTAGE STARTING
EMER	EMERGENCY	SEC	SECONDARY
EMS	ENERGY MANAGEMENT SYSTEM	SHT	SHEET
EMT	ELECTRICAL METALLIC TUBING	SIM	SIMILAR
EOL	END OF LINE RESISTOR	S/N	SOLID NEUTRAL
EP	ELECTRIC PNEUMATIC	SPEC	SPECIFICATION
EQUIP	EQUIPMENT	SPKR	SPEAKER
ER	EXISTING RELOCATED	SPR	SPARE
ES	EXPOSED STRUCTURE	SS	STAINLESS STEEL
EX	EXISTING TO REMAIN	SSW	SELECTOR SWITCH
EWC	ELECTRIC WATER COOLER	S/S	STOP/START PUSHBUTTONS
EXH	EXHAUST	STA	STATION
EXP	EXPLOSION PROOF	STD	STANDARD
F	FLUSH	SURF	SURFACE MOUNTED
FA	FIRE ALARM	SW	SWITCH
FABP	FIRE ALARM BOOSTER POWER SUPPLY PANEL	SWBD	SWITCHBOARD
		SYM	SYMMETRICAL
FACP	FIRE ALARM CONTROL PANEL	SYS	SYSTEM
FBO	FURNISHED BY OTHER	TBB	TELECOMMUNICATION BONDING BACKBONE
FDR	FEEDER		
FIXT	FIXTURE	TC	TIME CLOCK
FLR	FLOOR	TCC	TEMPERATURE CONTROL CONTRACTOR
FLUOR	FLUORESCENT		
FS	FLOW SWITCH	TCP	TEMPERATURE CONTROL PANEL
FU	FUSE	TE	TELECOMMUNICATIONS ENCLOSURE
FVNR	FULL VOLTAGE NON-REVERSING	TEL	TELEPHONE
GA	GAUGE	TEL/DATA	TELEPHONE/DATA
GAL	GALLON	TERM	TERMINAL
GALV	GALVANIZED	TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
GC	GENERAL CONTRACTOR		
GEN	GENERATOR	TL	TWIST LOCK
GFB	GROUND FAULT BREAKER	TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
GFI	GROUND FAULT CIRCUIT INTERRUPTER		
GFP	GROUND FAULT PROTECTOR	TO	TELECOMMUNICATIONS OUTLET
GRD	GROUND	TR	TAMPER RESISTANT
GRC	GALVANIZED RIGID STEEL (CONDUIT)	TV	TELEVISION
GYP	GYPSUM BOARD	TYP	TYPICAL
HOA	HANDS-OFF-AUTOMATIC SWITCH	UC	UNDER COUNTER
HORIZ	HORIZONTAL	UE	UNDERGROUND ELECTRICAL
HP	HORSEPOWER	UG	UNDERGROUND
HPF	HIGH POWER FACTOR	UNIV	UNIVERSAL
HT	HEIGHT	UT	UNDERGROUND TELEPHONE
HV	HIGH VOLTAGE	UTIL	UTILITY
HVAC	HEATING, VENTILATING AND AIR CONDITIONING	USS	UNIT SUBSTATION
		UV	ULTRAVIOLET
IC	INTERRUPTING CAPACITY	V	VOLT
IG	ISOLATED GROUND	VA	VOLT-AMPERES
IMC	INTERMEDIATE METAL CONDUIT	VERT	VERTICAL
INCAND	INCANDESCENT	VFD	VARIABLE FREQUENCY DRIVE
IR	INFRARED	VOL	VOLUME
I/W	INTERLOCK WITH	W	WATT
J-BOX	JUNCTION BOX	W/	WITH
KV	KILOVOLT	W/O	WITHOUT
KVA	KILOVOLT-AMPERE	WP	WEATHERPROOF
KVAR	KILOVOLT-AMPERE REACTIVE	XFMR	TRANSFORMER
KW	KILOWATT	XFR	TRANSFER
KWH	KILOWATT HOUR	∠	ANGLE
LEC	LOCAL EXCHANGE CARRIER (E.G AT&T)	@	AT
LG	LAY-IN GRID	▲	DELTA
LOC	LOCATE OR LOCATION	'	FEET
LT	LIGHT	"	INCHES
LTG	LIGHTING	#	NUMBER
LTNG	LIGHTNING	Ø	PHASE
LV	LOW VOLTAGE	℄	CENTER LINE
		P	PLATE

PROJECT NOTES

A. REFER TO ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL ELECTRICAL DEVICES PRIOR TO COMMENCING ROUGH-IN AND/OR INSTALLATION.

B. ALL MOUNTING HEIGHTS INDICATED ARE TO THE CENTERLINE OF THE ITEM UNLESS OTHERWISE INDICATED.

C. WHERE CONDUIT IS SHOWN TO BE ROUTED ABOVE EXISTING REMOVABLE CEILINGS, THE EC SHALL BE RESPONSIBLE FOR REMOVING CEILING TILES AND/OR GRID AS NEEDED AND REPLACING ALL CEILING BACK TO THE EXISTING CONDITION. THE EC SHALL TAKE NOTE OF AND NOTIFIY EITHER THE GENERAL CONTRACTOR OR OWNER OF ANY DAMAGED TILES OR SECTIONS OF CEILINGS. IF THIS IS NOT PERFORMED, THE EC SHALL BE HELD RESPONSIBLE FOR ANY DAMAGED CEILING COMPONENTS FOUND.

D. COORDINATE WALL AND CEILING MOUNTED ELECTRICAL, FIRE ALARM, AND TELECOMMUNICATION DEVICES WITH ARCHITECTURAL, MECHANICAL, PLUMBING, A/V, AND SECURITY SYSTEMS. REFERENCE ARCHITECTURAL ELEVATIONS AND FLOOR PLANS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES. UTILIZE MULTI-GANG ASSEMBLIES WITH BARRIERS, IF REQUIRED, WHERE ADJACENT DEVICES ARE SHOWN ON PLANS. MOUNT DEVICES IN READILY ACCESSIBLE LOCATIONS AND AVOID MOUNTING DEVICES BEHIND DOORS. CONFIRM EXACT MOUNTING LOCATIONS WITH ARCHITECT/ENGINEER WHERE ELECTRICAL DEVICES ARE ADJACENT TO OTHER TRADES, IN SPECIALTY WALL APPLICATIONS, OR A SPECIAL FIELD CONDITION IS PRESENT.

E. WHAT FOLLOWS IS WRITTEN TO PROVIDE AN UNDERSTANDING OF THIS PROJECT'S ELECTRICAL CONTRACTOR'S SCOPE OF WORK AS WELL AS THE OWNER'S EXPECTATIONS FOR ITS EXECUTION. THE INTENT IS THAT THIS BE A GUIDELINE TO USE IN THE CREATION OF THE BID PACKAGE AND WORK PLANNING DOCUMENTS. THE WORK PLAN IS THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY AND SHALL BE COORDINATED WITH THE OWNER AND ENGINEER PRIOR TO IMPLEMENTATION.

F. CIRCUIT NUMBERS INDICATED DO NOT REFLECT THE ACTUAL POSITION OF THE CIRCUIT BREAKERS IN THE PANEL; RATHER, THE NUMBERS INDICATE WHICH DEVICES ARE CONNECTED TO A COMMON CIRCUIT.

G. EXISTING TO REMAIN, "ETR", ON THIS PLAN REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.

PROJECT NOTES - DEMOLITION

A. ALL ELECTRICAL EQUIPMENT SHOWN ON THE DEMOLITION PLANS ARE "EXISTING TO BE REMOVED" UNLESS OTHERWISE INDICATED. IN ADDITION TO REMOVING DEVICES, REMOVE ALL ASSOCIATED ELECTRICAL CIRCUITS, CONDUITS AND CONDUCTORS, BACK TO SOURCE. REFER TO THE SPECIFICATIONS FOR ELECTRICAL DEMOLITION REQUIREMENTS. EMILY ADD: THIS SCOPE OF WORK INCLUDES COMMUNICATIONS AND OTHER LOW VOLTAGE CABLINE INDICATED ON DEMOLITION PLANS.

B. EXISTING TO REMAIN "EX" REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.

C. ALL INFORMATION SHOWN ON THE PLANS WAS GATHERED FROM FIELD OBSERVATION AND EXISTING DRAWINGS. FIELD VERIFY EXISTING CONDITIONS AND PROVIDE ADDITIONAL TRACING, REMOVING, RELOCATING AND EXTENDING OF CIRCUITS AND DEVICES NECESSARY TO MAINTAIN CONTINUITY OF EXISTING EQUIPMENT NOT IN THE AREA OF WORK. FIELD VERIFY EXACT DEMOLITION REQUIREMENTS AND INCLUDE ALL ASSOCIATED COSTS. ALL ABANDONED WIRING, CONDUITS, FITTINGS, BOXES, SUPPORTS, ETC. TO BE REMOVED FROM THE DEVICES BACK TO THE RESPECTIVE SOURCE PANEL. PROVIDE REVISED TYPED CIRCUIT DIRECTORY IN PANELBOARDS THAT HAVE CIRCUITS REMOVED. REFER TO THE SPECIFICATIONS FOR ADDITIONAL ELECTRICAL DEMOLITION REQUIREMENTS.

D. DASHED WALLS ON THE DEMOLITION PLANS INDICATE, IN GENERAL, EXISTING WALLS BEING DEMOLISHED. DO NOT RELY ON ELECTRICAL DRAWINGS TO DETERMINE EXTENT OF GENERAL CONSTRUCTION DEMOLITION. REFER TO ARCHITECTURAL DEMOLITION PLANS FOR THE EXACT EXTENT OF GENERAL CONSTRUCTION DEMOLITION REQUIRED BY THIS CONTRACT.

E. REFER TO DEMOLITION DRAWINGS OF OTHER TRADES. WHERE MOTORS, CONTROL PANELS, AND OTHER LOADS THAT HAVE AN ELECTRICAL CONNECTION ARE BEING REMOVED, INCLUDE THE DISCONNECTION AND REMOVAL OF ASSOCIATED ELECTRICAL FEEDS, CIRCUITS, AND LOOSE CONTROL EQUIPMENT IN THIS CONTRACT.

F. SUPPORT AND PROTECT ELECTRICAL EQUIPMENT EXISTING TO REMAIN, INCLUDING BUT NOT LIMITED TO; CONDUITS, WIRING, DEVICES, AND FIXTURES AS REQUIRED.

FIRE STOPPING NOTES - NON-DFD

A. REFER TO ARCHTECTURAL PLANS FOR THE FIRE RATING OF ALL WALLS AND FLOORS. FIRESTOP ALL PENETRATIONS THROUGH FIREWALLS AND FLOORS WITH A UL RATED SOLUTION. REFER TO FIRE STOPPING SPECIFICATIONS FOR ADDITIONAL INFORMATION.

B. IN EXISTING OCCUPIED AREAS, PERMANENTLY SEAL AND LABEL ANY PENETRATIONS MADE IN A FIRE OR SMOKE BARRIER WITHIN 24 HOURS OF MAKING THE PENETRATION.

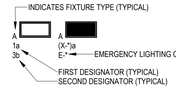
C. PROVIDE APPROVED FIRE RATING LABEL ON BOTH SIDES OF A PENETRATION SEPARATED BY BUILDING AND FLOOR.

CODES FOR THIS PROJECT

EDITION	CODE
	WISCONSIN 361 - 366 ADMINISTRATION AND ENFORCEMENT THIS INCLUDES THE 2015 EDITION OF: INTERNATIONAL BUILDING CODE INTERNATIONAL ENERGY CODE INTERNATIONAL MECHANICAL CODE INTERNATIONAL FUEL GAS CODE INTERNATIONAL EXISTING BUILDING CODE BY ADOPTING THE 2015 INTERNATIONAL BUILDING CODE, THE FOLLOWING NFPA CODES ARE ADOPTED: 2013 NFPA 20 STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION 2013 NFPA 72 NATIONAL FIRE ALARM AND SIGNALING CODE 2015 NFPA 101 LIFE SAFETY CODE 2013 NFPA 110 STANDARD FOR EMERGENCY AND STANDBY SYSTEMS
DEC. 2019	WISCONSIN SPS 316 STATE ELECTRICAL CODE INCLUDES 2017 EDITION OF NFPA 70
	LIGHTING ENERGY CALCULATION METHOD: IECC 2015 OR ASHRAE 90.1-2013

ELECTRICAL CIRCUITING:

LIGHTING FIXTURES:



LIGHTING CIRCUITING NOTES -

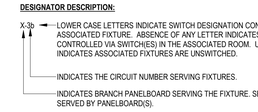
1. SINGLE DESIGNATOR INDICATES THE CIRCUIT AND CONTROL MEANS FOR THE ENTIRE FIXTURE.

2. NO HATCH INDICATES FIXTURE FED FROM NORMAL BRANCH OF POWER. DIAGONAL HATCH INDICATES FIXTURE SERVED FROM OPTIONAL OR CRITICAL BRANCH OF POWER. SOLID HATCH INDICATES FIXTURE SERVED FROM EMERGENCY OR LIFE SAFETY BRANCH OF POWER.

3. WHEN TWO DESIGNATORS, AND THE FIRST DESIGNATOR IS IN PARENTHESES, THAT INDICATES THAT A FIXTURE IS A CONTROLLED EMERGENCY / LIFE SAFETY LIGHT UTILIZING A UL924 LISTED EMERGENCY LIGHTING CONTROL DEVICE TO ILLUMINATE THE FIXTURE TO FULL BRIGHTNESS IN A LOSS OF NORMAL POWER. IN THIS SITUATION, THE FIRST DESIGNATOR INDICATES THE (NORMAL BRANCH SENSING CIRCUIT) AND CONTROL MEANS FOR THE FIXTURE. THE SECOND DESIGNATOR INDICATES THE EMERGENCY / LIFE SAFETY BRANCH CIRCUIT FOR THE FIXTURE. REFER TO LIGHTING DETAILS FOR WIRING DIAGRAMS.

4. WHEN TWO DESIGNATORS AND NO PARENTHESES, THAT INDICATES THAT A FIXTURE IS WIRED TO TWO SEPARATE CIRCUITS AND CONTROL MEANS. THE FIRST DESIGNATOR IS WIRED TO ONE SET OF LED BOARDS AND DRIVER(S) WITHIN THE FIXTURE. THE SECOND DESIGNATOR IS WIRED TO A SEPARATE SET OF LED BOARDS AND DRIVER(S) WITHIN THE FIXTURE. REFER TO LIGHT FIXTURE SCHEDULE FOR MORE INFORMATION.

DESIGNATOR DESCRIPTION:



ELECTRICAL DEVICES:

DESIGNATOR DESCRIPTION:

OFFICE - 277 & 120 VOLTS

NH - NORMAL BRANCH - 277 VOLTS
NL - NORMAL BRANCH - 120 VOLTS
QH - EQUIPMENT BRANCH - 277 VOLTS
QL - EQUIPMENT BRANCH - 120 VOLTS
EH - EMERGENCY BRANCH - 277 VOLTS
EL - EMERGENCY BRANCH - 120 VOLTS

NOTE DESCRIPTIONS -

GENERAL NOTES - NOTES THAT APPLY TO ALL DRAWINGS WITHIN THE DRAWING SET.
SHEET NOTES - NOTES THAT APPLY TO THE SHEET ON WHICH THEY APPEAR.
KEYED NOTES - NOTES THAT APPLY TO AN AREA, ITEM AND/OR DEVICE ON A FLOOR PLAN OR DETAIL.
DETAIL NOTES - NOTES THAT APPLY TO A SPECIFIC DETAIL.

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RD Project Number: 224051.01

Project:

OZAUKEE COUNTY JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

ELECTRICAL ABBREVIATIONS, CODES AND DESIGNATORS

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:
November 8, 2024

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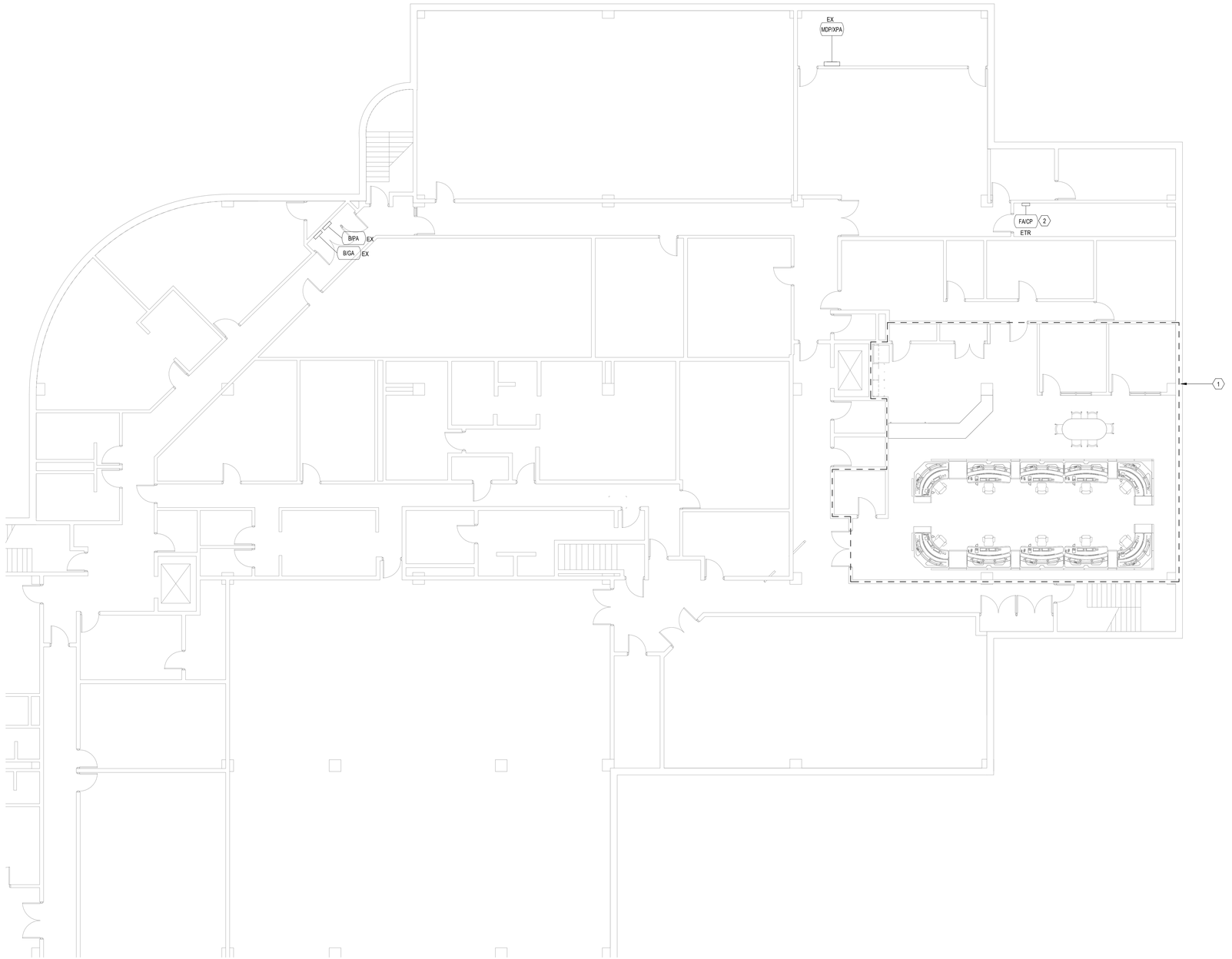
Set Type: Final Owner Revi

Sheet No.:
E001

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

KEYNOTES

1. PROJECT AREA.
2. ALL FIRE ALARM DEVICES SHALL BE WIRED BACK TO EXISTING FIRE ALARM PANEL IN THIS LOCATION.



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

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JUSTICE CENTER

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Key Plan:

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Sheet:

OVERALL FIRST FLOOR
ELECTRICAL PLAN

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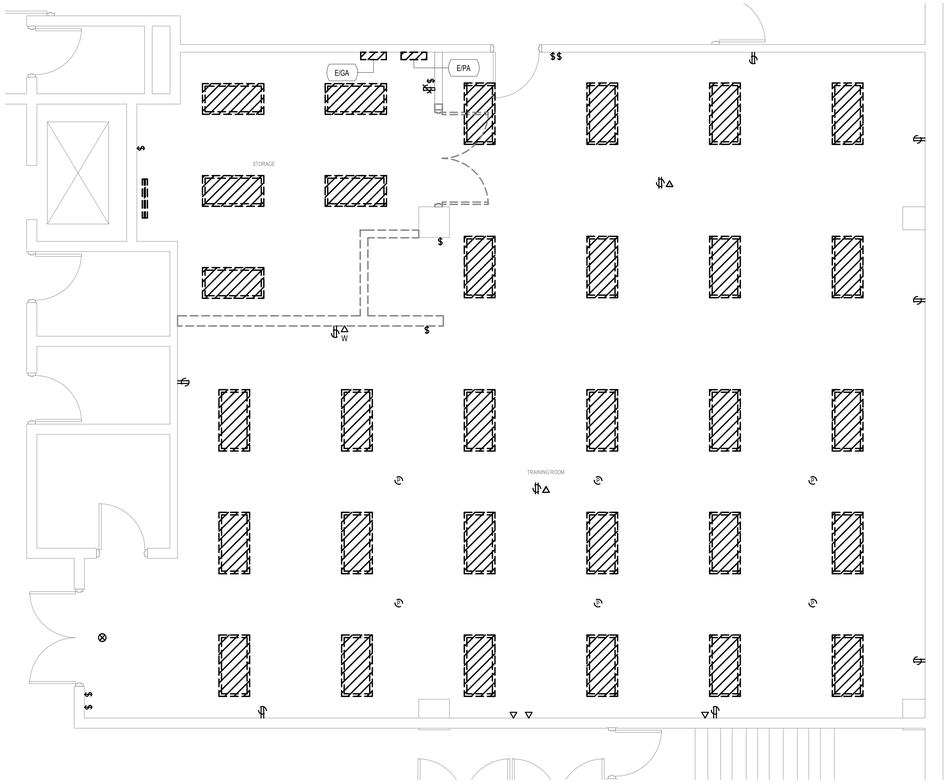


1 ELECTRICAL DEMOLITION FLOOR PLAN
1/4" = 1'-0"

SHEET NOTES

A. WIRE ALL EXIT SIGNS TO CIRCUIT E/PA-21 UNLESS OTHERWISE INDICATED.

B. WIRE ALL EMERGENCY BATTERY UNIT (EBU) LIGHTS TO UNSWITCHED NORMAL LIGHTING CIRCUIT SERVING THE AREA WHERE EBU IS LOCATED.

C. SERVE ALL 480/277 VOLT, NORMAL BRANCH CIRCUITS "NH" FROM PANEL "B/PA", UNLESS OTHERWISE INDICATED.

D. SERVE ALL 480/277 VOLT, ARTICLE 702 OPTIONAL STANDBY BRANCH CIRCUITS "OSBH" FROM PANEL "E/PA", UNLESS OTHERWISE INDICATED.

E. SERVE ALL 208/120 VOLT, NORMAL BRANCH CIRCUITS "NL" FROM PANEL "B/GA", UNLESS OTHERWISE INDICATED.

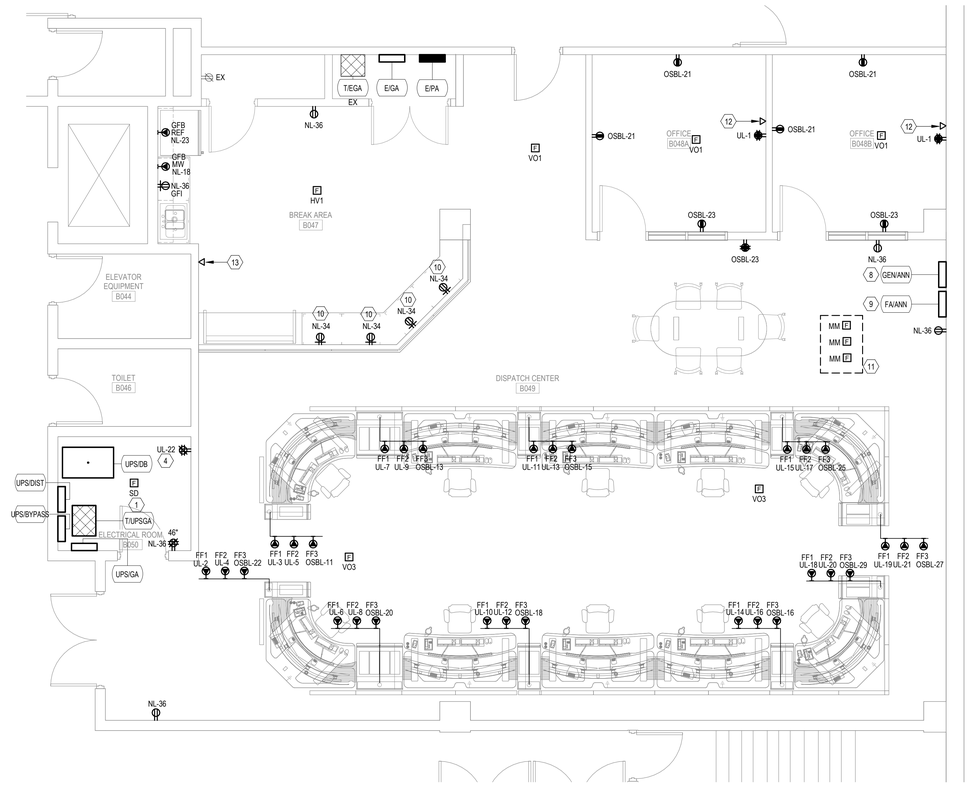
F. SERVE ALL 208/120 VOLT, UPS BRANCH CIRCUITS "UL" FROM PANEL "UPS/GA", UNLESS OTHERWISE INDICATED.

G. SERVE ALL 208/120 VOLT, ARTICLE 702 OPTIONAL STANDBY BRANCH CIRCUITS "OSBL" FROM PANEL "E/GA", UNLESS OTHERWISE INDICATED.

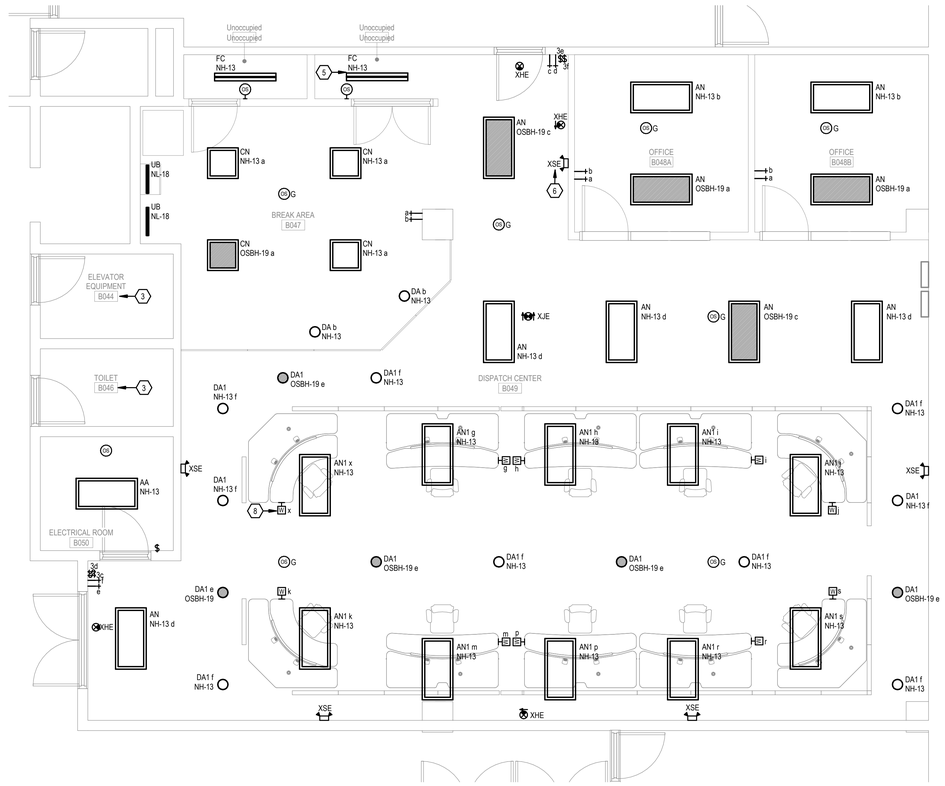
H. ALL LOW VOLTAGE DATA CABLING DESIGN AND INSTALLATION SHALL BE THE RESPONSIBILITY OF THE OWNER UNDER A SEPERATE CONTRACT.

KEYNOTES

1. TRANSFORMER HUNG FROM CEILING.
2. NOTE NOT USED.
3. EXISTING LIGHTING AND CONTROLS TO REMAIN.
4. OUTLET DEDICATED FOR IT RACK USE. MOUNT OUTLET 6" FROM CEILING.
5. TYPE FC TO BE CHAIN MOUNTED SUCH THAT THE BOTTOM OF LIGHT FIXTURE IS 9'-0" ABOVE FINISHED FLOOR, TYPICAL.
6. TYPE XS TO BE MOUNTED 8'-0" ABOVE FINISHED FLOOR, TYPICAL.
7. WIRELESS PEDESTAL MOUNTED DIMMING STATION , TO PROVIDE INDIVIDUAL CONTROL OF TYPE AN1 FIXTURE ABOVE WORK STATION WITH THE CORRESPONDING SWITCH LEG, TYPICAL.
8. RELOCATE EXISTING GENERATOR ANNUNCIATOR PANEL CURRENTLY LOCATED IN EXSITING DISPATCH CENTER. CAPTURE AND EXTEND WIRING FROM EXTISING PANEL TO NEW PANEL LOCATION SHOWN ON DRAWINGS. CONFIRM EXACT LOCATION WITH OWNER PRIOR TO INSTALLATION.
9. RELCOATE EXSITNG FIRE ALARM ANNUNCIATOR PANEL CURRENTLY LOCATED IN EXSITING DISPATCH CENTER. WIRE PANEL TO FIRE ALARM PANELS WITHIN ROOM B050. CONFIRM EXACT LOCATION WITH OWNER PRIOR TO INSTALLATION.
10. MOUNT OUTLET HORIZONTALLY TO FIT BETWEEN COUNTERTOP AND WINDOW.
11. PROVIDE (3) FIRE ALARM MONITOR MODULES (ALARM, TROUBLE, SUPERVISORY) FOR THE NEW CLEAN AGENT FIRE PROTECTION SYSTEM. MONITOR MODULES SHALL SEND A SUPERVISORY SIGNAL TO THE FIRE ALARM CONTROL PANEL UPON ACTIVATION. VERIFY EXACT LOCATION OF CLEAN AGENT CONTROL PANEL WITH CLEAN AGENT VENDOR/INSTALLER PRIOR TO INSTALLATION OF THE MONITOR MODULES.
12. PROVIDE SQUARE JUNCTION BOX AND 3/4" CONDUIT FROM JUNCTION BOX STUBBED TO ABOVE ACCESSIBLE CEILING FOR DATA PORTS. CABLE, FACEPLATE, AND DEVICE INSTALLATION BY OTHERS.
13. PROVIDE SQUARE JUNCTION BOX AND 3/4" CONDUIT FROM JUNCTION BOX TO ABOVE ACCESSIBLE CEILING FOR WALL PHONE. CABLE, FACEPLATE AND DEVICE INSTALLATION BY OTHERS.



3 POWER AND TECHNOLOGY FLOOR PLAN
1/4" = 1'-0"



2 LIGHTING FLOOR PLAN
1/4" = 1'-0"

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Project:

OZAUKEE COUNTY
JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

FIRST FLOOR ELECTRICA
PLANS

Revisions:

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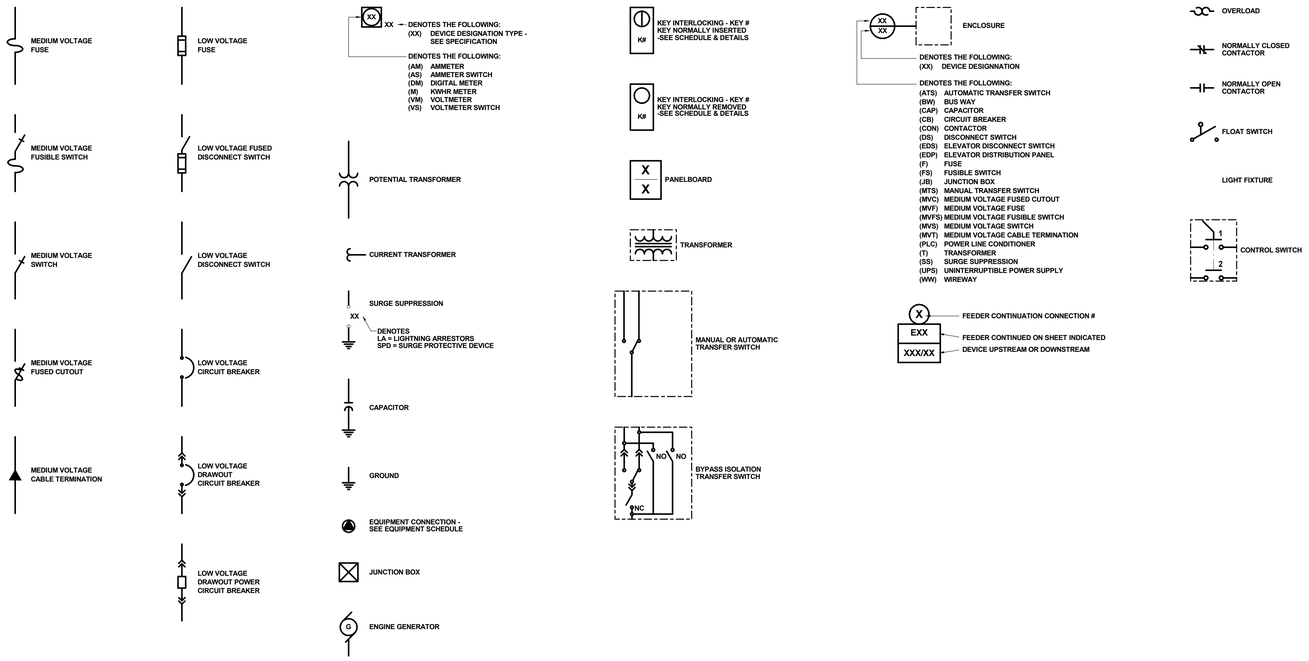
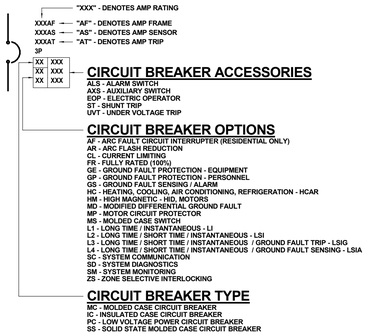
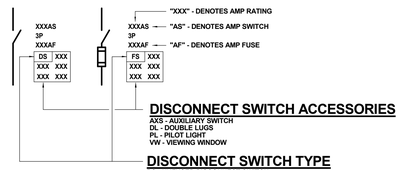
ONE-LINE SYMBOLS



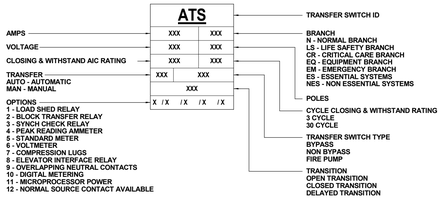
CIRCUIT BREAKER INFORMATION



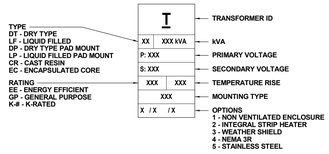
LOW VOLTAGE DISCONNECT SWITCH INFORMATION



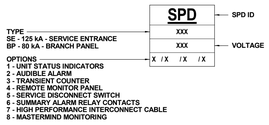
TRANSFER SWITCH INFORMATION



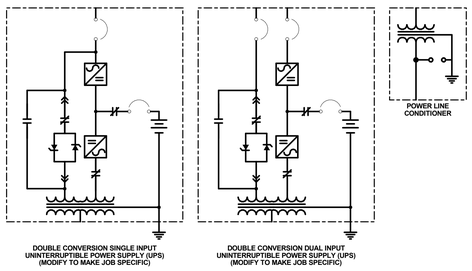
TRANSFORMER INFORMATION



SURGE PROTECTIVE DEVICE



SPECIAL ONE-LINE SYMBOLS



GENERAL NOTES -

1. ALL ITEMS INDICATED BY A DARK SOLID LINE AS SHOWN BELOW ARE NEW.
2. ALL ITEMS INDICATED BY A LIGHT DASHED LINE AS SHOWN BELOW ARE EXISTING TO REMAIN.
3. ALL ITEMS INDICATED BY A DARK DASH-DOT-DASH LINE AS SHOWN BELOW ARE EXISTING TO BE REMOVED.
4. ALL ITEMS INDICATED BY A LIGHT DASH-DOT-DASH LINE AS SHOWN BELOW ARE TYPICAL EQUIPMENT DIVISIONS.
5. ALL ITEMS INDICATED BY A LIGHT SOLID LINE AS SHOWN BELOW ARE FUTURE.
6. ALL DOWNTIME SHALL BE SCHEDULED WITH THE OWNER AND SHALL BE KEPT TO AN ABSOLUTE MINIMUM.
7. THE PANELS AND SWITCHBOARDS INDICATED ON THE ONE LINE DIAGRAM SHALL BE PROTECTED FROM AVAILABLE FAULT CURRENT SHOWN BY EITHER OF THE FOLLOWING METHODS:
   - PROVIDE BREAKERS WITH A MINIMUM AIC RATING GREATER THAN INDICATED
   - THE SERIES RATING METHOD IS NOT ACCEPTABLE

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Sheet:

ELECTRICAL DIAGRAMS

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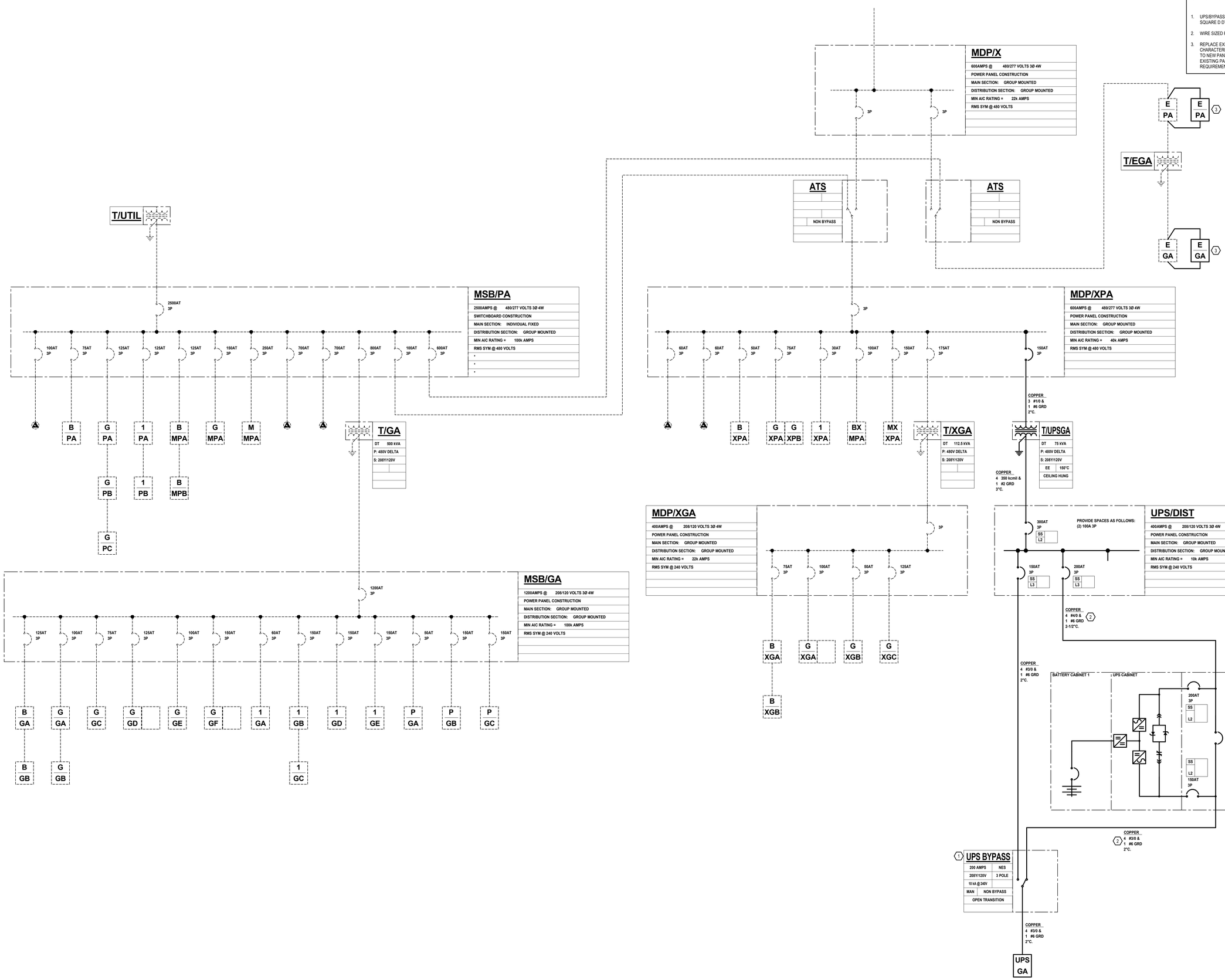
Sheet No.:

E400

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

KEYNOTES

1. UPS/BYPASS SHALL BE A 200A RATED 3-POLE NON-FUSED DOUBLE THROW SWITCH. SQUARE D DTU324N OR EQUAL.
2. WIRE SIZED PER MANUFACTURERS REQUIREMENTS.
3. REPLACE EXISTING PANEL WITH NEW PANEL. NEW PANEL SHALL MATCH CHARACTERISTICS OF EXISTING PANEL. EXTEND EXISTING FEEDER AS REQUIRED TO NEW PANEL. NEW PANEL SHALL BE INSTALLED IN THE SAME LOCATION AS EXISTING PANEL. REFER TO E601 FOR NEW PANEL SCHEDULE AND PANEL REQUIREMENTS.



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RD Project Number: 224051.01

Project:

OZAUKEE COUNTY
JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

ELECTRICAL ONELINE DIAGRAM

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:
November 8, 2024

Project No.: 240023.00

Set Type: Final Owner Revi

Sheet No.:

E401

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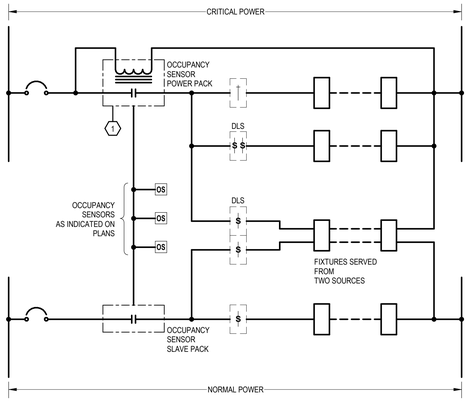


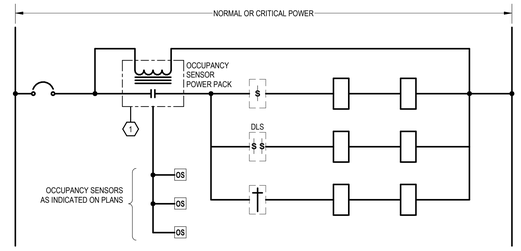
DETAIL NOTES

1. DETAIL INDICATES A TYPICAL OCCUPANCY SENSOR WIRING DIAGRAM. SEE FLOOR PLANS FOR THE REQUIRED LIGHTING CONTROL CONFIGURATION. PROVIDE THE NECESSARY CONTROL COMPONENTS AND WIRING FOR A COMPLETE SYSTEM.
2. SEE FLOOR PLANS FOR QUANTITIES, TYPES AND LOCATIONS OF OCCUPANCY SENSORS.
3. ALL FIXTURES LOCATED IN ROOM ARE CONTROLLED BY OCCUPANCY SENSOR(S) SHOWN ON PLANS.

KEYNOTES

1. MOUNT IN JUNCTION BOX ABOVE ACCESSIBLE CEILING OVER ENTRY DOOR, UNLESS OTHERWISE NOTED.

2 TYPICAL CEILING MOUNTED, MULTI-CIRCUIT OCCUPANCY SENSOR DETAIL
NOT TO SCALE



DETAIL NOTES

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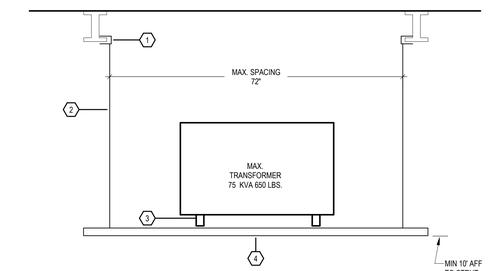
2. SEE FLOOR PLANS FOR QUANTITIES, TYPES AND LOCATIONS OF OCCUPANCY SENSORS.
3. ALL FIXTURES LOCATED IN ROOM ARE CONTROLLED BY OCCUPANCY SENSOR(S) SHOWN ON PLANS.

KEYNOTES

1. MOUNT IN JUNCTION BOX ABOVE ACCESSIBLE CEILING OVER ENTRY DOOR, UNLESS OTHERWISE NOTED.

1 TYPICAL CEILING MOUNTED, SINGLE CIRCUIT OCCUPANCY SENSOR DETAIL
NOT TO SCALE



DETAIL NOTES

1. TRANSFORMER UNISTRUT SUPPORTS ARE NOT TO BE USED TO SUPPORT CONDUIT, LIGHT FIXTURES, OR ANY OTHER EQUIPMENT THAT IS NOT ASSOCIATED WITH THE TRANSFORMER TO FACILITATE TRANSFORMER REPLACEMENT.

KEYNOTES

1. BEAM CLAMP UNISTRUT 1650AS.
2. 1/2" THREADED ROD TYPICAL
3. PROVIDE MASON INDUSTRIES ND TYPE DOUBLE DEFLECTION NEOPRENE MOUNT. NEOPRENE MOUNT TO BE SIZED BY MANUFACTURER TO ACCOMMODATE INSTALLATION AND TRANSFORMER WEIGHT.
4. UNISTRUT P1001

3 TRANSFORMER MOUNTING DETAIL
NOT TO SCALE

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Project:

OZAUKEE COUNTY
JUSTICE CENTER

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1201 S. Spring St
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Key Plan:

Sheet:

ELECTRICAL DETAILS

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:

November 8, 2024

Project No.: 240023.00

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Sheet No.:

E500

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

GENERAL EQUIPMENT SCHEDULE

ID	DESCRIPTION	LOC	VOLTAGE / PHASE	LOAD			FEED FROM			OCPD		FEEDER				MOTOR CONTROLLER					DISCONNECT SWITCH					SCCR	CONNECTION				SEE NOTE
				HP	FLA	KVA	PANEL	CIRCUIT	BRANCH	TYPE	SIZE	POLE	QTY	PHASE	GRD	COND	FURN BY	INST BY	WIRE BY	LOC	TYPE	OPTIONS	FURN BY	INST BY	WIRE BY	LOC	OPTIONS		NEMA TYPE	OPTIONS	MTG HEIGHT	
FF1	FURNITURE FEED	B049	120/1	-	-	1.8	SFP	SFP	UPS	CB	20	1	2	12	12	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
FF2	FURNITURE FEED	B049	120/1	-	-	1.8	SFP	SFP	UPS	CB	20	1	2	12	12	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
FF3	FURNITURE FEED (NON-UPS)	B049	120/1	-	-	1.8	SFP	SFP	UPS	CB	20	1	2	12	12	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
MW	MICROWAVE	B047	120/1	-	-	1.0	SFP	SFP	N	CB	20	1	2	12	12	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,14	-	-
REF	REFRIGERATOR	B047	120/1	-	-	0.5	SFP	SFP	N	CB	20	1	2	12	12	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,14	-	-

ABBREVIATIONS:

N = NORMAL BRANCH
LS = ARTICLE 517, LIFE SAFETY BRANCH
CR = ARTICLE 517, CRITICAL CARE BRANCH
EQ = ARTICLE 517, EQUIPMENT BRANCH
700 = ARTICLE 700, EMERGENCY BRANCH
701 = ARTICLE 701, LEGALLY REQUIRED STANDBY BRANCH
702 = ARTICLE 702, OPTIONAL STANDBY BRANCH

UPS = UNINTERRUPTIBLE POWER SUPPLY
OCPD = OVERCURRENT PROTECTIVE DEVICE
CB = CIRCUIT BREAKER
F = FUSE
BOL = BUILT-IN OVERLOAD
CS = COMBINATION MOTOR CONTROLLER
ECM = ELECTRICALLY COMMUTATED MOTOR

MAG = MAGNETIC MOTOR CONTROLLER
MAN = MANUAL MOTOR CONTROLLER
RVS = REDUCE VOLTAGE MOTOR CONTROLLER
SS = SOLID STATE MOTOR CONTROLLER
VFD = VARIABLE FREQUENCY DRIVE
IU = IN UNIT
NU = NEAR UNIT

OU = ON UNIT
EC = ELECTRICAL CONTRACTOR
FS = FOOD SERVICE EQUIP. CONTRACTOR
GC = GENERAL CONTRACTOR
MC = MECHANICAL CONTRACTOR
MFR = MANUFACTURER
OWN = OWNER

PC = PLUMBING CONTRACTOR
SA = SEE ARCHITECTURAL DETAILS
SD = SEE DRAWINGS
SFP = SEE FLOOR PLANS
SFS = SEE FOOD SERVICE PLANS
WP = WEATHERPROOF

OPTIONS:

1 = SINGLE RECEPTACLE
2 = DUPLEX RECEPTACLE
3 = DIRECT CONNECTION
4 = NON-FUSIBLE DISCONNECT
5 = FUSIBLE DISCONNECT
6 = WEATHERPROOF
7 = LOCKABLE
8 = CONCEALED
9 = TOGGLE SWITCH
10 = VERIFY WITH MANUFACTURER PRIOR TO INSTALLATION
11 = SURFACE MOUNTED
12 = FLUSH MOUNTED
13 = GFI RECEPTACLE
14 = GFI BREAKER
15 = LOCKABLE MOTOR RATED SWITCH
16 = SHUNT TRIP BREAKER

EQUIPMENT SCHEDULE GENERAL NOTES:

1. ALL WORK BY THIS CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE AND NATIONAL CODES.
2. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHER TRADES TO AVOID CONFLICTS AND TO VERIFY ALL EQUIPMENT CONNECTION REQUIREMENTS.
3. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COMPLETE ELECTRICAL SYSTEM PER CONTRACT DOCUMENTS AND ENSURING THE SYSTEM IS OPERATIONAL UPON JOB COMPLETION.
4. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COMPLETE ELECTRICAL SYSTEM FOR ALL OWNER-FURNISHED APPLIANCES IN ACCORDANCE WITH NEC ARTICLE 422 AND 440.22.
5. THIS CONTRACTOR SHALL PROVIDE ALL BRANCH CIRCUIT WIRING IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE AND THESE PROJECT DOCUMENTS.
6. PROVIDE ALL POWER WIRING INCLUDING ALL CIRCUITRY CARRYING ELECTRICAL ENERGY FROM PANELBOARD OR OTHER SOURCE THROUGH STARTERS AND DISCONNECTS TO MOTORS, PACKAGED EQUIPMENT, OR PACKAGED CONTROL PANELS. PROVIDE ALL WIRING BETWEEN CONTROL PANELS AND MOTORS. INCLUDE STARTERS, DISCONNECTS, AND OVERLOAD PROTECTION IF NOT INCLUDED IN SPECIFICATIONS. COORDINATE WITH EQUIPMENT SUPPLIER.
8. PROVIDE A SEPARATE GREEN GROUND FOR EACH MOTOR AND EQUIPMENT CONNECTION ROUTED BACK TO INTEGRAL GROUND BUS OF ASSOCIATED PANELBOARD OR MOTOR CONTROL CENTER. GROUND CONDUCTOR SIZES PER NEC ARTICLE 250.122.
9. PROVIDE A 20 AMP, 125V WEATHER-RESISTANT GFCI RECEPTACLE WITH A WEATHERPROOF IN-USE ENCLOSURE MOUNTED ADJACENT TO ALL HEATING, AIR CONDITIONING AND REFRIGERATION EQUIPMENT INSTALLED ON THE EXTERIOR OF THE BUILDING OR ROOFTOP.
10. VERIFY ELECTRICAL REQUIREMENTS INCLUDING VOLTAGE, HORSEPOWER, STARTER TYPE, AND DISCONNECTING MEANS FOR MOTORS AND EQUIPMENT PRIOR TO ORDERING CIRCUIT BREAKERS, DISCONNECT SWITCHES, AND STARTERS.
11. THE SHORT CIRCUIT CURRENT RATING (SCCR) IS THE MINIMUM CALCULATED VALUE AT THE UPSTREAM OVERCURRENT PROTECTIVE DEVICE. THE RESPECTIVE CONTRACTOR PROVIDING ANY MOTOR CONTROLLERS, CONTROL PANELS, FUSIBLE DISCONNECT SWITCHES, ETC. ASSOCIATED WITH THIS PIECE OF EQUIPMENT SHALL PROVIDE EQUIPMENT WITH LISTED SHORT CIRCUIT CURRENT RATINGS. EQUIPMENT NAMEPLATE SHALL CLEARLY INDICATE THE UL LISTED SCCR RATING FOR THE EQUIPMENT.

EQUIPMENT SCHEDULE NOTES:

1. PROVIDE QUAD RECEPTACLE. COORDINATE RECEPTACLE LOCATION WITH FURNITURE VENDOR. WIRING TO RECEPTACLE SHALL ROUTE THROUGH THE FURNITURE VENDOR PROVIDED TELE/POWER POLE AT EACH WORKSTATION.
2. COORDINATE RECEPTACLE LOCATION WITH FURNITURE VENDOR. WIRING TO RECEPTACLE SHALL ROUTE THROUGH THE FURNITURE VENDOR PROVIDED TELE/POWER POLE AT EACH WORKSTATION.

LIGHT FIXTURE SCHEDULE

ID	FIXTURE DESCRIPTION	TYPE	NO.	LIGHT SOURCE DESCRIPTION	WATTS	K	CRI (MIN.)	BALLASTS/DRIVERS TYPE	CONTROL	CIRCUITS	INPUT WATTS	VOLT	MOUNT	SURFACE TYPE	FIXTURE DEPTH	FIXTURE SPECIFICATION AND ACCEPTABLE MANUFACTURERS MANUFACTURER	CATALOG SERIES	OPTIONS	SEE NOTE
AA	2X4 TROFFER PATTERNED 12, FROSTED ACRYLIC, .125" THICK	LED	-	4200 DELIVERED LUMENS	35	4000	80	DR	SW	1	35	MVOLT	R	LG	<4"	METALUX	24GR-LD5-42-F-125-UNV-L840-CD-1-PAF-U	1	1A
AN	2X4 VOLUMETRIC TROFFER ANGLED LENS WITH CENTER METAL ACCENT	LED	-	4500 DELIVERED LUMENS	38	4000	80	DR	DM1	1	38	MVOLT	R	LG	<4"	METALUX	24EN-LD2-45-UNV-L840-CD1-U	1	1A
AN1	2X4 VOLUMETRIC TROFFER ANGLED LENS WITH CENTER METAL ACCENT	LED	-	DELIVERED LUMENS	38	4000	80	DR	DM1	1	38	MVOLT	R	LG	<4"	METALUX	24EN-LD2-45-UNV-L840-CD1-U	1	1A,2
CN	2X2 VOLUMETRIC TROFFER ANGLED LENS WITH CENTER METAL ACCENT	LED	-	3900 DELIVERED LUMENS	33	4000	80	DR	DM1	1	33	MVOLT	R	LG	<4"	METALUX	22EN-LD2-39-UNV-L840-CD-1-U	1	1A
DA	4" APERATURE ROUND DOWNLIGHT WIDE 65 DEG. DISTRIBUTION, HIGH EFFICIENCY TEXTURED LENS.	LED	-	1000 DELIVERED LUMENS	9	4000	80	DR	DM1	1	9	MVOLT	R	LG	<5"	ALPHABET	NU4-RD-SW-10LM-40K-80-65D-HET- *TRIM*-*BEZEL*-NC-UNV-DIM10	28,48	1B
DA1	4" APERATURE ROUND DOWNLIGHT WIDE 65 DEG. DISTRIBUTION, HIGH EFFICIENCY TEXTURED LENS.	LED	-	2000 DELIVERED LUMENS PER FT.	17	4000	80	DR	DM1	1	17	MVOLT	R	LG	<5"	ALPHABET	NU4-RD-SW-20LM-40K-80-65D-HET- *TRIM*-*BEZEL*-NC-UNV-DIM10	28,48	1B
FC	4' STRIPLIGHT ROUND FULL FROSTED LENSED SHIELDING WIDE DISTRIBUTION	LED	-	4100 DELIVERED LUMENS	35	4000	80	DR	SW	1	35	MVOLT	SUSP	ES	-	METALUX	4SNLED-LD5-41SL-LW-UNV-L840-CD1-U	1	1A
UB	22" NOMINAL UNDERCABINET SOLID FRONT; INTEGRAL ROCKER SWITCH	LED	-	755 DELIVERED LUMENS PER FT.	11	4000	80	DR	SW	1	11	120	S	CAB	-	AFX LIGHTING	NLLP2-22WH	28,54	1C
XHE	EXIT SIGN - SINGLE FACE THERMOPLASTIC HOUSING UNIVERSAL MOUNTING	LED	-	IN UNIT	3	-	-	-	-	-	3	277	S	V	-	ISOLITE	RL-EM-*ILLUMINATION*-U- *FRAME COLOR*-MTEB-SD	61,62,64,66	1D
XJE	EXIT SIGN - DOUBLE FACE THERMOPLASTIC HOUSING UNIVERSAL MOUNTING, INTEGRAL BATTERY	LED	-	IN UNIT	3	-	-	-	-	-	3	277	S	V	-	ISOLITE	RL-EM-*ILLUMINATION*-U- *FRAME COLOR*-MTEB-SD	61,62,64,66	1D
XSE	2 HEAD EMERGENCY BATTERY UNIT SELF DIAGNOSTICS STANDARD OUTPUT, INTEGRAL BATTERY	LED	-	IN UNIT	2	-	-	-	-	-	2	277	S	V	-	ISOLITE	RLZLED-2-WH-MBC	64	1D

NOTE:
SEE SPECIFICATION SECTIONS 26 50 00 FOR ADDITIONAL INFORMATION REGARDING LIGHTING FIXTURE AND INSTALLATION REQUIREMENTS. PROVIDE OPTIONS AND ACCESSORIES REFERENCED BY THE COLUMN TITLED "OPTIONS".
MANUFACTURERS AS ACCEPTABLE SHALL MEET ALL REQUIREMENTS AND FEATURES INDICATED. ACCEPTABLE MANUFACTURERS MUST MEET THE PHOTOMETRIC PERFORMANCE OF THE LISTED UNIT.

ABBREVIATIONS:

AR = AS REQUIRED
BL = BI-LEVEL SWITCHING
BT = BLUETOOTH
CAB = UNDERCABINET
CL = CLEAR
DALI = ADDRESSABLE, DIMMING <1-100%
DM0 = LED DIMMING 0-10V, 0 -100%
DM1 = LED DIMMING 0-10V, 1 -100%
DM5 = LED DIMMING 0-10V, 5 -100%
DM10 = LED DIMMING 0-10V, 10 -100%
DMW = DIM TO WARM LED

DMX = ADDRESSABLE, DIMMING <1-100%
DR = DRIVER
DW = DRYWALL
ELV = ELECTRONIC LOW VOLTAGE DIMMING
EM = EMERGENCY
ES = EXPOSED STRUCTURE
ET = ELECTRONIC BALLAST
F = FLUORESCENT
FD1 = FLUORESCENT DIMMING 1-100%
FD5 = FLUORESCENT DIMMING 5-100%

FD10 = FLUORESCENT DIMMING 10-100%
GRD = GRADE
H = HID
HAL = HALOGEN
HBF = HIGH BALLAST FACTOR
I = INCANDESCENT
LBF = LOW BALLAST FACTOR
LG = LAY-IN GRID
MLV = MAGNETIC LOW VOLTAGE DIMMING
NBF = NORMAL BALLAST FACTOR

OT = OTHER
PD = PENDANT
POE = POWER OVER ETHERNET
PL = PLASTER
PS = PULSE START
R = RECESS
RGB = RED, GREEN, BLUE LEDS
RM = REMOTE
S = SURFACE
SPEC = SPECIAL
ST = STANDARD

STN = STONE
SUSP = SUSPENDED
SW = SWITCHING
T = CERAMIC/GLASS TILE
TW = TUNABLE WHITE LED
V = VARIES
W = WALL MOUNTED
WD = WOOD
WR = WIRELESS
XFMR = TRANSFORMER

OPTIONS:

1 = POST PAINTED FINISH
2 = REGRESSED ALUMINUM DOOR FRAME
3 = FLAT STEEL DOOR FRAME
4 = FLAT ALUMINUM DOOR FRAME - MITERED CORNERS
5 = STAINLESS STEEL TRIM AND DOOR FRAME
6 = FURNISH WITH SPRING LOADED LATCHES
7 = FURNISH WITH HINGED DOOR
8 = DAMP LOCATION CONSTRUCTION
9 = WET LOCATION CONSTRUCTION
10 = IP65 RATING
11 = IP66 RATING
12 = IP67 RATING
13 = NEMA 4X RATED
14 = IC RATING
15 = ADA COMPLIANT
16 = DOUBLE GASKETED-LENS TO TRIM TO CEILING
17 = TRIPLE GASKETED-LENS TO DOOR TO HOUSING TO CEILING
18 = FURNISH WITH TAMPER RESISTANT HARDWARE
19 = AIR TIGHT
20 = SPARE

21 = FURNISH WITH AIR HANDLING CAPABILITY
22 = FURNISH WITH WIRE GUARD
23 = FURNISH WITH ENDCAPS
24 = FURNISH IN LENGTH AS SHOWN
25 = FURNISH WITH SOLID FRONT
26 = FURNISH WITH DUST COVER
27 = CUSTOM FINISH - SELECTION TBD
28 = STANDARD FINISH - SELECTION TBD
29 = FURNISH WITH HOUSE SIDE SHIELD
30 = FURNISH IN CUSTOM CONFIGURATION-REFER TO PLANS
31 = SPARE
32 = FURNISH WITH POWER OVER AIRCRAFT CABLE
33 = FURNISH WITH CHAIN MOUNTING
34 = FURNISH WITH RIGID STEM MOUNTING
35 = FURNISH WITH SWIVEL CANOPY
36 = FURNISH WITH ADJUSTABLE AIRCRAFT CABLE MOUNTING
37 = FURNISH WITH ADJUSTABLE MOUNTING HARDWARE
38 = FURNISH WITH MANUFACTURER'S CUSTOM JUNCTION BOX
39 = FURNISH RECESSED SLOPE ADAPTER
40 = FURNISH WITH CORD MOUNTING

41 = MATTE DIFFUSE LOW IRIDESCENT REFL.
42 = FURNISH WITH SYMMETRICAL REFLECTOR
43 = FURNISH WITH ASYMMETRICAL REFLECTOR
44 = FURNISH WITH TOP AND BOTTOM LENS
45 = FURNISH WITH LOUVER
46 = FURNISH WITH PERFORATED DIFFUSER
47 = FURNISH WITH EGGCRATE LOUVER
48 = FURNISH WITH SOFTENING LENS
49 = FURNISH WITH PRISMATIC LENS
50 = FURNISH WITH LINEAR SPREAD LENS
51 = FURNISH WITH SPREAD LENS
52 = SPARE
53 = SPARE
54 = FURNISH WITH ROCKER SWITCH
55 = FURNISH WITH INTEGRAL OCC. SENSOR
56 = FURNISH WITH INTEGRAL DAYLIGHT SENSOR
57 = FURNISH WITH INTEGRAL PHOTOCELL
58 = FURNISH WITH REMOTE DRIVER
59 = FURNISH WITH CURRENT LIMITING DEVICE
60 = FURNISH QUANTITY OF DRIVERS AS REQUIRED

61 = FURNISH WITH UNIVERSAL ARROWS AND RED OR GREEN STENCIL FACE
62 = FURNISH WITH FIELD ADJUSTABLE CHEVRONS
63 = FURNISH WITH MIRRORED BACKGROUND
64 = FURNISH WITH INTEGRAL BATTERY
65 = FURNISH WITH INTEGRAL HIGH CAPACITY BATTERY (FOR REMOTE HEADS)
66 = FURNISH WITH SELF DIAGNOSTICS
67 = FURNISH WITH AUXILIARY EMERGENCY BATTERY BALLAST/DRIVER
68 = SPARE
69 = SPARE
70 = SPARE
71 = FURNISH WITH ANTI-MICROBIAL FINISH
72 = CERTIFIED FOR MIL-STD461F
73 = FURNISH WITH RF NOISE SUPPRESSORS (ADVANCE RIF-1) FOR EACH DRIVER
74 = FURNISH WITH ACRYLIC LENS WITH INTEGRAL RFI SHIELDING
75 = FURNISH WITH LOW VOLTAGE CONTROL (LVC)
76 = SPARE
77 = SPARE
78 = SPARE
79 = SPARE
80 = SPARE

GENERAL NOTES:

- VERIFY CEILING T-BAR WIDTH (I.E. 9/16", 15/16", 1.5") WITH THE ARCHITECT/INTERIORS SPECIFICATION PRIOR TO ORDERING LAY-IN FIXTURES.
- IN ALL INSULATED OR FIRE RATED CEILINGS, THE EC SHALL BE RESPONSIBLE FOR THE PROPER TENTING (OR FIRE BOXING) OF THE RECESSED FIXTURES. FOR PREFAB PRODUCTS REFER TO TENMAT OR SPECIALTY PRODUCTS AND INSULATION.
- VERIFY DIMMING BALLAST / DRIVER COMPATIBILITY WITH DIMMING CONTROL.
- REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION AND MOUNTING HEIGHT.
- TO MEET SPECIFIED DELIVERED LUMEN PACKAGE PROVIDE PROGRAMMED DRIVER AS REQUIRED.
- FIXTURE PERFORMANCE TOLERANCES: CCT +/- 200 DEGREES; DELIVERED LUMENS +/- 5%; ENERGY CONSUMPTION +/- 5%; BEAM SPREAD DISTRIBUTION +/- 5 DEGREES AND AS OUTLINED IN 26 50 00.
- IF SUBMITTING A FIXTURE FOR APPROVAL AS AN EQUAL, PROVIDE CUT SHEET AND IES PHOTOMETRIC FILE PRIOR TO BIDDING. A WORKING SAMPLE OF THE FIXTURE IS REQUIRED FOR APPROVAL BY THE A/E.

LIGHT FIXTURE SCHEDULE NOTES:

1. MANUFACTURERS, PRODUCTS, AND DESCRIPTIONS LISTED IN THE LIGHTING FIXTURE SCHEDULE ARE THE BASIS OF DESIGN SPECIFICATION FOR EACH FIXTURE TYPE. EQUAL PRODUCTS WILL BE ENTERTAINED UNLESS OTHERWISE NOTED. ALL PROPOSED EQUAL PRODUCTS ARE REQUIRED TO MEET OR EXCEED ALL OF THE SPECIFICATION REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE INCLUDING BUT NOT LIMITED TO: PRODUCT GRADE, LIGHT SOURCE TECHNOLOGY, CONTROL TECHNOLOGY, OPTICAL PERFORMANCE (DELIVERED LUMENS OR CBCP), DISTRIBUTION, FIXTURE ACCESSORIES, CONSTRUCTION, DIMENSIONS, MOUNTING, FINISH, ENERGY PERFORMANCE, AND LISTINGS/RATINGS.

   THE SPECIFIER HAS EVALUATED ALL OF THE MANUFACTURERS LISTED BELOW AND CONSIDERS THESE MANUFACTURERS TO BE OF A QUALITY THAT MEET GENERAL SPECIFICATION REQUIREMENTS FOR THE CATEGORY OF PRODUCT UNDER WHICH THEY ARE LISTED. ALTHOUGH MANUFACTURERS ARE LISTED BELOW IT DOES NOT ENSURE THAT THEY HAVE PRODUCTS THAT MEET ALL OF THE SPECIFICATION REQUIREMENTS FOR EACH FIXTURE TYPE. IT MEANS THAT THESE MANUFACTURERS HAVE ALREADY BEEN EVALUATED AND HAVE PRODUCTS THAT SHALL BE REVIEWED FOR APPLICABILITY AS EQUALS. MANUFACTURERS THAT ARE NOT LISTED BELOW WILL REQUIRE A WORKING SAMPLE FOR SPECIFIER TO REVIEW IN ORDER TO BE EVALUATED FOR APPLICABILITY.

   THE BURDEN OF MEETING THE BASIS OF DESIGN SPECIFICATION IS ON THE DISTRIBUTOR QUOTING THE PROJECT. DETERMINATION OF EQUIVALENCY IS THE RESPONSIBILITY OF THE SPECIFIER. EVEN IF A PROPOSED EQUAL PRODUCT IS FROM ONE OF THE MANUFACTURERS LISTED BELOW, IF IT DOES NOT MEET THE BASIS OF DESIGN SPECIFICATION REQUIREMENTS THEN IT WILL BE REJECTED. THERE SHALL BE NO ADDITIONAL COST ASSOCIATED WITH REJECTION OF A FIXTURE NOT DEEMED EQUIVALENT BY THE SPECIFIER.

   A. COMMERCIAL TROFFERS AND WHITEGOODS: COLUMBIA, CREE, DAYBRITE, DAY-O-LITE, GE CURRENT, HE WILLIAMS, LITHONIA, METALUX, MERCURY, PMC

   B. SPECIFICATION GRADE DOWNLIGHTS / TRACK: 3G, CON-TECH, FOCAL POINT, GOTHAM EVO, HE WILLIAMS, INTENSE MX, JUNO-INDY, LEDRA ALPHABET ECO NU, LIGHTOLIER (CALCULITE), NORA, PORTFOLIO, PRESCOLITE, SPECTRUM, TECH ELEMENT PRO, USA ILLUMINATION (BASIC)

   C. SPECIFICATION GRADE UNDERCABINET: AFX NOBLE PRO, FAILSAFE, HALO, KELVIX UNICAB, TECH LIGHTING AMBIANCE GLYDE

   D. EXIT AND EMERGENCY: BIG BEAM, CHLORIDE, DUAL-LITE, EMERGI-LITE, EVENLITE, HE WILLIAMS, ISOLITE, LITHONIA, MULE, SURE-LITES, UTOPIA

2. PROVIDE (1) VIVE POWERPAK DIMMING MODULE (RMJS-8T-DV-B) PER FIXTURE OF THIS TYPE TO FACILITATE CONTROL WITH SINGLE PEDESTAL PICO WIRELESS CONTROL (LPED1-WH).

VentureArchitects
212 North 25th Street | Milwaukee, WI 53233 | ventarch.com
TELEPHONE [414] 271.3359
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Consultant:

RING & DUCHATEAU CONSULTING ENGINEERS
17400 West Capitol Drive - Brookfield, WI 53045
301 South Blount Street, Suite 101 - Madison, WI 53703
Phone: 414.778.1700 / Fax: 414.778.2360 / rd@ringdu.com
RD Project Number: 224051.01

Project:

OZAUKEE COUNTY
JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

ELECTRICAL SCHEDULES

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:
November 8, 2024

Project No.: 240023.00
Set Type: Final Owner Revi

Sheet No.:
E600

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

PANEL NAME:	E-PA [NEW]	**PANEL LOCATION:**	SFP
FED FROM:	ATS	**BRANCH:**	OP
MAIN SIZE, TYPE, CB TYPE, CB OPTION:	-, MLO, -, -	**VOLTAGE:**	480/277, 3Ø, 4W, WYE
PANEL BUS AMPS:	125	**AIC RATING:**	10kA
PANEL TYPE:	BRANCH PANEL	**MOUNTING, PANEL OPTION:**	SURFACE
MANUFACTURER:	SQUARE D	**MODEL:**	NEHB
PHASE LOAD (KVA):			
PANEL LOAD - CONNECTED:	0.4 (AMPS) 0.4 (kVA)		
PANEL LOAD - NEC DEMAND:	0.6 (AMPS) 0.5 (kVA)		

CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS	CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS
1	15	3		MC	EXISTING LOAD	2	15	3		MC	EXISTING LOAD
3	---	-	---	----------	----------	4	---	-	---	----------	----------
5	---	-	---	----------	----------	6	---	-	---	----------	----------
7	15	3		MC	EXISTING LOAD	8	15	3		MC	EXISTING LOAD
9	---	-	---	----------	----------	10	---	-	---	----------	----------
11	---	-	---	----------	----------	12	---	-	---	----------	----------
13	20	1		MC	EXISTING LOAD	14	20	1		MC	EXISTING LOAD
15	20	1		MC	EXISTING LOAD	16	20	1		MC	EXISTING LOAD
17	20	1		MC	EXISTING LOAD	18	20	1		MC	EXISTING LOAD
19	20	1		MC	LIGHTING	20	20	1		MC	SPARE
21	20	1		MC	EXIT SIGNS	22	20	1		MC	SPARE
23	20	1		MC	SPARE	24	20	1		MC	SPARE
25	20	1		MC	SPARE	26	20	1		MC	SPARE
27	20	1		MC	SPARE	28	25	3		MC	EXISTING LOAD
29	20	1		MC	SPARE	30	---	-	---	----------	----------
31	15	3		MC	EXISTING LOAD	32	---	-	---	----------	----------
33	---	-	---	----------	----------	34					SPACE
35	---	-	---	----------	----------	36					SPACE
37	15	3		MC	EXISTING LOAD	38					SPACE
39	---	-	---	----------	----------	40					SPACE
41	---	-	---	----------	----------	42					SPACE

PANEL NOTES:

PANEL NAME:	B-PA [EXISTING]	**PANEL LOCATION:**	SFP
FED FROM:	MSB/PA	**BRANCH:**	N
MAIN SIZE, TYPE, CB TYPE, CB OPTION:	-, MLO, -, -	**VOLTAGE:**	480/277, 3Ø, 4W, WYE
PANEL BUS AMPS:	100	**AIC RATING:**	10kA
PANEL TYPE:	BRANCH PANEL	**MOUNTING, PANEL OPTION:**	SURFACE
MANUFACTURER:	SQUARE D	**MODEL:**	NEHB
PHASE LOAD (KVA):			
PANEL LOAD - CONNECTED:	1.1 (AMPS) 0.9 (kVA)		
PANEL LOAD - NEC DEMAND:	1.4 (AMPS) 1.1 (kVA)		

CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS	CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS
1	20				EXISTING	2	20	1			EXISTING
3	20	1			EXISTING	4	20	1			EXISTING
5	20	1			EXISTING	6	20	1			EXISTING
7	20	1			EXISTING	8	20	1			EXISTING
9	20	1			EXISTING	10	20	1			EXISTING
11	20	1			EXISTING	12	20	1			EXISTING
13	20	1		MC	LIGHTING	14	20	1			EXISTING
15	20	1			EXISTING	16	20	1			EXISTING
17	20	1			EXISTING	18	20	1			EXISTING
19						20	20	3			EXISTING
21						22	---	-	---	----------	----------
23						24	---	-	---	----------	----------
25						26					
27						28					
29						30					
31						32					
33						34					
35						36					
37						38					
39						40					
41						42					

PANEL NOTES:

PANEL NAME:	UPS-GA [NEW]	**PANEL LOCATION:**	B050
FED FROM:	UPS/BYPASS	**BRANCH:**	OP
MAIN SIZE, TYPE, CB TYPE, CB OPTION:	150A, MCB, MC, -	**VOLTAGE:**	208/120, 3Ø, 4W, WYE
PANEL BUS AMPS:	150	**AIC RATING:**	10kA
PANEL TYPE:	BRANCH PANEL	**MOUNTING, PANEL OPTION:**	SURFACE
PHASE LOAD (KVA):	#REF!		
PANEL LOAD - CONNECTED:	69.6 (AMPS) 25.1 (kVA)		
PANEL LOAD - NEC DEMAND:	48.7 (AMPS) 17.5 (kVA)		

CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS	CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS
1	20	1		MC	RECEPTACLES -OFFICES	2	20	1		MC	FF1
3	20	1		MC	FF1	4	20	1		MC	FF2
5	20	1		MC	FF2	6	20	1		MC	FF1
7	20	1		MC	FF1	8	20	1		MC	FF2
9	20	1		MC	FF2	10	20	1		MC	FF1
11	20	1		MC	FF1	12	20	1		MC	FF2
13	20	1		MC	FF2	14	20	1		MC	FF1
15	20	1		MC	FF1	16	20	1		MC	FF2
17	20	1		MC	FF2	18	20	1		MC	FF1
19	20	1		MC	FF1	20	20	1		MC	FF2
21	20	1		MC	FF2	22	20	1		MC	IT RACK B050
23	20	1		MC	SPARE	24	20	1		MC	SPARE
25	20	1		MC	SPARE	26	20	1		MC	SPARE
27	20	1		MC	SPARE	28	20	1		MC	SPARE
29	20	1		MC	SPARE	30	20	1		MC	SPARE

PANEL NOTES:

PANEL NAME:	E-GA [NEW]	**PANEL LOCATION:**	SFP
FED FROM:	T/EGA	**BRANCH:**	OP
MAIN SIZE, TYPE, CB TYPE, CB OPTION:	60A, MCB, MC, -	**VOLTAGE:**	208/120, 3Ø, 4W, WYE
PANEL BUS AMPS:	60	**AIC RATING:**	10kA
PANEL TYPE:	BRANCH PANEL	**MOUNTING, PANEL OPTION:**	SURFACE
MANUFACTURER:	SQUARE D	**MODEL:**	NQOD
PHASE LOAD (KVA):	#REF!		
PANEL LOAD - CONNECTED:	32.8 (AMPS) 11.8 (kVA)		
PANEL LOAD - NEC DEMAND:	30.3 (AMPS) 10.9 (kVA)		

CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS	CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS
1	20	1		MC	EXISTING LOAD	2	20	1		MC	EXISTING LOAD
3	20	1		MC	EXISTING LOAD	4	20	1		MC	EXISTING LOAD
5	20	1		MC	EXISTING LOAD	6	20	1		MC	EXISTING LOAD
7	20	1		MC	EXISTING LOAD	8	20	1		MC	EXISTING LOAD
9	20	1		MC	EXISTING LOAD	10	20	1		MC	EXISTING LOAD
11	20	1		MC	FF3	12	20	1		MC	EXISTING LOAD
13	20	1		MC	FF3	14	20	1		MC	EXISTING LOAD
15	20	1		MC	FF3	16	20	1		MC	FF3
17	20	1		MC	EXISTING LOAD	18	20	1		MC	FF3
19	20	1		MC	EXISTING LOAD	20	20	1		MC	FF3
21	20	1		MC	EXISTING LOAD	22	20	1		MC	FF3
23	20	1		MC	RECEPTACLES	24					SPACE
25	20	1		MC	FF3	26					SPACE
27	20	1		MC	FF3	28					SPACE
29	20	1		MC	FF3	30					SPACE

PANEL NOTES:

PANEL NAME:	B-GA [EXISTING]	**PANEL LOCATION:**	SFP
FED FROM:	MSB/GA	**BRANCH:**	N
MAIN SIZE, TYPE, CB TYPE, CB OPTION:	-, MLO, -, -	**VOLTAGE:**	208/120, 3Ø, 4W, WYE
PANEL BUS AMPS:	225	**AIC RATING:**	10kA
PANEL TYPE:	BRANCH PANEL	**MOUNTING, PANEL OPTION:**	SURFACE
MANUFACTURER:	SQUARE D	**MODEL:**	NQOD
PHASE LOAD (KVA):			
PANEL LOAD - CONNECTED:	6.4 (AMPS) 2.3 (kVA)		
PANEL LOAD - NEC DEMAND:	6.4 (AMPS) 2.3 (kVA)		

CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS	CIRCUIT #	AMP	POLES	OPTIONS & ACC.	CB TYPE	NAME, DESCRIPTION AND REMARKS
1	20	1			EXISTING	2	20	1			EXISTING
3	20	1			EXISTING	4	20	1			EXISTING
5	20	1			EXISTING	6	20	1			EXISTING
7	20	1			EXISTING	8	20	1			EXISTING
9	20	1			EXISTING	10	20	1			EXISTING
11	20	1			EXISTING	12	20	1			EXISTING
13	20	1			EXISTING	14	20	1			EXISTING
15	20	1			EXISTING	16	20	1	GE	MC	MW
17	20	1			EXISTING	18	20	1		ECB	LIGHTING
19	20	1			EXISTING	20	20	1			EXISTING
21	20	1			EXISTING	22	20	1			EXISTING
23	20	1	GE	MC	REF	24	20	1			EXISTING
25	20	1			EXISTING	26	20	1			EXISTING
27	20	1			EXISTING	28	20	1			EXISTING
29	20	1			EXISTING	30	20	1			EXISTING
31	20	1			EXISTING	32	20	1			EXISTING
33	20	1			EXISTING	34	20	1		ECB	KITCHEN COUNTER RECEPTS
35	20	1			EXISTING	36	20	1		ECB	RECEPTACLES
37	20	1			EXISTING	38	20	1			EXISTING
39	20	1			EXISTING	40	20	1			EXISTING
41	20	1			EXISTING	42	20	1			EXISTING

PANEL NOTES:

Ventures Architects
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Consultant:

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301 South Blount Street, Suite 101 - Madison, WI 53703
Phone: 414.778.1700 / Fax: 414.778.2360 / r-d@ringdu.com
RD Project Number: 224051.01

Project:

OZAUKEE COUNTY
JUSTICE CENTER

Location:
1201 S. Spring St
Port Washington,WI 53074

Key Plan:

Sheet:

ELECTRICAL SCHEDULES

Revisions:

No.	Date:	Description:
1	11/22/24	CB-1

Date:

November 8, 2024

Project No.: 240023.00

Set Type: Final Owner Revi

Sheet No.:

E601

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical Bid)

R & D PROJECT NO. 224051.01
Ozaukee County Justice Center
Dispatch Remodel

ELECTRICAL INDEX

SECTION	NAME
26 05 00	Common Work Results for Electrical
26 05 02	Minor Electrical Demolition for Remodeling
26 05 03	Electrical Equipment Mounting Requirements
26 05 21	Building Wire and Cable
26 05 25	Power Cable Assemblies
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 31	Conduit for Electrical Systems
26 05 34	Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 05 71	Electrical Distribution System Studies
26 08 11	Testing Electrical Systems
26 09 23	Lighting Control Devices
26 22 14	Dry Type Transformers
26 24 16	Panelboards
26 27 26	Wiring Devices
26 28 14	Overcurrent Protective Devices
26 33 53	Static Uninterruptible Power Supply
26 50 00	Interior Luminaires
28 31 06	Fire Alarm System - Intelligent

PREPARED BY

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November 22, 2024

E:\224jobs\224051.01\02-Documents(PDF)\02-Document_Sent\06-BidDocuments\2024.11.22 Final Print Set

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 1 - General Requirements.

1.2 WORK INCLUDED IN THE ELECTRICAL CONTRACT

A. The mention of any article, operation, material, or method requires that the Contractor shall provide same, of quality noted, in the quantity required, and shall perform each operation, in complete accordance with the conditions stated. The Contractor shall provide all material, labor, equipment, and transportation as necessary to complete the project in conformity with the Contract Documents. In general, this work includes everything essential for a complete electrical system in operating order as shown or implied on the drawings or herein-after specified.

B. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be always subject to the Owners and/or A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.

C. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of all equipment and apparatus required to be installed by the Contractor. The Contractor upon completion of the project shall remove all equipment.

D. Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.

E. Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment provided by others.

1.3 CONTRACTOR IDENTIFICATION

A. Wherever in this specification the word "Contractor" appears, either as word or part of a word, it is meant to refer to the Contractor or Subcontractor performing the required work of their respective Divisions.

B. Wherever in this specification the words "man", "men", or their related pronouns may appear, either as words or parts of words, they have been used for literary purposes and are meant in their generic sense to include all humankind - both female and male sexes.

C. Definitions:

1. Provide: Furnish, install, and wire complete and ready for service.
2. Furnish: Responsible for purchasing items and delivery to the jobsite.
3. Install: Responsible for moving and mounting equipment to the final location.
4. Wire: Responsible for final connections, ready for service.
5. Exposed: Exposed to view in any room, corridor, or stairway.
6. This Contractor: The Electrical Contractor, also referred to as The Contractor.
7. The Engineer: Ring & DuChateau, Inc. Brookfield, WI.
8. Code: National, State and Local Electrical codes including OSHA requirements.
9. The Owner's Representative: The individual who the Owner selects as his project representative.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

10. Equals: Manufacturers or methods listed by name in the specifications, on the drawings or in an addendum are equals.
11. Substitution: Any manufacturer or method other than those listed by name in these specifications, on the drawings, or in an addendum.
12. The Architect: Venture Architects
13. Owner: Ozaukee County

1.4 PERMITS, CODES, ORDINANCES, STANDARDS AND SALES TAX

A. Contractor shall obtain and pay for all necessary permits and licenses pertaining to this Division.

B. The Contractor shall comply with National, State, and local Codes, laws, ordinances, and regulations. The requirements of the National Board of Fire Underwriters, OSHA or anything herein specified or shown on the drawings unless noted otherwise.

C. The Contractor shall pay all sales taxes as may be required. The contractor shall confirm with the Construction Manager or General Contractor if the project is exempt from sales taxes.

D. Should any change in the plans and specifications be required to conform with the above, the Contractor shall notify the Architect/Engineer before submitting a Bid. After entering into a contract, the Contractor shall be required to complete all the work necessary to meet the above requirements without extra expense to the Owner.

E. All materials shall be listed by and shall bear the label of an approved Nationally Recognized Testing Laboratory (NRTL) as identified by the United States Occupational Safety and Health Administration (OSHA), per the OSHA Nationally Recognized Testing Laboratory Program. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards, if available, applicable, and approved by the Engineer and the Owner, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system shall be so labeled.

1.5 REGULATORY REQUIREMENTS

A. All work and materials are to conform in every detail to applicable rules and requirements of the codes and standards listed below:

1. AASHTO American Association of State Highway & Transportation Officials.
2. ACI American Concrete Institute.
3. AEIC Association of Edison Illuminating Companies.
4. ANSI American National Standards Institute.
5. ASCE American Society of Civil Engineers.
6. ASHRAE American Society of Heating, Refrigeration and Air-Conditioning Engineers.
7. ASTM American Society for Testing and Materials.
8. DSPS Wisconsin Department of Safety and Professional Services.
9. EPA Environmental Protection Agency.
10. ETL Electrical Testing Laboratories, Inc.
11. IBC International Building Code as adopted by the State of Wisconsin.
12. ICEA Insulated Cable Engineers Association.
13. IEC International Electrotechnical Commission.
14. IECC International Energy Code.
15. IEEE Institute of Electrical and Electronic Engineers.
16. IES Illuminating Engineering Society.
17. ISA Instrument Society of America.
18. LPI Lightning Protection Institute.
19. MFMA Metal Framing Manufacturers Association Standards.
20. MSS Manufacturers Standards Society.
21. NBS National Bureau of Standards.
22. NECA National Electrical Contractors Association.
23. NEMA National Electrical Manufacturers Association.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

24. NETA National Electrical Testing Association.
25. NFPA National Fire Protection Association as adopted by State and/or local codes.
26. NRTL Nationally Recognized Testing Laboratory.
27. TIA Telecommunications Industry Association.
28. UL Underwriter's Laboratories.
29. Other Nationally Recognized Industry Standards.

B. All Division 26 work shall be done under the direction of a currently licensed Master Electrician.

1.6 DRAWINGS

A. The drawings depicting electric work are diagrammatic and show, in their approximate location, symbols representing electrical equipment and devices. The exact location of such equipment and devices shall be established in the field in accordance with instructions from the Architect.

B. The Contractor shall furnish and install all such work, piping, structural supports, electrical wiring and conduit and any other additional equipment for a complete operational system.

C. Unless specifically stated to the contrary, no measurement of an electrical drawing by scale shall be used as a dimension. Dimensions noted on the electrical drawings are subject, in each case, to measurements of adjacent or previously completed work and all such measurements necessary shall be taken before undertaking any work dependent upon them.

D. In the event of a conflict between the drawings and specifications this Contractor shall base his bid on the greater quantity, cost, or quality of the item in question, unless such conflict is resolved by an addendum.

1.7 MATERIALS AND EQUIPMENT

A. All materials and equipment required shall be new and shall be installed per the manufacturer's recommendation.

B. All items specified shall be the latest type or model produced by the manufacturer specified. If descriptive specification or model number is obsolete, substitute current product.

C. Where any specific equipment, materials, process, or method of construction is specified by name or by reference to the catalog number of a manufacturer, the specifications shall be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the drawings.

1.8 SUBSTITUTIONS

A. The Contractor shall follow the substitution process as outlined in the project manual or as described herein. Submission of a request for information, RFI, will be rejected.

B. The Contractor shall provide all supporting data and assume the "burden of proof" that any substitute proposed is equivalent to appearance, construction, capacity and performance.

C. Where an substitute is accepted and the use of such substitute shall require any redesign of structure, foundations, utilities, piping, wiring or of any other part of the architectural, structural, mechanical, plumbing, sitework, or electrical work, the cost of all such redesign, drawings, detailing and accompanying additional costs of any item of work shall be paid for by the Contractor and such redesign shall be subject to the approval of the Architect/Engineer and all authorities having jurisdiction over the work.

D. In any case where the Contractor wishes to use equipment or methods other than those listed by name in the Contract Documents, such equipment shall be considered a substitution and must be approved by the Engineer. To gain approval of substitutions, the Contractor shall submit the following to the Engineer for his review.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Documentation from the equipment manufacturer indicating where this equipment meets and does not meet the specifications or drawings as written. This documentation shall be submitted in letter form and shall include the manufacturer's letterhead.
2. Manufacturer's cut sheets. (3 copies). Cut sheets shall be originals as are contained in the manufacturer's catalog. Cut sheets shall contain all pertinent information for determining equivalency. Photocopies of these sheets will not be accepted for review.
3. In the case of lighting fixtures, the Contractor shall submit photometric data compiled by an independent testing laboratory. Photometric data shall be provided in paper copy and in electronic form in IES format. Provide point by point and other calculations as requested by the Engineer. This data shall contain the independent testing laboratory's label and the manufacturer's letterhead.
4. If requested by the Engineer, the Contractor shall also provide samples of the proposed equipment for the Engineer's review.
5. Evidence shall be furnished in writing with substitution submittals that there is an efficient service organization which regularly carries a stock of repair parts for the proposed equipment and that the organization is conveniently located for prompt service.
6. In each case the Contractor shall furnish any other information or materials as considered necessary by the Architect/Engineer to establish equality.

E. The Contractor shall also affix his review and/or approval stamp to all documentation submitted indicating they are in order and equal to the items specified.

F. Without the above documentation, photometric data, original cut sheets and Contractor's stamp; the submittal will be rejected without review.

G. Any substitution submittals, including samples, shall be received in the Architect/Engineer's office a minimum of ten working days prior to the Bid due date to allow adequate time for review. No consideration will be given to requests for substitution approval not conforming to these requirements.

H. Materials, equipment, or methods of installation other than those named will be accepted only if such materials, equipment, or methods are in accordance with the general requirements and are similar in composition, dimension, construction, capacity, finish and performance.

1.9 SUBMITTALS

A. Provide submittal certified by the original manufacturer, for each item of electrical equipment and appurtenances required for this project, as indicated below:
1. Short Circuit & Coordination Study.
2. Circuit Breakers.
3. Panelboards.
4. Transformers.
5. Disconnect Switches.
6. Fuses.
7. Transfer Switches.
8. Uninterruptible Power Supplies (UPS),
9. Wiring Devices and Coverplates.
10. Multi-outlet assemblies.
11. Cable Tray.
12. Lighting Fixtures.
13. Dimming Systems
14. Lighting Controls.
15. Occupancy Sensors.
16. Fire Alarm Systems.
17. Security Systems.
18. Telecommunications Cabling

B. The Contractor shall submit the Short Circuit & Coordination Study before or with any distribution equipment submittals.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. The Contractor shall affix his review and/or approval stamp to all documentation submitted indicating they are in order and equal to the items specified. The Engineer will reject all shop drawings that lack the Contractor's review and/or approval stamp. The Engineer shall also reject all submittals not reviewed by the Contractor.

D. Submittals shall be sent to the Architect/Engineer for review does not constitute notification of substitution unless specific changes are brought to the attention of the Architect/Engineer.

E. Provide PDF copies of submittals as listed above. Follow the process as outlined in General Requirements and Division 01.

F. Review of submittals shall not be considered as a guarantee of measurements of building conditions.

G. The Engineer's review of submittals shall not relieve the Contractor from the responsibility for any variation from the requirements of the Contract Documents.

H. The Contractor shall submit dimensional drawings for all electrical equipment rooms, requiring working clearances.

I. Failure to provide submittals in ample time for review shall not entitle the Contractor to an extension of contract time or cost, and no claim for extension by reason of such default shall be allowed.

J. Physical dimensions of submittals for review shall not exceed 8-1/2" X 11" unless impossible to illustrate data properly without using a larger sheet.

K. If more than one type of lighting fixture (or other materials) is on a submitted sheet, the Electrical Contractor shall conspicuously check the item submitted with a red pen.

L. The submittals shall reference all equipment designation on the drawings, such as panelboard designations. For equipment without designation, utilize the designation of the load, such as Motor #1 for a motor starter.

M. No materials or equipment subject to prior review by the Engineer shall be fabricated or installed by the Contractor, without such review and approval.

N. The use of the construction drawings as submittals is not acceptable.

O. See other sections of this specification for additional requirements.

1.10 DRAWINGS FOR REVIEW

A. The Contractor shall provide the following drawings at the request of the Engineer or if the Contractor proposes an alternate layout for an electrical/telecommunications room or closet.

B. Provide a 1/4" scaled floor plan of:
   1. Electrical equipment rooms/closets
   2. Electrical systems/communications rooms/closets
   3. Where telecommunications wiring is by the Electrical Contractor:
      a. Detailed layout of each telecommunication room/closet.
      b. Detailed front and rear elevations of each equipment rack(s) installed or modified as part of this project.

C. The drawings shall depict actual room and equipment dimensions, specifically noting the clearance dimensions.

D. The scaled floor plan shall indicate the locations of all electrical distribution equipment along with all other electrical or communications equipment located in the room but not limited to the following:
   1. Paging and miscellaneous sound system equipment.
   2. Fire alarm equipment.
   3. Television distribution equipment.
   4. Nurse call equipment.
   5. Master clock equipment.
   6. Intercom equipment.
   7. Security equipment.

1.11 WORK SEQUENCE AND SCHEDULING

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Install work in accordance with Construction Manager/General Contractor's schedule and to accommodate Owner's occupancy requirements.

1.12 PROJECT MODIFICATIONS

A. Contractor shall submit in writing any requests for modifications to the final drawings and specifications.
B. Documentation depicting modifications that are submitted to the Architect/Engineer for review shall indicate specific changes that are being suggested.

1.13 EXAMINATION OF SITE AND SPECIAL SITE CONDITIONS

A. Before submitting proposals for the work, the Contractor shall have examined the site and be satisfied with the existing conditions under which the work shall be accomplished.
B. No additional compensation shall be allowed the Contractor due to failure to make the above examination or neglect to include all materials and labor required to complete the work.

1.14 CONTINUITY OF EXISTING SERVICES AND SYSTEMS

A. No outages shall be permitted to existing systems except at the time and during the interval specified by the Owner. Obtain written authorization from the Owner. Any outage must be scheduled when the interruption causes the least interference with normal facility schedules and business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.
B. This Contractor shall restore any circuit interrupted because of this work to proper operation as soon as possible. Note that facility operations are on a seven-day week schedule.

1.15 STORAGE OF EQUIPMENT AND MATERIALS

A. Materials shall be stored in accordance with the manufacturer's written instructions to ensure the preservation of their quality and fitness for the project.
B. When considered necessary, the equipment and materials shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and they shall be placed under cover.
C. Stored materials shall be located to facilitate prompt inspection.
D. Equipment and materials shall be stored in approved locations and in a manner to prevent overloading of the building structure.

1.16 CHASES AND RECESSES

A. Contractor shall provide chases and recesses required for the work of this Contract.
B. Coordinate the location of the chases and recesses with all other trades whose work is involved.

1.17 SLEEVES

A. Fire and/or Smoke Rated Walls: Refer to architectural drawings for location and rating of walls. For all penetrations of rated walls, provide a UL listed assembly to maintain the F & T rating of the wall. Refer to section 2.2 for additional requirements.
B. Non-Fire Rated Interior Walls: Sleeves through walls that extend from floor to structural ceiling shall be a metal conduit sleeve extending a minimum of 2 inches beyond the wall. The voids in and around the sleeve shall be filled with sound-batt insulation.
C. Exterior Walls: Refer to section 26 05 31.
D. Floors
   1. Where conduits penetrate rated floors, provide a UL listed assembly or method utilizing a sleeve. The assembly shall maintain the F & T rating of the floor.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Sleeves shall extend a minimum of 4 inches above the floor. Refer to architectural drawings for rating of floors.

2. Where cables not in conduit penetrate rated floors, provide a UL listed assembly or method utilizing a sleeve. The assembly shall maintain the F & T rating of the floor. Sleeves shall extend a minimum of 4 inches above the floor. Sleeves shall be sized for 25% spare capacity. Refer to architectural drawings for rating of floors.
3. Existing floors shall be core drilled after verifying floor construction and location of the core with structural drawings and/or structural engineer.

E. All conduit
F. All sleeves shall be sized for 25% spare capacity.

1.18 CUTTING AND PATCHING

A. All cutting and patching that is necessary for the installation of the work of this Contract shall be provided by this Contractor under the direction and to the satisfaction of the Architect/Engineer unless this work is specified to be the work of the Contractors of other Divisions.
B. No cutting of structural work shall be done without the written consent of the Architect/Engineer being previously obtained in each case, and all such work shall be done in accordance with the Owner's Representative's directions and supervision.
C. All patching shall match adjacent surfaces.
D. Contractor shall, before starting work in areas which requires significant cutting and patching, inspect, and take note of existing conditions along with the Architect/Engineer to avoid later disputes with regard to the condition of the existing surface before work began.

1.19 WATERPROOFING

A. Where any work penetrates waterproof surfaces including roofs, foundations, walls, etc., the Architect/Engineer shall approve the method of installation before the work is started.
B. Contractor shall furnish all necessary sleeves, caulking and flashing as required to make the installation of the work watertight.

1.20 ENERGIZED WORK

A. No work shall be performed on energized equipment or circuits without written authorization from the Owner.

1.21 COOPERATION WITH OTHER TRADES

A. The Contractor shall give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference and/or delays.
B. If the Contractor installs work before coordinating it with other trades, or to cause interference with work of other trades, the Contractor shall make necessary changes in the work to correct the condition without extra charges.

1.22 JURISDICTION OF WORK

A. All work specified or shown for this Division of the work shall be part of this Contract.
B. The event of jurisdiction (as to whether the work shall be installed by another trade) shall not release the work from this Contract.
C. In such occurrence, the original Contractor shall sublet the work to the trade having jurisdiction.
D. The Contractor having jurisdiction shall then be responsible to complete the work in accordance with these drawings and specifications and to the original Contractor of this Division of the work.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1.23 SUPERVISION OF WORK

A. Contractor shall furnish the service of an experienced Superintendent who shall be constantly in charge of the installation of the work together with all Contractors, skilled workman, helpers, and laborers required to unload, transfer, erect, install, connect, adjust, start, operate, and test each system.
B. The Superintendent shall be thoroughly acquainted with and be responsible for the various Contractors' work so that it is properly coordinated and supervised to the satisfaction of the Architect/Engineer.

1.24 DEFECTS

A. Should the Engineer find any portion of the electrical system installed under this Contract that fails to comply with the Contract Documents, the Contractor shall replace the defects or imperfections at the Contractor’s expense. All other work disturbed by the correction of defects or imperfections shall also be corrected at the Contractor's expense.

1.25 PROTECTION OF FINISHED WORK

A. The Contractor shall maintain adequate protection of all contracted work and materials, located either on or off site of the project. Contractor shall protect the work and materials of all other Contractors and the Owner's property from damage arising from work under this Contract.
B. All damages resulting from neglect or refusal of the Contractor to protect such work, materials and property during erection, construction and completion of the project shall be the responsibility of the Contractor.
C. All costs associated with the repair and/or replacement of the damaged work shall be borne by the Contractor responsible for the damage. All repaired and/or replaced work shall be completed to the satisfaction of the Architect/Engineer.

1.26 DAMAGE TO OTHER WORK

A. Contractor shall be held responsible for all damage to other work caused by the work or through the neglect of the Contractor's employees.
B. The Electrical Contractor shall pay all costs for patching and repairing of damaged work and the work shall be performed by the Contractor who installed the work.

1.27 USE OF SYSTEM

A. The use or operation of new work, or any part thereof, even with the consent of the Owner's Representative, shall not be construed to be acceptance of the work, nor shall it be construed to obligate the Owner to accept improper work or defective material.
B. Use of the system does not start the contractor warranty period. The warranty shall start as described in General Requirements and Division 01.

1.28 CLEANING PAINTING AND FINISHING

A. During the progress of the work and when directed by the Architect/Engineer, the Contractor shall remove from the building site rubbish, dirt and other debris caused by performance of the work.
B. The Contractor shall clean all exposed work, the interior and exterior of cabinets and pull boxes, etc., and remove all rubbish and debris resulting from the work.
C. Where painted surfaces of equipment have been damaged or rusted during construction, the Contractor shall paint same to match final.

1.29 TESTS AND ACCEPTANCE

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. The operation of the equipment and electrical systems does not constitute an acceptance of the work by the Owner. The final acceptance is to be made after the Contractor has adjusted his equipment and demonstrated that it fulfills the requirements of the drawings and the specifications.
B. If any device, equipment, or wiring fails the testing specified herein, that item(s) shall be replaced or repaired as directed by the Engineer.
C. Upon completion of the installation, the Contractor shall furnish certificates of approval from all authorities having jurisdiction. He shall demonstrate that all work is complete and in perfect operating condition, with the raceway and conduit system properly grounded, all wiring free from grounds, shorts, and that the entire installation is free from any physical defects. In the presence of the Engineer and the Owner, the Contractor shall demonstrate the proper operation of all miscellaneous systems.

1.30 COMMISSIONING

A. The Contractor shall review the General Requirements and Division 01 for commissioning requirements and include the required labor to facilitate the commissioning in their bid.

1.31 TRAINING

A. Contractor shall provide 4 hours for demonstration and training the Owner of the basic operation installation and maintenance of the electrical systems.
B. Provide additional demonstration and training as detailed in the remaining Division 26, 27 and 28 sections.

1.32 RECORD DRAWINGS

A. The Contractor shall keep a detailed up-to-date record of the following items:
   1. Feeder conduit routing including junction/pull boxes.
   2. Dimensioned drawings indicating all conduits in the slab.
   3. Approximate junction box and branch conduit locations.
   4. Actual circuit numbers, the equipment and devices are connected to.
B. Record drawings shall be maintained throughout the duration of the project and shall reflect all pertinent information. At the time of project completion, the EC shall provide a bond copy and CD ROM copy of the following to the Owner's representative and engineer:
   1. A complete set of original contractor field marked-up record drawings in color scanned PDF format, and bond copy prints.
   2. A complete set of contractor edited, AutoCAD (.DWG format) or Revit (.RVT format) generated PDF format copies of all project sheets, and bond copy prints.
   3. AutoCAD (.DWG format) or Revit (.RVT format) files associated with the record drawings.
C. Record drawings shall be maintained throughout the duration of the project. At the time of project completion, the contractor's as-built field drawings shall be turned over to Ring & DuChateau to be drafted into a complete set of reproducible, AutoCAD (.DWG format) or Revit (.RVT format) generated, bond copy prints reflecting all pertinent information. Ring & DuChateau shall provide electronic and hard copies of the record drawings to the Owner's representative and Contractor.
D. The Contractor shall provide copies of all panelboard directories in pdf format as part of the record drawings.
E. See General Requirements - Division 1, for additional information concerning record documents.

1.33 ELECTRICAL DOCUMENTATION AVAILABILITY

A. On projects when the model is not being shared, the Project Electrical Contractor may obtain digital transfers, which contain the CAD generated electrical drawings from the

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Engineer. Th Project Electrical Contractor shall get signed release from the Architect for the architectural backgrounds prior to the digital transfer of the electrical drawings.

B. The cost will be $100.00 per transfer plus $75 per floor plan drawing.

None

1.34 GUARANTEES AND WARRANTIES

A. Contractor shall guarantee, in writing, that:
   1. All work installed shall be free from all defects in workmanship and materials.
   2. All apparatus shall develop capacities and characteristics specified.
   3. During the period of one year, or as otherwise specified, from date of substantial completion, any defects in workmanship, material or performance appear, the Contractor shall, without cost to the Owner, remedy such defects within a reasonable time as specified in notice from the Owner's Representative.

B. Refer to General Requirements and Division 01.

C. In default thereof, the Owner's Representative shall have the work done and charge the cost of the work to the Contractor.

D. The Contractor shall guarantee that items furnished shall have capacities equal to, or greater than, those specified.

E. Furnish manufacturer's written warranties for all equipment and cabling systems (ie- Commscope, Systimax, Panduit PanGen, etc.), stating effective date of Warranty to the Owner's Representative.

1.35 WORK BY OWNER

A. Not applicable.

1.36 OWNER FURNISHED PRODUCTS

A. The Contractor shall install, and wire Owner furnished products as listed below. The Contractor shall also include receiving the products at the job site and moving the products to their final location. The Contractor shall handle the repair or replacement, with the assistance of the Owner, of any products that are damaged or defective upon receipt. The Contractor shall assume all warranty responsibilities for these Owner furnished products.
   1. Owner furnished products:
      a. None.

1.37 ALLOWANCES

A. See General Requirements or Division 01 for allowance information.

1.38 UNIT PRICES

A. See Division 01 or bidding requirements for unit pricing information.

1.39 ALTERNATES

A. See Division 01 or bidding requirements for applicable alternate bidding information.

PART 2 PRODUCTS

2.1 ACCESS PANELS

A. Manufacturers:
   1. Milcor.
   2. Knapp.
   3. Zurn.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

B. Size: adequate size to permit adjustment or service of concealed devices.
C. Design:
   1. Suitable for installation in the material forming the finished surface.
   2. Flush metal frame.
   3. Flush hinged steel door with flush latch.
   4. Latches:
      a. Screwdriver operated.
      b. Key operated cylinder lock.
      c. Non-key special tamperproof design.
D. UL listed to conform to the fire rating of the surface it is installed in.
E. Panels in acoustic ceiling shall be recessed type, to which tile can be attached flush with the ceiling tile.

2.2 FIRESTOP MATERIALS

A. General
   1. Firestopping materials and/or assembly shall maintain the F (Fire) and T (Temperature) rating of the wall or floor.
   2. Firestopping materials and/or assembly shall maintain the W (Water) rating of the floor.
B. Sealants
   1. Manufacturers:
      a. 3M.
      b. Hilti.
      c. Insta-Foam Products.
      d. Bio Fireshield.
      e. Metacaulk.
      f. Verify with Construction Manager if all contractors shall utilize a single manufacturer of firestop products. Include the cost of that manufacturer in bid.
   2. One-part, intumescent elastomer, UL classified, non-corrosive to metal, and compatible with synthetic cable jackets.
   3. Material shall expand up to 10 times when exposed to flame or heat.
   4. Maximum flame spread and fuel contributed 25 and smoke development of 50 when tested in accordance with ASTM E84.
C. Assemblies
   1. Manufacturers:
      a. Specified Technologies, Inc.
      b. Prior approved equal.
   2. Device shall:
      a. Contain a fire and smoke sealing system that automatically adjusts to the addition or removal of cables.
      b. Contain an internal and external firestopping as required for the fire rating of the wall.
      c. Shall require no maintenance and shall accommodate future cable changes without mechanical adjustment and/or removal or replacement of protective materials.
   3. Be equivalent to E-Z Path Series.
D. T-rating wrap
   1. Wrap shall be equivalent to Hilti CFP-ES endo-shield low bio persistent endothermic mat with foil scrim on both sides.
E. Labels
   1. Self-adhesive label for each penetration. Label shall be equivalent to Hiti Identification Sticker #2096830.
   2. Label shall indicate the following:
      a. UL System installed.
      b. Product(s) utilized.
      c. Date installed.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

d. Contractor name.
e. Installer's name.
f. Company phone number.

PART 3 EXECUTION

3.1 ACCESS PANELS

A. Provide access panels for access to equipment, junction and/or pull boxes or other specialties installed behind wall or above ceiling surfaces.
B. Lay-in tee bar ceilings and snap-in removable metal pan ceilings shall be considered adequate for access.
C. Sublet installation work to subcontractors specifically skilled in the construction of the surfaces involved.
D. Confer with the other Project Contractors with respect to access panel locations and wherever practicable, group devices in such a manner to eliminate as many panels as possible.
E. Remove all markings and labels from access panels.
F. Provide screwdriver operated latches for all access panels except the following specific exclusions:
   1. Public or Secure Areas shall be key operated.
   2. Hourly Rated Surfaces shall be as required by UL.

3.2 FIRESTOP MATERIALS

A. Penetrations through fire and/or smoke rated construction shall be sealed to maintain the rating of the construction in which they occur and shall be UL listed for the rating of the barrier penetrated, the construction type utilized in that barrier and the raceway or cable penetrating the barrier.
B. Provide a label on the wall next to each penetration.
C. Utilize firestop material types as scheduled below:
   1. Conduit through-penetration of rated walls: Putty.
   2. Conduit through-penetration of rated floors: Putty or mortar.
   3. Cable tray through-penetration of rated walls: Bags or pillows.
   4. Cable penetration of rated walls:
      a. Conduit sleeve with firestop plug.
      b. E-Z path assembly or equivalent.
      c. Hilti Speed Sleeve or equivalent.
   5. Junction box membrane-penetration of rated walls: Putty pads.
D. Comply with the manufacturer's requirements for proper installation of firestop materials to obtain the required fire, F & T, and/or smoke rating.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 02
ELECTRICAL DEMOLITION FOR REMODELING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

1.2 SYSTEM DESCRIPTION

A. The purpose of the electrical demolition drawings is to provide the general scope of the electrical demolition required for the project. The electrical demolition drawings may not indicate every lighting fixture, wiring device, panelboard, junction box and etc.

B. The contractor shall include all costs associated with the removal and/or relocation of any electrical item, even if not indicated on the electrical demolition drawings, to facilitate the proposed construction.

1.3 REFERENCES

Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. None required.

3.2 EXAMINATION AND PREPARATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

B. Verify that abandoned wiring and equipment serve only abandoned facilities.
C. Demolition Drawings are based on the best available information at the time of design. Report discrepancies to Architect/Engineer before disturbing existing installation.
D. All materials identified to be salvaged or reused shall be inspected by the Contractor prior to removal. The Contractor shall provide a list of damaged equipment to the Architect/Engineer.
E. Beginning of demolition means contractor accepts existing conditions.
F. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
G. Coordinate utility service outages with Utility Company.
H. Provide temporary wiring and connections to maintain existing systems in service during construction.
I. After completion of demolition, provide permanent wiring and connections to maintain existing systems in service.
J. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire department at least 5 working days before partially or completely disabling system. Minimize outage duration.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Section 26 05 00 and this Section.
B. Remove, relocate, and extend existing installations to accommodate new construction.
C. Remove abandoned wiring to source of supply.
D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
F. Disconnect and remove abandoned panelboards and distribution equipment.
G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
I. Repair adjacent construction and finishes which were damaged during demolition and extension work to match existing conditions.
J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
K. Existing electrical equipment, devices, raceways, etc. which are required to remain but are affected because of the proposed renovation shall be revised/relocated to accommodate the new construction.
L. Extend existing installations using materials and methods as specified.
M. Where conduits penetrate below grade walls, they shall be removed as far as possible, sealed and/or capped to maintain the water integrity of the building envelope.
N. Existing branch conduits may be reused if the conduit meets all current codes regarding wire fill, supporting means etc.
O. In renovated areas where existing ceilings are being removed and a new ceilings are being installed, the electrical contractor shall be responsible for resupporting all existing conduits, boxes, etc. required to remain, per the these specifications and all applicable codes.
P. In renovated areas where new non-accessible ceilings are being installed, the contractor shall have the option of removing or relocating existing junction boxes, conduit and conductors that will be inaccessible or providing access panels for the existing junction boxes.

3.4 SALVAGEABLE EQUIPMENT

A. The Contractor shall dispose of all obsolete material.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.5 BALLAST DISPOSAL

A. The Contractor shall inspect all ballasts in all light fixtures removed as part of this project and take the actions described below.
B. All ballasts labeled as "NON-PCBs" or "NO PCBs" shall be handled as described in this section. If the PCB content is not stated on the ballast label, the ballast shall be handled as a PCB ballast.
C. All PCB ballasts shall have the wires clipped off and the ballasts placed in governmental approved enclosures (drums) and placed in storage in a location within the building as directed by the Owner. The quantity and size of the enclosures (drums) shall be determined by the Contractor. Enclosures (drums) will be provided by the owner. The Contractor shall provide the Owner in written form, a total count of the PCB ballasts.
D. The ballasts are not to be removed from the work site by the Contractor. To do so, would be a violation of governmental hazardous waste regulations.
E. The Contractor shall label and mark the PCB storage enclosures with approved PCB labels and the storage area with signs, marks and lines to meet the regulations of the governing authorities.
F. The Contractor shall also provide approve PCB absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drum.
G. When the ballast demolition is completed and all the PCB ballasts are placed in drums ready to be picked up for disposal, the Contractor shall notify the Owner. The Owner shall make arrangements for pickup and disposal of the PCB ballasts, including the cost of disposal.

3.6 LAMP DISPOSAL

A. The Contractor shall remove all lamps from all luminaires being removed or relocated. The lamps shall be removed intact. The Contractor shall be responsible for any additional charges for broken lamps.
B. The Contractor shall store the lamps in drums or boxes and place in storage in a location within the building as directed by the Owner. The Contractor shall provide the containers. The lamps shall be sorted by type.
    1. Fluorescent
        a. Compact, PL or biax lamps
        b. U shaped lamps
        c. Circline lamps
        d. 2', 3', 4' and 8' straight lamps.
    2. Mercury Vapor
    3. High Pressure Sodium
    4. Low Pressure Sodium
    5. Metal Halide
    6. Incandescent
C. Broken lamps shall be stored in a heavy plastic bag and the bag put into a rigid container. The broken lamps shall be sorted as described above.
D. The Contractor shall provide to the Owner, in written form, a total count of all lamp types, including broken lamps.
E. These lamps are not to be removed from the site by the Contractor. To do so, would be a violation of governmental hazardous waste regulations.
F. When the lamp demolition is complete and all lamps are placed in the containers ready to be picked up for disposal, the Contractor shall notify the Owner. The Owner shall make arrangements for pickup and disposal of the lamps, including the cost of disposal.

3.7 HAZARDOUS SUBSTANCES

A. Ionization smoke detectors: The contractor shall include all the costs associated with disposal of the non-salvaged ionization smoke detectors. Typically, the detectors can be returned to their original manufacturer for disposal of the radioactive element.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

B. Self-luminous exit lights: The contractor shall include all the costs associated with disposal of the non-salvaged self-luminous. Typically, the exit signs can be returned to their original manufacturer for disposal of the radioactive element.
C. PCB-Liquid filled transformers.
   1. Asbestos insulated wire.
   2. Oil immersed equipment.
   3. Other.

3.8 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.
B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.9 INSTALLATION

A. Install relocated materials and equipment under the provisions of the associated specification section(s) for new equipment as if the relocated equipment is new equipment. Example: Relocated luminaries shall be installed per specification section 26 50 00.

3.10 FIELD QUALITY CONTROL

A. Verify all electrical equipment that is shown on the drawings to be demolished and all associated electrical serving it has been removed.

3.11 ADJUSTMENT AND CLEANING

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

3.12 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.13 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 03
ELECTRICAL EQUIPMENT MOUNTING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical equipment mounting height requirements applicable to all Division 26, 27 and 28 sections.

1.2 SYSTEM DESCRIPTION

A. The section provides the standard mounting heights for electrical equipment. Any mounting heights on the architectural or electrical drawings supersede the mounting heights in this section.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. None required
B. For Record Purposes
   1. None required.
C. Operations and Maintenance Manuals
   1. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 MOUNTING HEIGHTS

A. General

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. All mounting heights are to the centerline of the item unless noted otherwise.
2. All equipment installed in this project shall be mounted per the American Disabilities Act (ADA) requirements.

B. Wiring Devices
1. Switches and Switch/Receptacle Combinations: 46 inches above finished floor.
2. Receptacles:
   a. Standard locations: 18 inches above finished floor, unless specifically noted otherwise on floor plans.
   b. Above countertops: Vertically mounted, 46 inches above finished floor.

C. Low Voltage Switching Equipment
1. Switches: 46 inches above finished floor.
2. Relay panels: 72 inches above finished floor to top of enclosure.

D. Disconnect Switches, Enclosed Circuit Breakers and Elevator Distribution Equipment
1. Disconnect switches, enclosed circuit breakers and elevator distribution equipment: 72 inches above finished floor to top of enclosure.

E. Panelboards
1. Panelboards: 84 inches above finished floor to top of enclosure; install panelboards taller than 84 inches with bottom of the enclosure, 4 inches above floor.

F. Transfer Switches
1. Transfer Switches: 72 inches above finished floor to top of enclosure; transfer switches taller than 72 inches shall be floor mounted.

G. Interior Luminaires
1. Fixtures to be mounted at 80" minimum above finished floor to bottom of fixture:
   a. Wall mounted luminaires protruding greater than 4" from wall.
   b. Pendant mounted fixtures located above walkways.
2. See electrical and architectural drawings for additional information further defining mounting height requirements.

H. Fire Alarm System
1. Pull stations: 46 inches above finished floor.
2. Alarm indicating device: 80" above finished floor to bottom of device or 6" below finished ceiling to top of device, whichever is lower.
3. Control panel: 72 inches above finished floor to top of enclosure.
4. Remote annunciator: 60 inches above finished floor to top of enclosure.

I. Security Systems
1. Card Readers and key pads: 46 inches above finished floor.
2. Control panels: 72 inches above finished floor to top of enclosure.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 21
BUILDING WIRE AND CABLE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building wire and cable.
B. Wiring connectors and connections.

1.2 SYSTEM DESCRIPTION

A. Provide the building wire and cabling as indicated on the drawings and specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. As requested by the Engineer, provide a field sample of each size and type cable utilized on this project. Minimum length: 2 feet. This cable shall be an actual sample cut from cable that has been delivered to the job site.
B. For Record Purposes
   1. Accurately record actual sizes, quantity and locations of wire and cables.
C. Operations and Maintenance Manuals
   1. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.
B. Conductors:
   1. Copper – Copper conductors are acceptable for all branch circuits and feeders.
   2. Aluminum – Not allowed.
C. Insulation Voltage Rating: 600 volts, 90 degree Celsius.
D. Insulation

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Interior, Exterior Above or Below Grade: ANSI/NFPA 70; Type THHN/THWN-2 or Type XHHW-2.
2. Interior and served from Isolated Power Systems: ANSI/NFPA 70; XLP Type XHHW-2 insulation. Insulation thickness shall not be less than 1/32" for #10 and #12 AWG and 5/64" for #8 AWG or larger. The dielectric constant of the conductor shall be 3.5 or less.
3. Flexible for Interior or Exterior: ANSI/NFPA 70; Type RHH/RHW-2 insulation.

E. Color coding: Insulation for all conductor sizes shall be colored. Color coding as specified in 26 05 53.

2.2 COMMUNICATIONS CABLES

A. Communications cables shall be the type as called for in the specifications and drawings for the installation of various communications systems.
B. Communications cables installed in cable trays shall be approved for use in cable tray and shall be of fire resistive construction.
C. Cables routed exposed through return air ceiling plenums shall be smoke resistance Teflon coated cable classified as type CLP or CMP communications cable.

2.3 WIRING CONNECTORS

A. Conductors #10 AWG and smaller: Ideal Twister compression type solderless connectors with plastic cover or equivalent. WAGO compact splicing connector with operating lever and transparent housing or equivalent.
B. Splices and taps in conductors #8 AWG and larger: Solderless compression type connectors, tool and die applied, of a type that not loosen under vibration or normal strains. Burndy "Hy-Dent" type or equivalent.
C. For exterior applications,
   1. In above ground appplications: Ideal Weatherproof wire connector, compression type solderless connector with plastic cover and silicone based sealant to protect splice from moisture and corrosion.
   2. In below grade applications: NSi Industries Easy-Splice Gel Splice kits or equivalent.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Store and protect in accordance with manufacturer's instructions.
B. Cable must be stored in a location protected from vandalism and weather.
C. Cable stored outside must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F minimum) location. If necessary, cable will (shall ?) be stored off site at the Contractor's expense.

3.2 EXAMINATION AND PREPARATION

A. Verify that interior of building has been protected from weather.
B. Verify that mechanical work likely to damage wire and cable has been completed.
C. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. General Installation
   1. Identify wire and cable under provisions of Section 26 05 53.
   2. Identify each conductor with its circuit number or other designation indicated on Drawings.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3. Install products in accordance with manufacturer's instructions and NECA "Standard of Installation".
4. Use stranded conductors for control circuits and for wiring served by isolated power systems.
5. Use highly stranded cable for feeders and branch circuits that call for flexible cable on the one line diagram.
6. Use conductor not smaller than 12 AWG for power and lighting circuits.
7. Use conductor not smaller than 16 AWG for control circuits.
8. Voltage drop for branch circuit and feeder circuit combined shall not exceed the requirements of NEC Article 215.
9. Install conductors only when raceway system is complete and building is enclosed and watertight. Pull all conductors into raceway at same time.
10. Route a continuous insulated equipment grounding conductor with all feeder and branch circuits.
11. Route branch circuits and switch legs as dictated by construction, these specifications, or instructions from the Engineer.
12. Use suitable wire pulling lubricant for building wire. Conductors served via isolated power systems shall be installed using a dry lubricant which will exhibit a low dielectric constant, to minimize leakage current.
13. Protect exposed cable from damage.
14. Use suitable cable fittings and connectors.
15. Neatly train and lace wiring inside boxes, equipment, and panelboards.
16. Clean conductor surfaces before installing lugs and connectors.
17. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
18. Circuit numbers shown on the drawings are for the Contractor's estimating purposes and to plan his wiring. Exact circuit numbers shall be selected by the Contractor at his option to provide a balanced load on all phases at panelboards. Panelboard average load shall not differ from phase to phase by ±7-1/2%
19. Provide cable riser clamp in vertical raceways where required by code. All riser clamps shall be accessible for inspection.
20. Cables within switchgear shall be routed in a manner which will allow adequate room for bending and terminating cables. Cables must be secured in a manner which will not result in cable weight being placed on the termination electrical joint. Cable support shall be made in a manner that does not force cable against ground metal or which compresses cable diameter.
21. Use suitable reducing connectors or mechanical connector adapters for connecting existing aluminum conductors to copper conductors.

B. Home Run Installation
1. Use 10 AWG conductors for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.
2. Use 8 AWG conductors for 20 ampere, 120 volt branch circuit home runs longer than 125 feet.
3. Use 10 AWG conductors for 20 ampere, 277 volt branch circuit home runs longer than 150 feet.
4. All branch circuit home run conductors greater than 200 feet, regardless of voltage, shall be sized for a maximum voltage drop of 3%. Home runs are defined for voltage drop purposes as the conductor distance from the panelboard to the first outlet of the network.

C. Feeder Installation
1. Feeder conduits shall not be installed in poured in place concrete.
2. Feeders shall follow the most accessible routes, concealed in construction in finished areas, exposed to the minimum temperature gradient and to minimum temperature fluctuation. Confine feeders to insulated portions of the building, unless otherwise shown.
3. Parallel Feeders
   a. Where multiple raceways are used for a single feeder, each raceway shall contain a conductor of each phase and neutral if used, and grounding conductor, if specified.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

b. Where feeder conductors are run in parallel, conductors shall be of same length, same material, circular-mil area, insulation type, and terminated in same manner.
c. Where parallel feeder conductors are run in separate raceways, raceways shall have same physical characteristics.

4. Each raceway shall contain only those conductors comprising a single feeder circuit.

D. Neutral Conductor Installation

1. The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

3.4 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.
B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. If manufacturer's torque values are not indicated, use the values specified in UL 486A-486B for the application.
C. Verify continuity of each branch circuit conductor.

3.5 ADJUSTMENT AND CLEANING

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 25
POWER CABLE ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal clad cable, Type MC.

1.2 SYSTEM DESCRIPTION

A. Provide power cable assemblies as indicated on the drawings and specified herein.
B. Permitted Uses
   1. Metal clad cable.
      a. Use metal clad cable for power within wood or metal stud walls, in finished areas of the building. Branch circuit home runs and all wiring within the ceiling cavity of corridors shall be complete raceway systems as indicated in specification section 26 05 31.
      b. Use metal clad cable for fire alarm throughout the project except when cable is required to be fire rated or when the cabling is above non-accessible ceilings.
      c. Not allowed.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. As requested by the Engineer, provide a field sample of each size and type cable utilized on this project. Minimum length: 2 feet. This cable shall be an actual sample cut from cable that has been delivered to the job site.
B. For Record Purposes
   1. Accurately record actual sizes, quantity and locations of wire and cables.
C. Operations and Maintenance Manuals
   1. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2.1 METAL CLAD CABLE - POWER

A. Description: NFPA 70, Type MC. Single conductor insulated wire, 2, 3 or 4 conductors with ground in interlocked metal armor.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 90 degrees Celsius.
E. Insulation Material: Type THHN/THWN-2.
F. Armor material: Steel or Aluminum.
G. Jacket: PVC.
H. Color coding:
   1. Insulation for all conductor sizes shall be colored. Color coding as specified in section 26 05 53.
   2. Cable jacket shall be color coded for ease of conductor size identification.

2.2 METAL CLAD CABLE – FIRE ALARM

A. Description: NFPA 70, Type MC. Single conductor insulated wire, 2, 3 or 4 conductors with ground in interlocked metal armor.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 90 degrees Celsius.
E. Insulation Material: Type THHN/THWN-2 for #12 and #14 AWG. Type TFN for #16 and #18 AWG.
F. Armor material: Steel or Aluminum. The armor shall have a red color and labeling to indicate cable is rated for fire alarm applications.
G. Color coding:
   1. Insulation for all conductor sizes shall be colored. Color coding as specified in section 26 05 53.

2.3 POWER CABLE CONNECTORS

A. Metal Box Termination
   1. Metal one or two screw clamp type with locknut. Provide anti-short bushing as required by code and/or by the cable or connector manufacturer.
B. Plastic Box Termination
   1. Cable clamping shall be integral with the box. Refer to section 26 05 34.

2.4 WIRING CONNECTORS

A. Refer to section 26 05 21.

2.5 CABLE SUPPORTS

A. Type MC Cable supports shall be metal one-hole straps for single cables and metal for multiple cables routed together, equivalent to Arlington SMC series.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Store and protect in accordance with manufacturer's instructions.
B. Cable must be stored in a location protected from vandalism and weather.
C. Cable stored outside must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F minimum) location. If necessary, cable shall be stored off site at the Contractor's expense.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.2 EXAMINATION AND PREPARATION

A. Verify that surfaces are ready to receive work.
B. Verify that field measurements are as shown on Drawings and/or are as instructed by the manufacturer.
C. Verify that required utilities are available, in proper location, and ready for use.

3.3 INSTALLATION

A. General
   1. Install products in accordance with manufacturer's instructions
   2. Identify wire and cable under provisions of Section 26 05 53.
   3. Identify each conductor with its circuit number or other designation indicated on Drawings.
   4. Use stranded conductors for control circuits.
   5. Use conductor not smaller than 12 AWG for power and lighting circuits.
   6. Use conductor not smaller than 16 AWG for control circuits.
   7. The voltage drop for the branch circuit and the feeder circuit combined shall not exceed the requirements of NEC Article 215.
   8. Install cables only when the building is enclosed and watertight.
   9. Route branch circuits and switch legs as dictated by construction, these specifications, or instructions from the Engineer.
   10. Protect exposed cable from damage.
   11. Use suitable cable fittings and connectors.
   12. Neatly train and lace wiring inside boxes, equipment, and panelboards.
   13. Clean conductor surfaces before installing lugs and connectors.
   14. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   15. Circuit numbers shown on the drawings are for the Contractor's estimating purposes and to plan his wiring. Exact circuit numbers shall be selected by the Contractor at his option to provide a balanced load on all phases at panelboards. Panelboard average load shall not differ from phase to phase by ±7-1/2%.
   16. Provide cable riser clamp in vertical raceways where required by code. All riser clamps shall be accessible for inspection.
   17. Cables within switchgear shall be routed in a manner which will allow adequate room for bending and terminating cables. Cables must be secured in a manner which will not result in cable weight being placed on the termination electrical joint. Cable support shall be made in a manner that does not force cable against ground metal or which compresses cable diameter.
   18. Use suitable reducing connectors or mechanical connector adapters for connecting existing aluminum conductors to copper conductors.
B. Above ceiling installations
   1. Cables installed above finished accessible ceilings shall be routed parallel and perpendicular to to the building structure.
C. Home Run Installation where cable is allowed for use as a home run.
   1. Use 10 AWG conductors for 20 ampere, 120-volt branch circuit home runs longer than 75 feet.
   2. Use 8 AWG conductors for 20 ampere, 120-volt branch circuit home runs longer than 125 feet.
   3. Use 10 AWG conductors for 20 ampere, 277-volt branch circuit home runs longer than 150 feet.
   4. All branch circuit home run conductors greater than 200 feet, regardless of voltage, shall be sized for a maximum voltage drop of 3%. Home runs are defined for voltage drop purposes as the conductor distance from the panelboard to the first outlet of the network.
D. Feeder Installation
   1. Feeder conduits shall not be installed in poured in place concrete.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2. Feeders shall follow the most accessible routes, concealed in construction in finished areas, exposed to the minimum temperature gradient and to minimum temperature fluctuation. Confine feeders to insulated portions of the building, unless otherwise shown.
3. Parallel Feeders
   a. Where multiple cables are used for a single feeder, each cable shall contain a conductor of each phase and neutral if used, and grounding conductor, if specified.
   b. Where feeder conductors are run in parallel, conductors shall be of same length, same material, circular-mil area, insulation type, and terminated in same manner.
   c. Where parallel feeder conductors are run in separate cables, cables shall have same physical characteristics.
4. Each cable shall contain only those conductors comprising a single feeder circuit.

E. Neutral Conductor Installation
   1. The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

3.4 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.
B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. If manufacturer's torque values are not indicated, use the values specified in UL 486A-486B for the application.
C. Verify continuity of each branch circuit conductor.

3.5 ADJUSTMENT AND CLEANING

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Equipment Grounding Conductors.

1.2 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.3 SUBMITTALS

A. For Approval
   1. None required.
B. For Record Purposes
   1. Accurately record location and sizes of all grounding electrodes.
   2. Accurately record actual size, quantity, and locations of all grounding electrode conductors.
C. Operations and Maintenance Manuals
   1. None required.

1.4 EQUIPMENT DIMENSIONS

A. None required.

1.5 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.6 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 EXECUTION

2.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Accept material on site. Inspect for damage.

2.2 EXAMINATION AND PREPARATION

A. Verify that final backfill, and compaction has been completed before driving rod electrodes.

2.3 INSTALLATION

A. GENERAL
   1. Install products in accordance with manufacturer's instructions.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.
3. Attach grounds permanently before permanent building service is energized.

B. EQUIPMENT GROUNDING CONDUCTORS
1. Install Equipment Grounding Conductor within each feeder and branch circuit raceway. Conductor shall be bonded at each end on suitable lug, bus, or bushing.
2. Install Equipment Grounding Conductor in nonmetallic and flexible conduit to complete equipment ground continuity. Ground wire shall be bonded at equipment and at first junction box of conduit system online side of flexible conduit to the system.
3. The Equipment Grounding Conductors shall be a separate, insulated green conductor. Isolated Equipment Grounding Conductors used in this facility shall be designated by any code approved color and this color shall be consistent throughout.
4. All circuits serving isolated ground receptacles shall be served from a dedicated isolated ground conductor. This conductor is in addition to the green Equipment Grounding Conductor indicated above.
5. Providing grounding in patient care areas to meet requirements of NFPA 99 and ANSI/NFPA 70.

2.4 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of potential method.

2.5 ADJUSTMENT AND CLEANING

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

2.6 START UP/MANUFACTURERS FIELD SERVICES

A. None required.

2.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.
B. Anchors and fasteners.

1.2 SYSTEM DESCRIPTION

A. Provide hangers and support systems for the electrical system.
B. Design of support systems shall be adequate for weight of equipment, conduit and wiring which they carry.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For approval
   1. None required.
B. For record purposes.
   1. As-built/Record Drawings shall accurately indicate the structural components utilized for mounting equipment.
C. Operations and Maintenance Manuals.
   1. Manufacturer's Installation Instructions: None required.
   2. Maintenance Data: None required.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MANUALS

A. Spare Materials
   1. None Required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 METAL SUPPORTING CHANNEL

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Manufacturers:
   1. ABB Kindorf/Superstrut/Steel City.
   2. Elgen Co.
   3. ERICO International Corporation.
   4. Unistrut
   5. Cooper B-Line
   6. Ideal Triddon Group Wesanco

B. Channel Types
   1. Galvanized steel:
      a. Strut shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 and shall be hot-dip galvanized after fabrication in accordance with ASTM A123.
      b. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33, and hot-dip galvanized after fabrication in accordance with ASTM A123.
      c. All hardware shall be stainless steel Type 304 or chromium zinc ASTM F1136 Gr. 3.
      d. All hot-dip galvanized after fabrication products must be returned to point of manufacture after coating for inspection and removal of all sharp burrs.
   2. Epoxy painted steel:
      a. Strut shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS Grade 33, then painted with water born epoxy applied by a cathodic electro-deposition process.
      b. All fittings and hardware shall be zinc plated in accordance with ASTM B633 (SC3 for fittings, SC1 for threaded hardware).
   3. Stainless steel:
      a. All strut, fittings and hardware shall be made of AISI Type 304 or Type 316 stainless steel as indicated.
   4. Accessories as required for supporting attached conduit and equipment.

2.2 LIGHTING FIXTURE SUPPORT

A. Items such as stems, hickeys, bar hangers and clips as required to securely attach fixtures to ceilings or walls.
B. Studs and Unistrut support for fixture outlet and ceiling support.
C. Fixture grid hangers for mounting surface units to exposed grid ceiling.
D. Provide auxiliary support so that the fixtures can be drawn up tightly, cannot be tilted or rotated, and will not be affected by vibrations.

2.3 MOUNTING PANELS

A. Size mounting panels to mount necessary equipment, of ¾ inch fire retardant plywood as indicated on drawings.
B. Provide uniform mounting panels as far as practical.

2.4 CONDUIT SUPPORTS

A. Conduit clamps, straps, supports and similar items shall be steel or malleable iron.
B. One hole straps for conduits 1" and smaller. Two hole straps for conduits larger than 1". Galvanized steel straps for metal conduits and plastic straps for nonmetallic conduits.
C. Where penetrating conduit weight is supported by floor, provide manufactured product or structural bearing collar designed to carry load.
D. Continuous bracket to support the size transformer as indicated on drawings.
E. Spring steel clips with snap-close clamps:
   1. Spring Steel Clip products shall be provided with corrosion resistance and be warranted against failure from corrosion for a period of ten (10) years from date of manufacture.
   2. Conduit clamp shall pivot a full 360 degrees and snap close around the conduit.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Push-in type conduit clamps are not acceptable.
3. Bar joist installation shall require a hammer to install onto the supporting surface.
4. Wall stud installation shall require a fastener to mount clip to the stud.
5. Box/conduit combination hanger shall be supported via a wire or rod.

2.5 ANCHORS

A. General
1. Shall be rated for the building material it is installed and for the load supported.
B. Metal: Zinc-coated or stainless steel insert wedge style for use in concrete or masonry.
C. Nylon: shall be 2 way expansion type with rapid fixing and high pull-out values. Anchor shall have be manufactured to restrict rotation after inserted into hole and not fall out of overhead holes.
D. Powder-Actuated: Provide with threaded steel stud, for use in concrete and masonry construction.

2.6 HARDWARE

A. Corrosion resistant or as noted for each product above.
B. Toggle bolts shall be all steel with springhead.
C. Threaded Rod shall be minimum of 3/8".

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to material and finish.
C. Store in a clean, dry location. Maintain factory packaging and as required, provide additional heavy canvas or heavy plastic cover to protect materials from dirt, water, construction debris and traffic.

3.2 EXAMINATION AND PREPARATION

A. Verify area is ready to receive electrical equipment or materials.
B. Install hangers, supports, and anchors only after structural work, where work is to be installed, has been completed. Correct inadequacies such as proper placement of inserts, anchors, and other building structural attachments.
C. Examine areas and conditions under which equipment and associated components are to be installed and notify Architect, in writing, of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.
D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.3 INSTALLATION

A. General
1. Install products in accordance with manufacturers' instructions.
2. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
3. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
4. Do not use powder-actuated anchors without approval from the Owner.
5. Do not drill or cut structural members without approval from the Architect/Engineer.
B. Mounting Panels
1. Install plywood mounting panels parallel and perpendicular to the structure.
2. Paint plywood with 2 coats of paint without covering the fire retardant label on the plywood.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. Lighting Fixtures
   1. Install channel supports across main grid runners or grid supports, securely tied down or anchored for fixtures and devices mounted in suspended ceiling systems so as not to cause tile to sag and so that fixture or device cannot be lifted, rotated, or displaced. Provide additional support of ceiling grid or tees at those locations where tiles and ceiling grid sags.
   2. Install grid troffer support clips I accordance with NEC 410.

D. Building Attachments
   1. Install building attachments at required locations within concrete or on to structural steel or raceway and equipment support.
   2. Install additional building attachments where support is required for additional concentrated loads.
   3. Install concrete inserts before concrete is placed.

E. Anchors
   1. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment.
   2. Installation methods shall be in conformity with the manufacturer's recommendations for maximum holding power, but in no case shall the depth of hole be less than four bolt diameters. Minimum distance between the center of any expansion anchor and an edge of exterior corner of concrete shall be not less than 42 times the diameter of the hole in which it is installed.

F. Support of Conduit
   1. Fasten conduit to structural parts of building in a manner acceptable to Engineer.
   2. Do not use perforated hanger iron.
   3. Install concrete insert channel as required, with spacings as recommended by manufacturer. Install with anchor and caps, insert joiner clips and closer seals as required.
   4. Support conduit as follows:
      a. Single conduit runs:
         1). Vertical Surfaces: Galvanized, heavy duty, sheet steel straps; back straps to be provided for all exposed conduit and conduit on exterior walls.
         2). Horizontal Surfaces: Galvanized, heavy duty, 2-hole steel pipe straps.
      b. Multiple conduit runs:
         1). Vertical surfaces: Horizontal or vertical rack channel with conduit straps as required.
         2). Horizontal Surfaces: Single or double rack channel trapeze, complete with conduit straps as required; all supported with thread hanger rods.
   5. Roof penetrations:
      a. 13 in. and larger conduit runs passing through floors shall be supported at each floor with riser pipe clamps.
      b. Conduit extending through roof shall not pass through a ceiling box at roof lines.
      c. Provide 14 ga. minimum copper box complete with watertight soldered seams and flanged to serve as pitch pocket for each conduit.
      d. Conduit and pitch pocket shall be installed in advance of roofing work.

G. Vertical Cable Support
   1. Conductors in vertical raceways shall be supported using suitable cable supports. Locate supports every 40 ft 0 in. length of conductor in a vertical raceway or as required by Code.

H. Equipment Closures
   1. Install surface-mounted cabinets and panelboards with minimum of four anchors.
   2. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch (25 mm) off wall.
   3. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.4 SUPPORT PROTECTION

A. In occupied areas, mechanical and electrical rooms and areas requiring normal maintenance access, guard certain equipment to protect personnel from injury.
B. Provide minimum ½" thick Armstrong Armaflex insulation or similar product applied with Armstrong 520 adhesive on lower edges of equipment, including busway, cable tray, pull boxes and electrical supporting devices suspended less than 7 feet above floors, platforms or catwalks in these areas.
C. Protect threaded rods or bolts at supporting elements as described above. Trim threaded rods or bolts such that they do not extend beyond supporting element.

3.5 FIELD QUALITY CONTROL

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

3.6 ADJUSTMENT AND CLEANING

A. Verify all connections are tightened to the proper torque as recommended by the manufacturer.

3.7 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.8 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 31
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.
B. Flexible metal conduit.
C. Electrical metallic tubing.

1.2 SYSTEM DESCRIPTION

A. Provide the conduit for the various electrical systems as specified herein.
B. Any conduit routings shown on Drawings are approximate locations unless dimensioned. Route as required to complete wiring system.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
    1. None required
B. For Record Purposes
    1. Accurately record actual routing of all feeder conduits on record or as-built drawings
    2. Record drawings shall show locations of feeder, branch circuit conduits, junction boxes and other significant items indicating conduit routing.
C. Operations and Maintenance Manuals
    1. Manufacturer's Installation Instructions: None required.
    2. Maintenance Data: None required.

1.5 EQUIPMENT DIMENSIONS

A. Not applicable.

1.6 EXTRA MATERIALS

A. Spare Materials
    1. None required.
B. Maintenance Materials
    1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 GENERAL

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. The products listed under Part 2 - Products are intended as conduit type definitions only. All allowable installation methods and required conduit types for those installations are defined under Part 3 - Execution. All conduit types listed under this section may not be approved for use on this project.

2.2 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.
B. Intermediate Metal Conduit (IMC): Rigid steel ANSI C80.6.
C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit. Fittings shall be liquidtight, threaded with insulated throat and plastic bushing.

2.3 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.
B. Fittings: ANSI/NEMA FB 1. Fittings shall be malleable steel construction, grounding type, two screw clamp type with locknuts and plastic bushing.

2.4 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.
B. Fittings and Conduit Bodies: ANSI/NEMA FB1. Fittings shall be steel, glandular compression type, rain and concrete tight with insulated throat or plastic bushing.
C. Fittings and Conduit Bodies: ANSI/NEMA FB1. Fittings shall be steel set screw type (indenter type are not acceptable) concrete tight with insulated throat or plastic bushing.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Accept conduit on site. Inspect for damage.
B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
C. Protect PVC conduit from sunlight.

3.2 EXAMINATION AND PREPARATION

A. Verify area is ready to receive electrical equipment or materials.
B. Verify routing and termination locations of conduit prior to rough-in.

3.3 INSTALLATION

A. GENERAL
1. Provide a separate raceway system for each of the following:
   a. Normal power wiring.
   b. Generator power wiring.
   c. Emergency power wiring.
2. Minimum size conduit as outlined below:
   a. 1/2 inch, with exceptions as follow:
      1). 3/8" flexible metal conduit and liquidtight flexible metal conduit shall be allowed under the provisions of NEC article 348-20.
   b. 3/4 inch, with exceptions as follows:
      1). Flexible metal conduit and liquidtight flexible metal conduit may be 1/2".
      2). 3/8" flexible metal conduit and liquidtight flexible metal conduit shall be allowed under the provisions of NEC article 348-20.
3. The conduit installation shall be complete prior to installing conductors and cables.
4. Ground and bond conduit under provisions of Section 26 05 26.
5. Identify conduit under provisions of Section 26 05 53.
6. Install conduit in accordance with NECA "Standard of Installation."
7. Cut conduit square using saw or pipecutter; de-burr cut ends.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

8. Bring conduit to shoulder of fittings; fasten securely.
9. Install no more than the equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.
10. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
11. Provide #12 pull wire in each empty conduit except sleeves and nipples.
12. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

B. INDOOR INSTALLATIONS
1. Conduits shall be electrical metallic tubing, with the exceptions as follows:
   a. Feeder conduits 2" I.D. or larger shall be metal conduit.
   b. Conduits containing feeders which are greater than 600 volts shall be metal conduit.
   c. Conduits containing fire rated conductors shall be the manufacturer and type of conduit as required for the fire rating.
2. All conduits shall be concealed in finished spaces.
3. Install conduits above suspended ceiling so that they do not interfere with the removal of the ceiling tile.
4. Conduits may be routed exposed in unfinished areas such as mechanical rooms.
5. Conduits shall be installed within the building envelope, in insulated portions of the building and follow the most accessible routes.
   a. Exception: Conduits installed within and below floor slabs. See the Additional Requirements for Specific Installations section for allowable installations.
6. Conduits shall be concealed in finished areas, and exposed to minimum temperature gradient or fluctuation.
7. Arrange supports to prevent misalignment during wiring installation.
8. Secure conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers, minimum spacing per code.
9. Group related conduits; support using conduit rack. Construct rack using steel channel.
10. Secure conduit supports to building structure and surfaces under provisions of Section 26 05 29.
11. Do not support or fasten conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
12. Do not attach conduit to ceiling support wires.
13. Arrange conduit to maintain headroom and present neat appearance.
14. Route conduit parallel and perpendicular to walls.
15. Maintain adequate clearance between conduit and piping. Route conduit above water, fluid or steam piping wherever possible.
16. Maintain 12 inches (300 mm) of clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C). Do not route conduit over boiler, incinerator, or other high temperature equipment.
17. Final connections to transformers, motors, generators, and other vibration producing equipment shall be made with appropriately sized flexible conduit. Length of flexible conduit connection shall be kept to a minimum.

C. INTERFACE WITH OTHER PRODUCTS
1. Refer to section 26 05 00 for fire stopping requirements.
2. Route conduits through roof openings for piping and ductwork or through an independent roof pipe curb. The roof pipe curb shall be turned over to the roofing contractor for installation. If there is not a roofing contractor for the project, install the roof pipe curb per manufacturers' written instructions.

3.4 FIELD QUALITY CONTROL

A. Verify all conduit is installed properly and securely mounted.

3.5 ADJUSTMENT AND CLEANING

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. All conduit to be painted shall be cleaned per the conduit manufacturer and paint manufacturer requirements.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 34
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall and ceiling outlet boxes.
B. Pull and junction boxes.

1.2 SYSTEM DESCRIPTION

A. Provide the electrical boxes as required for the electrical system and as specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. None required.
B. For Record Purposes
   1. As-built/Record Drawings shall accurately indicate the structural components utilized for mounting equipment.
C. Operations and Maintenance Manuals
   1. Manufacturer's Installation Instructions: None required.
   2. Maintenance Data: None required.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Luminaire Boxes: 4 inch octagon box set flush with finished surface, complete with 3/8 inch fixture stud.
2. Concrete Ceiling Boxes: Concrete type, 4 inch octagon box with minimum 2-1/8 inch depth, complete with 3/8 inch fixture stud.
3. Device Boxes: 4 inch square with raised cover having square corners and internally mounted ears, 1-1/2 inch deep minimum or square corner, galvanized masonry type with internally mounted ears, 2 1/2 inch deep minimum.
4. Box Support Bracket: Sheet metal box support bracket for metal stud walls, B-Line BB4 series or equivalent.

B. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast feralloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.2 PULL AND JUNCTION BOXES

A. General Purpose Junction and Pull Boxes:
1. NEMA OS 1, fabricated from code gauge galvanized steel, with covers held in place by corrosion resistant machine screws.
2. Size as required by code for number of conduits and conductors entering and leaving box.
3. Provide with welded seams, where applicable, and equip with corrosion-resistant nuts, bolts, screws, and washers.

B. Weatherproof Junction and Pull Boxes:
1. Stainless steel or cadmium plated malleable iron cast type with threaded hubs, cast cover, and neoprene gasket.

C. Nonmetallic Junction and Pull Boxes:
1. NEMA OS 2, PVC or PPO thermoplastic, with covers held in place by corrosion resistant machine screws.
2. Size as required by code for number of conduits and conductors entering and leaving box. Provide neoprene gasket for wet or damp box locations.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Accept material on site. Inspect for damage.
B. Protect material from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
C. Protect PVC boxes from sunlight.

3.2 EXAMINATION AND PREPARATION

A. Verify the area is ready to receive electrical equipment or materials.
B. Verify door swings before installing room light control boxes. Install boxes on latch side of room door unless noted otherwise.
C. Verify locations of all floor boxes with Architect prior to rough-in.

3.3 INSTALLATION

A. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Exact location is to be verified and shall be determined by:
1. Construction or code requirements.
2. Conflict with equipment of other trades.
3. Equipment manufacturer's drawings.

B. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
C. Where receptacles and communications outlets are indicated adjacent to each other on the drawings, the outlet boxes shall be physically adjacent to each other and not

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

spaced according to stud spacings. The Contractor shall fabricate box supports to allow all outlet boxes to be mounted adjacent to each other within the same stud space.

D. Minor modifications in the location of outlets and equipment is considered incidental up to a distance of 10 feet, provided the change in location is requested prior to rough-in.

E. Install electrical boxes to maintain headroom and to present a neat mechanical appearance. Locate boxes so as to assure accessibility of electrical wiring.

F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

G. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

H. Install boxes to preserve fire resistance rating of partitions and other elements.

I. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

J. Use flush mounting outlet boxes in finished areas.

K. Do not install flush mounting boxes back-to-back in walls; provide minimum 12-inch separation. Provide minimum 24 inches separation in acoustic rated walls. If back-to-back boxes must be installed, provide acoustical caulk between boxes to avoid sound transmission.

L. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

M. Use stamped steel bridges to fasten flush mounting outlet box between studs.

N. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

O. Use adjustable steel channel fasteners for hanging ceiling outlet boxes.

P. Do not fasten boxes to ceiling support wires.

Q. Support boxes independently of conduit.

R. Use gang box where more than two devices is mounted together. Do not use sectional box.

S. Use 4” square box with plaster ring for single and double device outlets.

T. Use cast outlet box in exterior locations and wet locations.

U. Use handy boxes only where specifically detailed on the drawings.

V. Boxes shall be sized per code to accommodate the number and size of conduit entrances to the box and to accommodate the number of conductors, splices, fittings, etc. within the box. Box extensions used solely to create additional box volume to meet N.E.C. box fill requirements shall be prohibited.

W. Provide additional support for all recessed mounted wall boxes in metal stud walls so that the box will be stabilized in the stud space by utilizing a box support bracket. Provide proper box support based on wall stud size.

X. INTERFACE WITH OTHER PRODUCTS

1. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
2. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.
3. Position outlet boxes to locate luminaries as shown on reflected ceiling plan.

3.4 FIELD QUALITY CONTROL

A. Verify all boxes are securely mounted and properly labeled.

3.5 ADJUSTMENT AND CLEANING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closure in unused box opening.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates and labels.
B. Wire and cable markers.
C. Conduit markers.

1.2 SYSTEM DESCRIPTION

A. Provide the identification for electrical equipment and devices as specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Submit the method of labeling for the wiring device labeling method. Also, submit the method of nameplate labeling for electrical distribution equipment as herein indicated.
B. For Record Purposes
   1. None required.
C. Operations and Maintenance Manuals
   1. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Nameplates: Engraved three-layer laminated plastic. Nameplates for equipment which are served from the normal distribution system shall have black letters on white background. Nameplates for equipment which are served from the emergency distribution system shall have white letters on a red background.
B. Locations:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Each electrical distribution and control equipment enclosure.

C. Letter Size:
1. Use 3/16 inch letters for identifying individual equipment and loads.
2. Use 1/4 inch letters for identifying grouped equipment and loads.

2.2 DEVICE LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch black letters on white background. Use for identification of individual wall switches and receptacles, and control device stations.

2.3 WIRE MARKERS

A. Description: Split sleeve type adhesive markers.
B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.
3. System Circuits: All wiring associated with the various systems shall be identified with the circuit number and type. For example, fire alarm wiring shall be identified as notification circuit (audio and/or visual) and initiation circuits (signaling line or zoned).

2.4 CONDUIT LABELS

A. Manufacturers:
1. W.H. Brady.
2. Seton Nameplate Company.
B. Tape Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings; secure with 2" wide tape with arrows indicating flow.
C. Lettering Size: Minimum 1-1/2” high.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to material and finish. Damaged products will not be installed.
C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect material from dirt, water construction debris and traffic. Wet materials will be unpacked and dried before storage.

3.2 EXAMINATION AND PREPARATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of cable trays. Do not proceed with installation until unsatisfactory conditions have been corrected.
B. Degrease and clean surfaces to receive nameplates and labels.
C. The verbiage utilized for identification purposes shall be the actual names or room numbers as designated by the Owner.

3.3 INSTALLATION

A. Perform Work in accordance with NECA Standard of Installation.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

B. Trays: Capable of supporting a concentrated load of 200 lb at any point, over and above full cable load.
C. Install nameplates and labels parallel to equipment lines.
D. Secure nameplate to equipment front using adhesive.
E. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
F. Conduit Labels:
    1. Install in accordance with manufacturer's instructions.
    2. Locations:
        a. Concealed and exposed conduit.
    3. Pipe Identification:
        a. Identify the following:
            1). System wiring as described in this specification section.
        b. Install label in clear view and align with axis of piping.
    4. Locate identification as follows:
        a. A maximum of 20 feet apart on straight runs including risers and drops.
        b. Adjacent to each junction box and condulet body.
        c. At each side of penetration of structure or enclosure.
        d. At each obstruction, where the conduit is not visible for more that 20 feet.
F. Color Coding for Wiring:
    1. 480 Volt System: Conductors shall be identified brown, orange, and yellow with a gray neutral. (A Phase - Brown, B Phase - Orange, C Phase - Yellow.)
    2. 208 Volt System: Conductors shall be identified black, red and blue with a white neutral. (A Phase - Black, B Phase - Red, C Phase - Blue.)
    3. 240 Volt System: Conductors shall be identified pink, purple and white with red stripe. (A Phase - Pink, Grounded B Phase or neutral - White with Red Stripe, C Phase - Purple.)
G. Junction boxes, pull boxes and equipment shall be stenciled or labeled as follows:
    1. Indicate the panel and circuit number housed within the junction and pull box cover. If box is mounted with cover facing up, indicate panel and circuit number on the side of the box.
    2. Fire Alarm box covers shall be painted red. Indicate the circuits housed within the box and indicate where the circuits originate from; panel or transponder.
H. Exit Lights:
    1. Exit light canopies shall be labeled with the panelboard designation and the circuit number.
I. Receptacle covers shall be labeled with the panelboard designation and the circuit number. Install labels in a neat and concise manner. Handwritten identification is not acceptable.
J. Switches
    1. Switch covers shall be labeled with the panelboard designation and the circuit number.
    2. Install labels in a neat and concise manner. Handwritten identification is not acceptable.
K. Control panels with dedicated line voltage power source shall have a label indicating the panel and circuit number.
L. Fire alarm system devices shall be label with the device number/address. This label shall be affixed to the base of the device, and not the removable head.
M. All conduits associated with the fire alarm systems shall be labeled at each junction box and initiating device location, indicating if the loop conductors housed in this conduit are incoming or exiting loop conductors. The labeling system shall be approved by the owner.
N. Existing Panelboards:
    1. Provide typed circuit directory for each panelboard. The use of adhesive applied directories is not acceptable. The directory shall accurately indicate the types of devices served and the rooms in which the devices are located. The rooms and panelboards shall be designated by the actual name or number designated by the Owner. Revise directory to reflect circuiting changes required to balance phase loads.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

O. Panelboard/Load Center nameplates shall be engraved as follows:
   1. Panelboard Designation: Per the drawings.
   2. The Utilization Voltage: For example, "208/120V 3 PHASE 4 WIRE".
   3. The designation of the panelboard, switchboard, motor control center, etc., from which this panelboard is served.
   4. The room where the source panelboard, switchboard, motor control center, etc., is located. If the source panelboard, switchboard, motor control center, etc. is in the same room, then indicate "THIS ROOM" on the nameplate.
   5. When a panelboard or load center is installed in a public space, confirm with the owner if the nameplate should be installed on the inside of the door for accessing the circuit breaker handles.

P. Disconnect switch and enclosed circuit breaker nameplates shall be installed as follows:
   1. For enclosed circuit breakers in public areas, the nameplates shall be attached to the inside face of the cover. Nameplates for enclosed circuit breakers and disconnect switches in equipment rooms and other non-public areas shall be attached to the outside face of the cover. The lettering on the nameplates shall be engraved with the following information:
      a. The designation of the panelboard, switchboard, motor control center, etc., which this equipment is served from. Utilize the designation per the drawings.
      b. Load served which shall be the next downstream device (panelboard, transformer, transfer switch, motor, etc.). Where the load served is a motor, the HVAC motor designation or other description (i.e. elevator #1) shall be used in lieu of the motor number on the electrical plans.

Q. Automatic and Manual transfer switch nameplates shall be installed as follows:
   1. Provide the transfer switch with an identification plate mounted in approximately the horizontal center of the transfer switch and at approximately eye level. Nameplate shall be engraved as follows:
      a. Designation per the drawings.
      b. The Utilization Voltage: For example, "120/208V 3 PHASE, 4 WIRE".
      c. The designation of the normal and emergency panelboards, switchboards, motor control centers, substations etc., from which this transfer switch is served. Utilize the designation per the drawings.
      d. The rooms where the normal and emergency source panelboards, switchboards, motor control centers, substations etc., are located.
      e. The downstream load served by this transfer switch (panelboard, transformer, motor control center, switchboard substation, etc.). Where the load served is a motor, the HVAC motor designation or other description (ex. elevator no. 1) shall be used in lieu of the electric motor number on the electrical plans.

R. Individually mounted transformers, such as indoor dry type or outdoor pad mounted unit nameplates shall be engraved as follows:
   1. Transformer Designation: Per the drawings.
   2. The designation of the panelboard, switchboard, motor control center, etc., which this transformer is served from.
   3. The room where the source panelboard, switchboard, motor control center, etc., is located if remote from the transformer.
   4. The designation of the panelboard switchboard, motor control center, etc., served by this transformer. Utilize the designation indicated on the drawings.

S. Uninterruptible Power Supply or Lighting Inverters:
   1. Unit Designation: Per the drawings.
   2. The Input Voltage: For example, "480/277V 3 PHASE, 4 WIRE".
   3. The Output Voltage: For example, "120/208V 3 PHASE, 4 WIRE".
   4. The designation of the panelboard or switchboard which this unit is served from.
   5. The room where the source panelboard or switchboard is located if remote from the unit.
   6. The designation of the panelboard or switchboard served by this unit. Utilize the designation indicated on the drawings.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.4 HVAC & PLUMBING EQUIPMENT NAMEPLATES:

1. Install with corrosive-resistant mechanical fasteners or adhesive.
2. Major Equipment Locations:
   a. Pumps (including steam condensate pumps/receivers).
      1). Identify the following on nameplates for steam condensate pumps/receivers:
         a). Equipment served by the pump/receiver.
         b). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
         c). Location of electrical source, building, room number or “this room.”
      2). Identify the following on nameplates for water pumps: HVAC Equipment tag.
   b. Computer Room Units. Identify the following on these nameplates:
      1). Equipment/space served by the computer room unit if the computer room unit is not located within the same space it serves.
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.”
3. Minor Equipment Locations:
   a. Major control components outside panels.
   b. Fire dampers, fire/smoke dampers, smoke dampers, control dampers.
   c. Starters. Identify the following on these nameplates:
      1). Equipment served by starter (i.e.: CHWP-7B, AHU-7B-SAF-1).
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.”
   d. Disconnects furnished by Division 23. Identify the following on these nameplates:
      1). Equipment served by disconnect (i.e.: CHWP-7B, AHU-7B-SAF-1).
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.”
   e. Variable Frequency Drives. Identify the following on these nameplates:
      1). Equipment served by variable frequency drive (i.e.: CHWP-7B, AHU-7B-SAF-1).
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.”
   f. Manual Motor Protectors. Identify the following on these nameplates:
      1). Equipment served by manual motor protector (i.e.: CHWP-7B, AHU-7B-SAF-1).
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5) if not immediately adjacent to the variable frequency drive serving the manual motor protector.
      3). Location of electrical source, building, room number or “this room,” if the variable frequency drive identifying the electrical source location is not immediately adjacent to the manual motor protector.
   g. Fan Powered VAV Boxes. Identify the following on these nameplates:
      1). Space/spaces served by fan powered VAV box if not located within space served.
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.
   h. Fan Coil Units. Identify the following on these nameplates:
      1). Space/spaces served by fan coil units if not located within space served.
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.
   i. Blower Coil Units. Identify the following on these nameplates:
      1). Space/spaces served by blower coil unit if not located within space served.
      2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
      3). Location of electrical source, building, room number or “this room.”

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

j. Cabinet Unit Heaters. Identify nameplates inside the front cover of the unit. Identify the following on these nameplates:
   1). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
   2). Location of electrical source, building, room number or “this room.”
k. Cooling Coil Condensate Pumps.
   1). Equipment served by cooling coil condensate pumps.
   2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
   3). Location of electrical source, building, room number or “this room.
l. Unit Heaters.
   1). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
   2). Location of electrical source, building, room number or “this room.
m. UV Lighting Sections. Identify the following on these nameplates:
   1). Equipment served by UV lighting section.
   2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
   3). Location of electrical source, building, room number or “this room.
n. Temperature Control Panels (TCP) and Temperature Control Power Supply Enclosures. Identify the following on these nameplates:
   1). Building served, floor in which the panel is located, TCP, three digit panel number in sequence (i.e.: CT-LL-TCP-008).
   2). Electrical source and circuit numbers (i.e.: 3BHQ1-1, 3, 5).
   3). Location of electrical source, building, room number or “this room.”

4. Responsibilities of Division 23:
a. Sheet Metal Plate:
   1). Provide a minimum 16 gauge sheet metal plate of adequate size for the information required to be provided on each nameplate for the following devices:
      a). Starters.
      b). Disconnects.
      c). Variable frequency drives.
      d). Manual motor protectors.
      e). UV lighting sections.
      f). Water system pumps.
      g). Heat transfer equipment.
      h). Tanks.
      i). Major control components located outside panels.
      j). Duct mounted humidifier distributors.
      k). Water treatment devices.
      l). Cooling coil condensate pumps.
      m). Round shaped steam condensate pumps/receivers.
   2). Coordinate the size of the sheet metal plate with the Division 26 contractor for those nameplates provided by the Division 26 Contractor.
   3). Permanently affix the nameplate to one of the following:
      a). Equipment support stand provided by division 23 contractor. Provide support stands of adequate size to include the nameplate. Locate the nameplate either above the equipment served or to the side of the equipment served.
      b). Mechanical equipment. The only mechanical equipment to which nameplates may be affixed is as follows:
         1). Square/rectangular shaped steam condensate pumps/ receivers.
         2). Computer room units.
         3). Fan powered VAV boxes.
         4). Fan coil units.
         5). Blower coil units.
         6). Cabinet unit heaters.
         7). Unit heaters.
         8). Air handling units.
         9). Fans.
         10). Fire dampers, fire/smoke dampers, smoke dampers, and

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

control dampers.
11). VAV boxes.
12). Duct mounted silencers.
c). To the wall. Locate the nameplate either above the equipment served or to the side of the equipment served.
d). Under no circumstance shall nameplates be affixed to curved pieces of equipment.

b. Furnish the final HVAC equipment tag numbering information to Division 26 for the following devices:
1). Steam Condensate Pumps/Receivers.
2). Computer Room Units.
3). Starters.
4). Disconnects.
5). Variable Frequency Drives.
6). Manual Motor Protectors.
7). Fan Powered VAV Boxes.
8). Fan Coil Units.
9). Blower Coil Units.
10). Cabinet Unit Heaters.
11). Cooling Coil Condensate Pumps.
12). Unit Heaters.
13). UV Lighting Sections.

c. Provide nameplates associated with the following devices:
1). Air Handling Units.
2). Water System Pumps.
3). Heat Transfer Equipment.
4). Tanks.
5). Fans.
6). Major control components outside panels.
7). Fire dampers, fire/smoke dampers, smoke dampers, and control dampers.
8). VAV Boxes.
9). Duct Mounted Silencers.
10). Duct Mounted Humidifier Distributors.
11). Water Treatment Devices.

5. Responsibilities of Division 23 09 00 Contractor:
a. Furnish the TCP equipment tag numbering information to Division 26 for temperature control panels and temperature control power supply enclosures.
b. Provide nameplates for major control components outside panels (i.e. – duct differential pressure sensing locations, water-side differential pressure transmitters, control dampers, and similar devices).
c. JCI shall provide a typewritten list, letter sized, of all temperature control panels within the facility used by JCI. In addition, provide a PDF file of the typewritten list to the facility.
d. ALC shall provide a typewritten list, letter sized, of all temperature control panels within the facility used by ALC. In addition, a PDF file of the typewritten list shall be provided to the facility.
e. It is the responsibility of each temperature control contractor to maintain their master overall list of all temperature control panels within the facility.
f. Tabulate the following:
1). Indicate once per page the name of the temperature control manufacturer (JCI/ALC).
2). Separate and sort the temperature control panels by floor.
3). Identify the panel number.
4). Identify all controllers located in the panel.
5). Identify the primary purpose of the temperature control panel (i.e.: MRI Chiller, Fire/Smoke Dampers, AHU-17, etc.).

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

6). Under no circumstances shall there be duplicate temperature control panel or temperature control power supply enclosure numbers.

g. Include final panel schedule in O&M Manuals.

6. Responsibilities of Division 26:

a. Provide the nameplates associated with the following devices:

1). Steam Condensate Pumps/Receivers.
2). Computer Room Units.
3). Starters.
4). Disconnects.
5). Variable Frequency Drives.
6). Manual Motor Protectors.
7). Fan Powered VAV Boxes.
8). Fan Coil Units.
9). Blower Coil Units.
10). Cabinet Unit Heaters.
11). Cooling Coil Condensate Pumps.
12). Unit Heaters.
13). UV Lighting Sections.
14). Temperature Control Panels.
15). Temperature Control Power Supply Enclosures.

b. Sheet Metal Plate:

1). The Division 23 contractor shall provide a sheet metal plate of adequate size for the information required to be provided on each nameplate.
2). Coordinate the size of the sheet metal plate with the Division 23 contractor for those nameplates provided by the Division 26 Contractor.
3). Permanently affix the nameplate to the sheet metal plate provided at one of the following:
a). Equipment support stand provided by division 23 contractor. The nameplate shall be located either above the equipment served or to the side of the equipment served.
b). Mechanical equipment. The only mechanical equipment to which nameplates may be affixed is as follows:
1). Steam condensate pumps/receivers.
2). Computer room units.
3). Fan powered VAV boxes.
4). Fan coil units.
5). Blower coil units.
6). Cabinet unit heaters.
7). Unit heaters.
8). Air handling units.
9). Fans.
10). Fire dampers, fire/smoke dampers, smoke dampers, and control dampers.
11). VAV boxes.
12). Duct mounted silencers.
c). To the wall. Locate the nameplate either above the equipment served or to the side of the equipment served.
d). Under no circumstance shall nameplates be affixed to curved pieces of equipment.

3.5 FIELD QUALITY CONTROL

A. Verify all nameplates have the correct equipment designations and room information.
B. Verify all nameplates are securely fastened to the equipment.

3.6 ADJUSTMENT AND CLEANING

A. Clean all nameplates when cleaning equipment. Remove dirt from lettering.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.7 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.8 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 05 71
ELECTRICAL DISTRIBUTION SYSTEM STUDIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short Circuit Study
B. Protective Device Coordination Study
C. Arc-Flash Hazard Analysis

1.2 SYSTEM DESCRIPTION

A. The electrical system short-circuit and protective device coordination studies shall include the following portions of the distribution system associated with this project.
   1. All new distribution system associated with this project.
   2. All the existing distribution equipment as specified herein.
      a. List the required existing equipment
   3. All equipment control panels where both line voltage and controls are present.

B. The electrical system short-circuit and protective device coordination study shall be performed in two phases, a preliminary and a final phase.
   1. Preliminary Report: This is a partial report, and is required to be submitted prior to, or at the same time as, the distribution equipment and overcurrent protective device shop drawings. It is understood that at the time of shop drawings that exact feeder routing and lengths are unknown. The intent of the preliminary submittal is to avoid equipment field changes resulting from interrupting ratings being too low and/or NEC article 700 and 701 selective coordination requirements not being achieved.
      a. Short Circuit Study. Provide a tabular summary of all calculated short circuit ratings based on utility information and estimated feeder lengths. For this report, estimated feeder lengths should be conservative (shorter) than what may be installed in the field. As a minimum, use “point-to-point” dimensions between equipment as located on the drawings, and 10’ floor-to-floor dimensions for vertical runs.
      b. Coordination Study. Provide a coordination study based on overcurrent devices that will be submitted in the distribution equipment shop drawing package. For NEC article 700 and 701 selective coordination requirements, include any overcurrent device changes or recommendations required to meet code required selective coordination requirements. Article 700 and 701 branches are identified on the oneline diagrams and include:
         1). Emergency Branch
      c. Arc Flash Study. Provide a tabular summary of the arc flash calculations at each distribution point, along with the required PPE level.
      d. Comments. Provide an executive summary including any recommended equipment changes necessary to meet all code requirements.
   2. Final Phase: Provide a complete final report as detailed in this specification, based on updated feeder dimensions and approved distribution and overcurrent device shop drawings.

C. Collect field data as required. This shall include gathering information on new and existing motors, length and clarification of new feeders and new device characteristics.

D. The studies shall be accomplished so that circuit breaker and/or relay specification recommendations, this would include all protective relay settings for the medium votlage generators and distribution, are submitted prior to or at the same time as the distribution equipment shop drawings so that the correct relays or circuit breaker options are ordered in a timely manner at no added cost to the Owner.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

E. Perform a short-circuit study using the latest ANSI/IEEE Standards calculation methods and EasyPower or SKM PowerTools software. Provide an electronic copy of all EasyPower or SKM files for the project on a CD.
   1. System connections which result in maximum fault conditions shall be adequately covered in the study.
   2. Short-circuit momentary duty values and interrupting duty values shall be calculated on the basis of assumed three-phase bolted faults, line-to-line faults, line-to-line-to-ground faults, line-to-ground faults, and three-phase-to-ground faults at each switchboard and switchgear bus, transformer, panel boards and significant location in the system. Short circuit study shall also include calculations based upon multiple sources, such as alternate utility sources, system bus ties (in optional system configurations), standby emergency systems, etc.
   3. The short-circuit tabulations shall include symmetrical fault currents and X/R ratios. For each fault location, the total duty on the bus as well as the individual contribution from each connected branch shall be listed with its respective X/R ratio.
   4. Compare the results of the short circuit study with the short circuit ratings of the new and existing equipment (if applicable) to evaluate their capability to withstand and clear a fault condition and provide personnel protection, without heavy damage to the equipment or surroundings. Verify that all equipment is applied within its rating. Provide a report to summarize the data and the results of the short-circuit study. Provide recommendations to adjust or replace equipment that is not properly rated for the available short-circuit current.
   5. Conductor for data table including all feeder characteristics and overcurrent protection.

F. Using the results of the short-circuit study; perform a protective device coordination study for the system described in Section 1.2.A above.
   1. The coordination study shall include computer-drawn coordination curves which illustrate proper relay/breaker settings and fuse size selection to obtain proper coordination and protection of the equipment. The coordination curves shall be drawn on Keuffel and Esser log-log paper #48-5258 or approved computer equivalent.
   2. The plots (no longer than 11" x 17") shall include complete titles, a simplified single-line diagram for the portion of the system being coordinated, significant motor starting characteristics, complete parameters of transformers, minimum melt and total clearing characteristics of fuses, and complete operating bands of low voltage circuit breaker trip curves. The coordination plots shall indicate the type of protective devices selected, proposed relay taps, time dial and instantaneous settings, transformer magnetizing inrush and ANSI withstand curves, cable thermal overcurrent withstand limits, and significant symmetrical and asymmetrical fault currents. A maximum of eight (8) devices shall be shown on any sheet.
   3. All restrictions of the NEC shall be adhered to and proper coordination intervals and separation of characteristic curves shall be maintained.
      a. Normal branches shall be coordinated.
      b. Life Safety, Critical, Equipment, Elevator, and Fire Pump branches shall be selectively coordinated including the following:
         1). Over current protective devices between the utility services and the smallest branch circuit over current protective devices,
         2). Over current protective devices between the generators and the smallest branch circuit overcurrent protective devices.
   4. Separate coordination plots shall be provided for phase devices and ground-fault devices.
   5. The coordination study shall include protective device setting records for each substation, switchgear lineup, switchboard, panelboard, etc. A report shall be provided to summarize the results of the protective device coordination study. The report shall include relay and circuit breaker setting sheets and coordination curves. Recommendations shall be provided including but not limited to missing devices, misapplied devices, NEC violations, or devices that are not providing satisfactory protection and/or coordination.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

G. As part of the studies, a listing of recommended relays, circuit breakers, fuses, etc., including complete ordering information, shall be provided in a timely fashion.

H. The Arc-Flash Hazard Analysis

1. The analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Fault Incident Energy (AFIE) levels and flash protection boundary distances.
2. The analysis shall be performed on conjunction with a short-circuit analysis and a time-current coordination analysis.
3. Results of the analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arching fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
4. The analysis shall be performed under worst-case arch-flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
5. The analysis shall be performed by a registered professional engineer.
6. The analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
7. The analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.
8. The proposed vendor shall demonstrate experience with Arc-Flash Hazard Analysis by submitting names of at least ten actual arc-flash hazard analyses is has performed in the past year.
9. The proposed vendor shall demonstrate capabilities in providing equipment, services and training to reduce arc-flash exposure and train workers in accordance with NFPA 70E and other applicable standards.
10. The proposed vendor shall provide equipment labels in compliance with NEC-2002 Section 110 and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval

1. Within two (2) weeks of award of the Contract, submit resume of the Study Engineer's qualifications.
2. Submit the final report in the quantity dictated by the Architect/Engineer. The final report shall include the following:
   a. Description, purpose, basis, and scope of the study and a single-line diagram of that portion of the power system which is included within the scope of the study.
   b. Tabulations of circuit breakers, fuse, and other protective device ratings versus calculated short circuit duties and commentary on same.
   c. Fault current calculations including a definition of terms and guide for interpretation of computer print-out.
   d. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary on same.

B. For Record Purpose

1. For the Owner
   a. Bound copy of the final approved report. Also provide a pdf copy of the final report as requested by the owner.
2. For the Engineer
   a. Bound copy of the final approved report. Also provide a pdf copy of the final report as requested by the Engineer.
   b. An electronic copy of all SKM Powertools files used in creating the study.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. Operations and Maintenance Manuals
   1. None required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

1.8 QUALIFICATIONS

A. The Contractor shall have the studies performed by qualified Engineers of the switchgear manufacturer or by an Owner-approved consultant. The Contractor is responsible for providing all pertinent information required by the preparers of the studies.
B. The study shall be performed by an engineer registered in the state where the project is located.
C. The final study shall be sealed and signed by the study engineer.
D. The equipment manufacturer or consulting engineer shall specialize in perform short circuit and protection devices studies and shall have a minimum of five years experience.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. None required.

3.2 EXAMINATION AND PREPARATION

A. Examine project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Refer to drawings and the NEC for devices requiring coordination.
B. Proceed with preliminary coordination study only after relevant equipment submittals have been assembled.
C. Final coordination study shall be based on the final approved submittals and the actual equipment supplied for the project.

3.3 INSTALLATION

A. Implementation of the study recommendations shall take place only after the Engineer and Owner's approval.
B. The Contractor shall hire an independent testing contractor to perform protective device calibration and apply prescribed settings. This Contractor shall assist testing contractor by providing work force and materials as required.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. The Contractor shall install and mark the arc flash equipment labels after the short circuit and protective device coordination studies have been completed and implemented. Clean areas of equipment to receive arc flash stickers for proper adhesion of sticker.

3.4 FIELD QUALITY CONTROL

A. Verify all overcurrent protective devices in the study match the devices installed
B. Verify all circuit breaker settings and fuse ratings match the study requirements.

3.5 ADJUSTMENT AND CLEANING

A. Adjust any circuit breaker settings not in compliance with study.
B. Replace any fuses not in compliance with the study.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 08 11
TESTING ELECTRICAL SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Field testing of electrical distribution equipment.

1.2 SYSTEM DESCRIPTION

A. This section specifies the acceptance electrical testing required for the various components of the electrical power system.
B. Refer to the various system specifications for testing requirements of those systems.
C. Prior to energizing equipment, the Electrical Contractor shall perform the tests as specified herein. The Electrical Contractor shall also retain the services of a recognized independent testing contractor for purpose of performing inspections and tests wherever indicated in this Section.
D. All new electrical equipment installed as part of this project shall be tested, where a test is specified herein. Test values shall conform to the equipment manufacturer's recommendations and the latest edition of the NETA Acceptance Testing Specifications.
E. Assure that electrical equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design specifications.
F. The following table will indicate which testing is the responsibility of the Electrical Contractor and the Independent Testing Contractor:

	Responsibility of:	
Item to be tested	**Independent Testing Contractor**	**Electrical Contractor**
General Field Testing		X
Receptacles		X
Branch Circuit Wiring		X
Feeders		X
Grounding	X	
Dry-Type Transformers (600 volts and less primary)	X	
Panelboards	X	
Circuit Breakers - Low Voltage	X	
Transfer Switches	X	
Uninterruptible Power Supplies (UPS)	X	

G. Inspections and tests shall utilize the following references:
   1. Project design specifications.
   2. Project design drawings.
   3. Manufacturer's instruction manuals applicable to each particular apparatus.
   4. Above referenced standards.
H. Electrical Contractor's responsibilities:
   1. Supply a source of test power to independent testing contractor at each test site
   2. Notify the Independent Testing Contractor when equipment becomes available for acceptance tests.
   3. Coordinate work to minimize project delay.
   4. Supply a complete set of electrical drawings, specifications, and pertinent change orders to the Independent Testing Contractor prior to commencement of testing.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

I. Independent Testing Contractor's responsibilities:
   1. Notify Engineer 72 hours prior to commencement of testing.
   2. Provide material, equipment, labor, and technical supervision to perform such tests and inspections.

J. Recommendations for acceptance or rejection shall be given upon consultation of Engineer, Owner, Contractor and Independent Testing Contractor's Representative.

1.3 REFERENCES

A. National Electrical Manufacturer's Association (NEMA).
B. American Society for Testing and Materials (ASTM).
C. Institute of Electrical and Electronic Engineers (IEEE).
D. National Electrical Testing Association (NETA).
E. Insulated Cable Engineers Association (ICEA).
F. American National Standards Institute (ANSI).

1.4 SUBMITTALS

A. For Approval
   1. Submit proof of independent testing contractor qualifications.
   2. Submit preliminary report no later than 10 calendar days after completion of testing.

B. For Record Purpose
   1. Record actual equipment nameplate information.
   2. Permanently record checks and tests and make available to Engineer and Owner.
   3. For the Owner
      a. Three bound copies of the final approved report. Also provide a pdf copy of the final report as requested by the owner.
   4. For the Engineer
      a. One bound copy of the final approved report. Also provide a pdf copy of the final report as requested by the Engineer.

C. Operations and Maintenance Manuals
   1. None Required.

1.5 EQUIPMENT DIMENSIONS

A. None required.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.

B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

1.8 QUALIFICATIONS

A. Meet federal, state, and local safety requirements for accreditation of testing laboratories, Title 29, Part 1907. Membership in National Electrical Testing Association constitutes proof of meeting such criteria.

B. Meet Federal Department of Commerce requirements for nationally independent testing laboratory certification.

PART 2 PRODUCTS

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2.1 APPROVED TESTING CONTRACTORS

A. High Voltage Maintenance, HVM.
B. AC Engineering
C. Electrical Energy Experts, EEE.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. None required.

3.2 EXAMINATION AND PREPARATION

A. GENERAL FIELD TESTING REQUIREMENTS
   1. Test work and equipment installed to ensure its proper and safe operation in accordance with intent of drawings and specifications.
   2. Check interlocking and automatic control sequences and test operation of safety and protective devices.
   3. Correct defects.
   4. Cooperate with electrical utility, suppliers, and manufacturer's representatives in order to achieve proper and intended operation of equipment.
   5. Test, adjust and record operating voltages at each system level before energizing branch circuits.
   6. Transformer taps must be adjusted to obtain as near as possible nominal system voltage.
   7. Where transformer is under utility jurisdiction, obtain services of utility to correct voltage.
   8. Replace devices and equipment damaged due to failure to comply with this requirement.
   9. Balance load among feeder's conductors at each panelboard, switchboard, or substation, and reconnect loads as may be necessary to obtain a reasonable balance of load on each phase. Electrical unbalance shall not exceed 7-1/2% between phases. If the Electrical Contractor feels that because of the nature of the load, a 7 1/2% or less unbalance cannot be achieved, the Electrical Contractor shall submit written request to the Engineer for approval.

B. RECEPTACLES
   1. Verify that each receptacle device is energized.
   2. Test each receptacle device for proper polarity.
   3. Test each GFCI receptacle device for proper operation.
   4. Test each receptacle device in patient care areas, including receptacles install in manufactured headwalls or columns, per NFPA 99 Section 3-3.3.3 and record the results per NFPA 99 Section 3-3.4.3. Record results in a format acceptable to the owner.

C. BRANCH CIRCUIT WIRING
   1. See Section 26 05 21 for additional information.

D. FEEDERS
   1. Verify cable color coding with applicable specifications and the National Electrical Code.
   2. Each feeder shall be megger tested for insulation resistance.

E. GROUNDING
   1. VISUAL AND MECHANICAL INSPECTION
      a. Inspect ground system for compliance with drawings and specifications.
      b. Verify that all electrical distribution equipment is properly grounded.
   2. ELECTRICAL TESTS
      a. Fall of Potential test per IEEE Standard No. 81 on main grounding electrode or system.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

b. Two Point Method test per IEEE Standard No. 81 to determine ground resistance between main grounding system, and major electrical equipment frame, system neutral and/or derived neutral points.

F. DRY TYPE TRANSFORMERS (600 VOLTS AND LESS PRIMARY)

1. VISUAL AND MECHANICAL INSPECTION
   a. Inspect for physical damage.
   b. Verify equipment is supplied and connected in accordance with design specifications.
   c. Check tightness of external bolted electrical joints in accordance with manufacturer's instructions.
   d. Verify resilient mounts are released.
   e. Perform specific inspection and mechanical tests as recommended by manufacturer.
2. ELECTRICAL TESTS
   a. Insulation resistance tests shall be performed winding-to-winding and winding-to-ground. Appropriate guard circuit shall be utilized over all bushings. Test voltage and minimum acceptable values shall be in accordance with manufacturer's recommendations.
   b. Perform a turns-ratio test on all tap connections. Verify that winding polarities are in accordance with nameplate.
   c. Perform power-factor or dissipation-factor tests in accordance with the test equipment manufacturer's published data.
   d. Testing shall occur prior to making primary and secondary feeder connections (i.e. prior to placing in service).
   e. Voltage
      1). Record voltage at new distribution lineup after the following transformer:
         a). T/RAD/UPS
         b). T/CU/03
         c). T/CU/10
      2). Record voltage at the furthest point of distribution out of each lineup.
      3). Adjust transformer taps as required to regulate the voltage across the system.

G. PANELBOARDS

1. VISUAL AND MECHANICAL INSPECTION
   a. Inspect for physical damage.
   b. Verify equipment is supplied and connected in accordance with design specifications.
   c. Inspect for proper alignment, anchorage, and grounding.
   d. Check tightness of accessible bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instructions for proper foot-pound levels.
   e. Doors, panels and Sections shall be inspected for paint, scratches and fit.
   f. Physically test all key interlocking systems.
   g. Proper mechanical operation of relays, switches, and other devices.
   h. Where applicable, verify fuse size are per coordination study.
2. ELECTRICAL TESTS
   a. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 7 1/2 percent of each other. Maintain proper phasing for multi-wire branch circuits.
   b. Megger check of phase-to-phase and phase-to-ground insulation levels prior to connection of any load circuits.

H. CIRCUIT BREAKERS - LOW VOLTAGE

1. All circuit breakers regardless of size shall receive the visual and mechanical inspection as indicated below. All circuit breakers which are either 225 amp frame and larger or with a trip setting of 100 amps and larger shall be tested per this Section.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2. VISUAL AND MECHANICAL INSPECTION
   a. All circuit breakers regardless of ampacity shall inspected as indicated below:
      1). Circuit breaker shall be checked for proper mounting, conductor size and feeder designation.
      2). Operate circuit breaker to ensure smooth operation.
      3). Inspect case for cracks or other defects.
      4). Check tightness of connection with torque wrench in accordance with manufacturer's recommendations.
3. ELECTRICAL TESTS
   a. All circuit breakers which are either 225 amp frame and larger or with a trip setting of 100 amps and larger shall be tested as indicated below:
      1). Measure contact resistance.
      2). Insulation resistance shall be determined phase to phase and phase to ground. Test voltage shall be 1,000 v dc.
      3). Perform long-time delay time-current characteristic tests by passing 300 percent rated primary current through each pole separately unless series testing is required to defeat ground fault functions.
      4). Determine short-time pickup and delay by primary current injection.
      5). Determine ground-fault pickup and time delay by primary current injection.
      6). Determine instantaneous pickup current by primary injection using run-up or pulse method.

I. TRANSFER SWITCHES
1. VISUAL AND MECHANICAL INSPECTION SHALL BE PERFORMED BY THE INDEPENDENT TESTING CONTRACTOR
   a. Inspect for physical damage, proper anchorage and grounding.
   b. Check switch to ensure positive mechanical and electrical interlocks between normal and alternative sources.
   c. Check tightness of all control and power connections.
   d. Perform manual transfer operation with no load connected.
   e. Ensure manual transfer warnings are attached and visible to operator.
2. ELECTRICAL TESTS SHALL BE PERFORMED BY THE INDEPENDENT TESTING CONTRACTOR
   a. Insulation Resistance Test: Measure insulation resistance phase-to-phase and phase-to-ground.
   b. Contact Resistance Test: Measure the contact resistance across each pole, both normal and alternative.
3. MANUFACTURERS TRAINED TECHNICIAN SHALL PERFORM THE FOLLOWING:
   a. Verify settings and operation of control devices in accordance with the project specifications.
      1). Voltage and frequency sensing relays.
      2). All time delays.
      3). Engine start and shutdown.

   b. Perform automatic transfer tests:
      1). Simulate loss of normal power.
      2). Return to normal power.
      3). Simulate loss of emergency power.
      4). Simulate all forms of single-phase conditions.
   c. Monitor and verify correct operation and timing. Record actual settings. A copy of all relay settings shall be turned over to the Owner’s representative.
      1). Normal voltage sensing relays.
      2). Engine start sequence.
      3). Time delay upon transfer.
      4). Alternate voltage sensing relays.
      5). Automatic transfer operation.
      6). Interlocks and limit switch operation.
      7). Time delay and retransfer upon normal power restoration.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

8). Engine cooldown and shutdown feature.

J. UNINTERRUPTIBLE POWER SUPPLIES (UPS)

1. VISUAL AND MECHANICAL INSPECTION
   a. Inspect for physical damage.
   b. Verify equipment is supplied and connected in accordance with design specifications.
   c. Check tightness of external bolted electrical joints in accordance with manufacturer's instructions.
   d. Test all electrical and mechanical interlock systems for correct operation and sequencing.
   e. Verify resilient mounts are released.
   f. Perform specific inspection and mechanical tests as recommended by manufacturer.
2. ELECTRICAL TESTS
   a. Test static transfer from inverter to bypass and back. Use normal load, if possible.
   b. Set free-running frequency of inverter.
   c. Test dc undervoltage trip level on inverter input breaker. Set according to manufacturer's published data.
   d. Test alarm circuits.
   e. Verify sync indicators for static switch and bypass switches are functioning properly.

3.3 INSTALLATION

A. None required.

3.4 FIELD QUALITY CONTROL

A. Perform testing in accordance with the equipment manufacturer's written recommendations and NETA Acceptance Testing Standards.

3.5 ADJUSTMENT AND CLEANING

A. Adjust, clean and correct any deficiencies from inspection and testing.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. These services are described above in Examination section for each type of equipment.

3.7 DEMONSTRATION AND TRAINING

A. None required.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Room Occupancy/Vacancy Sensors
B. Wireless Devices
C. Emergency Lighting Control Devices
D. Hardware & Wiring

1.2 SYSTEM DESCRIPTION

A. The objective of this section is to ensure the proper installation of the occupancy sensor-based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.
B. The occupancy sensor-based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.
C. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.
D. Occupancy Sensor controlled rooms: Spaces with occupancy sensors shall have a minimum control of Auto On/ Auto Off from motion detection.
E. Vacancy Sensor controlled rooms: Spaces with Vacancy sensors shall have a minimum control of Manual On/ Auto Off from motion detection and low voltage switches.
F. Wireless Devices: Wireless switches shall be battery powered to communicate with compatible power packs mounted at select fixtures. Switches shall be programmed to control individual fixtures as shown on plan in accordance with owner's standard.Sensors shall have a minim control of Auto On/Auto Off from motion detection.
G. Refer to Sequence of Operations Schedule for controls strategies applied to spaces.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.
B. IECC 2015 – International Energy Conservation Code.

1.4 SUBMITTALS

A. For Approval
   1. Shop Drawings: Indicate electrical characteristics and connection requirements; cable routing; connection diagrams; and equipment arrangement.
   2. Submit a lighting plan clearly marked by manufacturer showing proper product, location, and orientation of each sensor in every room.
   3. Product Data: Provide electrical and operation characteristics and connection requirements.
   4. Any deviations to this specification must be clearly stated by letter and submitted.
B. For Record Purposes
   1. Test Reports: Indicate satisfactory completion of required tests and inspections.
   2. "As-Built" documents shall include final location and type of each sensor.
   3. Provide "As-Built" wiring diagrams showing interconnection of all components and accessories.
C. Operations and Maintenance Manuals

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.5 EXTRA MATERIALS

A. Spare Materials
   1. Provide one type of each type of sensor and power pack installed on this project.
B. Maintenance Materials
   1. None required.

1.6 WARRANTY

A. Refer to warranty requirements in section 26 05 00.
B. The contractor shall warrant all equipment furnished in accordance with this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The supplier's obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective, or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The Watt Stopper
B. Greengate
C. Hubbell
D. Leviton
E. Sensor Switch (microphonic technologies acceptable as alternate to ultrasonic).
F. Steinel
G. Substitutions: Under provisions of Section 26 05 00.

2.2 OCCUPANCY/VACANCY SENSORS

A. All products shall be of the same manufacturer.
B. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
C. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
D. The drawings indicate the types of sensors and their relative location. Below is a listing of these type designations, a description of each, and basis of design product information:
   1. Type A: 600 sqft 360-degree coverage, ultrasonic, ceiling mounted.
   2. Type B: 1000 sqft 360-degree coverage, ultrasonic, ceiling mounted.
   3. Type C: 90 lineal feet coverage, ultrasonic, ceiling mounted.
   4. Type D: 600 sqft 180-degree coverage, passive infrared, wall switch sensor with 0-10V dimming. Adjust settings for Manual-On, if required for project.
   5. Type E: 1500 sqft 120-degree coverage, passive infrared, corner mounted.
   6. Type F: Timer switch, adjustable from 10 minutes to 2 hours, wall mounted.
   7. Type G: 1000 sqft. 360-degree coverage, Dual Technology, ceiling mounted.
   8. Type H: 600 sqft 180-degree coverage, dual technology, wall switch sensor, dual level. Adjust settings for 50% Auto-On, 50% Manual On as needed per Code Requirements.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

9. Type J: 1500 sqft 120-degree coverage, dual technology, corner mounted.
10. Type K: 600 sqft 180-degree coverage, passive infrared, wall switch sensor, single level. Adjust settings for Manual-On.
11. "/HV" represents an HVAC interface requirement. When shown on plans, provide auxiliary relay or isolated relay for interface with HVAC. Auxiliary relay may be provided integral to the sensor or as a separate module.
    a. Refer to schedules, specification, and sequence of operations in Division 23 for interface requirements.
12. "/D" represents the Digital version of sensor Type to be used on the lighting control system defined in specification 26 09 29.
13. "/WP" represents a sensor requiring a wet listing per space requirement. Provide technology and coverage as identified in Types above.

E. All sensors to be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Power and Auxiliary Packs rated at 20A, 120/277VAC.

G. All powerpacks and auxiliary packs shall be wired ahead or separate of any switching devices to remain active from motion, regardless of switch status. A switch device can include, but is not limited to, line voltage switches, wallbox dimmers, etc.

H. All powerpacks and auxiliary packs shall not be wired in line with a relay-controlled circuit. Continuous switching of power to the powerpack and auxiliary pack may result in loss of programming or shortened device lifespan. Wall switch sensors shall be capable of detection of motion at desk top level up to 300 square feet and shall have manual on, automatic off.

I. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180 degrees coverage capability.

J. Passive infrared sensors shall have a multiple segmented lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue built-up.

K. All sensors shall be capable of operating normally with any electronic ballast, PL lamp systems and rated motor loads.

L. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

M. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls shall be recessed to limit tampering.

N. All wall mounted sensors shall have selectable Manual-On and Auto-On function.

O. In the event of failure, a bypass manual "override on" shall be provided on each sensor. When a bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.

P. Ultrasonic operating frequency, minimum 30kHz, shall be crystal controlled to within plus or minus 0.005% tolerance to assure reliable performance and eliminate sensor crosstalk. Sensors using multiple frequencies are not acceptable.

Q. All sensors shall provide a method of indication to verify that motion is being detected during testing and that the unit is working.

R. All sensors shall have no leakage current to load, in Manual or in Auto/Off mode, for safety purposes and shall have voltage drop protection.

S. All sensors shall have UL rated 94V-O plastic enclosures.

T. Sensors shall control all lighting within a space, including undercabinet lighting shown on plans, unless noted otherwise. Specific zone control shall be as indicated on drawings with switch legs. EC shall provide the required powerpacks and auxiliary packs as required to achieve.

2.3 WIRELESS STANDALONE SYSTEM

A. ACCEPTABLE MANUFACTURERS:
   1. Lutron
   2. Substitutions: None, facility standard.

B. WIRELESS/BATTERY CONTROL STATIONS

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Basis of Specification: Lutron Pico Wireless
2. Type A: 2 Button switch. May be used with single zone on/off or bilevel control.
3. Type B: 2 Button switch with nightlight. May be used with single zone on/off or bilevel control.
4. Type C: 2 Button switch for On/Off with Raise/Lower control
5. Type D: 3 Button switch. Buttons provided with On/Off and 1 preset control.
6. Type F: 3 Button switch with Raise/Lower. Buttons provided with On/Off, 1 preset control and raise/lower control.
7. Type G: 3 Button switch with Raise/Lower and Nightlight. Buttons provided with On/Off, 1 preset control and raise/lower control.
8. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
9. Does not require external power packs, power or communication wiring.
10. Allows for easy reprogramming without replacing the unit.
11. Button Programming:
    a. Single action.
    b. Toggle action.
12. Includes LED to indicate button press or programming mode status.
13. Capable of being mounted with a table stand or directly to a wall under a faceplate.
    a. For Wall Mounting provide: Screw Mounting Kit; Model PICO-SM-KIT and Wallbox Adapter; Model PICO-WBX-ADAPT. Provide concealed mounting hardware for faceplates.
    b. For tabletop applications provide: Tabletop pedestals; model L-PED#-WH.
    c. EC to determine switch ganging from plans. EC to confirm mounting style with Owner prior to purchase.
14. Power: Battery-operated with minimum ten-year battery life or 3-year battery life for night light models.
15. Finish: Refer to Wiring Device Specification.

2.4 CIRCUIT CONTROL HARDWARE

A. WIRED

1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Transformers shall provide power to a minimum of two (2) sensors.
2. Relay Contacts shall have ratings of:
   13A - 120 VAC Tungsten.
   20A - 120 VAC Ballast.
   20A - 277 VAC Ballast.

B. WIRELESS

1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay.
2. Communicates via radio frequency with up to nine compatible wireless control stations, up to six occupancy/vacancy sensors, and one daylight sensor.
3. Plenum rated.
4. Relay Modules:
   a. 5 A relay module, without contact closure output.
   b. 16 A relay module, without contact closure output.
   c. Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
   d. The load switched in manner that prevents arcing at mechanical contacts when power is applied and removed from load circuits.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

e. Fully rated output continuous duty for inductive, capacitive, and resistive loads.

5. Dimming modules: EC shall reference Lighting Fixture Schedule to determine dimming compatibility. Available modules include:
   a. 5A dimming module with 0-10V control.
   b. EcoSystem Dimming module with addressable control of 32 EcoSystem ballasts.
   c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.
   d. Configurable high- and low-end trim.
   e. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.

2.5 CONTROL WIRING

A. WIRED
   1. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded UL Classified, PVC or TEFLON jacketed cable approved for use in plenums, where applicable.

B. WIRELESS
   1. There shall be no control wiring between the Load Control modules to either motion sensors or control stations.
   2. Follow Class 1 standards for line voltage wiring from Load Control modules to fixtures. Consult Manufacturer's wiring diagram for all product requirements as each device and system may differ in wire topologies.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Accept material on site. Inspect for damage.
B. Protect material from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

3.2 EXAMINATION AND PREPARATION

A. Verify that surfaces are ready to receive work.
B. Verify specified sensor will provide proper coverage of the room.

3.3 INSTALLATION

A. Do not install products until the building is enclosed and tempered.
B. Maintain conditions to manufacturer's instructions during and after installation of occupancy sensor system.
C. It shall be the Contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The Contractor shall provide additional sensors if required to cover the respective room properly and completely.
D. Sensors shall be located so they are not affected by activities in corridors or adjacent rooms. Sensors which are activated by activity in adjacent rooms shall be relocated at no additional cost.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

E. Install motion sensors 4-6 ft. away from ceiling air vents to eliminate potential false-triggers from HVAC system.
F. It is the Contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the owner's facility, to verify placement of sensors and installation criteria.
G. Install products and size conductors in accordance with manufacturer's instructions.
H. Provide 4 feet of slack cable at each sensor to allow field adjustment of sensor location.
I. Low voltage wiring shall comply with section 26 05 21.
J. All low voltage wiring:
   1. Wiring above an accessible ceiling shall be either installed in conduit or the cable may be installed without a raceway system if the cable has a plenum rated jacket and is installed in a neat and workmanlike manner. All wiring where not contained in conduits shall be firmly supported without resting on suspended ceilings and without being attached directly to electrical conduits, etc. Exposed cabling shall be supported by means of "D" rings or other approved cable suspension devices. When low voltage wiring is installed in conduit, utilize flexible metal conduit to ceiling mounted occupancy sensors to allow for repositioning.
   2. Wiring above a non-accessible ceiling or in an exposed structure shall be routed in conduit. In an exposed structure, the conduit shall be routed along or near the structural members to minimize the conduit visibility. Conduits installed after the structure painting shall be painted by the EC to match the adjacent finish as approved by the Architect.
K. EC shall install all powerpacks and auxiliary packs feeding area/space centralized over an entry door to the space, above an accessible ceiling, unless directed otherwise. Powerpack(s) shall be accessible with the owner's standard-height maintenance ladder. EC shall label powerpacks with self-adhesive tape with panel and circuit supplying controller and area served by powerpacks).
L. Identification: Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems". Identify circuits or luminaires controlled by occupancy sensors at each sensor.
M. Emergency Lighting Control Devices
   1. Coordinate exact location of device with Owner prior to rough-in.
   2. Install devices per manufacturer's instructions.
   3. Label device with Emergency/Life Safety panel and circuit information and normal sensing circuit and panel information.
   4. Verify proper operation of device.

3.4 FIELD QUALITY CONTROL

A. Perform operation test on completed installation to verify proper operation.
B. Replace equipment, components, and wiring which are defective.
C. System shall be tested to be free from grounds, shorts, and open circuits.

3.5 ADJUSTMENT AND CLEANING

A. At substantial completion, clean all sensor lenses.

3.6 START UP/MANUFACTURER'S FIELD SERVICES

A. It shall be the Electrical Contractor's responsibility to verify all proper adjustments of occupancy/vacancy sensors, including sensitivity and time delay setting, and train their and the owner's personnel to ensure owner's satisfaction with the control system.
B. Upon completion of the installation, the wireless control system shall be completely commissioned by the manufacturer's factory authorized technician who will verify and document all adjustments and sensor placement to ensure a trouble-free sensor-based lighting control system.
C. The Electrical Contractor shall provide both the manufacturer and the electrical engineer with ten (10) working days' written notice of the scheduled commissioning date. Engineer's

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

presence may be required to verify sensor calibration and programmed light levels during commissioning. Upon completion of the system fine tuning the factory authorized technician shall provide the proper training to the owner's personnel in the adjustment and maintenance of the sensors. The Electrical Contractor shall also provide the owner and engineer complete copies of all settings of all devices.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate modes of operation and required responses.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 22 14
DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Energy efficient dry type transformers.

1.2 SYSTEM DESCRIPTION

A. Provide the dry type transformers as indicated on the drawings and specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.
B. See the one-line diagrams for specific features required for this project.

1.4 SUBMITTALS

A. For Approval
   1. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
   2. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.
   3. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.
B. For Record Purposes
   1. Indicate which tap is currently connected in all transformers.
C. Operations and Maintenance Manuals
   1. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. None required.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Square D.
B. ABB.
C. Siemens.
D. Eaton.

2.4 ENERGY EFFICIENT TRANSFORMERS

A. Description: NEMA ST 20, factory-assembled, air cooled dry type transformers, ratings as indicated with a K-1 rating.
B. Transformers shall be low loss type with minimum efficiencies per DOE 2016 standards when operated at 35% of full load capacity. Efficiencies shall be tested in accordance with NEMA TP-2.
C. Efficiency Ratings:

Single Phase		Three Phase	
KVA	Efficiency	KVA	Efficiency
15	97.7	15	97.89
25	98.0	30	98.23
37.5	98.2	45	98.40
50	98.3	75	98.60
75	98.5	112.5	98.74
100	98.6	150	98.83
167	98.7	225	98.94
250	98.8	300	99.02
333	98.9	500	99.14
		750	99.23
		1000	99.28

D. Insulation system and average winding temperature rise for rated KVA as follows:
   1. 15 KVA and larger: Rated for 220 degree C UL Component Recognized insulation system, 150 degrees C. rise above a 40 degree C ambient.
   2. Transformer coils shall be of the continuous wound type and shall be impregnated with a nonhygroscopic, thermosetting varnish.
E. Case temperature: Do not exceed 50 degrees C. rise above ambient at warmest point.
F. Winding Taps:
   1. Transformers Less than 25 KVA: Two 5 percent full capacity taps on primary winding below rated voltage.
   2. Transformers 25 KVA and Larger: Six 2 1/2 percent full capacity taps on primary winding, 2 above and 4 below rated voltage.
G. Sound Levels: Maximum sound levels for 150 degree C Rise are as follows:
   1. 0 to 45 KVA - 40 dB.
   2. 46 to 112.5 KVA - 45 dB.
   3. 113 to 150 KVA - 47 dB.
   4. 151 to 300 KVA - 49 dB.
   5. 301 to 750 KVA - 58 dB.
   6. 751 to 1000 KVA - 60 dB.
H. Sound Levels: Maximum sound levels for 80 degree C Rise are as follows:
   1. 0 to 30 KVA - 40 dB.
   2. 31 to 75 KVA - 45 dB.
   3. 76 to 112.5 KVA - 47 dB.
   4. 113 to 225 KVA - 49 dB.
   5. 226 to 300 KVA - 56 dB.
   6. 301 to 500 KVA - 58 dB.
I. Basic Impulse Level: 10 KV.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

J. All cores to be constructed with low hysteresis and eddy current losses. The core flux density shall be well below the saturation point to prevent core overheating. The complete core and coil shall be bolted to the base of the enclosure, but isolated by means of rubber vibration-absorbing mounts.
K. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding conductor sized in accordance with applicable UL and NEC standards.
L. Enclosure: NEMA ST 20; Type 1. The transformer enclosures shall be ventilated and fabricated of heavy gauge sheet steel construction. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning, and phosphatizing, followed by electrostatic deposition of a polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49. Provide lifting eyes or brackets.
M. Mounting: Suitable for wall, floor, or trapeze mounting, except transformers larger than 75 KVA, suitable for floor or trapeze mounting.
N. Coil Conductors: Aluminum, continuous windings with terminations brazed or welded.
O. Nameplate: Include transformer connection data; KVA, primary and secondary voltage ratings; percent impedance and overload capacity based on rated allowable temperature rise.

2.5 OPTIONS

A. The accessories below apply to each transformer as indicated on the one-line diagrams.
1. OPTION 1:
a. Non ventilated enclosure.
2. OPTION 2:
a. Integral strip heaters: 120V 250W with thermostat.
3. OPTION 3:
a. Weathershield to upgrade enclosure to a NEMA 3R rating.
4. OPTION 4:
a. Visual clear lexan material and IR polymer backed by impact resistant metal mesh for visual and IR inspection without disturbing operations.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver transformers individually wrapped for protection and mounted on shipping skids.
B. Accept transformers on site. Inspect for damage.
C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

3.2 EXAMINATION AND PREPARATION

A. Examine areas and conditions under which transformers are to be installed and notify Engineer, in writing, of conditions detrimental to proper and timely completion of work.
B. Do not proceed with work until unsatisfactory conditions have been corrected.
C. Provide 3 1/2" high concrete pad under floor mounted transformers.

3.3 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.
B. Set transformer plumb and level.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. Use flexible conduit, under the provisions of Section 26 05 31, 2 ft (0.6 M) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
D. Release resilient mounts in transformer enclosure. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
E. Provide grounding and bonding in accordance with Section 26 05 26.
F. Provide engraved plastic nameplates under provisions of Section 26 05 53.

3.4 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 26 08 11.
B. Check for damage and tight connections prior to energizing transformer.
C. Measure primary and secondary voltages and make appropriate tap adjustments.

3.5 ADJUSTMENT AND CLEANING

A. Adjust voltage taps for required system voltage and check grounding requirements.
B. Tighten lugs and bus connections.
C. Clean interior of equipment.
D. Sand, prime and paint scratched or marred surfaces to match the original finish.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate changing of transformer taps.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Power panelboards.
   1. Circuit Breaker Type
B. Branch circuit panelboards.

1.2 SYSTEM DESCRIPTION

A. Provide the power and branch circuit panelboards as indicated on the drawings.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Shop Drawings shall indicate outline and support point dimensions, component list, conduit entry/exit locations, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
B. For Record Purposes
   1. As-built/Record Drawings shall accurately indicate the location of the equipment and the equipment shall be identified with the final designation as directed by the Owner.
C. Operations and Maintenance Manuals
   1. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
   2. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. Provide three fuses of each size, type and rating.
B. Maintenance Materials
   1. None.

1.7 WARRANTY

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Square D.
B. ABB.
C. Siemens.
D. Eaton.

2.2 POWER PANELBOARDS

A. Circuit Breaker Type:
   1. Circuit Breaker Panelboards: NEMA PB 1, 22,000 RMS symmetrical amperes minimum at 250 volts AC or 18,000 RMS symmetrical amperes minimum at 480 volts AC or as specified on the drawings. Equivalent to Square D I-Line.

B. Service Conditions:
   1. Temperature: 104 degrees F, 40 degrees C.
   2. Altitude: 1000 feet.

C. Panelboard Bus:
   1. Plated Copper Plated Aluminum, ratings as indicated. The panelboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 temperature rise requirements.
   2. Provide ground bus in each panelboard.
   3. Provide neutral bus where required by the utilization voltage.
   4. Circuit breakers requiring intermediate bussing between the main vertical bus and the circuit breaker are not acceptable.
   5. Main Lug Only Panels: UL listed for type and temperature rating of wire specified.

D. Indoor Enclosure: NEMA PB 1, Type 1. Minimum cabinet box dimensions: 6 inches deep; 20 inches wide.

E. Cabinet Front: Flush or surface type, hinged one-piece with door, fastened with concealed hardware and trim clamps. Provide concealed hinged door with flush lock. Finish in manufacturer's standard gray enamel.

F. Nameplates:
   1. Manufacturer’s nameplate, located on panel interior front, shall contain system information (such as but not limited to voltage and current ratings) and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and Short Circuit Current Rating including series rating. When Series rating method is acceptable as indicated on the One Line diagram, Series rating information shall be:
      a. Size and type of upstream device.
      b. Branch devices that can be used.
      c. UL series short-circuit rating.
   2. Refer to specification section 26 05 53 for additional nameplate requirements.

2.3 BRANCH CIRCUIT PANELBOARDS

A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB1, circuit breaker type.

B. Panelboard Bus:
   1. Plated Aluminum, ratings as indicated.
   2. Provide ground bus in each panelboard.
   3. Provide split neutral bus where required by the utilization voltage. Neutral bus shall be located in the mains compartment for incoming neutral conductors to be the same length.
   4. Main Lug Only Panels: UL listed for type and temperature rating of wire specified.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. Minimum integrated short circuit rating for 240 volt panelboards: 10,000 amperes rms symmetrical at 240 volt. Equivalent to Square D NQOD.
D. Minimum integrated short circuit rating for 480 volt panelboards: 14,000 amperes rms symmetrical at 480 volt. Equivalent to Square D NF.
E. Interiors: Field convertible for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted, separate from branch circuit breakers. Interior leveling provisions for flush mounted applications. Interior trim shall be dead-front construction.
F. Panel Circuit Capacity: 18, 30, 42, 72 or 84 as indicated on the panel schedule.
G. Indoor Enclosure: NEMA PB 1, Type 1. Minimum cabinet box dimensions: 5 3/4 inches deep; 20 inches wide.
H. Cabinet Front: Flush or surface type, hinged one-piece with door, fastened with concealed hardware and trim clamps. Provide concealed hinged door with flush lock. Finish in manufacturer's standard gray enamel.
I. Nameplates:
    1. Manufacturer's nameplate, located on panel interior front, shall contain system information (such as but not limited to voltage and current ratings) and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and Short Circuit Current Rating including series rating. When Series rating method is acceptable as indicated on the One Line diagram, Series rating information shall be:
        a. Size and type of upstream device.
        b. Branch devices that can be used.
        c. UL series short-circuit rating.
    2. Refer to specification section 26 05 53 for additional nameplate requirements.
J. Panels feeding existing circuits.
    1. Provide multi pole circuit breakers or handle ties for new circuit breakers that feed existing multi wire branch circuits that share a common neutral.

2.4 OPTIONS AND ACCESSORIES

A. The accessories below apply to each panelboard or load center shown on the drawings.
    1. OPTION 1:
        a. 200% Neutral Bus: 200% rated solid neutral. Bus shall be the same material as the main bus of the panelboard. Panelboard shall be marked for non-linear load.
    2. OPTION 2:
        a. Isolated Ground Bus: Isolated and insulated from the panelboard enclosure. Bus shall be the same material as the main bus of the panelboard.
    3. OPTION 3:
        a. Dual Main Lugs: Fully rated for ampere rating of the panelboard, conductor range centered on panelboard ampere rating.
    4. OPTION 4:
        a. Feed Through Lugs: Fully rated for ampere rating of the panelboard, conductor range centered on panelboard ampere rating.
    5. OPTION 5:
        a. Compression Lugs: Tool and die applied compression lugs.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to panelboard internal components, enclosure and finish.
C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect panelboards from dirt, water

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

construction debris and traffic.

3.2 EXAMINATION AND PREPARATION

A. Verify equipment dimension match approved submittals.
B. Examine areas to receive panelboards to assure adequate working clearance for panelboard installation.

3.3 INSTALLATION

A. Install equipment in accordance with NEMA PB 1.1 and in accordance with NECA Standard of Installation and manufacturer's written requirements.
B. Install equipment plumb. Install recessed equipment flush with wall finishes. Provide supports in accordance with Section 26 05 29.
C. Provide filler plates for unused spaces in equipment.
D. Panelboards
   1. Provide typed circuit directory for each panelboard. The use of adhesive applied directories is not acceptable. The directory shall accurately indicate the types of devices served and the rooms in which the devices are located. The rooms and panelboards shall be designated by the actual name or number designated by the Owner. Revise directory to reflect circuiting changes required to balance phase loads.
   2. Provide engraved plastic nameplates under the provisions of Section 26 05 53.
   3. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling below floor. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 08 11.

3.5 ADJUSTMENT AND CLEANING

A. Adjust doors and operating mechanisms for free mechanical movement.
B. Tighten lugs and bus connections.
C. Clean interior of panelboard.
D. Sand, prime and paint scratched or marred surfaces to match original finish.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate installation and removal of circuit breaker/fused switch and associated mounting hardware.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.
B. Wall dimmers.
C. Receptacles.
D. Wall plates.

1.2 SYSTEM DESCRIPTION

A. Provide the wiring devices as indicated on the drawings and specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Product Data: Provide manufacturer's catalog information showing catalog numbers, ratings, dimensions, colors, and configurations.
B. For Record Purposes
   1. As-built/Record Drawings shall accurately indicate the location of all floor boxes and poke-through fittings.
C. Operations and Maintenance Manuals
   1. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of Product.
   2. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies.

1.5 EQUIPMENT DIMENSIONS

A. Notify Engineer of any devices combinations that will not fit into be in a single box as indicated on the drawings.

1.6 EXTRA MATERIALS

A. Spare Materials
   1. Furnish two of each style, size and color of wall plate.
B. Maintenance Materials
   1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 WIRING DEVICES - GENERAL

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only.
B. Acceptable Manufacturers:
   1. Hubbell Wiring Devices.
   2. Cooper Wiring Devices.
   3. Pass and Seymour/Legrand.
   4. Leviton
C. Provide wiring devices of one manufacturer.
D. Verify device finish at time of submittal.
   1. Devices wired to/controlling normal source circuit shall be “white” in color.
   2. Devices wired to/controlling emergency source circuits shall be “red” in color.
   3. Devices wired to/controlling UPS source circuits shall be “blue” in color.
   4. If device is not available in red, alternate acceptable method allows utilizing same normal-source device finish with either a red faceplate or a red label. If red faceplate strategy is used, switch shall be separately ganged.
      a. Submittals shall identify every device where alternate method is applied for review with architect, engineer and owner.
E. Modularly Connected (Modular) Devices
   1. Modularly connected devices are allowed, but are not required.
   2. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
      a. Connectors shall comply with UL 2459
      b. Polarized connector with minimum six-inch stranded copper wire leads.
      c. Connectors shall have Polycarbonate right-angle housing with finger-safe connector housing which provides insulation from conductive surfaces.
      d. Connectors acceptable Manufactures and style:
         1). Hubbell SNAPConnect
         2). Leviton LevLok
         3). Pass & Seymour PlugTail
         4). Or an approved equal
      e. Devices shall comply with requirements listed in this Section.

2.2 SWITCHES

A. Specification Grade:
   1. General Use Toggle Switches (20 amp type):
      a. Single Pole - Hubbell #1221 series.
      b. Double Pole - Hubbell #1222 series.
      c. Three Way - Hubbell #1223 series.
      d. Four Way - Hubbell #1224 series.
      e. Keylock switches - Add an “L” to catalog numbers above.
      f. Provide key type switches where indicated on the drawings.
      g. Provide toggle switches with a "red" light lexan handle for switches utilized for controlling remote equipment. (See drawings for locations.) Provide engraved nameplate identifying the load controlled.
   2. Momentary Contact Switches:
      a. 20 amp type - Hubbell #1557.
      b. Provide key type switches where indicated on the drawings.

2.3 RECEPTACLES

A. General:
   1. All receptacles shall be grounding type.
   2. All wet location receptacles shall be weather resistant GFCI type.
   3. The use of feed-through GFCI receptacles is not allowed.
   4. Special purpose receptacles shall be specification grade and shall have the characteristics as shown on the drawings.
B. Receptacles – Specification Grade:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Standard receptacles. Equals to the listed specification grade receptacles must contain a one piece, all brass, mounting strap with integral ground contacts.
   a. 20 amp, 120V, NEMA 5-20R, single - Hubbell #5361 series.
   b. 20 amp, 120V, NEMA 5-20R, duplex - Hubbell #5362 series.
   c. 20 amp, 120V, NEMA 5-20R, duplex, ground fault interrupter - Hubbell #GFR5352 series.
   d. 20 amp, 120V, NEMA 5-20R, duplex, isolated ground - Hubbell #CR5352IG series.
   e. 20 amp, 120V, NEMA 5-20R, duplex, hospital grade tamper resistant - Hubbell #HBL8300SG series
   f. 20 amp, 120V, NEMA 5-20R, duplex, surge suppression - Hubbell #HBL5360S series.
   g. 20 amp, 120V, NEMA 5-20R, duplex, tamper resistant, with duplex USB charger - Hubbell #USB20X2 series.

2.4 WALL DIMMERS

A. General
   1. Provide wall box dimmers at locations indicated on the drawings. Part numbers provided indicate base specification of series. Equal wall box dimmers manufactured by Leviton, Cooper/Eaton, Legrand, Lutron, etc. are acceptable.
   2. Compatible with the voltage of the lighting circuit being controlled: 120V or 277V
   3. Provide with linear full-rage slide control.
   4. Derating is not required in multi-gang applications.
   5. Color to match receptacle and/or switches.

B. LED
   1. LED Wall Box Dimmers.
      a. 0-10V – Leviton #IP710-DOZ, single pole or three way, 10 amp max load, compatible with LED driver in associated luminaire. Three way operation with standard three way switch.

2.5 WALL PLATES

A. Flush Mounted Device Cover Plates: High impact smooth nylon.
   a. Wallplates with devices wired to/controlling normal source circuit shall be stainless steel
   b. Wallplates with devices wired to/controlling emergency/life safety/critical/equipment source circuits shall be stainless steel.
   c. Wallplates with devices wired to/controlling UPS source circuits shall be stainless steel.
   d. If device is not available in red, alternate acceptable method allows utilizing same normal-source device finish with either a red faceplate or a red label. If red faceplate strategy is used, switch shall be separately ganged.
      1). Submittals shall identify every device where alternate method is applied for review with architect, engineer and owner.

B. Surface Mounted Device Cover Plates: 1/2 inch raised galvanized steel covers with a minimum of two screws mounting the wiring device to the coverplate.

C. Weatherproof Cover Plate:
   1. New Construction:
      a. Vertical Mount: Gasketed, molded high impact, UV stabilized polycarbonate resin with hinged gasketed device cover, TayMac Corp. #72204. Assembly shall be rainproof while in use. Color as selected by Architect from manufacturer's standard colors.
   2. Existing construction or where outlet box can not be recessed in wall:
      a. Vertical Mount: Gasketed, flame retardant, UV stabilized, non conductive polycarbonate with hinged gasketed device cover, TayMac Corp. #20350. Assembly shall be rainproof while in use. Color as selected by Architect from manufacturer's standard colors.
      b. Horizontal Mount: Gasketed, flame retardant, UV stabilized, non conductive polycarbonate with hinged gasketed device cover, TayMac Corp. #60350.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Assembly shall be rainproof while in use. Color as selected by Architect from manufacturer's standard colors.

D. All wall plates covering receptacle circuits shall have the plate marked, in a neat, concise manner, with the panel and circuit number. Utilize a permanent marking system. Handwritten identification will not be accepted.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to devices, enclosure and finish.
C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect devices from dirt, water construction debris and traffic.

3.2 EXAMINATION AND PREPARATION

A. Verify existing conditions prior to beginning work.
B. Verify that outlet boxes are installed at proper height.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that floor boxes are adjusted properly.
E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
F. Verify that all outlet boxes for GFI receptacles are located in an accessible location after intended equipment is installed.
G. Provide extension rings to bring outlet boxes flush with finished surface.
H. Clean debris from outlet boxes.

3.3 INSTALLATION

A. General:
   1. Install in accordance with NECA "Standard of Installation" and per manufacturer's written instructions.
   2. Install devices plumb and level.
   3. Install switches with OFF position down.
   4. Do not use terminals on wiring devices (hot, neutral or ground) for feed-through connections, looped or otherwise. Make circuit connections via wire connectors and pigtails. All conductors utilized for pigtail connections shall be solid conductors. Do not terminate stranded conductors to any wiring device.
   5. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
   6. Connect wiring devices by manufacturer's written instructions.
   7. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
   8. Use jumbo size plates for outlets installed in masonry walls.
   9. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

B. Install gasket plates for devices or system components having light emitting features, such as switches with pilot lights. Where installed on rough textured surfaces, seal plates with black self-adhesive poly-foam.Switches/Dimmers
   1. All toggle switches controlling lighting, equipment and etc. served from an isolated power system shall be 2-pole devices.
   2. Wall box dimmers shall be ganged where possible in accordance with the manufacturer's derating factors.
   3. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer or as outlined within this specification, whichever is more stringent.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

4. 0-10V dimming control wiring for wall box dimmers can be installed in the same conduit as the power wiring if the control wiring is 600V rated.

C. Receptacles
1. Install vertically mounted receptacles with grounding pole on top, horizontally mounted receptacles with grounding pole on left.
2. Ground receptacles with an insulated green grounding conductor from the device ground screw to a pigtail connection. The pigtail connection shall also be electrically connected to the grounding conductor attached to the metallic box and the grounding conductor from the serving panel if provided.

D. Cord Reels and Cord Reel Housings
1. Support directly from structure with threaded rod or strut.

3.4 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.
B. Operate each wall switch with circuit energized and verify proper operation.
C. Verify that each receptacle device is energized.
D. For testing of wiring of receptacles refer to specification section 26 08 11.

3.5 ADJUSTMENT AND CLEANING

A. Adjust devices and wall plates to be flush and level.
B. Clean exposed surfaces to remove splatters and restore finish.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate installation and removal of poke-through fittings.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 28 14
OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fuses.
B. Circuit breakers.
C. Enclosed circuit breakers.

1.2 SYSTEM DESCRIPTION

A. Provide overcurrent protective devices as indicated on the drawings and as specified herein.
B. Provide a combination type arc-fault circuit interrupter circuit breakers for all 120-volt, 15- and 20-ampere circuits within dwelling units, dormitory units, and guest rooms and guest suites.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Product Data: Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.
B. For Record Purposes
   1. As-built/Record Drawings shall accurately indicate the location of the equipment and the equipment shall be identified with the final designation as directed by the Owner.
C. Operations and Maintenance Manuals
   1. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
   2. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MATERIALS

A. Provide three fuses of each size and type.

1.7 WARRANTY

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Refer to warranty requirements in section 26 05 00.

PART 2 PRODUCTS

2.1 SHORT CIRCUIT RATINGS

A. The panels and switchboards indicated on the one-line diagram shall be protected by circuit breakers which are fully rated to provide an AIC rating greater than or equal to rating indicated. The series rating method is not acceptable.

2.2 FUSES

A. Acceptable Manufactures
   1. Bussmann
   2. CEPCO
B. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
C. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.
D. Fuses, 0 - 600 ampere, shall be Class RK-1, one end rejection or to fit mountings specified. Dual element, time delay with short circuit protection for motor, transformer, welder, feeder and main service protection. 200,000 ampere interrupting rating.
   1. 250 volts - Bussmann Low-Peak, LPN-R.
   2. 600 volts - Bussmann Low-Peak, LPS-R.
E. Fuses, 601 - 6,000 ampere, shall be Class L, bolt-in. Time delay with short circuit protection for motor, transformer, feeder and main service protection. 200,000 ampere interrupting rating.
   1. Bussmann HI-CAP, KRP-C.

2.3 CIRCUIT BREAKERS

A. Acceptable Manufacturers
   1. Square D.
   2. ABB.
   3. Siemens.
   4. Eaton.
B. Branch Circuit Panel Circuit Breakers:
   1. Molded case type with thermal and magnetic trip elements in each pole.
   2. Single-handle common trip, two and three poles (handle ties not acceptable).
   3. Ground fault protection for personnel (5 mA) when indicated on the drawings.
   4. Ground fault protection for equipment (30 mA) when indicated on the drawings.
   5. Bolt-on type.
   6. Quick make and break toggle over center action.
   7. Handle trip indication.
   8. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
   9. Fixed handle padlock attachment, lockable in both ON and OFF positions, for all 3 pole circuit breakers. Part number QO1PL for QO type circuit breakers, part number HPAFD for EDB, EGB and EJB type circuit breakers, or equal.
   10. UL listed for type and temperature rating of wire specified and in accordance with UL Standard 489.
   11. UL listed short circuit rating (integrated equipment rating): Up to 240V: 10,000 RMS symmetrical amperes minimum. Up to 480V: 14,000 RMS symmetrical amperes minimum.
   12. UL SWD switching duty on 120V or 277V circuits where loads are panel switched.
   13. UL listed for use with the factory installed accessories listed below.
   14. Manufacturer of the circuit/breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted in.

2.4 CIRCUIT BREAKER TYPES

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. TYPE MC - Molded Case Circuit Breakers:
   1. Construction: Molded case type with permanent trip unit with thermal and magnetic trip elements in each pole.
   2. Single magnetic trip adjustment for breakers with a frame size greater than 100 amperes.
   3. Single-handle common trip, two and three poles (handle ties not acceptable).
   4. Push-to-trip test button.
   5. Plug-on to bus and bolt-on to mounting strap.
   6. Quick make and break over center toggle action.
   7. Handle trip indication.
   8. Shall meet the following standard:
      a. UL
      b. CSA
      c. IEC 157-1
      d. NEMA Standard AB1-1975
      e. Fed Spec W-C-375B/GEN
   9. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
   10. Fixed handle padlock attachment, lockable in both ON and OFF positions, for all 3 pole circuit breakers. Part number S29371 for H and J frame circuit breakers, part number QBPA for Q frame circuit breakers, or equal.
   11. UL listed for type and temperature rating of wire specified.
   12. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
   13. Options and Accessories:
      a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
      b. The following is a list of accessories available for a molded case circuit breaker. Refer to Section 2.5 for item code definitions.
         1). ALS – Alarm Switch
         2). AXS – Auxiliary Switch
         3). EOP – Electric Operator
         4). ST – Shunt Trip
         5). UVT – Under Voltage Trip
      c. The following is a list of options available for a molded case circuit breaker. Refer to Section 2.6 for item code definitions.
         1). AF – Arc Fault Circuit Interrupter
         2). CL – Current Limiting
         3). GE – Ground Fault Protection - Equipment
         4). GP – Ground Fault Protection - Personnel
         5). GS – Ground Fault Sensing
         6). HC – HACR Rating
         7). HM – High Magnetic
         8). MS – Molded Case Switch
         9). MP – Motor Circuit Protector

B. TYPE SS - Solid State Molded Case Circuit Breaker:
   1. Circuit breakers shall be solid state trip units as specified on the drawings or elsewhere in this specification. Circuit breakers shall be true RMS type. Interrupting rating shall be greater than the value shown on the drawings. All circuit breakers shall be constructed in accordance with UL Standard 489 and NEMA Standard AB1-1975 and shall meet the requirements of Federal Specification W-C- 375B/GEN as Class 25a and IEC 157-1. The circuit breakers shall be rated for continuous duty unless otherwise indicated. The ampere rating shall be determined by the interchangeable rating plug. Breakers shall be provided with ampere frames, ampere sensors, ampere rating plugs as noted on the one line drawings. Breakers shall have an integral LCD ammeter and trip indicator. The indicator shall display the cause of a tripping occurrence such as short circuit

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

overcurrent or ground fault. No external power source shall be required for this trip indicator.

2. Construction: Circuit breakers shall be constructed using glass reinforced insulating material providing high dielectric strength. The circuit breakers shall have quick-make, quick-break contacts with an over center operating mechanism. Current carrying components shall be isolated from the trip unit and field installed accessories. Breakers shall provide common tripping of all poles and shall be trip free. The integral trip unit shall be independent of any external power source and shall contain reliable electronic components to measure and time the output from internal current sensors and initiate tripping action. The circuit breaker shall be UL listed for reverse connection without requiring special construction.
3. Circuit breakers shall be provided with seals for locking the rating plug and adjustments to prevent unauthorized changes.
4. UL listed for type and temperature rating of wire specified.
5. Fixed handle padlock attachment, lockable in both ON and OFF positions. Part number part number S32631 for D, M, P and R frame circuit breakers, or equal.
6. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
7. Options and Accessories:
   a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
   b. The following is a list of accessories available for a solid state molded case circuit breaker. Refer to Section 2.5 for item code definitions.
      1). ALS – Alarm Switch
      2). AXS – Auxiliary Switch
      3). EOP – Electric Operator
      4). ST – Shunt Trip
      5). UVT – Under Voltage Trip
   c. The following is a list of options available for a solid state molded case circuit breaker. Refer to Section 2.6 for item code definitions.
      1). AF – Arc Fault Circuit Interrupter
      2). L1 – Long time / Instantaneous (LI)
      3). L2 – Long time / Short time / Instantaneous (LSI)
      4). L3 – Long time / Short time / Instantaneous / Ground Fault Trip (LSIG)
      5). L4 – Long time / Short time / Instantaneous / Ground Fault Sensing (LSIA)
      6). MP – Motor Circuit Protector
      7). SC – System Communication
      8). SD – System Diagnostic
      9). SM – System Monitoring
      10). ZS – Zone Selective Interlocking
      11). 100 – 100% Rated Circuit Breaker

C. TYPE IC – Insulated Case Circuit Breaker

1. Circuit breakers shall be solid state trip units as specified on the drawings or elsewhere in this specification. Circuit breakers shall be true RMS type. Interrupting rating shall be greater than the value shown on the drawings. All circuit breakers shall be constructed in accordance with UL Standard 489 and NEMA Standard AB1-1975 and shall meet the requirements of Federal Specification W-C- 375B/GEN as Class 25a and IEC 157-1. The circuit breakers shall be rated for continuous duty unless otherwise indicated. The ampere rating shall be determined by the interchangeable rating plug. Breakers shall be provided with ampere frames, ampere sensors, ampere rating plugs as noted on the one line drawings. Breakers shall have an integral LCD ammeter and trip indicator. The indicator shall display the cause of a tripping occurrence such as short circuit overcurrent or ground fault. No external power source shall be required for this trip indicator.
2. Construction: Circuit breakers shall be constructed using glass reinforced insulating material providing high dielectric strength. The circuit breakers shall

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

have quick-make, quick-break contacts with an over center operating mechanism. Current carrying components shall be isolated from the trip unit and field installed accessories. Breakers shall provide common tripping of all poles and shall be trip free. The integral trip unit shall be independent of any external power source and shall contain reliable electronic components to measure and time the output from internal current sensors and initiate tripping action. The circuit breaker shall be UL listed for reverse connection without requiring special construction.

3. Circuit breakers shall be provided with seals for locking the rating plug and adjustments to prevent unauthorized changes.
4. UL listed for type and temperature rating of wire specified.
5. Fixed ON and OFF pushbutton cover padlock attachment. Part number S33897 for NT frame circuit breakers, part number S48536 for NW frame circuit breakers, or equal.
6. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
7. Options and Accessories:
   a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
   b. The following is a list of accessories available for a insulated case circuit breaker. Refer to Section 2.5 for item code definitions.
      1). ALS – Alarm Switch
      2). AXS – Auxiliary Switch
      3). EOP – Electric Operator
      4). ST – Shunt Trip
      5). UVT – Under Voltage Trip
   c. The following is a list of options available for an insulated case circuit breaker. Refer to Section 2.6 for item code definitions.
      1). AF – Arc Fault Circuit Interrupter
      2). L1 – Long time / Instantaneous (LI)
      3). L2 – Long time / Short time / Instantaneous (LSI)
      4). L3 – Long time / Short time / Instantaneous / Ground Fault Trip (LSIG)
      5). L4 – Long time / Short time / Instantaneous / Ground Fault Sensing (LSIA)
      6). SC – System Communication
      7). SD – System Diagnostic
      8). SM – System Monitoring
      9). ZS – Zone Selective Interlocking
      10). 100 – 100% Rated Circuit Breaker

D. TYPE PC – Low Voltage Power Circuit Breaker

1. Circuit breakers shall be solid state trip units as specified on the drawings or elsewhere in this specification. Circuit breakers shall be true RMS type. Interrupting rating shall be greater than the value shown on the drawings. All circuit breakers shall be constructed in accordance with UL Standard 489 and NEMA Standard AB1-1975 and shall meet the requirements of Federal Specification W-C- 375B/GEN as Class 25a and IEC 157-1. The circuit breakers shall be rated for continuous duty unless otherwise indicated. The ampere rating shall be determined by the interchangeable rating plug. Breakers shall be provided with ampere frames, ampere sensors, ampere rating plugs as noted on the one line drawings. Breakers shall have an integral LCD ammeter and trip indicator. The indicator shall display the cause of a tripping occurrence such as short circuit overcurrent or ground fault. No external power source shall be required for this trip indicator.
2. Construction: Circuit breakers shall be constructed using glass reinforced insulating material providing high dielectric strength. The circuit breakers shall have quick-make, quick-break contacts with an over center operating mechanism. Current carrying components shall be isolated from the trip unit and field installed accessories. Breakers shall provide common tripping of all poles and shall be trip free. The integral trip unit shall be independent of any external power source and

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

shall contain reliable electronic components to measure and time the output from internal current sensors and initiate tripping action. The circuit breaker shall be UL listed for reverse connection without requiring special construction.

3. Circuit breakers shall be provided with seals for locking the rating plug and adjustments to prevent unauthorized changes.
4. UL listed for type and temperature rating of wire specified.
5. Fixed ON and OFF pushbutton cover padlock attachment, for all 3 pole circuit breakers. Part number S33897 for NT frame circuit breakers, part number S48536 for NW frame circuit breakers, or equal.
6. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
7. Options and Accessories:
   a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
   b. The following is a list of accessories available for a low voltage power circuit breaker. Refer to Section 2.5 for item code definitions.
      1). ALS – Alarm Switch
      2). AXS – Auxiliary Switch
      3). EOP – Electric Operator
      4). ST – Shunt Trip
      5). UVT – Under Voltage Trip
   c. The following is a list of options available for a low voltage power circuit breaker. Refer to Section 2.6 for item code definitions.
      1). L1 – Long time / Instantaneous (LI)
      2). L2 – Long time / Short time / Instantaneous (LSI)
      3). L3 – Long time / Short time / Instantaneous / Ground Fault Trip (LSIG)
      4). L4 – Long time / Short time / Instantaneous / Ground Fault Sensing (LSIA)
      5). SC – System Communication
      6). SD – System Diagnostic
      7). SM – System Monitoring
      8). ZS – Zone Selective Interlocking
      9). 100 – 100% Rated Circuit Breaker

2.5 CIRCUIT BREAKER ACCESSORIES

A. ACCESSORY ALS:
   1. Alarm Switch: One set of normally open and one set of normally closed contacts rated 120 volt 5 amps. Contact activation upon any trip function of the circuit breaker or external trip device, such as a shunt trip.

B. ACCESSORY AXS:
   1. Auxiliary Switch: One set of normally open and one set of normally closed contacts rated 120 volt 5 amps. Contacts signal the status of circuit breaker main contacts independent of the method used to open or close the circuit breaker.

C. ACCESSORY EOP:
   1. Electrical Operator: Device for remote On, Off and Reset control of circuit breaker from a remote device. Field verify operator voltage.

D. ACCESSORY ST:
   1. Shunt Trip: Electrically operated solenoid for remote opening of circuit breaker main contacts. Field verify coil voltage.

E. ACCESSORY UVT:
   1. Undervoltage Trip: Electrically operated solenoid for opening of circuit breaker main contacts when control voltage drops below 35 to 70% of rated system voltage. Field verify coil voltage.

2.6 CIRCUIT BREAKER OPTIONS

A. OPTION AF:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Arc Fault Circuit Interrupter:
   a. Circuit breaker shall be provided with integral arc flash protection for grounded systems.

B. OPTION AR:
1. Arc Flash Reduction:
   a. Circuit breaker shall have a maintenance mode for arc flash reduction.
   b. Maintenance mode shall have adjustable arc flash reduction settings.

C. OPTION CL:
1. Current Limiting: Interrupting rating of 100,000 RMS symmetrical amperes.
2. Meet the following standards:
   a. CSA listed
   b. IEC 157-1
   c. NEMA AB1-1975
   d. Fed Spec W-C-375B/GEN
3. Thermal and magnetic molded case type with ultra high speed blow apart contacts.
4. Ground fault protection when indicated on the drawings:
   a. Circuit breakers shall be provided with integral equipment protection for grounded systems.
   b. The ground fault system shall be residual type.
   c. The system shall have adjustable time delay and pick-up settings.
5. Single-handle common trip, two and three poles (handle ties not acceptable).
6. Quick make and break toggle over center action.
7. Handle trip indication.
8. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
9. On high level fault currents, the circuit breaker shall limit peak current and let-thru energy and provide a voltage transient-free interruption at near unity power factor. On fault currents below the threshold of limitation, the circuit breaker shall provide conventional overload and short circuit protection.
10. Combinations for series connected interrupting ratings shall be recognized by Underwriters Laboratories. Current limiting circuit breakers shall allow the use of branch circuit breakers with lower interrupting capacities on systems capable of delivering fault currents up to 200,000 rms symmetrical amperes at 480V AC.
11. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.

D. OPTION FR:
1. Fully Rated
   a. Circuit breaker shall be designed to continuously carry 100% of its rated current.

E. OPTION GE:
1. Ground Fault Protection - Equipment:
   a. Ground fault protection for equipment equal to 30 mA.
   b. Circuit breaker shall be provided with integral equipment protection for grounded systems.
   c. The ground fault system shall be residual type.
   d. The system shall have adjustable time delay and pick-up settings.

F. OPTION GP:
1. Ground Fault Protection - Personnel:
   a. Ground fault protection for personnel equal to 5 mA.
   b. Circuit breaker shall be provided with integral equipment protection for grounded systems.
   c. The ground fault system shall be residual type.
   d. The system shall have adjustable time delay and pick-up settings.

G. OPTION GS:
1. Ground Fault Sensing / Alarm:
   a. Circuit breaker shall be provided with integral equipment ground fault alarm contact only for grounded systems.
   b. The circuit breaker shall have adjustable ground-fault pickup and ground-fault delay settings.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

H. OPTION HC:
1. Heating , Air Conditioning, Cooling, Refrigeration - HACR:
a. Circuit breaker shall be provided with HACR rating.
I. OPTION HM:
1. High Magnetic - HID:
a. Circuit breaker shall be provided with high inrush current limit.
J. OPTION L1:
1. Long-Time / Instantaneous Protection - LI:
a. Circuit breaker shall be provided with integral long-time and instantaneous protection for grounded systems.
b. The circuit breaker shall have adjustable long-time pickup, long-time delay and instantaneous settings.
K. OPTION L2:
1. Long Time / Short Time / Instantaneous - LSI:
a. Circuit breaker shall be provided with integral long-time, short-time and instantaneous protection for grounded systems.
b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay and instantaneous settings.
L. OPTION L3:
1. Long Time / Short Time / Instantaneous / Ground Fault Trip - LSIG: .
a. Circuit breaker shall be provided with integral long-time, short-time, instantaneous, and equipment ground fault protection for grounded systems.
b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous, ground-fault pickup and ground-fault delay settings.
M. OPTION L4:
1. Long Time / Short Time / Instantaneous / Ground Fault Sensing - LSIA: .
a. Circuit breaker shall be provided with integral long-time, short-time, instantaneous, and equipment ground fault alarm contact only for grounded systems.
b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous, ground-fault pickup and ground-fault delay settings.
N. OPTION MD:
1. Modified Differential Ground Fault:
a. Circuit breaker shall be provided with current sensors for all three phases and the neutral.
b. Circuit breaker shall be provided with a Ground-fault Interface Module.
O. OPTION MP:
1. Motor Circuit Protector:
a. Motor circuit protector shall be provided with magnetic protection only.
b. The protector shall have adjustable instantaneous-trip settings.
P. OPTION MS:
1. Molded Case Switch:
a. Molded case switch shall be provided with fixed instantaneous-trip only.
Q. OPTION SC:
1. System Communication:
a. Circuit breaker shall be provided with capability for metering integration of device into a Building Automation System (BAS).
R. OPTION SD:
1. System Diagnostic:
a. Circuit breaker shall be provided with capability for advanced system diagnostics including power quality measurements and wave form analysis.
S. OPTION SM:
1. System Monitoring:
a. Circuit breaker shall be provided with capability for basic metering and data logging including current, voltage, power, energy and frequency.
T. OPTION ZS:
1. Zone Selective Interlocking:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

a. Circuit breaker shall have communications capabilities on trip functions compatible with all other electronic trip circuit breakers.

2.4 CIRCUIT BREAKER ENCLOSURE

A. Enclosure: NEMA AB 1, Type 1.
B. Fabricate enclosure from sheet steel which conforms to UL 50 including padlocking provisions for the OFF position.
C. Finish using manufacturer's standard enamel finish, gray color.

2.5 KEY INTERLOCKS

A. Key interlock shall be manufactured by Kirk or Superior. Key will be held captive when circuit breaker or switch is closed unless indicated otherwise.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to circuit breakers, internal components, enclosure and finish.
C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect equipment from dirt, water construction debris and traffic.

3.2 EXAMINATION AND PREPARATION

A. Verify equipment dimension match approved submittals.
B. Examine areas to receive enclosed circuit breakers to assure adequate working clearance for enclosed circuit breaker installation.
C. Verify overcurrent device rating is sized properly for the load and associated conductors.

3.3 INSTALLATION

A. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions.
B. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.
C. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

3.4 FIELD QUALITY CONTROL

A. Field testing will be performed under provisions of Section 26 08 11.
B. Inspect and test each circuit breaker to NEMA AB 1.
C. Inspect each circuit breaker visually.
D. Perform five (5) mechanical ON-OFF operations on each circuit breaker.
E. Verify circuit continuity on each pole in closed position.
F. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.
G. Include description of testing and results in test report.
H. Test and/or permanently record the following:
    1. Fuses:
        a. Equipment nameplate requirement.
        b. Actual fuse rating.
    2. Circuit Breakers:
        a. Nameplate data.
        b. Actual trip setting.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.5 ADJUSTING AND CLEANING

A. Adjust trip settings Short Circuit and Coordination Study or as directed by the Engineer. Install seals on all rating plugs and adjustments after trip settings have been adjusted.
B. Adjust doors and operating mechanisms for free mechanical movement.
C. Tighten lugs and bus connections.
D. Clean circuit breakers.
E. Sand, prime and paint scratched or marred surfaces to match original finish.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate installation and removal of circuit breaker and associated mounting hardware.
B. Demonstrate how to set adjustable trip settings on circuit breakers with electronic trip units.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 33 53
STATIC UNINTERRUPTIABLE POWER SUPPLY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Charger/rectifier unit.
B. Inverter unit.
C. Energy storage, maybe referenced as battery.
   1. Valve regulated lead acid batteries.

1.2 SYSTEM DESCRIPTION

A. Provide the static uninterruptible power supply (UPS) as indicated on the drawings and as specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Shop Drawings: Indicate electrical characteristics and connection requirements. Provide battery rack dimensions; battery type, size, dimensions, and weight; detailed equipment outlines, weight, and dimensions; location of conduit entry and exit; single-line diagram indicating metering, control, and external wiring requirements; heat rejection and air flow requirements.
   2. Product Data: Provide catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.
B. For Record Purposes
   1. As built/Record Drawings shall accurately indicate the location of the equipment and the equipment shall be identified with the final designation as directed by the Owner.
   2. Test Reports: Indicate field test and inspection procedures and test results.
C. Operations and Maintenance Manuals
   1. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
   2. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting the bid if the dimensional increases will be greater than 6 inches in any dimension.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1.6 EXTRA MATERIALS

A. Spare Materials
   1. Provide three fuses of each size, type, and rating.
B. Maintenance Materials
   1. Provide one set of any special tools required to maintain the system.

1.7 WARRANTY

A. UPS Warranty: The UPS manufacturer shall warrant the unit against defects in workmanship and materials for 12 months after initial startup or 18 months after the shipping date, whichever comes first.
B. Refer to Energy Storage for additional warranty information.
C. Warranty - End User: Warranties associated with items not manufactured by the UPS supplier but included as part of the system shall be passed through to the end user.

PART 2 SPECIFIC REQUIREMENTS

2.1 STATIC UNINTERRUPTIBLE POWER SUPPLY

A. MANUFACTURER
   1. Vertiv/Liebert
B. MODEL/SERIES
   1. EXS series
C. SUPPLIER
   1. Authorized distributor of specified manufacturer.

2.2 SYSTEM OPERATION

A. DESIGN REQUIREMENTS
   1. The UPS size, input voltage, input configuration, output voltage are indicated on the one-line diagram.
   2. The UPS shall be a double conversion on-line style, AC to DC to AC.
   3. The UPS shall be able to supply all required power to full rated output kVA loads with power factor from 0.7 lagging to 0.9 leading.
   4. The energy storage system shall support the UPS at 100% rated kW load for at least the minutes indicated on the one-line diagram at 77°F (25°C).
   5. The UPS shall have an active power factor corrected converter/rectifier, capable of maintaining input power factor and input current total harmonic distortion (THD) within specifications without an additional input filter.
   6. The UPS shall be of transformer-free design, requiring no internal transformer in the main power path for the basic operation of the module. Optional transformers in cabinets or otherwise external to the basic UPS module shall be permissible to provide isolation and/or voltage transformation.
   7. The UPS shall comply with FCC Part 15, Class A.
B. ENVIRONMENTAL CONDITIONS
   1. The UPS shall be able to withstand the following environmental conditions without damage or degradation of operating characteristics:
      a. Operating Ambient Temperature:
         1). UPS: 32°F to 104°F (0°C to 40°C) for up to 8 hours without derating; up to 95°F (35°C) continuously without derating
         2). Lead Acid Battery: 77°F (25°C), ±5°F (±3°C)
      b. Relative Humidity: 0 to 95%, non-condensing
      c. Altitude: To 3300 ft. (1000m) above Mean Sea Level without derating (compliant with IEC/EN 62040-3 at altitudes exceeding 1000m)
      d. Audible Noise Level: 65 dBA measured 5 ft. (1.5m) from the surface of the unit.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. MODES OF OPERATION
1. Normal: The critical AC load shall be continuously powered by the UPS inverter. The rectifier/charger shall derive power from the utility AC source and supply DC power to the DC-DC converter, which in turn shall supply the inverter while simultaneously float charging the energy storage system.
2. ECO Mode: The critical AC load shall be continuously powered by the bypass with the inverter available to power the load if the bypass source voltage or frequency exceeds adjustable parameters of power quality.
3. Emergency: Upon failure of utility AC power, the critical AC load shall be powered by the inverter, which, without any switching, shall obtain its power from the energy storage system via the DC-DC converter. There shall be no interruption in power to the critical load upon failure or restoration of the utility AC source.
4. Recharge: Upon restoration of the utility AC source, the rectifier shall supply power to the output inverter and to the DC-DC converter, which shall simultaneously recharge the battery. This shall be an automatic function and shall cause no interruption to the critical AC load.
5. Bypass: If the UPS must be taken out of service for maintenance or repair, the static transfer switch shall transfer the load to the bypass source. The transfer process shall cause no interruption in power to the critical AC load.
6. Maintenance Bypass: An external wrap-around maintenance bypass shall be used to ensure full isolation of the unit for the service of internal components while providing safety from arc flash and in compliance with OSHA requirements. Refer to the drawings if an external wrap-around maintenance bypass is required.
7. Off-Energy Storage: If the energy storage system is only taken out of service for maintenance, it shall be disconnected from the DC-DC converter by means of an external disconnect circuit breaker. The UPS shall continue to function and meet all the specified steady-state performance criteria, except for the power outage backup time capability. If multiple energy storage strings are used, each string shall be capable of being electrically isolated for safety during maintenance.

D. INPUT VOLTAGE SPECIFICATIONS:
1. Voltage Range: +20%, -15% full load, -40% at half load.
2. Frequency Range: 40 - 70Hz
3. Maximum Inrush Current: Shall not exceed 1.5 times rated input current.
4. Input Current Walk-In: The UPS shall contain a controlled module walk-in to minimize inrush current upon auto-restart. The module walk-in is programmable for a 1 to 5 second delay.
5. Power Factor**:** Minimum 0.99 at full load with nominal input voltage.
6. Current Distortion**:** Less than 3% THD at full load input current in double-conversion mode.
7. Surge Protection**:** Sustains input surges of 6kV without damage per criteria listed in IEEE C62.41, Category A, Level 3 and Category B, Level 3 and per IEC/EN/AS 61000-4-2, 3, 4, 5, 6 Category 2.
8. Short Circuit Current Rating**:** Units shall carry as standard 10kA Short Circuit Withstand Rating. All ratings shall be certified, and a label shall be applied to the unit clearly identifying this rating as required by the National Electrical Code.

E. OUTPUT VOLTAGE SPECIFICATIONS:
1. Load Rating**:** 100% of load rating at 104°F (40°C) for any load from 0.5 lagging to 0.9 leading
2. Voltage Regulation
   a. ±1% RMS average for a balanced, three-phase load
   b. ±5% for 100% unbalanced load for line-to-line imbalances
3. Voltage Adjustment Range**:** ±5% for line drop compensation adjustable by factory service personnel.
4. Frequency Regulation**:** 50 or 60Hz, ±0.05% free running
5. Bypass Frequency Synchronization Range**:** ±0.5, 1.0, 2.0, 3.0 Hz, adjustable by factory service personnel, ±2.0 Hz default setting
6. Frequency Slew Rate**:** 0.1 to 3 Hz/sec, 0.6 Hz/sec default setting

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

7. System Efficiency defined as output kW/input kW at rated lagging load power factor, average over operating range and not less than the values listed below:
   a. 10-15kVA: 90%
   b. 20-80kVA: 93%
   c. 100-250kVA: 95%
   d. Greater than 250kVA: 96%
   e. Unit shall be Energy Star rated.
8. Phase Imbalance:
   a. Balanced loads - 120° ±1°
   b. 100% unbalanced loads - 120° ±1.5°
9. Voltage Transients 0-100% or 100-0%
   a. Response
      1). Meets IEC 62040-3: 2010 Figure 2 Curve 1, Class 1
      2). Meets ITIC and CBEMA Curve Requirements
      3). Transient Voltage Deviation, RMS is 10% with 60ms recovery.
10. Frequency regulation ±1%
11. Overload at Full Output Voltage with ±1% voltage regulation
    A. 100% continuously
    B. 105-110% of full load for 60 minutes
    C. 110-125% of full load for 10 minutes
    D. 125-150% of full load for 60 seconds
    E. Greater than 150% of full load for 200 milliseconds

F. GROUNDING
1. The UPS chassis shall have an equipment ground terminal.

2.3 FABRICATION

A. All materials of the UPS shall be new, of current manufacture, high grade and shall not have been in prior service except as required during factory testing. All active electronic devices shall be solid-state. All power semiconductors shall be sealed. Control logic and fuses shall be physically isolated from power train components to ensure operator safety and protection from heat.

B. All power, AC and DC, capacitors shall be mounted to allow field replacement of the capacitors separately from the power switching controls and components. All the capacitors shall have a 15-year design life.

C. Wiring practices, materials and coding shall be in accordance with the requirements of the National Electrical Code, OSHA and applicable local codes and standards. Internal power wiring shall be extra flexible terminated with compression type lugs. All bolted connections of busbars, lugs and cables shall be in accordance with requirements of the National Electrical Code and other applicable standards. All electrical power connections shall be torqued to the required value and marked with a visual indicator. All power connections not serviceable from the front or top of the unit shall be permanent, without any need for periodic tightening.

D. Field Wiring
1. Wiring practices, materials and coding shall be in accordance with the requirements of the National Electrical Code, OSHA and applicable local codes and standards. All bolted connections of busbars, lugs and cables shall be in accordance with requirements of the National Electric Code and other applicable standards.
2. All field wiring power connections shall be to tin-plated copper busbars for connection integrity. Busbars shall have adequate space to allow two-hole, long-barrel, compression-type lugs forming a permanent connection between field wiring and field-installed lugs.
3. Provisions shall be made in the cabinets to permit installation of input, output, and external control cabling, using raceway or conduit. Provision shall be made for top and bottom access to input, output, bypass, and DC connections. In conformance with NEC, connection cabinets shall provide for adequate wire bend radius.
4. Control wiring shall be stranded tinned conductors.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

E. The UPS shall be in a NEMA Type 1 enclosure, designed for floor mounting. The UPS shall be structurally adequate and have provisions for hoisting, jacking and forklift handling. The UPS shall have front doors open to enable safe change of air filters without the need for shutdown.

F. Cooling

1. Forced redundant air cooling will ensure that all the components are operated within their specification. Airflow will be controlled according to load demand. The UPS will be capable of preserving normal operations even with multiple cooling fans out of operation (due to failure) with 100% of the output nominal load at 86°F (30°C) ambient temperature if there is only one failed fan per converter cell. If these conditions are not met (with one failed fan per converter cell), the UPS will supply the load through the static bypass if an overheating of the converters occurs. The failed fan condition will be immediately notified by the UPS through all the user interfaces and through Vertiv" LIFE" Services. The cooling air entry will be on the front and the air exit at the top of the UPS. The UPS will be installed with at least 24 inches of overhead clearance to allow cooling air to exit unhindered.
2. An internal, factory-mounted sensor for room ambient temperature shall be provided to give an alarm if the temperature of the inlet air to the UPS is above specified limits.
3. Air filters shall be located at the point of air inlet and shall be changeable. No service clearance or ventilation shall be required at the rear of the system.

2.4 SYSTEM PROTECTION

A. Surge Protection: The UPS shall have built-in protection against surges, sags, and overvoltage from the AC source. The protection shall meet the requirements of ANSI C62.41 B3 including:

1. 6kV, 100kHZ ring wave, line-to-line, line-to-neutral, line-to-ground and neutral-to-ground
2. 6kV, combined wave, line-to-line, line-to-neutral, line-to-ground and neutral-to-ground

B. Output Protection: The UPS shall be protected against sudden changes in output load and overload at the output terminals. The UPS shall have built-in protection against permanent damage to itself and to the connected load for all predictable types of malfunctions. Fast-acting current-limiting devices shall be used to protect against cascading failure of solid-state devices. Internal UPS malfunctions shall cause the module to trip off-line with minimum damage to the module and provide maximum information to maintenance personnel regarding the reason for tripping off-line. The load shall be automatically transferred to the bypass line without any interruption for an internal UPS malfunction. The status of protective devices shall be indicated on a graphic display screen on the front of the unit.

C. AC Ground Fault Detection: The UPS is a three-wire system and shall have the capability to detect and annunciate AC phase-to- ground faults when the UPS is powering the load from the battery or other DC source. If an AC ground fault occurs between a phase and ground, a message shall be displayed on the operator screen indicating that the fault condition exists. The UPS shall also have as standard the ability to indicate this condition via a programmable contact to actuate a third-party device, such as a warning light or audible alarm system.

D. Rectifier Fuse Protection: Each rectifier AC phase shall be individually fused with fast-acting fuses so that loss of any semiconductor shall minimize cascading failures. Fuses shall be bolted to busbars at both ends to ensure mechanical and electrical integrity. The display panel on the front of the unit shall indicate a blown fuse occurring on any phase of the rectifier.

2.5 DISPLAY AND CONTROLS

A. The UPS shall be provided with a microprocessor-based control panel for operator interface to configure and monitor the UPS. The control panel shall be located on the front of the unit where it can be operated without opening the hinged front door. A backlit, menu-driven, full-graphics, color touchscreen liquid crystal display shall be used to display

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

system information, metering information, a one-line diagram of the UPS and battery, active events, and event history.

B. UPS system logic and control programming shall reside in a microprocessor-based control system with non-volatile flash memory. System control logic shall utilize high-speed digital signal processors (DSPs). Switches, contacts, and relays shall be used only to signal the logic system as to the status of mechanical devices or to signal user control inputs. Customer external signals shall be isolated from the UPS logic by relays or optical isolation.

C. A microprocessor shall control the display and memory functions of the monitoring system. All three phases of the three-phase parameters shall be displayed simultaneously. All voltage and current parameters shall be monitored using true RMS measurements for accurate (+1.5%) representation of non-sinusoidal waveforms typical of computers and other sensitive loads. These parameters shall be displayed:
   1. Input voltage, line-to-line.
   2. Input current.
   3. Input frequency.
   4. Input kVA/kW.
   5. Battery voltage, each battery string.
   6. Battery charging/discharging current.
   7. Battery temperature, each battery string.
   8. Battery state of charge.
   9. Battery run time.
   10. Battery run time.
   11. Bypass input voltage, line-to-line.
   12. Bypass input frequency.
   13. Output voltage, line-to-line.
   14. Output frequency.
   15. Output current.
   16. Output kVA/kW, total and percentage of full load.
   17. Ambient temperature.
   18. Total operating hours.
   19. Power Flow Diagram graphically depicting how the load is supplied:
      a. Remote AC input circuit breaker
      b. Battery circuit breaker, each breaker
      c. Inverter output circuit breaker
      d. Static bypass
      e. Maintenance bypass

D. Main Display Screen shall display the following status indicators:
   1. Rectifier.
   2. Input supply.
   3. Battery self-test.
   4. Input disconnect.
   5. Emergency power off.
   6. Charger.
   7. Output disconnect.
   8. Maintenance disconnect.
   9. Bypass disconnect.
   10. Inverter, on/off.
   11. Bypass.
   12. Output supply.

E. The microprocessor shall have an event log to display a list of events in chronological order. The event log shall store 1500 events with the oldest events overwritten if the log capacity is reached. All events shall be displayed in text format. Event codes requiring a manual to decipher the event code are not acceptable.

F. Battery status indicator shall display the DC alarm conditions, temperature, battery state of charge, current battery voltage and battery time remaining.

G. The UPS shall provide controls to allow the operator to:
   1. Configure and manage manual battery test.
   2. Start battery test.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3. Monitor test status and progression.
4. Stop battery test.
5. Battery test status.

H. Controls: System level controls shall be:
1. Start inverter and transfer to inverter.
2. Stop inverter and transfer to bypass.
3. Start-up screen.
4. Alarm silence command.
5. Fault reset command.
6. Mode selector.
7. System settings: time, date, language passwords.
8. Network settings.
9. Transfer load from inverter to bypass and from bypass to inverter.

I. Remote Monitoring
1. The unit shall provide 3 dry contacts for monitoring: Trouble, Alarm and Critical Alarm.
2. The unit shall have web card capable of providing any one of the following 3 protocols:
a. SMNP
b. MODBUS over IP or RS-485
c. BACnet

2.6 STATIC BYPASS

A. For times when maintenance is required or when the inverter cannot maintain voltage to the load due to sustained overload or malfunction, a bypass circuit shall be provided to isolate the inverter output from the load and provide a path for power directly from an alternate AC (bypass) source. The UPS control system shall constantly monitor the availability of the inverter bypass circuit to perform a transfer. The inverter bypass circuit shall consist of a continuous duty bypass static switch and an overcurrent protection device to isolate the static bypass switch from the bypass source. The bypass static switch shall denote the solid-state device incorporating SCRs (silicon-controlled rectifiers) that can automatically and instantaneously connect the alternate AC source to the load.

B. Static Bypass Switch Rating:
1. The static bypass switch shall be rated for continuous duty operation at full rated load for highest reliability without the use of mechanical devices as used with a momentary rated device.

C. Manual Load Transfers:
1. A manual load transfer between the inverter output and the alternate AC source shall be initiated from the control panel. Manually initiated transfers shall be make-before-break, utilizing the inverter and the bypass static switch.

D. Automatic Load Transfers:
1. An automatic load transfer between the inverter output and the alternate AC source shall be initiated if an overload condition is sustained for a period more than the inverter output capability or due to a malfunction that would affect the output voltage. Transfers caused by overloads shall initiate an automatic retransfer of the load to the inverter only after the load has returned to a level within the rating of the inverter source and the alarm has been acknowledged.

E. Momentary Overloads:
1. In the event of a load current inrush or branch load circuit fault more than the inverter rating, the bypass static switch shall connect the alternate AC source to the load for at least 600 milliseconds, allowing up to 1000% of the normal rated output current to flow. Output voltage shall be sustained to the extent the alternate AC source capacity permits. If the overload condition is removed before the end of the 600-millisecond period, the bypass static switch shall turn Off and the load shall remain on inverter power. If the overload remains, then a transfer to the alternate AC source is to be completed.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

F. Backfeed Protection:
1. As required by UL1778 and CSA, the static transfer switch shall not backfeed UPS power to the bypass distribution system while the UPS is operating on battery during a bypass power outage. The purpose of this requirement is to prevent the risk of electrical shock on the distribution system when the normal source of power is disconnected or has failed. If a shorted SCR is detected, the static transfer switch shall be isolated by an internal automatic circuit breaker and an alarm message shall be annunciate at the UPS control panel. The load shall remain on conditioned and protected power after detection of a shorted SCR and isolation of the bypass static switch.

2.7 MAINTENANCE BYPASS

A. The maintenance bypass shall be internal or external to the UPS as indicated on the one-line diagram.

2.8 ENERGY STORAGE

A. Disconnect Breaker:
1. The UPS shall have a properly rated circuit breaker (600VDC) to isolate it from the energy storage module. This breaker shall be in a separate/barriered NEMA-1 compartment. The UPS shall be automatically disconnected from the battery by opening the breaker when the battery reaches the minimum discharge voltage level or when signaled by other control functions.
2. Opening of the breaker will isolate the energy storage string from the UPS and from any other energy storage string.
3. Provide a battery disconnect per energy storage string.

B. Lead VRLA
a. The battery system will consist of 2 full voltage strings. Each string shall provide approximately half of the required runtime.
b. The battery power pack shall consist of lead-calcium sealed, valve regulated type batteries and a properly rated circuit breaker (500VDC nominal, 800VDC maximum) for isolating the battery pack from UPS. The battery cells and disconnect breaker shall be installed and housed in a NEMA-1 cabinet, matching the UPS style and design.
c. The battery runtime is indicated on the drawings. The battery system shall provide 100% initial capacity upon delivery.
d. The battery shall be with a 3-year full warranty and 7-year pro rata under full float operation.
e. The battery design shall utilize absorbent glass mat technology to immobilize the electrolyte.
f. Provide the required interface of the battery to the UPS.
2. Safety Device and Level of Protection
a. The battery system shall be designed with the highest level of protection built into the battery system against potential safety risks including but not limited to over voltage, short circuit current, over temperature and runaway temperature. It shall consist of an additional level of protection namely cell, module, and string level.
1). Battery Management System (BMS) and Switchgear: Each battery string shall be installed with a main circuit breaker to isolate the affected battery string in the event of a fault. BMS shall also be included in each string to provide continuous monitoring of the voltage and temperature of each cell within the string. BMS gathers and analyses the string current. In the event of overvoltage or short circuit, the BMS will trip the associated string main circuit breaker. This will be an output alarm point.
2). Cell Protection: Several protection features shall be incorporated into the cell namely, safety function layer (SFL), Multi-layers

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Separator, Safety Vent, Safety Fuse and Overcharged Safety Device. These safety features are to protect the cell from overcharging and thermal runaway. The features shall trip the string main circuit breaker. This will be an output alarm.

b. When two battery strings are indicated on the drawings, each string shall be full voltage that combined provide the specified run time. Each string will have dedicated enclosure(s).

C. Combination

1. A combination shall consist of a flywheel and the indicated batteries on the drawings. The intent is for the flywheel to supply the momentary power dips and outage and the batteries to supply any sustained power dip or outage.
2. The above specifications pertain to the equipment that create the combination.

2.9 REQUIRED ACCESSORIES

A. Integrated Battery Monitoring

1. Shall be Alber BDSUI or prior approved equal.
2. This integrated battery monitoring solution extends and optimizes useful battery life, reduces maintenance costs, and increases safety. The monitoring system reports all critical battery parameters, including internal resistance, total voltage, cell voltage, temperature, and discharge events. Provide the required interface of the battery monitoring to the UPS so UPS display any general battery alarm, and that any general battery alarm can be sent out to any remote monitoring similar to any UPS alarm.

2.10 FACTORY TESTING

A. Before shipment, the manufacturer shall fully and completely test the UPS unit to ensure compliance with the specification.
B. The UPS unit shall be tested at the system-specified capacity. Testing shall be done using load banks at part-load and the full kW rating of the unit.
C. Operational discharge and recharge tests to ensure guaranteed rated performance.
D. System operations such as startup, shutdown and transfers shall be demonstrated.
E. A certified copy of the test results shall be available for each system.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Accept Products on site in factory packing. Inspect for damage.
B. Handle and store equipment according to the manufacturer's written instructions.
C. Protect equipment from extreme temperature and humidity by storing it in a conditioned space.
D. Protect equipment from dust and debris by wrapping unit in dust tight cover and storing away from construction activity.
E. Deliver batteries no sooner than 5 days before charging.
F. Do not store or install unless temperature is maintained between 32 degrees F (0 degrees C) and 104 degrees F (40 degrees C), at a relative humidity less than 95 percent (non-condensing).

3.2 EXAMINATION AND PREPARATION

A. Verify that surface is suitable for UPS installation.
B. Convene a pre-installation conference one week prior to commencing work of this Section.

3.3 INSTALLATION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Do not install products until the building is enclosed.
B. Maintain conditions to manufacturer's instructions during and after installation of the system.
C. Install in accordance with manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under the provisions of Section 26 08 11.
B. Verify specification performance criteria; measure battery discharge and recharge times; simulate faults in each system component and utility power; Operate unit at 77 degrees F (25 degrees C) for eight hours; and other tests as recommended by manufacturer.

3.5 ADJUSTMENT AND CLEANING

A. Adjust doors and operating mechanisms for free mechanical movement.
B. Tighten lugs and bus connections.
C. Clean interior of equipment.
D. Sand, prime and paint scratched or marred surfaces to match the original finish.

3.6 START UP / MANUFACTURER FIELD SERVICE

A. Verification of Conditions: To ensure full warranty coverage, a manufacturer certified technician must perform the start-up service. Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect/Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
B. Inspection
    1. Visual Inspection - UPS
        a. Inspect equipment for signs of damage.
        b. Verify installation per drawings supplied with installation manuals or submittal package.
        c. Inspect cabinets for foreign objects.
        d. Verify that neutral and ground conductors are properly sized and configured per manufacturer’s requirements as noted in the installation manuals or submittal package.
    2. Visual Inspection - Batteries
        a. Inspect electrolyte level in cells (flooded cells only).
        b. Inspect all cell cases.
        c. Inspect each cell for proper polarity.
        d. Verify that all printed circuit boards are configured properly.
    3. Mechanical Inspection
        a. Check all control wiring connections for tightness.
        b. Check all power wiring connections for tightness.
        c. Check all terminal screws, nuts and/or spade lugs for tightness.
    4. Electrical Inspection
        a. Check all fuses for continuity.
        b. Confirm input and bypass voltage and phase rotation are correct.
        c. Verify control transformer connections are correct for voltages being used.
C. Ensure connection and voltage of the battery string(s) and/or flywheel.
D. Start UP
    1. Energize control power.
    2. Perform control/logic checks and adjust to meet manufacturer’s specification.
    3. Verify DC float and equalize voltage levels.
    4. Verify DC voltage clamp and overvoltage shutdown levels.
    5. Verify battery discharge, low battery warning and low battery shutdown levels.
    6. Verify fuse monitor alarms and system shutdown.
    7. Verify inverter voltages and regulation circuits.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

8. Verify inverter/bypass sync circuits and set overlap time.
9. Perform manual transfers and returns while energized to verify all bypass and key interlocking.
10. Simulate utility outage at no load.
11. Verify proper recharge.

E. Testing:
1. Load Bank
   a. UPS shall be electrically connected to the electrical distribution system and Building Automation System. Room HVAC shall be fully operational and shall be utilized for room cooling during the load bank test.
   b. EC to provide resistive load bank(s) and all necessary interconnection conductors and cabling. The load bank shall be connected to the UPS output distribution panel or appropriate termination point. Coordinate load bank testing with Owner, Engineer, and commissioning agent (if applicable).
   c. Load bank test each UPS at 100% full load for a minimum of 4 hours.
   d. During the load bank test, confirm operation and performance in changes of mode of operation at full load:
      1). Normal (inverter) operation to Static bypass operation
      2). Static bypass operation to Maintenance bypass operation
      3). Maintenance bypass operation to Static bypass operation
      4). Static bypass operation to Normal (inverter) operation
   e. Include a minimum of six simulated power failures, three by operating the line circuit breaker to the UPS and three by operating the normal power breaker on the input to the upstream transfer switch. Generator to start and transfer switch to transfer to generator power.
   f. After the load bank test, the following performance tests shall be performed:
      1). Step Load 0 kW to 50% of UPS nameplate rating
      2). Step Load 50% to 100% UPS nameplate rating
      3). Step Load 0 kW to 100% UPS nameplate rating
   g. Record input voltage, input current, output voltage and output current at the start of the load bank test and at 15-minute increments during test.
   h. Record ambient air and room air temperature prior to start of testing and at 15-minute increments during test, including at the end of the test.
2. DC Discharge Test
   a. Test each UPS at 50% full load on battery for time recommended by battery manufacturer.
   b. Record DC voltage, current and capacity remaining at 1-minute intervals during run time. When multiple DC cabinets are applied, current is to be recorded individually for each.
   c. Plot battery discharge voltages and currents, and validate runtime meets specification.
   d. Record DC voltage during recharge intervals and verify recharge process.
3. Thermographic Inspection – Responsibility of Electrical Contractor
   a. During load bank test and battery load test, perform thermographic inspection of system interconnections using infrared camera. Note and correct any deficiencies.
4. Confirm proper operation of and successful restart from fault condition and from emergency power off condition.
5. Test remotely connected UPS status indication signals. This includes any remote annunciator and the integration with the Building Automation System.
6. Provide complete report of the load testing including an executive summary and any observed test issues.

3.7 DEMONSTRATION AND TRAINING

A. Provide systems demonstration under provisions of Section 26 05 00.
B. Demonstrate operation of uninterruptible power supply by simulating an outage.
C. Training:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Provide a comprehensive demonstration to Owner or maintenance personnel and Engineer of system maintenance and operation after load bank test.
2. Provide 4 hours of instruction each for two people, to be conducted at the project site with manufacturer's certified technician.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 26
ELECTRICAL WORK
SECTION 26 50 00
INTERIOR LUMINAIRES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior Luminaires and accessories
B. Emergency lighting units
C. Exit signs
D. Lamps
E. Luminaire accessories

1.2 SYSTEM DESCRIPTION

A. Provide the luminaries and accessories as indicated on the drawings and specified herein.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTALS

A. For Approval
   1. Within twenty-one (21) days of contract award, successful Contractor shall submit a complete list of lighting products he intends on furnishing with manufacturer and complete catalog designations, along with currently quoted lead times for delivery of same. Should the Contractor anticipate that the delivery schedule of any specified product may adversely impact the construction schedule, he shall bring it to the attention of the Owner at this time.
   2. Submit fixture shop drawings in booklet form with index and a separate sheet for each fixture, assembled in Luminaire "type" alphabetical order, with specified fixture and accessories clearly indicated on each sheet. The manufacturer and catalog number of any associated ballast shall be indicated on fixture cut sheet. Each and every option and accessory which is scheduled for the fixture shall be clearly indicated on each sheet. Provide original cut sheet for each type of ballast utilized on the project. The sheets submitted shall be original cut sheets from the manufacturer's catalog, not photocopies. Indicate dimensions and description of each Luminaire construction.
   3. For all luminaires with paint color or finish options, standard or custom, include a single color original of manufacturer's color or finish choices for architect's review
   4. Shop drawings shall be submitted for review by the Engineer only after they have been reviewed and stamped by the Contractor.
   5. Product Data - Fixtures: Provide dimensions, ratings, and performance data.
   6. Product Data - Ballasts: Provide ratings and performance data for each type of ballast on project. If the lighting manufacturer cannot indicate the specific ballast being provided in the fixtures, it will be acceptable to provide the generic performance criteria of the ballast (ie GEB10) along with a list of possible ballast manufacturers that the fixture manufacturer may use to meet this criteria.
   7. Product Data-Luminaire Ballast Disconnects: Provide data showing disconnect devices and location in/on fixture. Provide fixture wiring diagram showing actual location(s) of the luminaire ballast disconnects.
   8. Substitutions/Alternates: Should the Contractor wish to have considered products other than those specified they must submit complete information on the proposed

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

items fourteen (14) days in advance of the bid. Failure to submit prior to the deadline constitutes a guarantee that the specified products will be supplied.

B. For Record Purposes
   1. Update record drawings actual fixture type installed.

C. Operations and Maintenance Manuals
   1. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
   2. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
   3. Maintenance Data: Include replacement parts list.

1.5 EQUIPMENT DIMENSIONS

A. Refer to luminaire schedule on drawings for approximate overall dimensions. Also refer to manufacturer's website of specified luminaire for dimensions of luminaire. Minor dimensional increases of 1 inch or less are acceptable, unless specific exact dimensions are indicated on the drawings. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 1 inch in any dimension.

1.6 EXTRA MATERIALS

A. Provide two (2) of each driver type.
B. Provide ------.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

1.8 REVISIONS

A. Should the Contractor revise, substitute or provide alternate products than those upon which the State of Wisconsin Commerce 63 Code submittal is based, the Contractor shall pay all costs associated with the revisions and re-submittal of the Lighting Compliance Worksheets to the state. This includes but is not limited to the time required by the Engineer and Lighting Designer to revise documents and re-submit them. It also includes all plan review fees. The Contractor must also provide all documentation necessary for the Engineer to update the submittal.

PART 2 PRODUCTS

2.1 LUMINAIRES – GENERAL

A. Provide lighting fixtures of the size, type and rating indicated in "Lighting Fixture Schedule," complete with, but not necessarily limited to, lamps, lampholders, reflectors, ballasts, starters, wiring, accessories and any other details required for a complete working installation.
B. Fixture catalog numbers do not necessarily include all accessories and are intended to serve as a guide in defining types and manufacturers of unit only.
C. Type of fixtures to be provided for each outlet is indicated by an alphanumeric designator on drawing.
D. Gasketing material shall be vinyl, neoprene or other non-aging type material as approved by Engineer and is appropriate for the atmosphere in which the fixture is scheduled to be installed.
E. EC shall field verify the ceiling type and coordinate with fixtures.
F. Provide proper trim for each fixture as required for various types of ceilings being installed throughout project; plaster rings, fixture ends or caps, suspension units, mounting brackets, and/or other auxiliary parts necessary to make a complete fixture. It is the Contractor's responsibility to notify the Engineer in writing within 21 days after the bid date

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

of any discrepancies between the electrical drawings, light fixture schedule, architectural plans, reflected ceiling plans and/or room finish schedules. Failure to notify the Engineer of discrepancies means that the Contractor is responsible for any costs associated with changing fixtures to match construction conditions.

G. Housings:
   1. Shall be free from burrs, sharp corners and edges.
   2. Shall be steel, unless noted otherwise, formed and supported to prevent warping and sagging.
   3. Provide with spring loaded latches for all troffers.
   4. Housings shall be post-painted.

H. Mounting Accessories:
   1. Recessed fixtures:
      a. Provide trim type and accessories required for installation in ceiling types specified and/or shown on the reflected ceiling plan and room finish schedule.
   2. Surface mounted fixtures:
      a. Provide ceiling spacers as required for fixtures not labeled as suitable for direct mounting to a low-density ceiling.
   3. Suspended fixtures:
      a. Provide pendant or cable length required to suspend luminaires at indicated height.
      b. Swivel hangers in mechanical equipment areas shall be shock-absorbing types.

I. Finishes:
   1. Painted finishes:
      a. Shall be polyester powder painted enamel finish.
      b. Shall be painted after fabrication, unless noted otherwise.
   2. Polished, brushed, other metal finishes:
      a. Shall be finished with clear coat to inhibit finish deterioration and corrosion.
   3. All finish types and colors shall be verified with the architect prior to ordering.

J. Louvers, Reflectors, Lenses:
   1. All louvers and reflectors shall be semi-specular, low iridescent, clear alzak, unless noted otherwise.
   2. All acrylic lenses shall be 100% virgin acrylic material with pattern 12 prismatic, overall 0.125” minimum thickness.

K. Options and Accessories:
   1. Refer to specific list on the Light Fixture Schedule. Coordinate all accessories such as air supply, air return, air handling etc. with the other trades.

2.2 LED LIGHTING

A. The manufacturer offering this item must have produced at least 1000 (one thousand) identical or similar models to that being tendered.

B. The manufacturer of the LED lighting fixture shall utilize high-brightness LEDs.

C. Light output of the luminaire shall be the absolute photometry following IESNA LM-79 requirements and guidelines.

D. Lumen maintenance of the LED’s (sources, arrays, modules) shall be reported following IESNA LM-80 requirements and guidelines.

E. Luminaire Color Rendering Index (CRI) shall be a minimum of 70 for exterior fixtures, and a minimum of 80 for interior fixtures.

F. Refer to the luminaire schedule for basis of specification for individual luminaires. Basis of specifications list performance requirements for the specific application of each product. Equal products submitted shall perform within the following tolerances unless otherwise noted.
   1. Luminaire Correlated Color Temperature (CCT) shall be as scheduled within a maximum tolerance of +/-200 degrees. For interior fixtures CCT shall be within a 2-step McAdams ellipse.
   2. Delivered lumens: +/- 5%
   3. Energy consumption: +5%

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

4. Beam Spread: +/- 4 degrees

G. The LED fixture shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the fixture is to be installed: 25 degrees C for exterior locations and conditioned interior locations, and 40 degrees C for unconditioned interior locations.

H. The luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours at 25 degrees C for exterior locations and conditioned interior locations, and 40 degrees C for unconditioned interior locations.

I. The luminaires shall have a verifiable one hundred (100) hour burn in time at the factory.

J. The luminaire shall be mercury-free, lead-free and RoHS compliant.

K. The luminaire shall be certified by a Nationally Recognized Testing Laboratory (UL, ETL, IEC) as listed by OSHA.

L. LED driver shall have a minimum power factor of 0.9.

M. Unless otherwise noted, electrical components of the LED lighting fixture [Manufacturer's UL listed LED light engine/board array and driver(s)] shall be of modular construction so that each component is individually replaceable in the field for maintenance and repair purposes. Provide internal disconnecting means for each component. The disconnecting means shall be factory installed and shall be Ideal Power Plug or equivalent. Disconnect shall be rated to meet or exceed voltage and ampacity ratings of fixture, see lighting fixture schedule for details.

N. The LED lighting fixture shall carry a limited 5-year warranty minimum for entire LED luminaire including light engine(s)/board array, and driver(s).

O. LED driver shall be compatible with dimming control as specified. Refer to Lighting Fixture Schedule and controls specification.

P. LED driver shall have no pre-programmed default dimming levels specific to the driver electronics. All dimming tolerances shall be field programmable via digital lighting system specified upon Owner request. Dimming tolerances include low and high end trim.

Q. LED driver may be factory-tuned to achieve specified lumen output as directed by lighting designer or engineer at time of submittals. This shall have no affect on dimming range.

R. LED luminaire, driver, and controls shall be submitted for review at the same time to ensure compatibility.

S. When a logarithmic dimming curve is available compared to a linear dimming curve, specific driver cutsheet shall be provided for review of compatibility with control system.

T. All LED fixtures when submitted for review shall include the "Lighting Facts" sheet.

2.3 EXIT SIGNS

A. Shall have 6" high with ¾" wide stroke lettering meeting all codes and standards.

B. Provide directional arrows as indicated or required.

C. Provide mounting accessories as required to back, end, pendant, top or flush mount per project requirements.

D. Shall be of modular design, facilitating the replacement of individual parts.

E. Shall be illuminated by LED's, unless noted otherwise.

F. Shall have a die-cast aluminum housing unless noted otherwise.

G. When indicated on the drawing, provide a pre-wired maintenance-free nicad battery backup with a 90-minute run time unless noted otherwise.

H. Exit signs with internal battery backup shall have self-diagnostic system.

I. Exit signs in areas subject to physical abuse shall be provided with necessary physical protection.

J. Provide all edge-lit exit signs with opaque backing.

K. Exit light housings shall be designed, manufactured and rated for the atmosphere in which they are installed. Provide housings for damp, wet, corrosive or hazardous locations as required by the project.

2.4 BATTERY BACKED-UP EMERGENCY LIGHT UNITS

A. Shall have two lamp heads, minimum 7 watts per lamp.

B. Provide internal, pre-wired lead-acid battery, unless noted otherwise.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

C. Provide with self-diagnostic system.
D. Emergency battery fixtures in areas subject to physical abuse shall be provided with necessary physical protection.
E. As noted on plans or schedules, each fixture shall be provided with a time delay circuit to keep emergency lighting on for a user-selected amount of time after normal power is restored.

1.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE AND HANDLING

A. Inspect and report concealed damage to carrier.
B. Handle carefully to avoid damage to equipment and finish.
C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect equipment from dirt, water construction debris and traffic.

3.2 EXAMINATION AND PREPARATION

A. Examine substrate and supporting grids for Luminaires and notify Engineer in writing of conditions detrimental to proper and timely completion of work.
B. Do not proceed with work until unsatisfactory conditions have been corrected.
C. Verify ceiling system compatibility with recessed fixture mounting before releasing the order for manufacture.
D. Examine each Luminaire to determine suitability for lamps specified.

3.3 INSTALLATION

A. GENERAL
1. Install in accordance with manufacturer's instructions.
2. Contractor shall determine that ceiling suspension system is adequately supported to receive and support the lighting fixtures. Where deemed inadequate, do not install fixtures until additional support has been provided.
3. Verify local codes and ordinances that may pertain to installation and aiming of exterior fixtures. Notify Engineer prior to Bid time if problems are encountered.
4. Make fixture holes for wire entrance with knock-out punches or hole saw, remove burrs. Do not cut holes with tin snips.
5. Special care shall be taken to assure light-tight joints between recessed fixtures and ceiling.
6. Recessed lighting fixtures which are installed in a rough textured ceiling surface where light may be emitted between fixture frame and ceiling surface shall have black self-adhesive polyfoam gasketing installed around inside edges of frame to prevent light leaks.
7. Care shall be taken in placement of outlets and surface-mounted fixtures to maintain alignment, spacings, layout, and general arrangement shown on drawings. Contractor may vary these dimensions slightly in order to clear obstructions. Any major changes in the arrangement must be approved by Engineer.
8. Mount wall and ceiling fixtures independent and secure so that they are not dependent on finish for support and cannot be rotated or displaced.
9. Maintain clearances as required in Article 410 of the NEC. Notify Engineer of any conflict, prior to rough-in.
10. Install suspended Luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend Luminaire at indicated height. Verify heights in the field.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

11. Install surface mounted Luminaires plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
12. Install wall mounted Luminaires at height as indicated on Drawings.
13. Install accessories furnished with each Luminaire.
14. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within Luminaire.
15. Bond products and metal accessories to branch circuit equipment grounding conductor.
16. The aiming and adjustment of luminaires must take place after the Project's amenities have been completely installed. These amenities shall include, but not necessarily limited to plantings, furniture, artwork, graphics and signage. Contractor shall include in his base bid, provisions for lifts, scaffolding, extension ladders, and all other materials required to complete adjustments to the satisfaction of the Architect, Engineer and Owner.
17. Install specified lamps in each Luminaire.

B. INDOOR

1. Coordinate with trades so lighting fixtures are properly aligned with items such as diffusers, grilles, speakers, sprinkler heads and structure. Coordinate any conflicts with architect and, if necessary, relocate fixtures as directed so there will be no conflict with other equipment or structure.
2. Install tandem fixtures in continuous rows so that finished appearance conforms to appearance of individual units.
3. Align and plumb rows of light fixtures and individual fixtures. Adjust to the satisfaction of the Engineer.
4. Provide additional trim as required for closing openings around recessed fluorescent lights which are mounted in patterns.
5. Support Luminaires larger than 2' x 4' size independent of ceiling framing.
6. Support pendant mounted Luminaires independent of ceiling framing.
7. Locate recessed ceiling Luminaires as indicated on lighting plan. Coordinate all discrepancies between the lighting plan and the reflected ceiling plan and room finish schedule with the architect prior to installation.
8. Exposed Grid Ceilings: Support surface mounted Luminaires on grid ceiling directly from building structure
9. Install recessed Luminaires to permit removal of all components that may require maintenance from below.
10. Install recessed Luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating or spacing required from insulation in ceiling space.
11. Install clips to secure recessed grid-supported Luminaires in place.
12. Connect recessed Luminaires to branch circuit outlets provided under Section 26 05 34 using flexible conduit only. Allow for positioning of Luminaires in ceiling tile increments.

3.4 FIELD QUALITY CONTROL

A. Operate each Luminaire after installation and connection. Inspect for proper connection and operation.

3.5 ADJUSTMENT AND CLEANING

A. Aim and adjust Luminaires as indicated on Drawings.
B. Adjust exit sign directional arrows as indicated.
C. Replace LED board in luminaires that have more than 1% failed LED's at Substantial Completion.
D. Clean electrical parts to remove conductive and deleterious materials.
E. Remove dirt and debris from enclosure.
F. Clean photometric control surfaces as recommended by manufacturer.
G. Clean finishes and touch up damage.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3.6 START UP/MANUFACTURER FIELD SERVICES

A. None required.

3.7 DEMONSTRATION AND TRAINING

A. Demonstrate removal and installation of lamps and ballasts in all luminaire types.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

DIVISION 28
ELECTRICAL WORK
SECTION 28 31 06
FIRE ALARM SYSTEM - INTELLIGENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire alarm control panel.
B. Manual fire alarm stations.
C. Automatic smoke and heat detectors.
D. Fire alarm signaling appliances.
E. Auxiliary fire alarm equipment.
F. Fire alarm wiring and cable.

1.2 SYSTEM DESCRIPTION

A. General Scope of Work:
    1. Extend the existing Fire Alarm System.
        a. This system is:
            1). An intelligent addressable system.
            2). continuous sounding
            3). U.L. listed.
            4). An electrically supervised system.
    2. The system shall be fully installed, tested, and left in first class operating condition.
    3. The existing system currently being replaced under a different project. Manufacturer and model unknown during design of this project. Confirm exact manufacturer and model with owner. Intent of this project is to expand the system being installed under a different project to support new devices added as part of this project.
    4. See floor plans for more information regarding suggested device locations.
B. The work will include, but not be limited to, the following:
    1. Existing Fire Alarm Control Panel (FACP).
    2. Alarm Initiating Devices.
        a. Manual Stations.
        b. Temperature Detectors (Fixed and Rate-of-Rise).
        c. Area Smoke Detectors.
    3. Alarm Indicating Devices:
        a. Horns
        b. Visual Strobes.
    4. Auxiliary Devices:
        a. Control Modules.
        b. Monitor Modules.
        c. Fault Isolation Modules.
        d. Door Release/Holders.
    5. Annunciator Panels, Remote Transponders, Terminal Cabinets, etc.
    6. All wiring (conduit, outlets, wire, etc.) required to provide power to and interconnect all components listed above.
    7. All wiring (conduit, outlets, wire, etc.) required to provide power to, and interconnect, devices supplied under other divisions, including:
        a. Sprinkler water flow switches.
        b. Sprinkler valve supervisory switches.
        c. Sprinkler pressure switches.
        d. Fan shutdown of air handling units through temperature control panels.
        e. Initiation of elevator recall.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

f. Interface with the Building Automation System (BAS).

8. All submittals required by the Architect/Engineer and local authorities, and the obtaining of all approvals there from.
9. All equipment shall be U.L. listed compatible as a product of a single fire alarm system manufacturer.
10. Any devices interfacing with the existing fire alarm system equipment shall be U.L. recognized compatible.

C. Update the existing building automation system graphics such that the building footprint is represented. Within this footprint shall be all the fire alarm system initiation and alarm initiation auxiliary devices. These graphics shall be like the existing building graphics. These graphics may utilize the CAD generated floor plans, if applicable.

D. Related work in other Sections:
1. Sprinkler Valve Supervisory Switches: Division 21.
2. Damper Switches and EP Switches: Division 23.
3. Temperature Control Systems: Division 23.

1.3 REFERENCES

A. Refer to section 26 05 00 for applicable codes and standards for the material and installation related to this section.

1.4 SUBMITTAL

A. For Approval to Engineer
1. Shop Drawings:
a. Complete shop drawings of all custom-fabricated or assembled products, including wiring diagrams.
b. Drawings identifying all terminals and illustrating all device wiring connections.
c. Bill of materials listing all components and devices.
d. Product Data: Provide electrical characteristics and typical connection requirements.
e. Plans showing device locations and types,
f. Typical riser diagrams.
1). Interconnections between all existing and new panels shall be shown on the riser diagrams.
g. Battery calculations for batteries supporting new and modified circuits.
1). For modified circuits, if existing calculations are not available and acceptable to the AHJ, measurements may be utilized. Measure the power draw under alarm prior to modifications and after modifications to determine alarm load. Fire alarm system “idling” current draw may be used from typical manufacturer’s data for that specific panel type.
h. Voltage drop calculations of new and modified circuits.
1). For modified circuits, if existing calculations are not available and if acceptable to the AHJ, measurements may be utilized. Measure the voltage at end of line prior to modifications and after modifications to demonstrate that voltage drop requirements have been achieved.

B. For Approval by Authority Having Jurisdiction (AHJ)
1. Fire alarm vendor and electrical contractor shall prepare and submit to the AHJ all required equipment product data, wiring diagrams and calculations such as:
a. All and any information and data (such as drawings showing device locations and types, typical riser diagrams, typical wiring diagrams, approvals, test data, etc.) required by local authorities.
b. Battery calculations for batteries supporting new and modified circuits.
1). For modified circuits, if existing calculations are not available and acceptable to the AHJ, measurements may be utilized. Measure the power draw under alarm prior to modifications and after modifications

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

to determine alarm load. Fire alarm system “idling” current draw may be used from typical manufacturer’s data for that specific panel type.

c. Voltage drop calculations of new and modified circuits.

1). For modified circuits, if existing calculations are not available and if acceptable to the AHJ, measurements may be utilized. Measure the voltage at end of line prior to modifications and after modifications to demonstrate that voltage drop requirements have been achieved.

C. For Record Purposes

1. Record actual locations of all field mounted initiating devices, signaling appliances, field wiring including cable type and raceway wire fill and hidden devices such supervisory relays and end-of-line resistors. These drawings shall provide sufficient detail as outlined in NFPA 72. Drawings shall be reproducible.
2. Test Reports: Indicate satisfactory completion of required tests and inspections.
3. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

D. Operations and Maintenance Manuals

1. Provide / Update existing operation maintenance manuals with the following:
   a. Nomenclature of all replaceable parts, part numbers, current costs, and name and address of nearest vendor of parts. Where manuals include manufacturer's catalog pages, clearly indicate items included and delete it as not included in this installation.
   b. Copy of guarantees and warranties.
   c. Copy of approved shop drawings with data concerning changes made during construction.
2. Upon approval of rough draft, submit one (1) final PDF copy for each unit of equipment.

1.5 EQUIPMENT DIMENSIONS

A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting their bid if the dimensional increases will be greater than 6 inches in any dimension.

1.6 EXTRA MATERIALS

A. Spare Materials

1. 1 of each device provided for this project.

B. Maintenance Materials

1. None required.

1.7 WARRANTY

A. Refer to warranty requirements in section 26 05 00.

B. All equipment and wiring shall be guaranteed against defects in materials and workmanship for a one-year period from the start up and beneficial use of the system. Warranty service for the equipment shall be provided by the system supplier's factory trained representative during normal working hours, Monday through Friday, excluding holidays. Emergency service provided at times other than as stipulated above shall be available from the same source at additional cost to the owner.

1.8 SYSTEM CONFIGURATION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. The system shall be configured such that system Signaling Line Circuits (SLC) shall not leave large areas of the building unprotected upon cable failure. The following rules must be maintained when wiring this system:
   1. The SLC shall be wired in a Class B configuration.
   2. Each SLC shall have no more than 65% of the maximum addressable device quantity for either analog input or digital input/output type devices.
   3. No SLC shall serve more than one (1) floor.
   4. Provide two fault isolator modules per SLC. Divide the number of initiating devices equally on the circuit.
B. The Notification Appliance Circuits (NAC) shall be configured per the following rules:
   1. The NAC shall be wired in a Class B configuration.
   2. Each NAC shall use no more than 70% of the circuits' power capacity.
   3. No NAC shall serve more than one (1) floor.
C. Communication wiring between panels shall be Class X.

1.9 SYSTEM OPERATION

A. Existing.

1.10 SIGNAL LINE CIRCUIT LIST

A. Listed below are added minimum building fire alarm system signal line circuits required for this project:
   1. Extend existing circuits serving area to new devices.

1.11 EVACUATION ZONES

A. This building is not a defend in place facility.
B. Entire building evacuates upon any general alarm.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide products of the same manufacturer as the new fire alarm system.

2.2 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL

A. Existing.
B. Expand panel and program to accommodate this project.

2.3 REMOTE ANNUNCIATOR

A. Existing.
B. See floor plans regarding panel relocation.

2.4 INITIATING DEVICES

A. Manual Station:
   1. Semi-Flush mounted
   2. Intelligent addressable
   3. Single action manual station
   4. Unit address shall be field adjustable.
   5. Provide manufacturer's standard back box.
   6. Provide red wire guards as shown on the drawings.
B. Combination Heat Sensor:

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

1. Intelligent addressable, analog heat sensor.
2. Unit address shall be field adjustable.
3. Provide with standard sensor base.
4. Temperature rating shall be 135° F. unless noted otherwise on plans.
5. Rate of Rise temperature sensing shall be 15° F. per minute, unless noted otherwise on plans.

C. Fixed Heat Sensor:
1. Electronic heat sensor.
2. Temperature rating shall be 200° F. unless noted otherwise on plans.
3. Unit address shall be field adjustable.

D. Smoke Sensor:
1. Intelligent addressable.
2. Photoelectric type.
3. Adjustable sensitivity.
4. Plug in base with integral LED.
5. Unit address shall be field adjustable.
6. Provide with standard sensor base.

2.5 SIGNALING APPLIANCES

A. General:
1. Strobes shall have field selectable Candela output. Candela output shall be indicated on the drawings.
2. Strobes shall have a flash rate of 1 flash per second (1 Hz) complying with the ADA.
3. All wall mounted devices shall be red with white lettering.
4. All ceiling mounted devices shall be white with red lettering.
5. All strobes shall be synchronized.

B. Combination Alarm Horn/Strobe:
1. Semi-flush mounted in wall or ceiling in finished areas.
2. Sound Rating: 87 dBA at 10 feet.
3. Tone shall be temporal 3 code.
4. Provide with integral strobe lamp and flasher.
5. Provide with lettered "FIRE" on the faceplate.
6. Install the horn strobe in a common backbox.
7. Horn may share cabling with visual devices.

C. Horn Only:
1. Semi-flush mounted in wall or ceiling in finished areas as shown on plans.
2. Sound Rating: 87 dBA at 10 feet.
3. Tone shall be temporal 3 code.
4. Provide with lettered "FIRE" on the faceplate.
5. Horn may share cabling with visual devices.

D. Strobe Only:
1. Semi-flush mounted in wall or ceiling in finished areas as shown on plans.
2. Strobe lamp with lettered "FIRE" on the faceplate.

E. Re-Entrant Speaker:
1. Surface mounted loudspeaker.
2. Sound rating: 102 dBA at 10 feet on the 15W tap.
3. Tone shall be temporal 3 code.
4. Provide in red color.
5. Speaker shall be equivalent to Wheelock STH-15 series.

2.6 AUXILIARY DEVICES

A. Door Holders:
1. Holders shall be semi-flush wall mounted.
2. Holders shall have a holding force of twenty-five (25) pounds.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

3. Finish shall be brushed aluminum.
4. Where the wall is not immediately adjacent to the door swing, the Electrical Contractor shall furnish and install a magnetic door holder/closure mounted on the door(s) frame.
5. Holders shall include integral diodes to reduce buzzing.
6. Coil voltage: 24 VDC.
7. Door holders are provided by door hardware vendor. Magnets shall be installed and wired by the electrical contractor.

B. Monitor Module:
1. Intelligent Addressable.
2. Unit shall include integral LED.
3. Unit shall have field adjustable address.

C. Control Module:
1. Intelligent Addressable.
2. Unit shall include integral LED.
3. Unit shall have field adjustable address.

D. Refer to monitor and control module description on the drawings. The intent of these schedules is to list the interface points with non-fire alarm equipment. Provide additional modules as required for internal fire alarm system requirements.

E. Fault Isolator Module:
1. Intelligent Addressable
2. Unit shall automatically isolate circuits when output short is detected.
3. Unit shall allow manual isolation of circuit through control panel selection.
4. Unit shall include integral LED.

2.7 FIRE ALARM WIRE AND CABLE

A. Fire Alarm Power Branch Circuits:
1. Building wire as specified in Section 26 05 21.

B. Signaling Line and Indicating Appliance Circuits:
1. Shall comply with NFPA 70 and NFPA 72.
2. All cables shall be a manufacturer and type tested to be compatible with the Fire Alarm manufacturer selected.

PART 3 EXECUTION

3.1 SHIPPING, DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.
B. Accept Products on site in factory packing. Inspect for damage.
C. Protect equipment from extreme temperature and humidity by storing it in a conditioned space.
D. Protect equipment from dust and debris by wrapping unit in dust tight cover and storing away from construction activity.
E. Do not store or install unless temperature is maintained between 32 degrees F (0-degrees C) and 104 degrees F (40 degrees C), at a relative humidity less than 95 percent (non-condensing).
F. Maintain conditions during and after installation of Products.

3.2 EXAMINATION AND PREPARATION

A. Verify equipment dimension match approved submittals.
B. Examine areas to receive equipment to assure adequate space for the equipment installation.

3.3 INSTALLATION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

A. Install products in accordance with manufacturer's instructions. Installation shall be supervised and tested by the manufacturer of the system equipment. The work shall be performed by skilled technicians under the direction of experienced engineers, all of whom shall be properly trained and qualified for this work.

B. Raceway requirements
   1. Install all fire alarm system wiring in conduit.
   2. Where multiple horizontal runs to a single panel are made for a class A circuit (IE: in and out cabling), they shall be separated by a minimum distance of 4 feet until they are within a maximum distance of 10' from the fire alarm panel.
   3. Where vertical runs to a single panel are made for a class A circuit (IE: in and out cabling), they shall be separated by minimum of 1 foot.

C. Minimum size conductors for individual devices are as follows:
   1. Speakers 2#18 twisted shielded.
   2. Strobes - 2 #14.
   3. Signaling line or initiating device circuit wiring - 2 #18 twisted.
   4. Magnetic door holders/closers device - 2 #12 from fire alarm control panel to holders/closers.
   5. Remote annunciator/graphic devices - 2 #18 twisted for data transmission and 2 #12 for power.
   6. Fire alarm cabling shall be red.

D. Mount outlet box for electric door holder to withstand 80 pounds (36.4 kg) pulling force.

E. Conductors within equipment enclosures shall be carefully cabled and laced. Individual conductors shall be identified in accord with Section 26 05 29.

F. Outlet pull and junction boxes shall be painted red on the exterior and shall be installed in accordance with Section 26 05 34.

G. Label all fire alarm devices, including bases, with circuit number and address.

H. Connections shall be made directly to and from device terminal screws of fire alarm devices. Screw terminals shall have rising plates to terminate more than one wire, or each wire shall be terminated to individual screws, or each wire shall terminate in a ring lug.

I. Cabling serving any supervised and SLC circuits shall not be spliced in any boxes. Cabling shall be continuous between field devices, "splice-free".

J. Provide enough slack cable at each ceiling mounted device such that the device may be moved (2) tiles in any direction.

K. Coordination with HVAC:
   1. Locate all duct detectors associated with main air handling units (supply and return ducts) in the locations shown on the drawings.
      a. Refer to HVAC plans for additional detector location information.
   2. All duct detectors in association with fire/smoke dampers shall be located upstream of these dampers.
   3. Final smoke detector locations shall be coordinated with HVAC such that a minimum of 3 feet of separation is maintained between the smoke detectors and final diffuser/grill locations.
   4. EC shall furnish, wire and complete final installation of the duct smoke detectors.
      a. EC shall coordinate installation of the detector housing and sampling tubes with the mechanical contractor.
      b. The intent is the mechanical contractor shall modify the duct work as required for the duct smoke detector installation.
   5. Coordinate programming of the Fire Alarm Control Panel with the Temperature Control Contractor for operation and control of control modules interfaced with HVAC equipment.

L. Suggested procedure for Smoke detection installation during construction:
   1. Applies to smoke heads installed for preliminary testing of fire alarm system and/or system interfaces to fire safety functions during construction or partial occupancy:
      a. Provide temporary construction smoke detection heads.
         1). Mark heads to indicate temporary use with permanent marker.
            a). Suggest "T" for temporary or "C" for Construction.

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

2). Heads shall initiate a supervisory signal on the fire alarm system.

b. After final cleaning is complete, remove temporary heads and provide new, clean heads.
   1). Test new smoke heads.
   2). Provide itemized list of devices involved and that are specific to this project.
   3). Device list to be shared with AHJ at time of final acceptance.

c. Intent is that final acceptance is conducted by the AHJ on a fully operational system using final installed devices.

d. EC, Fire Alarm Vendor and Owner to work out acceptable method with AHJ.

3.4 FIELD QUALITY CONTROL

A. Fully functional test system to verify proper system operation.

B. Test in accordance with NFPA 72 and local fire department requirements.

3.5 ADJUSTMENT AND CLEANING

A. Clean interior of all equipment.

B. Adjust taps on all speakers for proper sound level.

3.6 START UP/MANUFACTURER FIELD SERVICES

A. Upon completion of the system's modification and installation, an approved representative of the system manufacturer shall be employed to conduct a thorough test of the system and submit a written report of the findings to the Architect. The test shall be per NFPA 72 and shall include, at the least, verifying the following:
   1. The functional operation of each resettable initiating device (manual stations, detectors, etc.) and circuit.
   2. The functional operation of every alarm device and circuit.
   3. The functional operation of each monitored device circuit.
   4. The functional operation of each control circuit.
   5. The supervision functions of each Initiating, Indicating, Monitoring, Control and Supply Circuit.
   6. Control station automatic signaling.
   7. All tests shall be completed in the presence of the Owner or Owner's representative.

3.7 DEMONSTRATION AND TRAINING

A. Provide systems demonstration by a fully qualified, trained representative of the equipment supplier.

B. Provide a total of 8 hours of demonstration and training for the system. Demonstrate normal and abnormal modes of operation and required responses to each.

END OF SECTION

Attachment: Project Documents_Invitation for Bid_Justice_Dispatch_Electrical_FINAL_2-27-2025 (Review/Approve Dispatch Center Electrical

Public Safety Committee

AGENDA INFORMATION SHEET

AGENDA DATE: **April 2, 2025**
DEPARTMENT: **Sheriff**
DIRECTOR: **Christy Knowles**
PREPARER: **Timothy Nelson**

Agenda Summary Management/Financial Reports

ATTACHMENTS:

- Sheriff's Office Report - April 2025(PDF)

PUBLIC SAFETY COMMITTEE

Ozaukee County Committee Report

General Fund Sheriffs Department

For the Two Months Ending Friday, February 28, 2025

Profit and Loss Statement ACTUAL TO AMENDED BUDGET

	Current Month Actual	2025 YTD Actual	2025 Amended Budget	Budget Balance	% Budget YTD
Revenues					
Intergovernmental Revenues	-	$15	$34,075	$34,060	0.04%
Public Charges for Services	$32,548	$34,732	$401,650	$366,918	8.65%
Intergovernmental Charges	$83,933	$165,063	$191,000	$25,937	86.42%
Interdepartmental Charges	$75	$75	$45,092	$45,017	0.17%
Other Revenue	$28,424	$90,929	$175,775	$84,846	51.73%
Total Revenues	**$144,980**	**$290,814**	**$847,592**	**$556,778**	**34.31%**
Expenditures					
Salaries	$739,150	$1,584,830	$10,139,506	$8,554,676	15.63%
Fringe Benefits	$295,793	$594,262	$3,862,616	$3,268,354	15.38%
Travel/Training	$7,819	$11,423	$54,110	$42,687	21.11%
Supplies	$46,861	$80,489	$891,602	$811,113	9.03%
Purchased Services	$122,340	$250,149	$1,482,595	$1,232,446	16.87%
Interdepartment Charges	$30,048	$69,223	$511,016	$441,793	13.55%
Other Expenses	$15,287	$15,965	$126,338	$110,373	12.64%
Total Operating Expenditures	**$1,257,298**	**$2,606,341**	**$17,067,783**	**$14,461,442**	**15.27%**
Capital Outlay					
Equipment & Furniture	$15,218	$20,207	$320,394	$300,187	6.31%
Total Capital Outlay	**$15,218**	**$20,207**	**$320,394**	**$300,187**	**6.31%**
Total Expenditures	**$1,272,516**	**$2,626,548**	**$17,388,177**	**$14,761,629**	**15.11%**
Other Finance (Sources)	-	-	($396,394)	($396,394)	0.00%
Net Other Financing Sources/Uses	**-**	**-**	**($396,394)**	**($396,394)**	**0.00%**
Net Increase (Decrease)	**($1,127,536)**	**($2,335,734)**	**($16,144,191)**	**($13,808,457)**	**14.47%**

Equity:

Attachment: Sheriff's Office Report - April 2025 (Management/Financial Reports)

Ozaukee County Committee Report

General Fund Emergency Management

For the Two Months Ending Friday, February 28, 2025

Profit and Loss Statement ACTUAL TO AMENDED BUDGET

	Current Month Actual	2025 YTD Actual	2025 Amended Budget	Budget Balance	% Budget YTD
Revenues					
Intergovernmental Revenues	-	-	$79,601	$79,601	0.00%
Other Revenue	-	-	$6,000	$6,000	0.00%
Total Revenues	**-**	**-**	**$85,601**	**$85,601**	**0.00%**
Expenditures					
Salaries	$14,937	$26,880	$214,563	$187,683	12.53%
Fringe Benefits	$4,423	$8,548	$57,330	$48,782	14.91%
Travel/Training	$248	$248	$4,050	$3,802	6.12%
Supplies	$1,465	$1,465	$37,525	$36,060	3.90%
Purchased Services	$112	$483	$18,225	$17,742	2.65%
Interdepartment Charges	$1,635	$4,985	$33,416	$28,431	14.92%
Other Expenses	-	-	$3,638	$3,638	0.00%
Total Operating Expenditures	**$22,820**	**$42,609**	**$368,747**	**$326,138**	**11.56%**
Capital Outlay					
Total Expenditures	**$22,820**	**$42,609**	**$368,747**	**$326,138**	**11.56%**
Net Increase (Decrease)	**($22,820)**	**($42,609)**	**($283,146)**	**($240,537)**	**15.05%**

Equity:

Attachment: Sheriff's Office Report - April 2025 (Management/Financial Reports)